

Impact factors on the adoption of Blockchain Technology in the Hotel In- dustry

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AFFIDAVIT

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ABSTRACT

Blockchain technology has become a buzzword in recent years and is said to provide the grounds for disruptive innovations across industries. The innovative feature of the technology is its capability to enable individual, distrustful participants of a network to perform peer-to-peer transactions in a reliable and indisputable manner, without the requirement for an intermediary. This seems particularly interesting for the hospitality industry, which heavily relies on intermediaries for business transactions. Food supply management, loyalty programs, reputation and payment systems are further examples of potential use of the blockchain technology.

Using a blend of the technology, organization and environment framework (Tornatzky, Fleischer, & Chakrabarti, 1990) and the inter-organizational system framework (Iacovou, Benbasat, & Dexter, 1995) a framework was designed based on the impact factors technology context, organizational context, environment & external pressure and perceived benefits. An exploratory approach using expert interviews with members of the Hospitality Technology Next Generation (HTNG) was chosen to address the early stage of academic discourse in this area.

The data input will then be analysed along the framework in order answer the research question: How are the four impact factors relevant for the adoption of blockchain technology in the hotel industry? Findings include a consensus across experts, yet technical, organizational and environmental challenges are likely to prevent the implementation despite the positive outlook that is evident from the literature.

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1 INTRODUCTION

1.1 Research background

Blockchain technology has attracted a great deal of attention in information technology and across all industries, and it is often referred to as potentially one of the most promising emerging information technologies (Hackett, 2017; Mattila, 2016; Swan, 2015; Tapscott & Tapscott, 2016).

Among others, its expected benefits are improvements in security, transparency, speed and efficiency (Beck & Müller-Bloch, 2017). Using sophisticated consensus mechanisms, blockchain technology is regarded as enabling the reshaping of industry dynamics via a decentralized trust, thus challenging any business model that relies on third parties for verification of transactions or trust (Beck & Müller-Bloch, 2017; Mougayar, 2016). Indeed, blockchain technology is considered to have the power to redistribute who creates and who captures value in a market place (Mattila, 2016). However, on a scientific level, there is a lack of systematic review of current blockchain-based applications with regard to implications for processes in particular domains, limitations, and suitability across different thematic areas (Casino, Dasaklis, & Patsakis, 2019).

Information technologies in general are supposed to have supporting capabilities, however the full exploitation of these abilities might be limited by organizational management's attitudes, ambitions, and financial situation (Law, Buhalis, & Cobanoglu, 2014). On an organizational level, (technical) innovations are perceived to be managerial challenges, as they often involve a high degree of uncertainty and risk. Organizations dealing with innovation need to gather knowledge to evaluate, manage, absorb, and adapt to innovations such as blockchain technology (G. C. O'Connor, 2006). Historically, the hospitality sector lagged behind other industries in terms of adopting information technology (Buick, 2003). This has changed in recent years, as information technology is increasingly considered to enhance competitiveness through a better understanding of the market situation and customer needs; it also acts as a support for business decisions by collecting data (P. O'Connor & Murphy, 2004).

State-of-the art hotel management considers data, generated and collected by information technology, as one of the most valuable assets; an increasing amount of both internal and external data is collected to support business decisions (Buhalis & Leung, 2018). Nevertheless, Navío-Marco et al. (2018) observe a delay of the scientific review of impact and implications of information technology changes in the hospitality sector in comparison to other industries. Academic research in the field between the hospitality industry and information technology should offer support by introducing new information technology advancements to business operations (Law et al., 2014).

1.2 Research aim and objectives

The goal of this study is to investigate the impact factors affecting the possible adoption of a novel technology in the hotel industry: blockchain technology. The researcher uses a framework consisting of four impact factors to analyze the literature and empirical data gathered from experts via qualitative interviews.

The framework was elaborated based on a blend of the *technology, organization, and environment framework* (Tornatzky et al., 1990) and the *inter-organizational system framework* (Iacovou et al., 1995). It consists of the following impact factors: *technology context, organizational context, environment and external pressure, and perceived benefits*.

Based on the background of the research and the research aim, the following research question is posed: How are the four impact factors *technology context, organizational context, environment and external pressure, and perceived benefits* relevant to the adoption of blockchain technology in the hotel industry?

1.3 Thesis structure

This research starts with a broad review of existing literature on blockchain technology. The review is grouped along the thematic areas of technological foundations, benefits of the technology, organizational considerations and the environment.

Then, an overview of technology adoption frameworks is provided. Based on a blend of existing technology adoption frameworks, a research model is derived and explained. Further, the methodology, the research instruments and the data analysis are described. The impact factors that are defined in the research model are evaluated using qualitative data that was obtained in exploratory expert interviews. The results of the research and discussion are presented. Finally, a conclusion is presented that includes practical implications and potential future research.

2 BLOCKCHAIN TECHNOLOGY

2.1 Technology context

There is general consensus that in order to assess adoption scenarios concerning blockchain technology in any industry, foundational concepts and mechanics applied in blockchain technology must be understood. Blockchain technology can be described as a means to manage data in a novel way (Peck, 2017). Brandon (2016) describes the blockchain as an “electronic shared, replicated, distributed (organizationally and geographically), and decentralized transaction file” (p. 34). Even though the term blockchain was not used in the Bitcoin white paper published under the pseudonym Nakamoto (2008), that paper is regarded as the origin of the technology as well as of the term *blockchain*. The key mechanics of the technology are described as data being organized in the form of *blocks* that are cryptographically *chained* together, resulting in the creation of the term *blockchain*. The innovative feature of the technology is its capability to enable individual, distrusting participants of a network to perform peer-to-peer transactions in a reliable and indisputable manner, without the requirement for an intermediary (Mougayar, 2016). Blockchain technology is based on a combination of well-established technologies such as distributed consensus mechanisms, cryptographic hash and digital signature and it can hence be described as a meta-technology (Mougayar, 2016; Zheng, Xie, Dai, & Wang, 2017a).

Mattila (2016) and Walch (2017) indicate the lack of a descriptive established nomenclature and terminology for blockchain technology as well as its foundational functionalities. The lack of conceptual clarity has led to inflationary use of the term in different contexts and consequently to increased difficulty in comprehending it as such. For example, the terms *distributed ledger* (technology) or *shared distributed ledger* (technology) are frequently used interchangeably with the term *blockchain* (technology), independent from the specific use case and individual database and network architecture (Beck & Müller-Bloch, 2017; Hackett, 2017; Wüst & Gervais, 2017). In this study, the term blockchain or blockchain technology, if not specified otherwise, is employed in a broad way to refer to technology using the distributed consensus architecture.

2.1.1 From centralized structures to a distributed system

Relational databases have been the predominant form of storing and managing data since their invention in the 1980s. This type of database architecture stores and manipulates information in tables organized by lines and columns, and a query language such as SQL is used to obtain that information (Meunier, 2016b; Peck, 2017). A range of technological achievements such as the Internet, increased computing power, modern cryptography, and peer-to-peer protocols have contributed to the development of new approaches, such as blockchain technology (Brandon, 2016).

In contrast to traditional relational databases, in blockchain technology there is no central node (e.g., an intermediary such as an institutional bank) overseeing transactions. This means that data is collected, updated, and stored collectively (Lin & Liao, 2017; Tapscott & Tapscott, 2016; Zheng, Xie, Dai, & Wang, 2017a). Therefore, blockchain technology breaks the paradigm of a centralized consensus via a central database and transfers this authority and trust to a decentralized network (Mougayar, 2016).

In relational databases, data redundancy is achieved via backups and replication on different physical servers and backups. In contrast, data redundancy is inherent in blockchain technology, as the entire set of data is available and replicated by each node in the network (Wüst & Gervais, 2017). The distributed nature of blockchain technology requires full transparency of the data (Lin & Liao, 2017; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a). All data records as well as the process of updating new information of the blockchain are transparent to all participants in the network. The transparency of the data allows individuals to audit and trace back historic records by accessing any node in the blockchain (Lin & Liao, 2017; Zheng, Xie, Dai, & Wang, 2017a). Furthermore, the transparency acts as an enabler of public verifiability of the current state of the ledger as well as possible (malicious) modifications (Gervais et al., 2016). Each transaction within the blockchain is immutable, since data entries are stored in different nodes. A modification of a historic transaction would require taking control of more than 50% of all nodes, which would necessitate significant resources to temper historical data (Swan, 2015; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a).

While offering full transparency and traceability of transactions, blockchain technology does not require individual agents to disclose identity or legal personality (Lin & Liao, 2017; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a). Privacy is granted, as the only information necessary to transmit transactions is the individual's blockchain address. Early blockchain applications such as Bitcoin are mainly focused on the management of a distributed state. In the case of Bitcoin, this is the distribution of a cryptocurrency among all nodes (Frantz & Nowostawski, 2016), but more recent developments try to use the underlying functionalities to execute procedural instructions, for example in the format of programmable contracts. From a technical perspective, blockchain technology is regarded as a way to decrease the development and operation costs of traditional servers and to support the mitigation of performance bottlenecks of centralized server systems (Zheng, Xie, Dai, & Wang, 2017a).

2.1.2 Mechanics of blockchain technology

The cryptographic technology behind blockchain stems from asymmetric encryption, which requires each network node to use a *public key*, a second, related *private key*, and an address (or account number) for identification, encryption, and decryption. Both keys and the account number are mathematically linked to each other. The address is used to identify the involved parties,

while either of the keys can decrypt or encrypt transactions (Brandon, 2016). To send transactions to another party, the address, a transaction text, and one’s own private key are required to process and legitimate the transactions by creating a unique one-time digital signature. A mathematical function allows other users to verify the signature and to ensure that the transaction stems from the account owner.

As illustrated in Figure 1, information on all transactions and hence ledger balances originate from the *genesis block*. Due to this transparency, all nodes in the network can verify and review transactions and ledger balances for correctness (Swan, 2015). The *genesis block* can be described as the initial set of transactions, grouped together as a block, which serve as the foundation of a blockchain (Gramoli, 2016). Using consensus mechanisms, additional sets of transactions (such as the transfer of virtual assets among nodes) are grouped together into a block and reference the previous (parent) block via a hash value. Figure 1 illustrates a series of individual blocks that comprises the all transaction records since the initial genesis block, just like a conventional ledger (Zheng, Xie, Dai, & Wang, 2017a). Any changes to transactions within a historic block would trigger a modified hash value of the entire block and would hence be identified by other participants in the network.

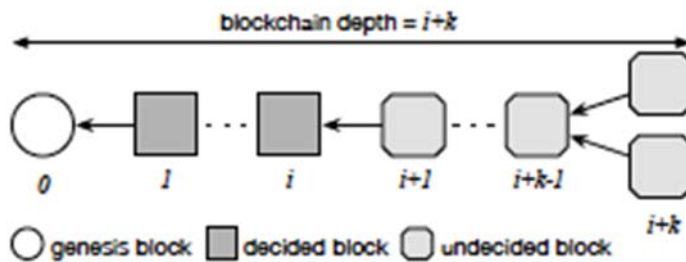


FIGURE 1 – BLOCKCHAIN ARCHITECTURE

Source: (Gramoli, 2016)

2.1.3 Types of blockchains

Due to the lack of conceptual clarity, the term *blockchain* can refer to a multitude of use cases. One basic approach is to distinguish between different typologies of blockchain technology, based on the network architecture. Under this rule, Mattila (2016) differentiates between *generic* and *specific* blockchain types. Generic blockchain architectures enable users to write their own programs and applications based on the functionality of the underlying blockchain, which then executes the programs in a distributed way. In contrast, blockchains for a specific, limited scope of tasks (such as transferring value or tracking assets) are generally limited in terms of the purpose design and do not allow users to deviate from the intended use case.

A widely used distinction of blockchain typologies is based on the degree of accessibility: *private* (sometimes referred to as *permissioned*), *public* (or *permissionless*), and *consortium* blockchains (Buterin, 2015; Mattila, 2016; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a).

2.1.3.1 Public / Permissionless

Public blockchains such as Bitcoin can be accessed by any peer without permission. The openness requires full transparency, meaning that any node can read and enter any data. Game-theoretical incentives are used to promote trust between unknown nodes (Nakamoto, 2008). In terms of degree of decentralization, public blockchains are considered fully decentralized (Zheng, Xie, Dai, & Wang, 2017a). Since even developers of applications have no authority to adapt or modify platforms once in use, independence and censorship resistance are ensured; however, at the same time, this raises the issue of lacking governance (Peck, 2017). Based on this characteristic, advocates of public blockchains regard the technology as an enabler for openness, transparency, and neutrality (Buterin, 2015).

2.1.3.2 Private / permissioned and consortium

Permissioned blockchains have emerged as an alternative to public blockchains to use the technology not within an entirely open environment, but within a set of defined, known nodes. In a private (permissioned) blockchain architecture, writing permissions are kept centralized to a defined set of nodes. Read permissions may be made available (public permissioned blockchain) or be entirely restricted (private permissioned blockchain) (Buterin, 2015; Lin & Liao, 2017; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a). Vukolić (2017) describes private blockchains as attractive to business applications as, in a considerable number of use cases, a certain degree of privacy, auditability, and governance is required. All participants within a private blockchain can be identified, but they do not necessarily have to trust each other. In contrast to public blockchains, any defined authority might amend the rule set of the blockchain, or transactions may be amended or reverted (Peck, 2017). Furthermore, transaction throughput and latency can be significantly improved by the application of alternative consensus mechanisms, which results in higher efficiency compared to public blockchains (Zheng, Xie, Dai, & Wang, 2017a). A subgroup of private blockchains are consortium blockchains, in which consensus is agreed by a defined set of nodes, such as a consortium. This type of blockchain requires different approaches to consensus and can be described as partially decentralized (Buterin, 2015).

There seems to be disagreement about which blockchain type can be used in the most beneficial way. Buterin (2015) compares the development of blockchain technology with the emergence of the internet as a “network of networks”: he envisions hybrid combinations with exchangeable layers between public and private blockchains. In contrast, Wüst and Gervais (2017) postulate that permissioned blockchains have strong similarities with centralized databases. Furthermore, Izsmaylov (as cited in Withby, 2017) questions the meaningfulness of private blockchains by comparing them with company intranets: Izsmaylov (as cited in Withby, 2017) fundamentally

question whether private blockchains are better suited to support business needs than conventional centralized databases are. In addition, due to the internal scope of private blockchains, Catalini and Gans (2016) question their effect on the overall market. Empirical research has proven that consensus mechanisms designed for public blockchains could be ill suited to a private blockchain environment (Gramoli, 2016; Natoli & Gramoli, 2016). Based on the broad differences in design properties, such as degree of decentralization, efficiency, immutability, or transparency, McConaghy (2016) proposes a classification of blockchain typologies. This classification could be used as a basis for the classification of existing blockchain solutions. Depending on the business process requirement, the framework could also be of substantial support in understanding the advantages and disadvantages of the different blockchain typologies.

2.1.4 Approaches to consensus

One of the most important attributes of blockchain technology is the way transactions are authorized, grouped, ordered, processed, and finally trusted in a decentralized way. Blockchains are not controlled by any one centralized person, organization, or country. Instead, functionalities are used to delegate the formerly centralized task to a decentralized network. This requires mechanisms to maintain a common agreement on the state of the blockchain as well as the order in which transactions are processed. In case several parties modify a database at the same time, the modifications somehow need to be reconciled to prevent different versions or forks of the same database to emerge (Mattila, 2016). In traditional databases, a central authority fulfills the task of synchronizing. In the blockchain environment, in contrast, market rules have been designed “to incentivize the propagation of new, legitimate transactions, to reconcile conflicting information, and to ultimately reach consensus at regular intervals about the true state of the ledger in an environment where not all participating nodes can be trusted” (Catalini & Gans, 2016, p. 1). According to Mattila (2016), blockchain technology enables a new type of digital trust: trust in a single member or authority is substituted by the trust that participants will on average behave honestly. Whereas a central authority might imply cost (such as transaction fees) and requires a certain degree of trust, blockchain technology has the ability to complete transactions and verifications at zero cost (Tapscott & Tapscott, 2016).

Nakamoto (2008) describes the process of finding consensus between all nodes as a framework to find one, generally accepted history and the validity of transactions. How consensus is elaborated between the involved nodes is defined by the underlying blockchain protocol, which is a set of instructions and rules that apply to all participating nodes in the network and depend on the purpose of the blockchain (Pass, Seeman, & Shelat, 2017). Different blockchain protocols use different consensus algorithms. In other words, instead of a centralized node, all nodes on the network compare their versions of the ledger (the hash values of the latest block) in an ongoing process and based of a defined set of rules. Depending on the consensus mechanism, nodes agree on the order and validity of new transactions and blocks being added in a subsequent manner, building a chain.

In the long run, the consensus mechanism prevents the chain from taking the shape of a tree by building branches (Mattila, 2016). In the short run, however, blocks are added speculatively (as displayed in Figure 1, allowing the addition of multiple blocks at the same time, which triggers a transient branching process called forking. In case forks occur, in most blockchain protocols the longest branch is adopted and regarded as the valid one. This mechanism implies that a block being added to the chain does not guarantee that it has been decided (Catalini & Gans, 2016). As each type of consensus mechanism has advantages and disadvantages, it is fundamental to understand its mechanics to evaluate its utility in the particular use case. Figure 2 evaluates and compares prevailing consensus mechanisms using properties such as node identity management (open to the public or permissioned), energy efficiency, and tolerated power of adversary. The following section introduces three prevailing blockchain consensus mechanisms.

Property	PoW	PoS	PBFT	DPOS	Ripple	Tendermint
Node identity management	open	open	permissioned	open	open	permissioned
Energy saving	no	partial	yes	partial	yes	yes
Tolerated power of adversary	< 25% computing power	< 51% stake	< 33.3% faulty replicas	< 51% validators	< 20% faulty nodes in UNL	< 33.3% byzantine voting power
Example	Bitcoin	Peercoin	Hyperledger Fabric	Bitshares	Ripple	Tendermint

FIGURE 2 - TYPICAL CONSENSUS ALGORITHM COMPARISON

Source: (Zheng, Xie, Dai, & Wang, 2017a)

2.1.4.1 Proof of work (PoW)

The model of proof of work (PoW), initially presented by Nakamoto (2008), is the most widely deployed consensus mechanism in existing open blockchain applications (Gervais et al., 2016). PoW can be conceptualized as a piece of data that requires significant computational efforts (and therefore hardware investments and electrical power) to create and to meet certain criteria, but that is, on the other hand, easy to verify (Lin & Liao, 2017).

In PoW consensus mechanisms, all nodes in the network participate in broadcasting and validating transactions, and *miners* use advanced computational power to form new blocks of transactions at regular intervals. The PoW mechanism used in Bitcoin, for example, requires miners to compute a nonce value that, once hashed together with additional parameters (such as the previous block hash code), needs to meet a certain threshold criterion. When a nonce value is found, it is forwarded to the network so that peers can authenticate the PoW by computing the hash of the proposed block. The one miner who manages to compute a block with the required

specification and receives confirmation of correctness is given a reward in the form of a set amount of Bitcoins (Nakamoto, 2008). The process is driven by an incentive structure that rewards honesty in the process of creating a block (Mattila, 2016). The process of mining does not serve to verify transactions, but to protect the system from malicious attacks: if a malicious actor intended to tamper historic data in a blockchain, s/he would need to spend an excessive amount of resources to outpace the network by re-calculating not only the tampered block, but also all following cryptographically connected blocks. The audit trail becomes more secure against modification with the sequential addition of blocks, as more computational power (hence energy) has been invested to support it (Catalini & Gans, 2016).

According to Gervais et al. (2016), PoW security assumes that no single node is able accumulate the majority stake of processing power, as a node with more power could control the blockchain by sustaining the longest chain. However, Catalini and Gans (2016) indicate the inherently wasteful nature of the PoW concept as a mean to maintain security, and this characteristic is increasingly under criticism. The excessive energy consumption of mining farms has been discussed in mainstream media and is used to question the sustainability of the concept (Hern, 2017). Research is actively being conducted to mitigate the extensive resource consumption by performing useful computational problems (Catalini & Gans, 2016; Zheng, Xie, Dai, & Wang, 2017a). The probability of computing the electronic puzzle required in PoW equals the fraction of computational power available to any computing node in the network. This fact has led to the formation of mining pools. These are strategic unions of cooperating miners who agree to share the block reward equivalent to the contributed mining efforts (Swan, 2015). Eyal and Sirer (2014) describe *selfish mining* as a strategy by mining pools to maximize the probability of reward by not publishing blocks and forking the chain. While the rest of the nodes continue to mine on the chain, the *selfish miners* try to compute more sequential blocks in their (disclosed) branch. Once the disclosed chain supersedes the public one in length, it is exposed to all nodes and regarded as valid. Studies have shown that selfish miners equipped with 33% of the mining power can effectively increase their power to 50% (Gervais et al., 2016).

PoW is an overall classification of a consensus mechanism, but prevailing systems vary greatly in terms of their specifications. Properties such as the block interval (meaning the latency at which transactions are written to the blockchain), the block size (the number of transactions within one block), and the way information is delivered to other nodes in the network have an influence on other properties such as scalability, performance, and security (Gervais et al., 2016).

2.1.4.2 Proof of stake (PoS)

Proof of stake (PoS) can be described as a more resource-efficient version of PoW, as fewer nodes are involved. Like in PoW, miners are prioritized to build blocks according to their stake – but in currency, not in computing power (Saleh, 2019). Nodes that are competing to build blocks

are required to prove the ownership of their stake (e.g., in the form of a currency). In the simplest versions of PoS, those with higher stakes are more likely to be elected, and at the same time are assumed to behave less maliciously (Zheng, Xie, Dai, & Wang, 2017a).

2.1.4.3 Practical Byzantine fault tolerance (PBFT)

In networks without trust between nodes, complicated and resource-consuming approaches to consent need to be put in place, whereas in networks of participants that are known and assumed to behave correctly, more efficient consensus mechanisms such as the practical Byzantine fault tolerance (PBFT) approach can be used (Sukhwani, Martinez, Chang, Trivedi, & Rindos, 2017). PBFT works with the premise that all nodes of the network are known and can therefore only be applied in private / permissioned settings. Furthermore, PBFT protocols assume that less than one third of the nodes behave maliciously (Dinh et al., 2017). Additional blocks are agreed on in several phases. In each round, a *primary* is selected, who has the responsibility of ordering transactions. The next phase is only entered once two thirds of all nodes have approved the ordering of the transactions (Zheng, Xie, Dai, & Wang, 2017a). PBFT protocols can achieve a higher throughput and decreased latency, but they are limited by their lack of scalability in terms of number of nodes (Vukolić, 2015).

2.1.4.4 Other consensus mechanisms

A wide range of other consensus mechanisms exist, differing in terms of efficiency, security, scalability, and performance. A closer review and comparison of consensus protocols have been done by Bliga (2017) and Cachin and Vukolic (2017).

2.1.5 Technical challenges

Even though the concept of blockchain has raised much attention in recent years, it is still in its infancy in terms of technical sophistication and foundational concepts (Valdes & Furlonger, 2017a). A meta-study on the current state of research on blockchain from a technical perspective has revealed that more than 80% of published scientific papers in the field deal with topics related to Bitcoin, whereas only around 20% investigate blockchain in a wider sense, thus leaving significant research gaps (Yli-Huumo, Ko, Choi, Park, & Smolander, 2016). The moderate maturity of the technology becomes more apparent when considering successfully implemented business solutions. According to Valdes and Furlonger (2017a), only the applications Bitcoin and Ethereum are technically and economically proven in the field at a certain scale. As Wiczner (2017) states, security remains a critical issue. Indeed, according to the cyber-security firm Chainalysis, in 2016 and 2017, within a period of 12 months, hackers and criminals were able to abscond cryptocurrency from Ethereum worth 1% of the company's market value. Fraud cases did not predominantly happen in the blockchain environment itself, but in software solutions that enable one to access blockchain applications (Malanov, 2017a; Swan, 2015). Limitations and technical challenges of the technology have been investigated (Dennis & Owen, 2015;

Lin & Liao, 2017; Malanov, 2017a; Swan, 2015; Wüst & Gervais, 2017; Zheng, Xie, Dai, & Wang, 2017a). The performance, technical sophistication, and limitations can be assessed from various perspectives.

2.1.5.1 Throughput

Throughput, measured in transactions per second, is a metric for the processing power of a blockchain protocol (Swan, 2015). In comparison to competing centralized systems, such as Twitter (5,000 transactions per second) or Visa (2,000 transactions per second), the transaction throughput (i.e., transactions per second) in current public blockchain networks is an unresolved challenge: existing blockchain solutions lag significantly behind in performance (Dennis & Owen, 2015; Yli-Huumo et al., 2016). For instance, Bitcoin is currently able to process a maximum of seven transactions per second (Malanov, 2017a). In current systems, an increase in throughput requires a decrease in security (Buterin, 2016; Gervais et al., 2016).

2.1.5.2 Size of the ledger

An increasing number of users and hence transactions of a particular blockchain application entails an increased size of the blockchain ledger (Swan, 2015). Based on publicly available information, the Bitcoin ledger reached a size of 210 gigabytes in May 2019 ("Blockchain Size," 2019). The nature of a blockchain requires million-fold duplications of the entire ledger, which is criticized as inefficient and wasteful (Malanov, 2017a).

2.1.5.3 Resource consumption

From an efficiency perspective, blockchain's resource consumption has also been criticized, mainly in PoW consensus mechanisms (Swan, 2015). The probability of mining a block relates to the efforts in terms of computational power spent by each participating node performing identical operations. To achieve the highest security standards, cryptographic puzzles require a high degree of difficulty and hence a certain time period for a solution to be found (Yli-Huumo et al., 2016). The complexity of the consensus finding process contributes to decreased efficiency and processing speed compared to centralized competing network solutions (Wüst & Gervais, 2017). Another determinant of the efficiency and inherently the security of a blockchain is the individually set maximum block size, which indirectly defines the maximum number of transactions compiled within one block as well as the frequency and velocity of block propagation (Gervais et al., 2016).

There is a research gap in the literature regarding the evaluation of the effectiveness of blockchain protocol design decisions, such as block generation times, block sizes, or information propagation mechanisms (Yli-Huumo et al., 2016). A first approach has been elaborated by Gervais et al. (2016) with the design of a framework that allows the comparison of PoW-based blockchain protocols based on the trade-offs between performance and security.

2.1.5.4 Transparency

The transparency of public blockchains has been regarded as an enabler for a new form of economy and governance (Swan, 2015). As an answer to the inherent tensions between privacy and transparency, blockchain technology offers pseudonymity instead of real anonymity (Malanov, 2017a; Wüst & Gervais, 2017). It has been proven that privacy leakage can occur after processing transactions using public and private keys (Biryukov, Khovratovich, & Pustogarov, 2014). While some disclosure might be acceptable for individual parties, corporations might require full confidentiality of certain transactions (Malanov, 2017a). However, recent developments, such as the cryptocurrency Zerocash, prove that the overall state of a distributed ledger can be transparent and verifiable to all nodes without disclosing individual information about individual nodes (Wüst & Gervais, 2017).

2.1.5.5 Scalability

The scalability of current blockchain protocols is a topic of ongoing discussion. In current protocols, all nodes in the system store all states in processes within a network (Swan, 2015). The large degree of distribution grants a high level of security but limits scalability, as a blockchain can only process as many transactions as a single node can (Buterin, 2015). Consequently, intended steps to increase scalability affect other properties, such as the degree of centralization (e.g., as applied in private blockchains) or security.

2.1.5.6 Trilemma

Given the current state of the technology, a blockchain protocol can to the full degree only have two out of three properties of the triangle (Buterin, 2016; McConaghy, 2016; Slepak, 2016). Great efforts are currently being made to overcome the so-called blockchain trilemma.

- **Mainstream / Scalability:** Slepak (2016) defines mainstream scalability by the ability of a blockchain protocol itself to compete with a centralized peer system in terms of transaction volume.
- **Consensus / Security:** The blockchain protocol is able to keep data synchronized among all nodes at all times to prevent security risks such as double-spends (McConaghy, 2016).
- **Decentralization:** The system is able to run when each individual node can access the network with its share of computational power (Buterin, 2016). Slepak (2016) points out the possibility for distributed systems to be centralized unless this trend is combated. A protocol behind a decentralized system can only be regarded as a framework to make a system work; it cannot safeguard its decentralized future. As the amount of users grows, the plurality of opinions within the blockchain grows. *Any* decision might lead to a disaffection of a significant part of the network. In addition, Slepak (2016) highlights the risk of new distributed systems being compromised by competing centralized players (e.g., by fake users or sabotage).

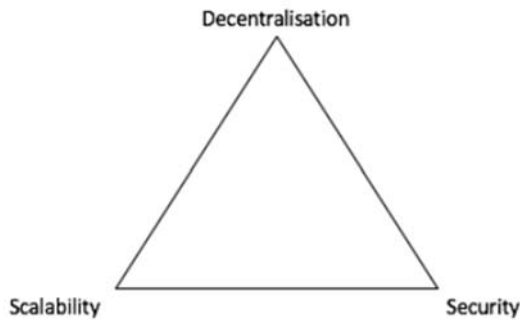


FIGURE 3 - BLOCKCHAIN TRILEMMA

Source: (Slepek, 2016)

2.2 Blockchain benefits

Blockchain has evolved into a major buzzword not only in information technology (IT) and financial industries, but also in a business administration context. Few resources are available on business practitioners' perceptions of blockchain technology and its impact on businesses and industries (Beck & Müller-Bloch, 2017). However, a survey of executive board members' views on digital business conducted by Gartner Inc proves the relevance of the topic: more than one third of the survey participants evaluated blockchain technology as a tremendous business opportunity (Furlonger, Howard, & Valdes, 2017).

For example, the "platform economy" has challenged prevailing business models and created a new form of doing business via offering intermediary services (Kenney & Zysman, 2016). Blockchain technology is considered to have the potential to redistribute how value is created around these platforms and which party involved captures the value by skipping intermediaries (Mattila, 2016). Mougayar (2016) indicates the needlessness of a trusted intermediary in the blockchain environment as a step towards the decentralization of trust; he describes the blockchain environment as enabling a shift in trust from centralized actors towards decentralized organizations and computers, and consequently as a vehicle for a wide range of business opportunities. Due to blockchain technology's key features, such as the authentication of transactions without the requirement for a central, trusted authority, acting as an intermediary, efficiency gains, and decreased transaction costs, Mattila (2016) considers blockchain technology as "disruptive" and impacting all sectors and layers of businesses and society. In contrast, Iansiti and Lakhani (2017) question the disruptive character of blockchain technology and its ability to attack traditional business models with, for example, a lower cost solution. They assess blockchain technology as a far more pervasive vehicle with the potential to create new business models and to question existing social and economic systems. Blockchain technology should not only be regarded as a facilitator of existing business processes, but also as an enabler of new business models (Mougayar, 2016). Furthermore, in the long run, besides making enterprises, industries, and even societies more cost efficient, Valdes and Furlonger (2017a) also expect blockchain to redefine

and challenge basic business processes and models, for instance through the removal of intermediaries.

Only a limited amount of literature has been published on blockchain technology use cases, blockchain technology applications, and the selection of corresponding blockchain typologies (Casino et al., 2019; Wüst & Gervais, 2017). In contrast to the categorization of blockchain typologies based on the architecture presented in Section 2.1.3, a similar approach to that of Zheng (2017a) is used in this chapter. Namely, an application-oriented classification is used to briefly introduce current and future blockchain developments and their relevance to industries and businesses, based on available literature. An in-depth review of use cases was conducted by Casino et al. (2019).

2.2.1 Financial markets, digital currency, and interbank and international payments

Blockchain technology was initially used and is widely known for being the technology supporting Bitcoin cryptocurrency (Yli-Huumo et al., 2016). Bitcoin is a distributed, digital currency system based on a public ledger – the blockchain (Nakamoto, 2008). The underlying technology is regarded as a substitute for central banks as settlement authorities for the currencies for which they are responsible (Wüst & Gervais, 2017). The special property of Bitcoin is the consistency of the currency's value, without the control of any organization or government (Yli-Huumo et al., 2016). In the current interbank and international payment system, a number of parties are involved, incurring processing fees, a risk of chargebacks, and a certain amount of time. However, blockchain technology is considered to have the ability to decrease transaction fees, reduce the risk of chargebacks, and improve transaction speed and transparency, among others (Beck & Müller-Bloch, 2017; Mattila, 2016; Swan, 2015). Many major banks and financial institutions are currently evaluating the adoption of the technology in different areas, such as payment, stock trading, and other transaction-based processes (Beck, Czepluch, Lollike, & Malone, 2016; Wüst & Gervais, 2017).

2.2.2 Governance, proof of ownership, integrity, and identity verification

The idea of blockchain technology as a distributed record of ownership can be extended into a transaction network or marketplace of any assets. Such asset registers on a blockchain are immutable and censorship-resistant distributed records of digital or physical content (Mattila, 2016).

Governments are entities entrusted with managing and holding official records, such as registration, attestation, identification, tax, and marriage records (Swan, 2015). The safety and automation of blockchain-based applications can contribute to increased transparency and efficiency, and eventually impede corruption in government-related processes (Biswas & Muthukumarasamy, 2016). Another proposed use case for blockchain technology is the proof of own-

ership of intellectual property: while, for instance, patent offices currently provide proof of ownership in a centralized way, in distributed networks, time stamping services might be used so that the owner of a digital object can prove his/her ownership by proving that no other node previously published the object (Wüst & Gervais, 2017). Sharples and Domingue (2016) suggest using blockchain technology as proof of intellectual work and as a tool to reliably check the occurrence of events such as awarding degrees. In addition, they describe blockchain technology's benefits for educational uses, such as the digital recording of achievement of credits, already piloted at MIT (Durant & Trachy, 2017). Finally, digital identity has become an important property in the interconnected, digital environment, and it is a crucial security component for digital businesses. Rivera et al. (2017) have discussed the significance of blockchain technology in this context.

2.2.3 Record keeping

On the level of individual enterprises, Brandon (2016) highlights the benefits of the use of blockchain technology in record keeping, finance, and accounting: in contrast to double entry bookkeeping, where transactions are entered in debit and credit, in blockchain-based "triple entry bookkeeping," a third entry into a blockchain (a cryptographic signature) is done. Blockchain technology's data validation mechanisms and tamper-proof integrity would ease current internal and external auditing processes and substitute the current practice of validation of transactions and balances (Dai & Vasarhelyi, 2017). Blockchain technology is also regarded as an enabler of the democratization of the supply chain. Instead of maintaining supply chain data on local copies at organizational levels, information could be stored on shared ledgers, enabling fast, immutable, and easy management (Mattila, 2016). As the retailer Walmart's blockchain-based supply change management system proves, on an enterprise level, such projects have been successfully implemented (Hackett, 2017).

2.2.4 Smart contracts

Smart contracts are self-executing, programmed transaction protocols that automatically execute the properties of a digital contract (Vukolić, 2015). In other words, contractual agreements are translated into tamper-proof and automatically enforceable machine-readable codes that do not require human interaction (Mattila, 2016). Although they note that this is still far in the future, Iansiti and Lakhani (2017) question the layout of firms with the emergence of smart contracts: if one regards companies as a set of contracts (between customers and sellers, or employees and employers), the automatization of the contracts might carry along significant changes. Decentralized autonomous organizations (DAO) are organizations that are operated in an autonomous way, based on a set of smart contracts. There is no central instance of management, which means that such organizations behave and evolve as defined by rules that are computerized in the underlying smart contracts (Wüst & Gervais, 2017). Some researchers consider blockchain technology as a driver for the development of a fully programmable economy (Valdes

& Furlonger, 2017a). In recent years, initial coin offerings (ICOs), for example via the application Ethereum, have become a prominent use case. Mostly start-up enterprises use this vehicle as a platform to finance their businesses by trade shares in exchange for cryptocurrency or tokens (Malanov, 2017b). The underlying contract is stored in the public blockchain with full access to all notes, allowing a sort of accountability. According to Valdes and Furlonger (2017b), like other blockchain applications, the technical realization and market readiness of blockchain-based smart contracts have not been executed due to challenges in terms of scalability, auditability, the lack of legal framework, and missing developer skills.

2.2.5 Internet of things

Internet of things (IoT) is one of the most promising information and communication technologies. IoT integrates smart objects into the Internet to provide services to end-users. Examples of such services are radio-frequency identification (RFID) technology, smart homes, and e-health applications (Zheng, Xie, Dai, & Wang, 2017a). To date, enterprises have tended to create centralized, enterprise-owned smart systems that lack interoperability with other systems. Blockchain technology is regarded as tackling this obstacle by allowing large-scale functionality and enhanced user experiences (Swan, 2015). However, Mattila (2016) questions the benefit of this interoperability for enterprises, given that especially corporations with a significant network use customer lock-in (and the lack of interoperability) as a tactic to gain competitive advantage. Critics also question the meaningfulness as they consider the interface between the physical and the digital reality, for example via sensors: if the data obtained via sensors is tampered with, the blockchain technology has no authority or processes to prove the correctness of such values (Wüst & Gervais, 2017).

2.2.6 Possible blockchain applications in the hotel industry

The possible blockchain technology use cases that were discussed above can have a direct or indirect impact on functions such as, among others, Human Resources, Procurement, Finance, Sales and Marketing, and Legal in all industries, including the hotel industry (Tapscott & Tapscott, 2016). While some blockchain applications may influence the economy as such, a vendor ecosystem is also forming, aiming to resolve business challenges of the hotel and travel industry in particular. Some renowned players in the market, such as Lufthansa and TUI, have been among the first to publicly announce the adoption and intended deployment of blockchain-based applications (Keane, 2017; Whyte, 2017).

Still, there is a limited amount of research available, particularly investigating use cases in the context of the tourism and hotel industry. Önder and Treiblmaier (2018) have identified blockchain-related research propositions in the area of reputation systems, disintermediation of distribution, and payment and customer-to-customer transactions. In addition, Dogru et al. (2018)

indicate identity management, food supply change management, loyalty programs, and smart contracts as areas of relevance to the hospitality industry.

2.2.6.1 Distribution

TUI Group has applied blockchain technology to improve its internal inventory management processes (Dogru et al., 2018; Whyte, 2017). Various start-ups are working on distribution platforms supported by blockchain technology and smart contracts, aiming to disintermediate the distribution process via online travel agencies (Bjoroy, 2017). The promoted benefits of such applications are a redistribution of power towards individual hotels by allowing the latter to manage business logic and terms and conditions around the distribution process, and at the same time reducing commission payments (Izmaylov, Anderson, Lemble, & Vysoky, 2017).

2.2.6.2 Customer loyalty programs

The idea of blockchain-based loyalty programs is often regarded as a logical extension of the concept of cryptocurrency. Enterprises and start-ups in this area are developing applications that can issue loyalty tokens as a reward to their members, which can then be exchanged or sold to others (Kowalewski, McLaughlin, & Hill, 2017).

2.2.6.3 Security and identity

Blockchain could enable personal data to be stored in the format of cryptographically secured codes, and individual nodes could grant permission to check or validate information such as IDs (Dogru et al., 2018). Developers are aiming to create singular travel IDs that include information necessary for travel, such as passports or photo IDs. This would ease information exchange and security processes, for instance upon check-in, and it would at the same time provide more comfort to travelers (M. B. Baker, 2017).

2.2.6.4 Reputation systems

The reliability and trustworthiness of current online recommendation and reputation systems is under debate due to their exposure to fake users and centralized systems (Önder & Treiblmaier, 2018). Because of its foundational properties, blockchain technology is regarded as a way to resolve these inherent challenges (Dennis & Owen, 2015; Schaub, Bazin, Hasan, & Brunie, 2016).

2.3 Organizational context

2.3.1 Impact on organizations

Individual enterprises and organizations need to not only understand the underlying blockchain technology, but also determine how to react to the advent of this innovation and its implications for organizations and entire industries (Valdes & Furlonger, 2017a).

The question arises of how one can evaluate the relevance of the technology to individual enterprises or organizations and build know-how to eventually engage in a blockchain-related project (Beck & Müller-Bloch, 2017).

Fueled by its popularity, numerous platforms and protocols have been launched under the blockchain umbrella. Given that blockchain bears a number of risks from a technical perspective, an institution's commitment to the technology requires thoughtful consideration. According to Wüst and Gervais (2017), blockchain solutions only make sense "when multiple mutually mistrusting entities want to interact and change the state of a system, and are not willing to agree on an online trusted third party." This means that successful blockchain projects need to make use of the foundational benefits of the technology: adding trust to an untrusted environment (Valdes & Furlonger, 2017b). Other reasons to prefer a blockchain-related project over a trusted intermediary might include lower transaction cost, elimination of the requirement of reconciliation and data synchronization, faster transactions, or simply the inability to find a suitable intermediary (Greenspan, 2015; Mattila, 2016).

Valdes and Furlonger (2017b) state that numerous projects currently under development are attempting to deploy a centralized business model using a decentralized architecture. In line with Greenspan (2015), they state that blockchain is often regarded merely as a database solution or storage, rather than an enabler of new business models. The optimistic view on the potential of blockchain technology and its ability to influence the economy is under debate. Blockchain technology is one of various current developments in IT, but a disruptive development in a competing technology would affect its attractiveness in an unpredictable way (Mattila, 2016). Consequently, it is evaluated as likely, but still uncertain, that blockchain technology will reach critical mass in the stable mainstream ecosystem. Some researchers argue that blockchain technology will affect markets by decreasing the need for intermediation (Swan, 2015; Tapscott & Tapscott, 2016). In contrast, other researchers expect blockchain technology to change the scope of intermediation and to create new types of marketplaces, rather than eliminating intermediation (Catalini & Gans, 2016).

Optimistic observers have addressed numerous use cases for blockchain technology (Swan, 2015). However, some of these cases, such as public governance or voting, need to be re-evaluated: because the process of voting requires a central authority (the government), a blockchain application would be a "more inefficient version of what you would do otherwise" (Peck, 2017). In addition, Peck (2017) argues that in a large proportion of scenarios, adding up all the benefits of blockchain technology does not currently outweigh the cost of implementation or the technical challenges of current protocols. Furthermore, Valdes and Furlonger (2017b) note that there is a considerable amount of research in progress, but that to date no complete, mission-critical solution for scaled business operations is available on the market. A large proportion of protocols and foundational concepts currently available are immature and do not use the full potential of the technology and – in some cases – can be implemented using relational databases at a

significantly lower cost (Greenspan, 2015; Valdes & Furlonger, 2017b). All in all, since current technology can be described as immature and untested, Valdes and Furlonger (2017a) predict an increased level of operational risk over the coming years.

2.3.2 Where does a blockchain makes sense?

Bitcoin has proven the capabilities of blockchain technology by demonstrating how a market-place without a central trusted authority can work. Many studies have been published on possible use cases of blockchain technology in business processes, but there seems to be limited research concerning whether blockchain technology is the appropriate technical answer for a particular business case. Given that blockchain technology is only *one* out of several emerging technologies, it competes not only with existing systems, but also with other emerging technologies. Considering technical, organizational, and legal limitations, observers state that at the current stage, there would be more reasons not to use blockchain technology than to do so (Peck, 2017).

Wüst and Gervais (2017) have created a structured, scientific methodology to identify blockchain use cases and corresponding blockchain typology. The researches propose a flow-chart to visualize the decision process regarding the appropriateness of blockchain technology for a particular use case (Figure 4). The determining elements comprise factors such as the requirement to store a state, the requirement to have several editors of the database, the constant availability of online trusted third parties (TTPs), the identification and trustworthiness of the participants, and the need for public verifiability. Meunier (2016a) provides an overview of comparable flow-charts using similar parameters.

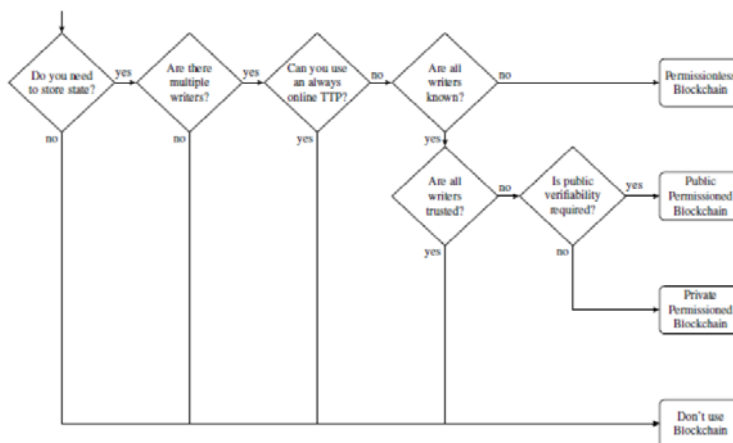


FIGURE 4 - BLOCKCHAIN REQUIREMENT FLOW-CHART

Source: (Wüst & Gervais, 2017)

2.3.2.1 Organizational requirements

Even though the academic analysis of blockchain use cases lags behind actual adoption, Treiblmaier (2019) provides an overview of available publications. For the evaluation of organizational requirements, Beck and Müller-Bloch (2017) conducted a valuable case study with a focus on the organizational challenges of blockchain technology, based on an actual blockchain-related project in an investment bank. Their study is based on O'Connor's (2006) findings on the adoption of radical innovations. Beck and Müller-Bloch (2017) conducted interviews with key decision makers involved in the project. They applied their results to O'Connor's framework, aiming to generalize and describe the capabilities required by an organization in the various phases of the adoption of a blockchain-related project.

- The *discovery* phase describes the early stage of recognizing an innovation's existence and relevance to the business. Members of an organization or enterprise are eager to engage with the technology and support learning and education on the subject.
- The *incubation* phase is reached once use cases are allocated and tests are conducted at the same time as up-and-running systems
- The *acceleration* phase is the full deployment and commercialization of the innovation.

From an organizational perspective, besides the phases themselves, the efforts required to transition from one phase to another also need to be considered (Beck & Müller-Bloch, 2017):

- The transition phase from discovery to incubation is mostly dependent on financial resources, but also on organizational hubs such as innovation laboratories. This allows interaction between, for instance, IT experts, external suppliers, and business process owners.
- During the cut-over from incubation to acceleration, a shift from the innovation laboratory towards the business process owner is performed once the project has proven its value for the enterprise.

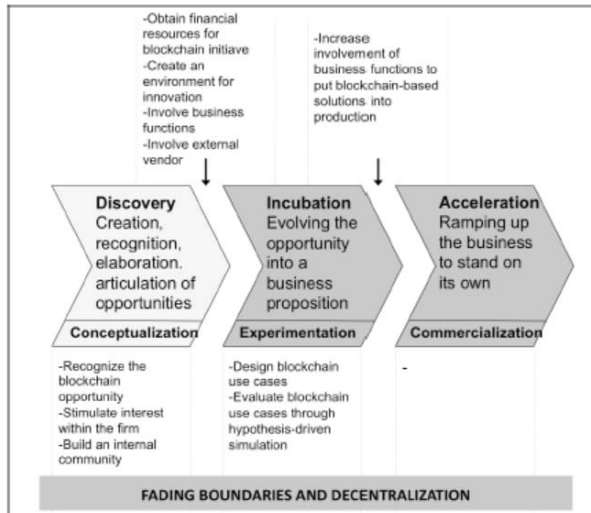


FIGURE 5 - BLOCKCHAIN INNOVATION PROCESS

Source: (Beck & Müller-Bloch, 2017)

Becker and Müller-Bloch (2017) conclude that blockchain initiatives require intense cooperation between the actors involved, both intra-organizationally and inter-organizationally. They observe fading boundaries caused by a strong collaboration between different business units such as sales, technology, and legal, but also the involvement of external partners, such as vendors. In addition, a key to successful implementation is the definition and realization of proof-of-concepts. These business proposals should allow organizations to realize opportunities that they have not fully seized with legacy systems, rather than exercising existing business processes in a distributed manner (Furlonger et al., 2017).

2.4 Environment and external pressure

2.4.1 Vendor environment

The heterogeneous vendor environment, ranging from start-ups to fully formed consortia of established IT companies, offers a wide range of different distributed ledger protocols, with a lack of industry-wide standards (Mougayar, 2016). Many projects or products available on the market advertised as blockchain-based do not actually use blockchain technology (Valdes & Furlonger, 2017a). Furthermore, interoperability between different ledgers, a foundational premise of the proclaimed crypto-economy, does not exist yet (Valdes & Furlonger, 2017b). The vendor ecosystem can be described as volatile, with many new suppliers emerging and offering blockchain protocols for numerous different industries and use cases (Valdes & Furlonger, 2017a).

2.4.2 Regulatory considerations

As technological capabilities advance, so must legal regulations to maintain the regulatory capabilities of authorities. The possibility of transferring value, for instance in the form of cryptocurrency, without the need for a banking institution (underlying legal regulations for payment processors) requires the legal rules to be revised and specified (Lin & Liao, 2017; Mattila, 2016). In addition, Mattila (2016) indicates the changed requirements regarding the understanding and execution of legal matters: the execution of smart contracts and decentralized autonomous organizations (DAOs) as well as their implications for the economy and society inherit the formulation of contractual arrangements into computer codes. Consequently, the regulation of these computer codes by authorities is an important factor in governing economic behavior. Furthermore, the lack of a detailed nomenclature and terminology for blockchain technology as well as the fast pace of development represent a challenge for authorities in regulating the phenomenon (Walch, 2017). In many cases, the impact of the utilization of blockchain technology on legal and regulatory guidelines remains an open topic, thus posing a risk for organizations aiming to engage in a blockchain-related project (Valdes & Furlonger, 2017a). The proclaimed strength of blockchain technology – the irreversible character of transactions – is at the same time a deficit. While central authorities, for example, might stop or reverse malicious, incorrect, or fraudulent transactions, the immutable character of blockchain prevents such actions from being performed (Wieczner, 2017).

The European General Data Protection Regulation (GDPR), in effect since May 2018, aims to safeguard individuals' ownership of their personal data. The lack of authority (data controller), the irreversible nature, and – depending on the type – the transparency of blockchain applications pose a challenge regarding data protection and security regulations. Namely, the right to be forgotten seems to be in conflict with blockchain's immutable and transparent characteristics (Schwerin, 2018). Recent research highlights that possible work-arounds to comply with GDPR regulations could include (but are not limited to) using additional encryption mechanisms and storing confidential data off-chain (Jakobson, 2019; Wirth & Kolain, 2018). In contrast, a report by the European Parliamentary Research Service (2019) indicates the potential of blockchain technology to deliver benefits from a data protection perspective.

2.4.3 Hotel industry characteristics

Hotels are located in a complex economic ecosystem, requiring them to engage with multiple direct and indirect stakeholders such as hotel owners, management, supply chain, hotel guests, employees, marketing organizations, and business partners (Buhalis & Leung, 2018). Figure 6 provides an overview of this fragmented ecosystem. Modern hotel guests demand seamless, personalized, co-created hotel stay-experiences, involving multiple actors in the ecosystem. Information technology is regarded as a vehicle to enhance such experiences (Neuhofer, Buhalis, & Ladkin, 2015).

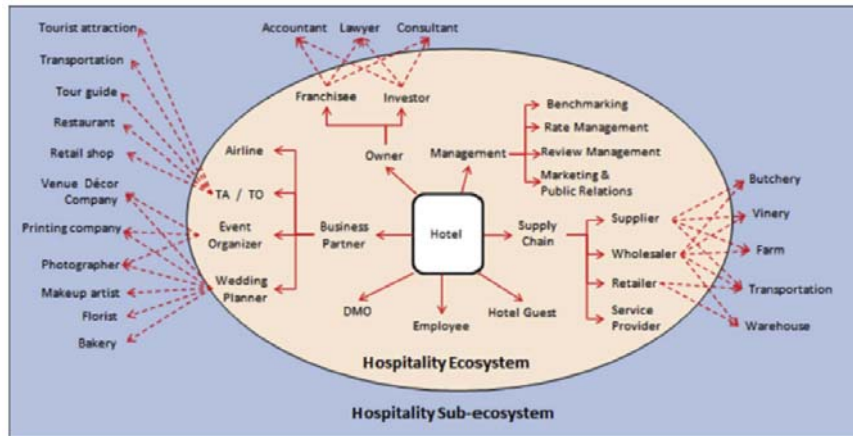


FIGURE 6 - KEY MEMBERS IN HOSPITALITY ECOSYSTEM AND SUB-SYSTEM

Source: (Buhalis & Leung, 2018)

Historically, the hotel industry was a slow adopter of IT compared to other industries (Buick, 2003). However, as in any other industry, the invention of the internet and social media have not only influenced but changed the tourism and hotel industry. The deployment of the internet has contributed to increased transparency and demand in terms of efficiency and customer satisfaction (Buhalis, 2003; Navío-Marco et al., 2018). These developments have required hotel managers to invest in IT to fulfil their duties in an increasingly globalized, connected, and competitive business ecosystem, as illustrated in Figure 6. At the same time, these technological investments have changed strategic management approaches and have been the basis for questioning and amending business processes (Law et al., 2014).

Ip et al. (2011) categorize hospitality IT applications along the operational areas of *human resources and training, security, reservation, revenue management, marketing, guest services, and strategic and operational management*. Furthermore, in their study on IT and its impact on hotel performance, Melián-González and Bulchand-Gidumal (2016) summarize areas of IT application within the hotel industry in a broader understanding into the fields of *operational productivity, employee productivity, customer service, and commercialization*.

- IT applications aiming to improve **operational productivity** are deployed in areas such as energy management systems or kitchen control systems and are designed to improve the relationship between input (of any kind) and output.
- Given that the hotel business is a labor-intensive service industry, **employee productivity** applications such as self-check-in terminals aim to reduce staff costs while not affecting performance outputs. Conversely, IT applications can also release hotel staff from manual work, allowing them to focus on service, thus impacting guest satisfaction.
- **Customer service** IT applications can either support employees in executing high-quality service (e.g., increased customization, improved service recovery, mobile

communication) or offer automated service via, for instance, mobile apps, recommender systems, or automated physical environment adaption (temperature, scent, music).

- **Commercialization** applications, such as distribution channel management, revenue management, customer satisfaction measures, or client behavior knowledge, are deployed to maximize hotel income.

State-of-the-art information technologies in the travel industry need to support interoperability, constant networking, and personalization to safeguard competitiveness on the market (Buhalis & Law, 2008). Since the internet and web-based applications have paved the way for easy information exchange, data has become a valuable asset in modern hospitality. Indeed, the modern hotelier requires, manages, analyses, and exchanges data in various formats (Buhalis & Leung, 2018). This data can be of an internal (e.g., reservation and guest history, revenue statistics, cost analysis) or external (economic, political, environmental) nature and is the basis for business decisions and forecasting trends (Zhang, Shu, Ji, & Wang, 2015). Buhalis and Leung (2018) suggest enhancing the setup of the hotel ecosystem (Figure 6) by standardizing exchange data protocols and deploying technologies such as cloud storage and big data to improve interoperability and efficiency, as well as to exploit the full potential of data. Further fields for research and possible developments are smart tourism and destinations, artificial intelligence, ontologies, and – as discussed in this study – peer-to-peer platforms (Navío-Marco et al., 2018).

Law et al. (2014) observe that in the hotel industry, IT is not always regarded as an essential contributor of economic success, leading to the situation that decisions concerning IT are often not taken at a top executive level. The authors state that as a result, the hotel industry is not taking full advantage of information and communication technology's potential. This poses the risk of IT innovations being deployed as a way to perform existing processes in a more efficient or cost-saving way, rather than as a way to re-engineer those processes.

As an example of a missed opportunity to redesign existing processes, Kowalewski, McLaughlin, and Hill (2017) name the rise of online travel agencies and distributors (OTAs): IT innovations in online distribution have been deployed by new players on the market rather than existing hotel companies. These emerging OTAs have used new technologies to successfully reduce inefficiencies by acting as intermediaries in the online distribution process. Today, OTAs have a strong market presence, leading to the situation that hotels are highly dependent on them and are putting substantial effort into disintermediating clients' booking behaviors. To prevent the repetition of similar developments, researchers have pleaded to further promote the importance of IT decisions and allocation of resources within the hospitality industry (Buhalis & Law, 2008; P. O'Connor & Murphy, 2004).

3 THEORETICAL FRAMEWORK

3.1 Technology adoption theories

The adoption of innovation concerns the decision to make use of a new product (Rogers Everett, 1995). In the same vein, Damanpour and Schneider (2006) described innovation adoption as a course that results in implementing a process, product or practice that is new to the adopting organization.

An extensive body of research and theories have been developed concerning innovation adoption in general, but also for innovation adoption of information technology in particular. Table 1 provides an overview of the most-used theories in information system innovation adoption (Oliveira & Martins, 2011). The scope of the frameworks varies quite a bit: While some models focus on the adoption process on an individual level (such as in the TAM, TPB or UTAUT frameworks), others focus on the analysis of variables on an organizational or firm level (e.g. DOI and TOE framework). Fichman (2000), however, stated that no unifying theory of innovation adoption exists, and that a no unifying theory will never be established.

Technology acceptance model (TAM)	Davis, 1986
Theory of planned behaviour (TPB)	Ajzen, 1985
Unified theory of acceptance and use of technology (UTAUT)	Venkatesh et al., 2003
Diffusion of innovation (DOI)	Rogers, 1995
Technology-organisation-environment framework (TOE)	Tornatzky and Fleischer, 1990

TABLE 1 - TECHNOLOGY ADOPTION THEORIES

In an organizational context, successful adoption and implementation processes require not only considering the adoption process, but also user acceptance (Hameed, Counsell, & Swift, 2012). Accordingly, some authors (J. Baker, 2012; Hameed et al., 2012; Oliveira & Martins, 2011) have argued in support of a combination of different innovation adoption models with different focuses in order to meet the requirements in terms of complexity.

A review of the literature on information technology innovations has suggested that the technology, organization and environment (TEO) framework (Tornatzky et al., 1990) provides a sound theoretical starting point for analyzing the adoption of blockchain technology in a corporate environment. This framework has been employed extensively and is comprehensively approved for organizational-level studies of IT innovation use cases (Hameed et al., 2012; Oliveira & Martins, 2011). This framework represents one part of Tornatzky and Fleischer’s publication *The Process of Technological Innovation* (1990), which offers an approach to describe the innovation process in a corporate environment, extending from the researchers’ development of innovations to the individual user’s final adoption process. Along three dimensions, the TEO framework describes how the firm’s context influences the adoption and implementation of innovations. As illustrated in Figure 7, Tornatzky et al. (1990) identified three main areas within a firm’s context that influence the process of adopting and implementing technological innovations: the technological, organizational and environmental contexts.

- The technology context refers to the existing technologies in use, as well as any potential new technologies relevant to the enterprise.
- The organizational context describes organization-related characteristics, such as size and scope.
- The environmental context comprises the surroundings in which an enterprise conducts its business, thus referring to the industry, competitors or legal framework.

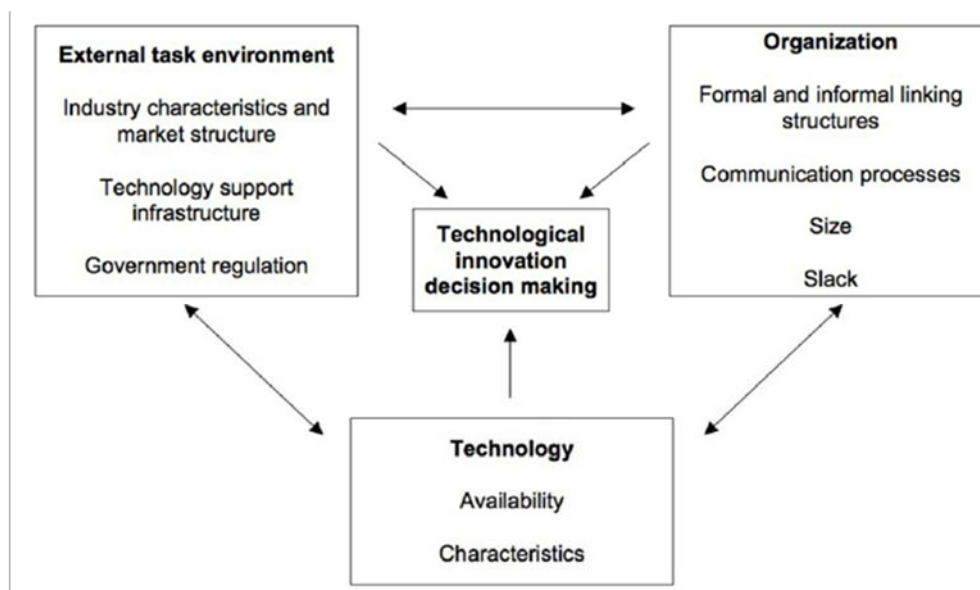


FIGURE 7 - THE CONTEXT OF TECHNOLOGICAL INNOVATION

(Tornatzky et al., 1990)

By definition, the TEO framework represents an organization-level theory. However, its capacity for synthesis with other theories to achieve the scope of a comprehensive analysis has been widely utilized and accepted (J. Baker, 2012; Hameed et al., 2012; Oliveira & Martins, 2010, 2011).

Innovations can be rather multifaceted and require a more global analysis beyond the limits of single enterprises or organizations. Examples for such inter-organizational systems (IOSs) include, for instance, electronic data interchange or business-to-business ecommerce, as these business cases entail integrating innovation between multiple businesses (Oliveira & Martins, 2010). Iacovou et al. (1995) elaborated a framework to this end, later called the IOS framework. This framework aids in understanding the factors influencing the adoption of an inter-organizational system—namely, electronic data interchange. As illustrated in Figure 8, the framework consists of the variables *perceived benefits*, *organizational readiness* and *external pressure* as determinants for the adoption and integration of electronic data interchange.

- *Perceived benefits* describes to the expected advantages and improvements that an adoption of an innovation can provide to an enterprise. Such advantages may include cost savings, internal efficiencies or increased customer service.
- *External pressure* describes the influences from sources within the enterprise’s competitive surroundings and comprises competitive pressure, industry pressure and dependency on trading partners.
- *Organizational readiness* consists of IT sophistication, management understanding and the financial resources available for adopting an innovation on both the internal side as well as on the side of potential trading partners.

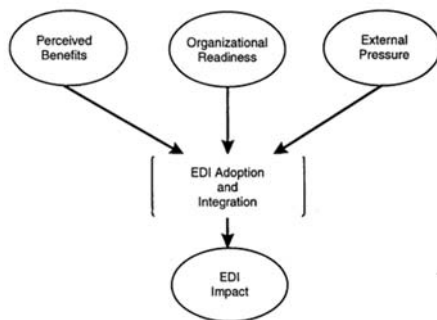


FIGURE 8 - EDI ADOPTION MODEL

(Iacovou et al., 1995)

3.2 Research model

The present research is based on a framework (illustrated in Figure 9) elaborated from a synthesis of features of the TOE and IOS frameworks. A similar approach was utilized by Oliveira and Martins (2010) in their empirical investigation of e-business adoption in European countries. The TOE model was employed as a generally accepted starting point, with elements from Iacovou et al.'s IOS framework added or blended within it. The proposed model comprises *perceived benefits* (from the Iacovou et al. model), *technology context*, *environmental and external pressure* and *organizational context* (as a combination of the TEO and IOS models). These four elements are described in detail in the following sub-chapters.

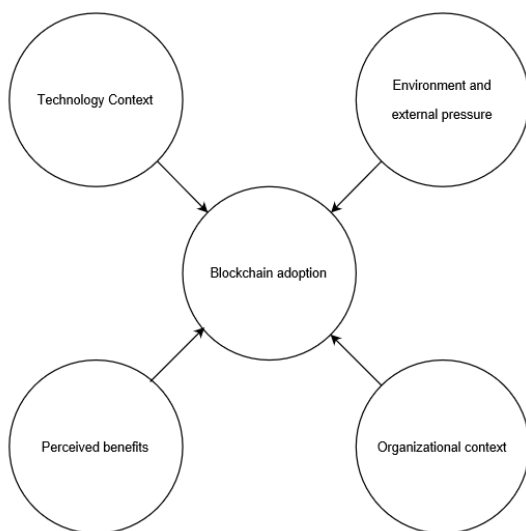


FIGURE 9 - RESEARCH MODEL (OWN MODEL)

3.2.1 Technology context

An enterprise's technology context contains any relevant and available IT solutions. This includes novel technologies that are available in the market and not implemented, as well as technologies already in use (Tornatzky et al., 1990). Tushman and Nadler (1986) classified technological innovations available to enterprises into innovations that generate either incremental, synthetic or discontinuous changes. While incremental innovations comprise new or additional features of an existing product, synthetic changes can be understood as a combination of existing technologies in a new manner. Innovations that generate discontinuous changes (often referred to as *radical*) represent a significant change to current processes or technologies (Ettlie, Bridges, & O'keefe, 1984). Whereas incremental innovations bare few risks, synthetic or discontinuous innovations entail an increased level of operational and financial risks.

Organizations must carefully evaluate the effects and the organizational changes related to any technological innovation available to the enterprise or the industry (Tornatzky et al., 1990). As per Iacovou et al.'s (1995) definition, technological readiness for innovation describes the degree of sophistication of IT usage and management within an organization. Several empirical studies have proven that technology readiness represents an important determinant of IT adoption (Armstrong & Sambamurthy, 1999; Iacovou et al., 1995; Zhu, Kraemer, & Xu, 2006).

3.2.2 Organizational context

Attempts to adopt innovations require financial investments and bear a certain degree of cost. The requisite financial resources refer to costs of installation, implementation, subsequent enhancement and ongoing expenses during usage (Iacovou et al., 1995). Zhu et al. (2006) described the determining factors of technological readiness as a combination of the given technology infrastructure (the technology context) and IT human resources (the organization context). IT human resources comprise the knowledge and skills required to develop and implement potential innovations (Iacovou et al., 1995). Tornatzky et al. (1990) expressed a broader understanding of enterprises' human resource capabilities and identified the following determining factors: inter-departmental collaboration and communication, organizational structure, firm size and available resources.

3.2.3 Environment and external pressure

The environmental context includes the industry's structure, the regulatory environment and the availability of technology service providers (Tornatzky et al., 1990). *External pressure* is not explicitly identified in the TEO framework, and is therefore added to the external task environment. This reflects the role of trade partners and competitors, and thus competitive pressure in the adoption process in general, but also in the IOS adoption process in particular (Iacovou et al., 1995). Mansfield (1968) pointed out the role played by intense competition regarding enterprises' innovation adoption processes. As more competitors within an industry begin investigating an innovation, others may be obliged to do so as well in order to maintain a competitive position (Iacovou et al., 1995). However, innovations fueled by competitive motivations can be promoted or impeded by industry or government regulations. Such regulations are considered to confer both beneficial and adverse effects for innovation (Tornatzky et al., 1990). For instance, new constraints or regulations may force enterprises to invest in innovation; similarly, requirements to comply with, for instance, certain standards can impede novel products or procedures. In addition, Tornatzky et al. (1990) identified the support infrastructure, including skilled labor, availability of consultants or technology service suppliers as relevant factors within the environmental context.

3.2.4 Perceived benefits

The factor of *perceived benefits* was included in the Iacovou et al. model, but is not present in the TOE. As such, this factor is added to the research model here. Iacovou et al. (1995) described perceived benefits as the scope of recognition concerning the relative advantage an innovation can deliver to an enterprise. Benefits can be differentiated into direct benefits (such as operational savings) and indirect benefits, which refer to the influence on business processes and relationships. According to Benbasat (as cited in Iacovou et al., 1995), higher management's understanding of the relative advantages increases the probability of resource allocation for innovation adoption. From a managerial perspective, it is vital to review not only the benefits, but also the obstacles in terms of financial, technical and organizational competences. Empirical evidence has proven that such obstacles represent significant barriers for adoption decisions (Zhu et al., 2006). Conversely, enterprises that perceive adoption obstacles to be lower are more likely to adopt the innovation (Cho, 2006).

4 METHODOLOGY

4.1 Introduction

This chapter aims to describe and justify the method employed to answer this study's research question. After justifying the method selection, the selected survey instrument is described and it is explained how desired data material was extracted and analyzed.

Figure 10 illustrates the process of creating this thesis. Prior to collecting data, a deep understanding of the foundational aspects of blockchain technology was required. After formulating this study's purpose, an extensive literature review was performed. After gaining insight into the subject, an interview guideline was elaborated, which served as a roadmap for the interviewing process. Qualitative data was obtained from expert interviews of blockchain experts in the hospitality sphere. Finally, the data was analyzed, results were processed and conclusions formulated.

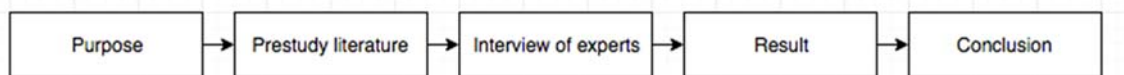


FIGURE 10 - PROCESS OF THE THESIS

4.2 Description and justification of the method

The main objective of this research is to provide answers to the research questions and derive practical implications. To this end, the researcher adopted an exploratory research approach using qualitative expert interviews to evaluate findings from the theoretical aspect. Exploratory research refers to broad-ranging, intentional data collection designed to discover and maximize the discovery of generalizations based on understanding of the research subject (Given, 2008). When investigating a subject such as blockchain technology, where the field is immature and applications are continuously and quickly updated, a certain amount of flexibility is required in the research process. Working with a degree of openness and flexibility presents opportunities to gain deeper insights into the subject that may not have been visible from the beginning. For this reason, a qualitative research approach was applied here. This was further supported by fact that, due to the infancy of blockchain technology and its related applications, no empirical data was available to answer the research question.

One of the main benefits of qualitative interviews is that, due to the use of open interview questions, not only is the area of research analyzed, but new fields of interest can also be discovered.

This is supported by a loose interview environment and the low degree of strict guidelines (Meuser & Nagel, 1991). Expert interviews are thus employed to obtain insight, thoughts and knowledge of the area in question from an expert point of view. “Experts” are considered individuals who possess access to certain privileged information or responsibilities relevant to providing a solution to the research subject (Pfadenhauer, 2009). In expert interviews, the interview partners themselves are not the main subject of the analysis. Rather, the interview questions responses are placed into an organizational context in which the experts are interviewed (Meuser & Nagel, 2009). The most prevailing limitations and challenges involved in executing expert interviews were elaborated by Pfadenhauer (2009) and Meuser and Nagel (1991):

- Selection and availability of the most suitable experts
- Lack of expert trust or interest during the interview
- Confidentiality of information
- Time limitations

The benefits of this survey method are deemed to outweigh the inherent problems and challenges, which is why it was selected for this research.

4.3 Research instrument

In this research, semi-structured and partially standardized interviews with open questions were employed as the survey instrument. Expert interviews should be conducted using a thoroughly prepared interview guideline. This document not only supports the ability to compare and contrast several interviews by structuring the interview, but it also allows to focus to be placed on several sub-aspects of the research subject and engenders a relaxed conversation atmosphere (Meuser & Nagel, 1991). The interview guideline was aligned with the research framework, and questions were formulated to reflect the four areas of *technology context*, *organizational context* and *environmental context* and *perceived benefits*. Furthermore, these questions were based on extensive review of the literature from studies commonly employed to investigate organizational technology innovation adoption. “How” and “what” questions were asked with a broader focus, which narrowed as the interviews progressed. To keep the research flexible and open to changes regarding the order of questions and direction, unstructured interview questions were asked. This approach was selected due to the early stage of the research topic and the scarce availability of research and know-how in the field.

The full interview guideline can be found in Appendix 1 of this research.

4.4 Sampling and interviewees

The research on blockchain applications in a business context in general, as well as in a hospitality context in particular, remains in its early stages. As the present research is investigating a narrow aspect—blockchain technology in a hospitality context—knowledge from both the research field and the hospitality industry is required from the interviewees. Through interviews, the researcher is able to examine different opinions surrounding the topic. As such, it was important to interview those placed in the leading edge of the decision-making process of the hospitality industry. The interviews were thus conducted with selected, active members of the non-profit trade organization “Hospitality Technology Next Generation” (HTNG). Organized in workgroups including hospitality IT executives as well as representatives from major technology firms, the HTNG seeks to elaborate industry-wide accepted recommendations and standards for next-generation information system solutions for the hospitality industry. Informants were chosen from both hotel industry and information technology representatives actively participating in the dedicated workgroup *Blockchain*, which was formed in 2017 and officially kicked-off with a webinar on November 20, 2017. The interviewees were chosen specifically for their area of expertise in not only the hotel industry, but blockchain technology as well, certified by their affiliation to HTNG.

Interview	Abbreviation	Company	Position	Interview Date	Duration
Interview 1	I1	Hospitality IT Consulting firm	Hospitality IT Executive	1-Jul-19	27:17
Interview 2	I2	Hospitality IT Consulting firm	IT Consultant & Advisor	23-Jul-19	34:17
Interview 3	I3	Hospitality IT Software Supplier	Chief Executive Officer	18-Jul-19	41:48
Interview 4	I4	Hospitality IT Software Supplier	Head of Product Strategy	29-Jul-19	34:49
Interview 5	I5	Hospitality IT Software Supplier	Chief Technology Officer	1-Aug-19	46:59
Interview 6	I6	Hospitality IT Software Supplier	Chief Evangelist	22-Jul-19	18:36
Interview 7	I7	Hotel Industry IT Expert	Chief Information Officer MEA	2-Aug-19	25:26
Interview 8	I8	Hospitality IT Software Supplier	Chief Executive Officer	26-Jul-19	40:28

TABLE 2 - INTERVIEW PARTNERS

4.5 Description of evaluation and analysis

For the qualitative evaluation and analysis of the guided expert interviews, a modified form of the method espoused by Meuser and Nagel (1991) is employed.

As per Meuser and Nagel (2009), the process of analyzing the expert interviews comprises the following steps:

- *Transcription* is required for relevant passages of interviews only, with a limited emphasis on paralinguistic focus.
- *Paraphrasing* includes rephrasing relevant passages in the researcher's words.
- *Coding* means allocating thematic units and thematic ordering of paraphrases.
- *Thematic comparison* involves grouping comparable text passages, which are eventually contrasted and finally assigned headers.
- The aim of *sociological* conceptualization is to group and order meanings, generalizations and interpretation patterns on the basis of the collected data materials.
- During the phase of *theoretical generalization*, interpretation patterns and generalizations are sorted and contrasted to theory and literature.

Evaluation of the transcripts was conducted according to an adapted analysis method devised by Meuser and Nagel.

4.6 Execution

In order to answer the research question, interviews were conducted with the selected experts, as detailed in Chapter 4.4. The initial contact with the experts was made by e-mail.

In this first correspondence, the research topic and purpose was explained, as was the approximate interview length and the study's confidentiality. All interviews were conducted in English in July and August of 2019, and on average lasted for 33 minutes. Due to the geographical spread of the experts, the interviews were conducted in remote sessions using web-based communication tools and were digitally recorded. Before starting each interview, the researcher repeated the content of the interview guide in order to ensure a smooth survey. Any disturbing factors were eliminated as possible. Before the sound recording was initiated, the researcher provided a short, personal introduction as well as a short overview of the research subject, the research goal and the scope of the interview. In addition, the confidentiality and anonymity were highlighted. The interviews were conducted based on the interview guideline. However, the researcher strove to adapt to the flow of the conversation in order to obtain results that were as insightful as possible, accomplished by resorting the interview questions based on the experts' responses. After all questions included in the interview guide were answered, the researcher gave the experts the opportunity to make additions or clarifications to the research topic. Once each interview was concluded, the recordings were transcribed in a timely manner. The recorded conversations were transcribed verbatim in full. Linguistic aspects were not taken into account in the transcription process.

This research applies an amendment to the analysis approach by Meuser and Nagel in a manner that is particularly relevant for exploratory expert interviews. Ullrich (2006) stated that, in the

analysis or exploratory interviews, the interest is not on the proceedings of an individual expert (meaning the particular results of one interview), but rather on the review in comparison with and re-confirmed by other interviewees.

Following the elaborated framework and based on the definitions, a coding scheme was created regarding the influence factors of *technology context*, *perceived benefits*, *environment and external pressure* and *organizational context*. As such, the data sampling was aligned with the pre-conceived understanding of blockchain technology. Additionally, codes were developed for observations that have not been covered in the framework so far. The coding was performed in MAXQDA 2018. In total, 645 code segments were identified. The coding was performed to organize the interview data and involved studying the individual data, including within the context of the other interview results. Since the categories were already defined based on the research model and inherited in the design of the interview guideline, these were also applied in the analysis. This means that the “thematic comparison” step was omitted in this study, and the analysis was instead based on pre-defined categories. Throughout the analysis of the results, particular care was taken to critically reflect on the existing categories and, if appropriate, further categories would have been added. Based on the structured segments, data concerning the influencing factors for adopting blockchain technology was derived. Cross-referencing the interview results with previous research and publications helped to critically reflect on the influencing factors defined in the research model.

5 RESULTS AND DISCUSSION

5.1 Interview results

The following empirical portion of this thesis discusses the results of the qualitative research. After describing the interview partners' background, the results are presented and compared with each other to be interpreted in the following step. The structure of the results presentation is based on the predefined influencing factors under investigation.

5.1.1 Expert background

A total of nine experts were interviewed for this research. Seven interviews were conducted with individual experts, and one interview was conducted with two interview partners. At the time of the interviews, six experts were employed by an IT firm, either already working or intending to work in the area of blockchain technology. Two experts were self-employed and working in the consulting sector, predominantly in a tourism and hotel information context. One interview partner was employed in the information technology area of a hotel management company. An overview of the interview partners is shown in Table 2. Independent from their education or current occupation, all interview partners possessed expertise in both research fields under review: the hotel industry and information technology. While one interview partner is currently employed in the hotel industry, three more have historically been employed in corporate IT hotel company positions.

5.1.2 Technology context

In terms of the state of information technology and adoption, the majority of the experts described the hotel industry as remaining "behind" compared to other industries (IP1:312-327, IP2: 434-442, IP3: 376-381, IP4: 251-254, IP5a: 286-293, IP5a: 259-268, IP7: 119-135, IP8: 61-72). The hotel business was further described as not IT-driven or advanced in technical sophistication (IP2: 407-420, IP5a: 402-405, IP7: 110-115). Three experts also observed inefficiencies, primarily in the back-end of the IT environment (IP7: 110-115; IP5a: 286-293, IP8: 27-36, 43-60), while the guest-facing applications were described as more advanced (IP8: 43-60). IP8 observed room for improvement in hospitality IT, as the applied technology was initially designed as individual applications and then interconnected over the years (IP8: 61-72).

Competing technologies

Two interview partners stated that, using current database solutions, legacy systems are capable of managing many use cases. As such, there would not be a benefit of applying blockchain technology (IP3: 267-271, IP6: 167-170). In addition, the interview partners presumed potential resistance from legacy software suppliers, who apply lock-in mechanisms in order to maintain

market presence (IP3: 236-246, IP5a: 259-268). Due to the design properties of private blockchains, and their similarities to relational databases, IP1 anticipated competition between private blockchains and legacy databases (IP1: 178-185). Furthermore, IP7 observed that blockchain technology is competing with other emerging technologies, such as artificial intelligence and robotics (IP7: 178-185).

Technological readiness

The interview partners shared different appraisals regarding the technical maturity of blockchain technology and its readiness for adoption in the hospitality field. Six experts stated that blockchain technology is not yet fully market ready for the hospitality industry (IP2: 347-348, IP3: 327-336, IP4: 271-274, IP5b 496-509, IP6: 97-103, IP8: 117-121). Two interview partners considered blockchain technology to be partially ready for implementation in a hospitality context, but with limitations regarding transaction speed (IP1: 190-205, IP8:528-535). One expert felt that blockchain technology was just about to reach critical mass and acceptance by individual enterprises and the economic system as such (IP1: 43-50). Some experts appeared optimistic that technical limitations are going to be resolved in approximately two to three years (IP8: 117-121), three to five years (IP4: 271-274), or five years (IP2: 347-348, IP3: 327-336). IP5 observed growing pains described as typical for emerging technologies (IP5b: 60-62). IP7 claimed that the technology capabilities are improving, and thus expected more market-ready applications to launch (IP7:189-199).

Two interview partners stated that, at blockchain technology's current level of sophistication, there is no reason for the hotel industry to implement this technology and substitute existing solutions (IP2: 359-361, IP6: 215-221). An inconsistent perception was also expressed concerning realized implementation: IP7 stated that, apart from cryptocurrencies, there is no proven, successful use case that is ready for implementation in the hotel industry (IP7:167-173). Other experts, meanwhile, observed that blockchain technology is undergoing experimentation and testing, but only a limited number of tangible blockchain deployments exist (IP4: 113-118, IP6: 195-198). As the blockchain environment is still evolving and currently lacks standards, IP6 described investments by hospitality companies as risky (IP6: 226-228).

Blockchain typologies

All interview partners were aware of different blockchain types and differentiated between private and public blockchains (P1: 167-173, IP2: 248-253, IP3: 296-308, IP4:195-202, IP5a: 384-399, IP5b 380, IP6: 180-192, IP7: 256-262, IP8:516-523). In addition, three experts mentioned "federated blockchains" as another type of blockchain technology (IP1: 167-173, IP3: 136-142, IP7: 256-260). IP1 did not see a prevailing blockchain type at the moment (IP1: 167-173). Responding to the question of the most beneficial blockchain typology in a hospitality context, four

interview partners indicated that both typologies can be used beneficially. As each type possesses advantages and disadvantages, however, this depends on the characteristics and requirements of the business case that seeks to be solved with blockchain technology (IP2: 310-314, IP3: 296-308, IP5a: 384-399, IP6: 180-192). Limitations of blockchain types are also largely dependent and can vary from trivial to significant (IP2: 248-253).

Three experts considered enterprises to be more likely to adopt private rather than public blockchains (IP6: 180-192, IP4:195-202, IP4: 186-194, IP8:516-523). The interview partners described the reasons for this as relating to enterprises' requirement to set boundaries (IP4: 186-194) and the enhanced security (IP8: 218-231), transaction speed (IP2: 79-87) and privacy (IP8:516-523) conveyed by private blockchains. IP2 further emphasized that such requirements can come at the cost of other properties, such as trust (IP2: 79-87). Two interview partners questioned the reasonableness of private blockchains due to their similarity to relational databases (IP1: 178-185, IP7: 256-262). IP7 was of the opinion that public blockchains types are more effective (IP7: 256-262). In addition, IP6 observed vendors stating that blockchain technology should, in principle, be public architecture (IP6: 180-192). Furthermore, IP1 argued that, as a principle, blockchain should be of public design (IP1: 167-173). IP3, meanwhile, considered public blockchains to be ill suited for industry applications unless customers are affected, such as in payments (IP3:310-312). IP2 claimed that public blockchains can be applied anywhere that requires a trusted intermediary (IP2:32-34).

Technical difficulties

Six experts described blockchains' inability to quickly process transactions as a challenge, particularly in areas requiring data to be updated instantly (IP1: 145-152, IP2: 68-78, IP4: 160-168, IP6: 158-162, IP7: 35-37, IP8:493-502). Some experts also explicitly emphasized the slow transaction speed in comparison to legacy systems (IP1: 145-152, IP2: 68-78, IP4: 160-168, IP6: 158-162, IP8:493-502). Particularly in public blockchains, IP2 and IP8 observed an inherent challenge in latency and transaction speed (IP2: 230-236, IP8:493-502).

Two interview partners mentioned security issues as technical challenges. Specifically, they stated that incidents and security issues in, for instance, cryptocurrencies could adversely influence faith in the technology, and thus adoption initiatives (IP4: 173-174, IP7:274-285). IP3 observed scalability limitations, especially in public blockchains, but still appeared confident in new consensus mechanisms overcoming this challenge (IP3: 284-289). Three interview partners described the transparent character of some blockchain applications as challenging in terms of data protection, privacy and compliance (IP1: 252, IP2 236-241, IP3: 296-408, IP8: 491-493). IP6 mentioned the high cost of mining, which involves substantial energy consumption, as a technical challenge (IP6: 162-166).

IP2 described technical difficulties and limitations not as problems, but rather as inherent properties of the technology. This expert perceived technical difficulties of the technology as limitations caused by the fact that either blockchain itself or the respective blockchain type does not fit the requirement of the intended processes (IP2: 339-345). IP2 observed that solutions exist for some technical limitations, but that these sometimes involve shifting elements in off-blockchain applications (IP2: 242-248).

Interoperability

Two interview partners highlighted the importance of industry standards for blockchain technology in order to enable possible interoperability between other blockchain protocols and legacy systems (IP1: 152-158, IP6: 226-228). IP5 questioned how standardization can be obtained within the blockchain environment and expected this to take several years (IP5a: 245-257). Three interview partner emphasized the lack of industry standards for blockchain technology as a challenge placing current investments at risk (IP3: 504-516, IP5b: 288-293, IP6: 226-228). IP3 stated that numerous blockchains will be available for various purposes in the future (IP3: 122-129). By contrast, IP1 expressed uncertainty as to whether a multi-layered blockchain environment with connections between different blockchains will arise (IP1:173-175). Three experts mentioned the lacking interoperability capabilities on the side of hotel industry legacy systems as impeding successful integration of blockchain technology into existing processes (IP1: 254-263, IP3: 228-234, IP5b: 304-312). The interoperability is manifested by lock-in efforts of legacy system software suppliers (IP3: 236-246, IP5a: 259-268) and would eventually require legacy systems to be replaced (IP1: 254-263).

Type of innovation

IP3 believed that blockchain technology possesses a transformative force that will significantly influence businesses and societies over the next 10 to 40 years (IP3: 519-540). Already today, IP2 identified use cases and areas such as hotel distribution that can be disrupted (IP2: 177-182). IP6 opposed the statement of optimistic commenters that blockchain technology would replace the Internet, seeing such developments as remaining far away (IP6: 254-258). Two experts questioned blockchain technology's disruptive character; they rather observe a potential to improve processes using blockchain capabilities (IP4:148-156, IP7: 220-236).

5.1.3 Perceived benefits

Four experts indicated that blockchain technology is suited for applications in any industry possessing multiple partners that require some form of trust regarding how they interact, conduct business, or track and share fragmented information in a distributed manner (IP1: 40-43, IP2: 63-68, IP4: 304-309, IP5b: 298-304, IP8: 152-155).

Two interview partners highlighted the importance of defining certain business objectives before evaluating any activities in blockchain technology. Such objectives can include cost reduction, increased efficiency or improved reporting (IP3: 428-433), as well as improved customer experience (IP5a: 438-443, IP5b: 324-338). IP3 described that the motivation to implement any new technology should be linked to such a business objective rather than a particular technology (IP3: 428-433). As per IP7, any technology needs to be able to provide additional economic benefits, such as cost savings or revenue opportunities, which the expert was convinced would be seen in future blockchain applications (IP7: 285-294). IP4 emphasized that possible use cases need to inherit significant changes to processes rather than replicating the status quo based on a different technology (IP4:335-337). This was supported by two experts, who stated that not all businesses have the demand for using blockchain technology and its properties (IP3: 271-273, IP8: 126-127). Some experts observed that use cases in the hospitality industry currently under preparation or deployment do not necessarily aim to resolve business challenges, but are rather promotional in order for companies to be perceived as innovators or technology leaders (IP2: 363-370, IP4: 348-352, IP5a: 151-157). Other reasons mentioned by experts include corporate leaders' personal motivation (IP2: 363-370) or the intention of creating a compelling work environment for employees (IP3: 424-427).

Recognition of advantage

The majority of interview partners evaluated blockchain technology as a future enabler of increased efficiency (IP4:337-347, IP5a: 196-205, IP5b:206-219, IP6:-239, IP7:229-237, IP8: 163-171). According to two experts, this efficiency is based on an advanced level of automation and interoperability (IP4:337-347, IP5b:206-219). In relation with the potential for increased efficiency, some interview partners expected a decrease in cost (IP4:337-347, IP5a: 173-175, IP5b:80-83). This decreased cost is expected to be realized by a decreased necessity and subsequent lower expenses for intermediaries in various business contexts (IP1: 268-269, IP5a:166-180, IP5b:80-83, IP7:294-297). Blockchain does not resolve yield or margin problems, but it could potentially be packaged as a larger initiative to, for instance, build relationships with customers, such as through enhanced loyalty systems (IP5a: 438-443).

Half of the interview partners highlighted blockchain technology's transparent character and associated accountability and integrity as a benefit (IP1: 269-270, IP3: 296-302, IP4: 130-131, IP6: 239-242, IP8: 215-218). Two interview partners mentioned its immutable character as a benefit as well (IP6:242-245, IP8: 155-159). IP7, meanwhile, highlighted blockchain's distributed nature, and the fact that not one single entity owns the data, as a benefit (IP7: 30-32).

Use cases

The following section provides a summary of the experts' answers regarding possible use cases in the hospitality industry.

Identity management

Seven interview partners regarded personal identity management as a potential area for beneficial use of blockchain technology (IP1: 67-73, IP2 187-198, IP4: 289-300, IP5a: 137-140, IP5b:69-75, IP6: 116-122, IP7:52-60). IP1 described the ongoing digitalization as a reason for requiring a proof of digital identity (IP1: 67-73). Two experts discussed a possible application in the form of an electronic wallet (IP6: 123-125) where personal data such as credit card numbers or passport data are stored in a blockchain (IP7:52-60). The identity management application should be able to release only relevant data with requiring entities and, if necessary, revoke the data (IP5b:69-75, IP7:52-60).

IP2 mentioned that identity management most likely cannot be implemented on a hotel industry level and is more likely to occur on a travel industry or even governmental level (IP2 187-198). IP5a and IP6 evaluated a *global* guest ID management application as most beneficial, enabling easier identity verifications and security controls in, for instance, hotels or airports (IP5a: 140-147, IP6: 116-122). The reason for this concerns the requirement of reaching global mass in order for a possible application to act as a global clearing house for identity in the most beneficial manner (IP5b: 149-151).

Loyalty

The majority of experts mentioned loyalty programs as possible use scenarios for blockchain technology, particularly for multi-branded programs (IP1: 113-123, IP3: 163-194, IP4:122-128, IP5a: 137-140, IP6: 150-152, IP7:74-79).

The respondents justified the application's relevance through the demand to find a technical solution that is less complex and more efficient than today's setup (IP3:163-194, IP5a: 348-356). IP3 highlighted that the wide range of partners such as airlines, hotels, and tour and travel providers involved in loyalty programs are currently required to convert points from their legacy systems in order to provide flexibility to participants (IP3:163-194). Blockchain technology is considered to be able to enhance the user experience by simplifying how points are stored, transferred, exchanged and redeemed, eventually by tokenizing the loyalty points (IP1: 113-123, IP3:163-194, IP4:122-128, IP5a: 186-195, IP7:74-79). IP5a also explained that loyalty programs constitute a suitable initial use case for adopting blockchain, as consumers already know how such programs work and the degree of risk involved is low (IP5a: 344-346, 348-356). The low processing speed of blockchain-based applications was considered a challenge for loyalty programs, as transactions are required to be processed immediately (IP7:42-47). IP3 thus did not foresee hotel companies converting loyalty points into tokens, as this would require complying with cryptocurrency regulations (IP3: 408-415). IP4 stated that blockchain-based loyalty applications must provide true innovative factors rather than simply minor add-ons in order to justify the effort involved in the adoption (IP4: 363-374).

Distribution

The blockchain use case of hotel room inventory management and distribution by treating room inventory as tokenized assets, without the need of intermediaries, was mentioned in all interviews (IP1: 123-135, IP2: 114-121, IP3: 195-203, IP4: 240-250, IP5a: 430-435, IP6: 109-116, IP7: 79-87, IP8: 237-250). Due to the current fragmentation of data throughout various distribution channels and the involvement of intermediaries through several instances, the ecosystem lacks standardization, synchronization and transparency (IP1: 123-135, IP8: 180-196, 237-250). However, distribution constitutes an important factor for the hospitality industry's success; hence, the future design of distribution processes places pressure on hoteliers (IP5a: 206-214, 430-435).

Some experts evaluated the application of blockchain technology to create a distribution platform without requiring intermediaries as a way to compete with the power and control of online travel agencies and global distribution systems (IP1: 123-135, IP2: 114-121, 158-176, IP7: 79-87). At the same time, two experts stated that blockchain-based online distribution represents the most distant use case, as existing online travel agencies will defend their market positions (IP6: 109-116, IP2: 134-145). Blockchain technology might ease the process of third parties purchasing room inventory without the need for a contractual relationship (IP2:146-157). As a first hotel company, Nordic hotels have implemented a blockchain-based distribution application, but the platform appears immature (IP7: 79-87). At the current state of technology, the use case of travel distribution remains distant, as it requires more integration and transactional speed (IP7: 215-217). IP2 stated that it is not likely for the entire volume of bookings to move to blockchain-based solutions, though it was believed that pressure on established intermediaries will increase (IP2: 177-185).

Financial transactions and settlement

Applying blockchain in a context of financial transactions and payment settlement was mentioned by seven experts (IP1: 78-79, IP2: 95-113, IP3: 207-220, IP4:132-141, IP5a: 137-140, IP7:88-92, IP8: 251-256). In particular, the experts highlighted possible increased efficiency in the process of business-to-business transactions, such as commission payments in combination with smart contracts, eliminating the need for intermediaries (IP2: 95-113, IP3: 207-220, IP5a: 196-205). IP3 and IP4 also observed benefits for the hotel industry in the field of payment reconciliation, deposit handling and cancellation fees (IP3: 207-220, IP4:132-141). IP3 emphasized its application for more efficient and secure handling and reconciliation of gift certificates, vouchers and the redemption process (IP3: 203-206).

Supply chain management

Five experts considered supply chain management of, for instance, food within the context of the hospitality industry as a feasible area for blockchain application (IP1: 82-107, IP4:227-231,

IP5b: 85-88, IP6: 125-132, IP8: 163-171). Two experts have already observed or participated in actual proof of concepts of blockchain-based applications in companies in the travel industry, though not in the hospitality industry (IP1: 82-107, IP4: 227-231). IP5b discussed blockchain technology's boundaries in supply chain management, highlighting that the information stored on the blockchain can only be as effective as the source of the information (IP5b: 85-88).

Other use cases

The use case of smart contracts in a hospitality context was mentioned by five experts (IP1: 137-139, IP2: 48-62, IP5a: 196-205, IP5b: 304-312, IP7: 32-35). IP5b in particular discussed the use case of voting based on a blockchain-based application (IP5b: 75-76).

5.1.4 Organizational context

Management skills, IT and human resource skills

Experts assessed that, apart from the top executive level, less qualified IT staff is generally employed in the hotel industry compared to other industries (IP2: 407-420, IP3: 463-476). As per IP2, the hotel industry is thus not well positioned to be an adopter of blockchain technology and remains dependent on third-party suppliers (IP2: 282-289).

Organizational structure / involvement

Several interview partners observed a general lack of knowledge of blockchain technology capabilities, as well as its business value and risks (IP2: 254-271, IP4: 312-321, IP8: 324-328). IP4 highlighted the difficulties involved in educating hospitality executives in the field of blockchain technology from the perspective of an IT supplier, which consequently impedes IT and innovation adoption (IP4 394-401). In terms of involvement in blockchain projects, two experts stated that blockchain predominantly constitutes an IT topic, so any end user should not need to fully comprehend or even be aware of the underlying technology of transactions (IP3: 342-352, IP8: 606-622). As one main barrier of blockchain adoption, IP1 described enterprises' resistance to change, which impedes organizational and cultural adoption of blockchain-related projects (IP1: 159-160, IP1: 252-253).

First step

Regarding the ideal first step for potential adoption of blockchain technology, the experts provided a mixed set of answers. Three interview partners described further expansion of know-how on blockchain technology's management and IT responsibilities as an important first step in adopting blockchain technology (IP1: 239-246, IP2: 275-282, IP7: 185-188). Two interview partners emphasized that a first step should consist of defining the pertinent challenges or business objectives to be tackled by blockchain technology (IP1: 239-246, IP3 357-370). IP7 considered investments in research and development, eventually through the funding of start-ups, to

represent a feasible first step to extend knowledge about the subject (IP7: 185-188). According to four experts, initial adoption of the technology should comprise a small business case, including simple processes, in order to gain confidence in the technology (IP1: 239-246, IP5b: 233-237, IP7: 204-210, IP8: 342-352). IP7 identified the acceptance of cryptocurrency as payment methods or loyalty applications as possible first steps in blockchain technology (IP7: 204-214).

Finance resources

In terms of financing information technology, experts assessed the lack of financing as a root cause for the slow pace of IT innovation and enhancement (IP1:312-327; IP4: 60-74, IP7; 136-152). IP7 further mentioned the importance of fueling innovation from the hotel company's perspective by financing start-ups in the field of blockchain technology (IP7: 309-313).

Implementation and adoption

IP5a expected future blockchain developments to be adopted by either a new entrant, which will generate disruption by bringing in more efficient solutions, or a dominant supplier seeking increased operational efficiency (IP5a: 405-417). Due to missing resources and limited know-how, implementation is more likely to occur in corporate hotel groups rather than individual hotels, (IP4: 218-225). IP1 assessed that implementation is easier in privately held companies compared to publicly held companies (IP1: 223-225). IP5a did not anticipate blockchain technology becoming visible to users and described it as a back-end application (IP5a: 244-245). IP3 expected such applications to arise in the consumer context rather than a business service context (IP3: 519-540).

5.1.5 Environment and external pressure

Structure of industry

From an IT perspective, experts describe the hotel industry's structure as complex for various reasons. The business model of major hotel chains (including a separation between hotel ownership and operation) creates challenges for the decision-making process, making innovation difficult (IP1:312-327, IP3-486-496, IP7: 119-135). As well as the separation between hotel owners and operators, two experts further observed complex IT processes arising due to the number of relationships and partnerships involved in the hotel business (IP5a: 123-127, IP5b: 298-304). In addition, two experts identified the geographical spread and legal and regulatory requirements as barriers to easy IT innovation (IP5a: 259-268, P7: 119-135). Two other experts emphasized the lock-in efforts of legacy system suppliers, which impede the flexibility and ability needed to innovate (IP3: 236-246, IP5a: 259-268). Two experts stated that the hotel industry decision-makers tend to wait for proven concepts in other industries before adapting (IP3: 376-381; IP5a:278-286). IP3 characterized the hotel industry as risk averse in questions of IT adoption

(IP3: 376-381). As per IP5a, the fragmented nature of hospitality, which involves multiple partners, results in missing industry standards, which subsequently slows the pace of innovation adoption (IP5a: 286-293).

Four experts observed that IT's importance for hotel companies has evolved in recent years, with hotel managers now realizing its benefits for revenue maximization and cost saving, which has resulted in greater investments (IP2: 390-397, IP2: 398-405, IP4: 60-74, IP6: 88-89). IP7 stated that IT has not significantly evolved over recent decades, exercising the same processes with slightly different tools (IP7: 153-163). IP4 said that, within the hotel industry, IT is regarded as a cost center, rather than an opportunity to improve guest interaction and behavior (IP4: 60-74), though it should be considered an integral part of an enterprise's health (IP2: 434-442).

Pressure and competitiveness

None of the interviewed experts have observed direct pressure on hotel companies to adopt blockchain technology (IP1:282-302, IP2: 383-384, IP3-442-446, IP4: 377-382, IP5a: 430-435, IP5b: 459-463, IP6: 248, IP: 220-229, IP8: 573-576), but the majority of the experts expected such pressure to increase in the coming years as blockchain technology evolved (IP2: 383-384, IP3-442-446, IP5a: 430-435, IP5b: 459-463, IP8: 579-584). One interview partner mentioned indirect pressure by executive boards to gain knowledge of blockchain technology, initiated by public discussion of the technology (IP3-442-446).

Blockchain hype

The majority of the experts have observed hype surrounding blockchain technology in recent years (IP2: 131-134, IP3: 109-120, IP4: 97-99, IP7: 17-22, IP8: 121-125). IP8 observed that, during this hype phase, most of the projects did not effectively utilize blockchain technology as an additional benefit (IP8: 121-125). In addition, IP8 stated that the discussion primarily concerned the technology itself, rather than the solutions it provided (IP8: 629-637). This was followed by a disillusionment phase, due to the lack of relevant adoption (IP4: 97-99, IP5a: 93-96). As a consequence of the hype, five experts observed that numerous executives and decision-makers have adopted a "wait and see" position to monitor further development of the technology and value-oriented application (IP3: 109-120, IP4: 382-385, IP5b: 459-463, IP6: 97-103, IP7:189-199).

Support infrastructure and vendor environment

IP7 observed that the lack of financing for hotel industry IT limits the growth of a supplier environment, as it is difficult for start-ups to receive funding (IP7: 136-152). From the perspective of a hotel executive, expertise on blockchain remains difficult to obtain due to a lack of relevant experts (IP7: 100-106). IP8 compared the current vendor environment with the dot com boom: players that survived the crash and disillusionment period are not large players (IP8: 132-140).

Regulatory environment

Four interview partners described legal and regulatory challenges as obstacles to adopting blockchain technology in the hotel industry (IP1: 252, IP2 236-241, IP3: 296-408, IP4: 377-382). IP3 described compliance with multiple countries' regulations as a challenge for potential global blockchain-related application (IP3: 408-415). Three interview partners further highlighted GDPR compliance, particularly the individual "right to be forgotten," as contradicting blockchain properties (IP2 236-241, IP3: 296-408, IP4: 377-382).

5.1.6 Blockchain terminology

Some experts described challenges around the terminology employed to describe blockchain technology. Specifically, two experts observed that the term "blockchain" is equated with or associated with bitcoin (IP4: 174-182, IP8:100-107). One expert highlighted the importance of discussing "private blockchains" or "public blockchains" rather than simply "the blockchain", due to their difference in design and features (IP2: 30-32). Following the technical evolution and enhancement of blockchain technology, one expert suggested categorizing blockchain types as versions based on their capabilities (IP5a: 96-108).

5.2 Results analysis

5.2.1 Introduction

This sub-chapter elaborates on the analysis of the interview results. The relevance of each influence on blockchain technology adoption, as defined in the research model, is presented. In addition, the findings are linked to the literature review. Areas of further research are then suggested and the limitations of the current work discussed.

5.2.2 Technology context

To comprehend the technology context of adopting new technology, it is important to understand not only the novel features of the new technology, but also the technologies already in use (Tornatzky et al., 1990). All the interviewed experts shared the view that the hotel industry is not advanced in terms of IT sophistication on IT adoption compared to other industries (IP1:312-327, IP2: 434-442, IP3: 376-381, IP4: 251-254, IP5a: 286-293, IP5a: 259-268, IP7: 119-135, IP8: 61-72). The experts further identified a number of issues around the state of IT systems, such as a lack of financing (IP1:312-327; IP4: 60-74, IP7; 136-152), a complex business model with numerous decision-makers (IP1:312-327, IP3-486-496, IP7: 119-135), a high barrier to substitute legacy IT systems due to lock-in effects (IP3: 236-246, IP5a: 259-268), and complex requirements due to geographic spread (IP5a: 259-268, P7: 119-135). Improvements in IT infrastructure were observed, mainly in the guest-facing area, while the underlying infrastructure remained unchanged in its basic functionality (IP7: 110-115; IP5a: 286-293, IP8: 27-36, 43-60).

These results aligned with the findings of previous research (Buhalis, 2003; Navío-Marco et al., 2018). It can therefore be assumed that the technology readiness of the hotel industry is too limited for the adoption of blockchain.

All interview partners applied a blockchain typology differentiation in at least private and public (IP1: 167-173, IP2: 248-253, IP3: 296-308, IP4:195-202, IP5a: 384-399, IP5b 380, IP6: 180-192, IP7: 256-262, IP8:516-523). Federated blockchains were also mentioned by three experts (IP1: 167-173, IP3: 136-142, IP7: 256-260) as a third typology. These differentiations follow a distinction also applied in the academic discourse (Mattila, 2016; Wüst & Gervais, 2017; Zheng, Xie, Dai, Chen, & Wang, 2017). When asked about the preferred blockchain type for application in the hotel industry, the results mirrored the plurality of opinions seen in the theoretic discourse: half the interviews adopted a purpose-driven approach. These experts stated that, depending on the requirements of the particular business requirement, both types could be used beneficially (IP2: 310-314, IP3: 296-308, IP5a: 384-399, IP6: 180-192). These respondents followed the methodology of Wüst and Gervais (2017) and categorized blockchain typologies based on the design properties. The results reflect a belief among experts that enterprises are more likely to adopt private than public blockchain typologies (IP6: 180-192, IP4:195-202, IP4: 186-194, IP8:516-523). This follows the Vukolić (2017) argumentation concerning the requirements of privacy, auditability, and governance for enterprises. It was somewhat surprising that no interview partner mentioned the implication of the underlying consensus mechanisms regarding various blockchain typologies when discussing their usefulness. In the literature, consensus mechanisms are considered an important determinant of the functional principles of blockchain applications (Mattila, 2016; Pass et al., 2017).

Most interview partners (IP1: 145-152, IP2: 68-78, IP4: 160-168, IP6: 158-162, IP7: 35-37, IP8:493-502) described transaction speeds as a technical challenge, particularly in public blockchains (IP2: 230-236, IP8:493-502), including in comparison to relational database solutions (IP1: 145-152, IP2: 68-78, IP4: 160-168, IP6: 158-162, IP8:493-502). Other challenges were observed in the areas of privacy, compliance, and data protection (IP1: 252, IP2 236-241, IP3: 296-408, IP8: 491-493); scalability (IP3: 284-289); and energy consumption (IP6: 162-166). The experts' observations match those noted in prior research; though the trichotomy described in the theoretic discourse was not mentioned by the experts (Buterin, 2015; McConaghy, 2016; Slepak, 2016).

Previous literature has emphasized the importance of interoperability between all hotel IT systems to maximize efficiency, safeguard competitiveness, and support a seamless and personalized guest experience through the full exploitation of data (Buhalis & Law, 2008; Buhalis & Leung, 2018). In contrast, the results here demonstrate that legacy systems still lack the ability to interoperate with new applications, subsequently impeding the adoption processes, including potentially for blockchain technology (IP1: 254-263, IP3: 228-234, IP5b: 304-312). In line with

the literature (Buhalis & Leung, 2018), some experts highlighted the requirement for standardization to safeguard interoperability, not only with legacy systems, but also among possible blockchain applications (IP3: 504-516, IP5b: 288-293, IP6: 226-228). In line with Peck (2017), the interview results also illustrate that legacy systems using relational databases are a competing technology for blockchain technology, particularly private blockchains (IP3: 267-271, IP6: 167-170). From a technical perspective, this can be explained by the similarity of private blockchain and relational databases (IP1: 178-185, IP7: 256-262) and a lack of perceived incentives to adopt (IP7: 289-291).

There are similarities between the interview results and those described by Mattila (2016) and Walch (2017) concerning the terminology surrounding blockchain technology. The experts confirmed a lack of conceptual clarity for blockchain technology in the discourse. The term “blockchain technology” is often associated with cryptocurrencies (IP4: 174-182, IP8:100-107), which subsumes the broad field of different typologies without further differentiation (IP5a: 96-108).

Blockchain technology was not considered ready for full integration in the hospitality industry (IP2: 347-348, IP3: 327-336, IP4: 271-274, IP5b 496-509, IP6: 97-103, IP8: 117-121). These findings are in agreement with previous research on the readiness for business application (Dennis & Owen, 2015; Lin & Liao, 2017; Malanov, 2017b; Valdes & Furlonger, 2017a; Wüst & Gervais, 2017; Zheng, Xie, Dai, Chen, et al., 2017). However, most experts were optimistic regarding future evolution of blockchain technology and expect advanced blockchain applications to emerge within a maximum timeframe of five years (IP7:189-199, IP2: 347-348, IP3: 327-336, IP4: 271-274, IP8: 117-121).

The theme observed in the theoretic discussion of blockchain technology’s disruptive character also prevailed in the results (Iansiti & Lakhani, 2017; Mattila, 2016; Mougayar, 2016; Valdes & Furlonger, 2017a). While some experts predicted blockchain technology would disrupt and transform businesses (IP3: 519-540, IP2: 177-182), others described the technology rather as a vehicle to improve existing processes via new IT (IP4:148-156, IP7: 220-236).

5.2.3 Organizational context

Similarities were noted between the observations of the experts interviewed in this research (IP4: 60-74, IP2: 434-442) and those described by Law et al. (2014) regarding the status of IT in the hospitality industry. Specifically, there was an agreement that IT is still frequently not regarded as an important contributor to economic success. This might constitute one reason for the low fund allocation for IT amongst hospitality companies, as compared to other industries (IP1:312-327; IP4: 60-74, IP7; 136-152).

A general theme in organizational challenges concerned limited knowledge and education in all industries regarding blockchain technology, including in the hospitality industry (IP2: 254-271,

IP4: 312-321, IP8: 324-328). This was aggravated by the fact that some experts described IT employees in line positions in the hospitality industry as less advanced in terms of know-how (IP2: 407-420, IP3: 463-476). The requirement for further education for not only IT responsibilities, but also for company executives regarding blockchain's foundational aspect, benefits, and business risks, was deemed an important step towards technology adoption (IP1: 239-246, IP2: 275-282, IP7: 185-188). Benbasat (as cited in Iacovou et al., 1995) observed a positive relationship between higher management's understanding of adoption's relative advantages and probability of resource allocation. The hospitality industry's lack of knowledge concerning blockchain technology's capabilities, as well as its business values and risks, is thus an obstacle to the adoption process (IP2: 254-271, IP4: 312-321, IP8: 324-328)

Beck and Müller-Bloch (2017) propose a theoretic framework with which to analyze the blockchain innovation process within organizations. Applying this three-step framework to the analysis of the interviews, it is clear that the majority of the hospitality industry can be classified as being in either the initial "discovery phase" or transition to the "incubation phase". While the "discovery phase" predominantly concerns knowledge of and education in the novel technology, the "transition phase" requires financial resources to fund the first steps towards adoption (Beck & Müller-Bloch, 2017). The results illustrate that both the literature and the experts evidence organizational limitations and obstacles within the hospitality industry in both thematic areas.

Due to blockchain's novelty and the low rate of actual adoption in the sphere of the experts, only isolated insights were obtained regarding the Tornatzky et al. (1990) human resources capability of determining the organizational context. In terms of firm size – and, consequently, the availability of resources – blockchain applications are more likely to be adopted in corporate hotel groups than in individual hotels (IP4: 218-225). In contrast to Beck and Müller-Bloch (2017), who observed fading boundaries between various departments and stakeholders in the adoption process, the experts expressed a view that blockchain-related projects predominantly require IT-department involvement (IP3: 342-352, IP8: 606-622).

5.2.4 Perceived benefits

As per Iacovou et al. (1995), the perception of benefits concerns the degree of recognition of a relative advantage of any technology. These advantages can consist of direct influence, such as cost savings, or indirect influence, such as enhanced or modified business processes or relationships. The results indicate that, in a hospitality context, blockchain technology has the potential to enable benefits in both areas. First, the results demonstrate that blockchain technology yields a direct influence, as per the Iacovou et al. (1995) differentiation: blockchain technology is a potential driver of increased efficiency (IP4:337-347, IP5a: 196-205, IP5b:206-219, IP6:-239, IP7:229-237, IP8: 163-171), leading to decreased costs (IP4:337-347, IP5a: 173-175, IP5b:80-83). This efficiency is achieved via a higher degree of automation and interoperability (IP4:337-347, IP5b:206-219). The indirect influence concerns how blockchain technology enables interaction

between individual partners in a distributed manner and without the need for an intermediary (IP1: 40-43, IP2: 63-68, IP4: 304-309, IP5b: 298-304, IP8: 152-155). The transparency, and thus accountability and integrity (IP1: 269-270, IP3: 296-302, IP4: 130-131, IP6: 239-242, IP8: 215-218), but also immutability (IP6:242-245, IP8: 155-159), further influence the interaction between business partners.

To capitalize on blockchain technology's full potential, any future application must involve changes and improvements to the underlying processes. Blockchain is ill-suited to replicate existing IT processes based on a novel technology (IP4:335-337), thus it is not suited for all business cases (IP3: 271-273, IP8: 126-127). The economic benefit of any adoption is a condition for any future blockchain application (IP7: 285-294).

The results of this study show that blockchain use cases in the hotel industry are in the areas of identity management (IP1: 67-73, IP2 187-198, IP4: 289-300, IP5a: 137-140, IP5b:69-75, IP6: 116-122, IP7:52-60), loyalty and rewards programs (IP1: 113-123, IP3: 163-194, IP4:122-128, IP5a: 137-140, IP6: 150-152, IP7:74-79), distribution (IP1: 123-135, IP2: 114-121, IP3: 195-203, IP4: 240-250, IP5a: 430-435, IP6: 109-116, IP7: 79-87, IP8: 237-250), financial transactions and payments (IP1: 78-79, IP2: 95-113, IP3: 207-220, IP4:132-141, IP5a: 137-140, IP7:88-92, IP8: 251-256), supply chain management (IP1: 82-107, IP4:227-231, IP5b: 85-88, IP6: 125-132, IP8: 163-171), and smart contracts (IP1: 137-139, IP2: 48-62, IP5a: 196-205, IP5b: 304-312, IP7: 32-35). These findings match those of earlier publications (Dogru et al., 2018; Önder & Treiblmaier, 2018). It is noted that the use case of reputation systems suggested by Önder and Treiblmaier (2018) and Dennis and Owen (2015) was not confirmed in this research.

Melián-González and Bulchand-Gidumal (2016) differentiated four areas of IT application in the hotel industry: operational productivity, employee productivity, customer service, and commercialization. The results indicate that blockchain technology, once it has achieved maturity and market readiness, could be applied in all the described areas within the hotel industry.

5.2.5 Environment and external pressure

There is agreement between the literature and the experts over the complex environment, requiring hotels to engage with multiple, independent stakeholders. From an IT perspective, Buhalis and Leung (2018) discuss the numerous direct and indirect partners using various applications and standards in basic business processes of any hotel, such as room reservations. The experts also considered the structure of the industry to be fragmented, requiring complex IT processes and architecture (IP5a: 123-127, IP5b: 298-304). From a customer perspective, IT is increasingly important for smooth, simple navigation by actors in the eco-system, providing guests with a personalized stay experience (Neuhofer et al., 2015). The complexity is intensified by the geographical spread of hotel companies, hence the obligation to comply with various countries' regulations (IP5a: 259-268, P7: 119-135). As a multitude of stakeholders, each of whom require

a certain degree of trust, are involved in various hotel industry business processes, the hotel industry has the potential to use blockchain technology in a beneficial way (IP1: 40-43, IP2: 63-68, IP4: 304-309, IP5b: 298-304, IP8: 152-155).

In terms of regulatory environment, the results of the current study are consistent with those of Lin and Liao (2017) and Valdes and Furlonger (2017a): the absence of clear legal rules and regulation are obstacles for further blockchain adoption (IP1: 252, IP2 236-241, IP3: 296-408, IP4: 377-382). There are similarities between the experts' attitudes to blockchain technology's limited ability to comply with European GDPR (IP2 236-241, IP3: 296-408, IP4: 377-382) and those described by Schwerin (2018). Blockchain has limitations when it comes to compliance with GDPR, particularly individuals' right to be forgotten. However, blockchain technology could improve individuals' sovereignty over the own personal data (IP5a: 140-147, IP6: 116-122), a view supported by findings from the European Parliamentary Research Service (2019). Jakobson (2019) and Wirth and Kolain (2018) also observe the potential for technological developments to enable compliance with GDPR regulations.

There is very little in the literature on the question of whether there is pressure for hotel companies to engage with blockchain technology. The results of this study show that, with the technology's current state of sophistication, there is no external pressure on hotel companies to adopt (IP1:282-302, IP2: 383-384, IP3-442-446, IP4: 377-382, IP5a: 430-435, IP5b: 459-463, IP6: 248, IP: 220-229, IP8: 573-576). However, pressure is expected to increase as the technology advances (IP2: 383-384, IP3-442-446, IP5a: 430-435, IP5b: 459-463, IP8: 579-584). This supports previous research by Buhalis and Law (2008) and O'Connor and Murphy (2004), who highlight the importance of investment in IT to maintain competitiveness. Law et al. (2014) also emphasize the pressure to engage with new technologies that could redesign current business processes. The highly competitive area of hotel room inventory distribution and the future design of distribution processes are of particular importance for hoteliers (IP5a: 206-214, 430-435), thus putting pressure on IT innovation.

The present findings are consistent with those of other research, which indicate that the blockchain technology vendor ecosystem is fragmented and not yet fully developed (IP8: 132-140; Mougayar, 2016). Due to an absence of system standards, interoperability between different blockchain types is not possible (Valdes & Furlonger, 2017b). With respect to blockchain technology applications designed for the hotel industry, a lack of funding was observed, leading to a limited number of vendors and start-ups in the field (IP7: 136-152).

6 CONCLUSION AND OBJECTIVE EVALUATION

6.1 Summary

This thesis has investigated how the four impact factors of technology context, organizational context, environment and external pressure, and perceived benefits are relevant to the hotel industry's adoption of blockchain technology. In the first step, the key terms were defined and discussed. Findings from the literature review then formed the basis for empirical research. As a survey instrument, a qualitative research method was selected in the form of eight semi-structured, problem-centered, and guideline-oriented expert interviews. The analysis and evaluation of the empirical data was conducted on the basis of Meuser and Nagel (1991). The interview results were then presented, compared, and analyzed. In the next step, these results were interpreted and compared with the literature.

Despite its exploratory nature, this study offers insights into the influential factors in the adoption of blockchain technology in the hotel industry. It is apparent that, in the technology context, the challenges for the adoption of blockchain technology are twofold. First, the technology is not yet regarded as fully market-ready for the hospitality industry; and furthermore, the level of IT sophistication in the industry is considered to impede adoption. This may be due, in part, to the hotel industry's organizational context. The research has shown that there is a tendency, in the hotel industry, to not regard IT as a key contributor for economic success, leading to lower resource allocation and know-how, in comparison to other industries. The results of the investigations show that an important step towards adoption initiatives is the improvement of hotel companies' inter-organizational know-how of the foundational aspects, benefits, and risks of blockchain technology, in particular on the executive level. Although blockchain technology is not considered fully mature and is seen to inherit technical limitations, it has significant perceived benefits, primarily in the areas of increased efficiency, disintermediation, higher degree of automation and interoperability, integrity, and accountability. Obstacles are seen in the areas of legal compliance, organizational resistance to change, integration capabilities, education, IT sophistication, and security. The most anticipated areas of application are around business processes identity management, loyalty and rewards programs, distribution, financial transactions and payments, and supply chain management.

Due to the fragmented nature of the hospitality industry, involving connections and interfaces with multiple external partners in the value creation process, this research supports the view that blockchain technology, once it has reached maturity, could be used beneficially in the hotel industry. However, this research has found that, in its current state of advancement, there is no external pressure on hotel companies to engage with the technology. This is indicated by the fact that the vendor ecosystem seems volatile and not fully developed and the legal regulations have not been clarified.

6.2 Managerial implications

The impact of disruptive technologies and the emergence of new players, such as online travel agencies, has had significant impact on hotel owners, operators, and stakeholders. This reflects the importance of innovation and transformation in the industry. The researcher observes strong managerial relevance, as enterprises are required to keep up with technological innovation processes to safeguard competitiveness. Hence, this research could support managers in understanding impact factors for decision-making around blockchain adoption. The findings of this research underline the importance of know-how in beneficial use of emerging technologies for not only those with IT responsibilities, but also at the executive level. Taken together, the findings suggest a role for company executives in promoting the relevance of both IT in general and emerging technologies, such as blockchain. Blockchain technology is considered to have enabling properties, though full utilization could be limited by hotel managers' attitudes.

6.3 Limitations

Several limitations of this research should be acknowledged. The researcher was limited to analyzing the influencing factors in blockchain technology adoption at an early stage in the maturation of the technology, with few actual adoptions having been realized in a hotel industry context. As with many adoption models, there is a risk that other important factors have not been included in the framework. In addition, the scope of the research was limited by the availability of interview partners with expert knowledge in both the hotel industry and blockchain technology. Before the interview data were gathered, the experts and the researcher engaged in a workgroup on the research topic. Although the interview results here show a plurality of views and perceptions, the risk remains that the output of the workgroup influenced the individual experts' responses.

6.4 Future research

Using a broad, exploratory approach, this research is among the first to investigate the factors influencing the adoption of blockchain technology in the hotel industry. As the technology advances, future research should focus on the identified, individual impact factors in more depth. Due to the infancy of the technology and the limited amount of literature gathered from the hotel industry context, the researcher decided to investigate blockchain technology in a broader sense, rather than focusing on certain blockchain typologies. As blockchain typology may vary significantly in terms of properties, design and functionalities, the question arises as to which architecture should be considered for the particular business contexts. In addition, it should be considered how potential blockchain application could affect existing IT strategy plans for hospitality companies and the expectations of business partners and clients. Concrete evaluation of the effectiveness of available blockchain applications for the hospitality could shed more light

on this field for practitioners. There is also a need for future research to consider whether the right skills are in place in the hospitality industry for blockchain development and deployment.

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APPENDICES

Appendix 1: Interview Guideline

INTERVIEW GUIDELINE			
No.	Category	Sub-Category	Question
	Introduction	Introduction	
	Socio-demographics	Socio-demographics	Could you let me know your current company as well as your previous employer?
	Socio-demographics	Socio-demographics	In which position have you been working for these companies?
	Socio-demographics	Socio-demographics	How long have you been in these positions?
	Socio-demographics	Socio-demographics	What are your responsibilities in your current position?
	Socio-demographics	Socio-demographics	What is the size of your current employer / company? (Size of hotels operated)
1	Technology	Experience	What are your experiences with blockchain technology so far?
2	Peceived Benefits	Use cases	In your opinion, what are the future applications of blockchain technology?
3	Peceived Benefits	Use cases	Where do you think blockchain technology can be used in the hotel industry?
4	Peceived Benefits	Benefits	In your opinion, what are the main benefits of BCT in the hotel industry?
5	Technology	Difficulties	What do you think will be the technical difficulties in the adoption of BCT in a hotel company?
6	Technology	Types & Supplier variety	Currently there is a big variety of different Blockchain technology types and suppliers: In your opinion, which types are most useful in the hotel industry.
7	Technology	Readiness	In your opinion, how ready is BCT for the application in hotel companies?
8	Organization	Strategies & Support	In your opinion, which organizational strategies are important to adopt BCT in a hotel company?
9	Organization	First Steps	In your opinion, what would be the best first step to adopt blockchain technology into a hotel process?
10	Organization	Barriers	In your opinon, what are the main barriers to adopt BCT in a hotel process?
11	Environment & Pressure	Reason for engagement	From the perspective of a hotel company, which motivations do you see to adopt blockchain technology?
12	Environment & Pressure	External Pressure	In your opinion, what kind of pressure is there for a hotel company to adopt blockchain technology?
12	Environment & Pressure	External Pressure	<i>What kind of pressure is there from competitors?</i>
13	Hotel Industry IT		May I ask you for your perception of IT and the genral adoption of IT in the hotel industry?
13	Open	Open	Is there anything else you would like to add to the topic of application of BCT in the hotel industry?

Appendix 2: Original Interview Responses

Interview 1

1 Interview 1

2 I:

3 For the interview the questions open ended, in case you have

4 any questions or something is not clear, just let me know,

5 ask any time.

6 IP1:

7 Okay.

8 I:

9 So please before we start off I would like to learn a bit

10 about your background. Could you let me know the company you

11 currently work for and the previous job you had.

12 IP1:

13 Okay, my name is Marco Correia, I am a Portuguese citizen, I

14 am 49 years old, I have 31 years of hospitality background

15 of which 35 plus on the technology side roughly. Currently I

16 am an entrepreneur, I run two companies of my own, I run a

17 consulting business called T-Hotel Hospitality Knowledge,

18 that is a consulting firm dedicated to digital marketing in

19 one business area and the other business area is strategic

20 ideas advisory for hospitality companies and travel

21 companies. The other firm is a company called Travel Tech

22 Nest that provides software development and software

23 integration services for travel and hospitality. Previous to

24 that I was working on high end luxury. I was head of IT/CIO

25 for (Orient Express Hotels/Belmond. I was in the company for

26 doing the re-branding and I was the global leader for all
27 the IT operations in the company doing the software. I
28 didn't start as the CIO, I had several roles - I started as
29 a regional director for Southern Europe and rose to EMEA,
30 then Global Director of IT operations and finally Head of
31 IT/ CIO.

32 I:

33 Okay, interesting curriculum, interesting, to get a bit more
34 into the topic, could you tell us what was your experience
35 with blockchain technology so far?

36 IP1:

37 Speaking as a professional, I have run several let's say
38 pilot steps, pilot cases, that never moved to more than
39 results better, than the testing, as in a proof of concept,
40 although there was no use potential on blockchain. There is
41 a use potential on blockchain for – let's say as a whole -
42 there's the technology in the whole of many sectors and many
43 industries, including hospitality and travel. The level of
44 maturity of the technology just I would say recently is
45 about to reach a level of maturity that we can start the
46 processes, ready, number 1. Also there is... we start to have
47 acceptance by the economic system, by the economic firms, by
48 the established companies, about the uses of the technology
49 because a kind of a geek only technology that started to
50 move to the mainstream. It's a bit like Linux, let's think
51 about Linux and the open source movement. When it started it
52 was a bit like an altruistic movement, now the open source
53 is the core of the internet, right? But it took a while

54 before it started to get accepted by the major players and
55 now they... nobody discusses the value and importance of
56 open source software. I think exactly the same is happening
57 with blockchain.

58 I:

59 Okay, you already mentioned a bit about applications so my
60 next question would be, in your opinion what are the future
61 applications of blockchain technology?

62 IP1:

63 In hospitality or... ?

64 I:

65 In general.

66 IP1:

67 In general, I would say one of them will be identity
68 management, it will be very important in terms of identity
69 management, especially because our identities are becoming
70 more and more digital so there is a need to ensure that your
71 digital identity is worked down and proof... and needs to be
72 verified and there needs to be a distributed system to
73 justify that depth, that level of distribution. I would say
74 any financial transactions, any system that involves
75 multiple parties, I'll say contracts, think about any... I
76 would say generally speaking any contract that involves
77 multiple parties to ensure that the authenticity of the
78 contract and the integrity of contract is kept. This can go
79 from financial applilaction to legal from something as
80 simple as a small loan to something as complex as a
81 commission OTA versus hotel chain agreements for instance,

82 that is one thing. And also in shipment, in physical goods
83 where you need to verify the integrity of the goods. For
84 instance, one of the cases that I mentioned that I used as a
85 proof of concept - that was an interesting case - well I
86 left the company so I did not know if that moved on from
87 proof of concept to production but the outset was a
88 promising one. We were running beside the Peruvian
89 hospitality technology because we had trains operations in
90 Peru and Peru is one of the largest copper producers in the
91 world. We had a business of our trains, because we had the
92 track for touristic trains, so we could also cargo trains on
93 the track and we were using blockchain technology. So
94 basically every time a cargo was put on a container and the
95 container had let's say X amount of tons, let's say 10 tons,
96 and it was filled and a software key, this was important for
97 the let's call it a high OT, a high OT device, that had a
98 blockchain software component meaning that from the moment
99 that that device was logged down and it was moved from the
100 mine to the train, from the train to the ship, from the ship
101 to its final destination in the factory where it will be
102 formed into wires or whatever, that blockchain, when it was
103 filled that was the mechanism of authentication that was
104 used to verify that the 10 tons were still the ten tons was
105 the blockchain mechanism, to guarantee the integrity of the
106 container because copper... there are a lot of people stealing
107 copper because it's quite a valuable metal.
108 I:
109 That's interesting. Now we talked a bit about applications

110 in general so where do you think blockchain technology can
111 be used in the hotel industry?
112 IP1:
113 Loyalty programs, especially multi-brand loyalty programs, I
114 think we are seeing a trend that loyalty will disappear from
115 being only the loyalty programs for only Marriotts or only
116 Hiltons and we are going to see multi brands. For instance,
117 let me give you an example: Everyone speaks about Amazon,
118 now coming to your topic, there's a lot of hospitality,
119 there is a big discussion, right? So how do you ensure that
120 your Amazon Prime Points are always there when you exchange
121 them for AirBnB or Hilton or God knows what, that your
122 balance always stays correct? That is one area where I see a
123 lot of opportunity. The other area is on the contracts, on
124 pricing, on pricing integrity between hotels and OTAs. It is
125 one of the big problems and that is seldom being heard is,
126 for instance, there are prices, especially wholesale prices,
127 that are dealt with OTAs or with mixed rights, this price is
128 not to be sold online or to be sold outside of the package,
129 and then suddenly the OTA is in trouble and they post that
130 price publicly on the internet, typical case...
131 and you just find it later. If there is a sealed blockchain
132 on that contract that is connected all the way through the
133 distribution chain, there too blockchain will prevent that
134 happening because there is a seal that will prevent the
135 publishing of the contract, of that price, to the market.
136 That's another application of blockchain where I see the use
137 in hospitality, just two examples. As I mentioned, the

138 contract level I see that is one of the biggest uses of

139 blockchain.

140 I:

141 Okay, so what do you think will be the technical

142 difficulties in the adoption of blockchain technology in the

143 hotel companies?

144 IP1:

145 I think generally speaking the biggest difficulty is with

146 the processing because transactions have to happen fast and

147 when you have multiple nodes on the network checking the

148 validity or the token, writing things, it is an operation

149 that usually like think about a credit card transaction now

150 that is 5 milliseconds, if it takes 10 seconds, that will be

151 not acceptable. That is really still the processing power,

152 the technical will be the speed of transactions and then the

153 second one will be the multitude of protocols because with

154 the blockchains we already start to see variances on the

155 blockchain technology and that will... no, the lack of

156 standards, if there is no standard there is no

157 interoperability between the different blockchain protocols

158 that can be an issue and that is the technical part. Then

159 there is going to be the old, the biggest problem of all,

160 that will be cultural, the adaption.

161 I:

162 Okay, you mentioned already that there is a big variety

163 of different blockchain technology types and suppliers, in

164 your opinion which types are the most useful in the hotel

165 industry?

166 IP1:

167 That is... I don't see any one prevail at the moment. I

168 don't see, to be honest, at the moment I cannot say. *[Pause*

169 *13:14 to 13:23]* I'll say, if you're asking about, probably

170 the federated or private that's different, I would say, as a

171 principle, blockchain is public and it is all about

172 cryptocurrencies they are all by the public blockchains,

173 Bitcoins and Ethers and all that stuff. My question here

174 is will that survive forever? Are we going to move to a

175 let's call it the internet of blockchains? I don't have any

176 answer for you. Are we going to see things moving to a

177 consortium like R3 or like a consortium of blockchains?

178 Maybe, maybe that's what is going to happen. I think it is,

179 to be honest, I have no big faith in the private blockchains

180 like - what's it called, Monax - I don't have a big faith in

181 all those because I think these guys are trying to control

182 something that is already wide open. What I don't know

183 between the federated model and the public chain models, I

184 don't know which one is going to win. I would say preferably

185 public but I might be wrong.

186 I:

187 Okay, in your opinion how ready is blockchain technology for

188 the application in hotel companies?

189 IP1:

190 Technically speaking it's ready? Technically speaking it is

191 ready in... let me correct myself, the network is not ready,

192 the technology is ready, that is ... let me rephrase that, it

193 is again the problem of speeding up processing and that is

194 still an issue. Maybe source for some back office operations
195 might be already accessible, not for commission handling, it
196 is not a guest-setting operation say for commission process
197 intakes, no, 10 seconds or 20 seconds, who cares? It's not
198 the end of the world but when you are thinking about for me
199 reservations, guest transactions, still we are starting to
200 see hotel groups and OTAs starting to assess payment in
201 cryptocurrencies, that means that there is a certain level
202 of assessments because at the end of the day cryptos are
203 available blockchain technology, but if it is like fully
204 business ready? I don't think so, not yet, because of speed
205 up processes, that's the goal, only that.

206 I:

207 Okay, now making a little move into the organization itself,
208 in your opinion which organization strategies are important
209 to adopt blockchain technology in a hotel company?

210 IP1:

211 Sorry, can you repeat the question, I didn't understand it.

212 I:

213 Which organizational strategies are important to adopt
214 blockchain technology in a hotel company?

215 IP1:

216 Oh, organizational changes! I think, first of all it is
217 risk, that is an appetite for risk. There is a certain risk
218 involved here. There is, I would say, I think that starts at
219 the top, the executive level, the C-level, and I think there
220 is too big a... I think there are three major areas that
221 have to be sponsored: IT, of course, technology: Finance

222 because there will be all these financial applications: And
223 legal/compliance. I would say that it would be easier to
224 implement blockchain in a privately held company than in a
225 publicly held company because of the compliance issues and
226 looking at our industry model, a company that is
227 simultaneously owner-operator will be much easier to act
228 than on the usual model of operator only versus franchisee
229 owner... when there are multiple people that run the hotel or
230 are stakeholders for demanding about the hotel.

231 I:

232 Okay, in your opinion what would be the first step to adopt
233 the blockchain technology in a hotel process?

234 IP1:

235 Education.

236 I:

237 Pardon?

238 IP1:

239 Education, educate people first because if you don't get
240 education then people won't have clue as to what you're
241 talking about and it will not happen. That would be the
242 first step and the second would be a very small, I think in
243 emerging technologies, the biggest error that you always can
244 do is to try to start big. You start small with PoCs and
245 small non-business physical projects to gain confidence and
246 then traction and then start to move from there.

247 I:

248 Okay, so maybe this is like a repetition but what are the
249 main barriers to adopting blockchain technology in a hotel

250 process?

251 IP1:

252 Again, compliance, I would say compliance is a big one. The

253 resistance to change, ... cultural, and also availability of

254 the technology or... let me correct myself, the integration

255 capabilities of the current hospitality platforms. You can,

256 in fact, you can want to implement the technology, you can

257 have let's say serious sponsorship, you can, in terms of

258 compliance, have no problems implementing but sadly you go

259 and you have a PMS or a point of sale or a system that is

260 ten years old and sadly you have to invest... you have to

261 replace it. Integration capabilities of that system do not

262 allow implementation of blockchain. That can also be big

263 sometimes, the risk of obsolete technology.

264 I:

265 From the perspective of a hotel company which motivation do

266 you see to adopt blockchain technology?

267 IP1

268 Cost reductions, cost reductions by removing the 'man in the

269 middle' in several processes; risk reduction by sharing

270 integrity of operations and contracts. Also I would say in

271 terms of - I don't see more on the revenue side, it's more

272 on the costs and on the risk side, basically those are the

273 biggest opportunities I see.

274 I:

275 Okay, in your opinion what kind of pressure is there for

276 hotel companies to adopt blockchain technology?

277 IP1:

278 Sorry?

279 I:

280 What kind of pressure is there for hotel companies to...

281 IP1:

282 Not a lot at the moment, there is not a lot, I was last week

283 or two weeks ago at HITEC, the biggest technological trade

284 show in the world for hospitality technology, and the

285 pressure is... no, there are other areas of pressure, like

286 say IoT, automation is a big area of pressure to cut cost

287 reduction. Blockchain there is not a massive pressure or,

288 say, there is an indirect pressure, there is an indirect

289 pressure by the acceptance of alternate methods of payment.

290 That is let's not say you have to blockchain because of

291 little contracts or because of guest profile integrity and

292 so on, but as you know especially because of the rise of the

293 Chinese market - it's the number one market and those

294 clients they bring on their alternative payment methods and

295 many of these payment apps - I'm not thinking about UnionPay

296 or Alibaba but I'm thinking about integrated payments in

297 their own phone based or on the NCS or... NCS basically, they

298 are based on paypal pay, googlepay, and now let's see what

299 happens with Huawei and Samsung. All these mobile device

300 payments they tend to move towards blockchain technology to

301 guarantee integrity. That is the kind of pressure that is

302 there, extreme pressure there isn't.

303 I:

304 Before you mentioned, when we talked about technical

305 difficulties, you mentioned also cultural challenges within

306 a company.

307 IP1:

308 Yes.

309 I:

310 Could you be more specific?

311 IP1:

312 Hospitality as an industry has always been slow to adapt

313 technology, it is basically... as a joke we would say that

314 basically we always love to be between second and last.

315 Until there is established technology and there are other

316 industries using it in everyday practice there is a typical

317 resistance from hotel owners, hotel operators, to that

318 technology. We don't have a reputation of being the first in

319 line for any technology. That has to do with the cost of

320 installation. Now technologies are emerging, the issue is

321 they are more expensive and it also has to do with the pace

322 of innovation. Hospitality is not one of the industries

323 where you see the first innovations showing up. Within the

324 tourist industry you see innovation coming much faster to

325 other areas like theme parks or airlines or cruise ships

326 than to hotels. Those are the cultural points I was

327 mentioning.

328 I:

329 Absolutely, we are almost at the end of the interview, I

330 wanted to ask you if there is anything you would like to add

331 to the topic of application of blockchain technology in the

332 hotel industry which was not covered by my questions in any

333 form?

334 IP1:

335 No, I would say that I think there one point I think that
336 your analysis should consider is the role of the industry
337 standards organizations on the implementation of blockchain
338 in the industry, I think. At HTNG and OTA, a topic what was
339 the next generation of open travel alliance, they have
340 already developed a very considerable work on the areas of
341 blockchain and are trying to bring standards to the
342 industries so basically the adaption is streamlined and then
343 there is a special standards embedded to integrate those
344 technologies into the systems so we don't start to face
345 different protocols, different methods of integration, and
346 that will be an enabler, a fast route, for those adaptations.
347 I think that is something that you should consider also in
348 your research, is what will be the role and how important
349 and how much attention and effort has been worked by these
350 industry organizations.

351 I:

352 Absolutely, that was really interesting I have to say, I
353 think we covered a lot of topics. I am having some
354 difficulties in my research too because it is such a wide
355 field with so many possible applications.

Interview 2

1 I So be careful what you say now. So, before
2 we start off, I would like to learn a bit about your
3 background. Could you let me know your current company as

4 well as your previous employer, your previous job you did?

5 IP2: I don't have a current company. I work

6 independently. I'm basically retired from full-time

7 employment, but I sit on several boards of directors and

8 advisory Boards of companies in the hospitality technology

9 space, including one in the blockchain space.

10 I: Okay. Okay. So let's just deep dive into

11 blockchain technology now. What are your personal

12 experiences with blockchain technology, so far?

13 IP2: I can't say that I have personal experiences.

14 I've studied it as a technology. I've have analyzed how it

15 could support various activities within the hospitality

16 community, done some analysis on where the value drivers

17 might be in doing that. Monitored the progress of the

18 technology itself. But I'm not a practitioner. I stopped

19 writing code 25 years ago and haven't tried again since.

20 I: Okay. So you touched already a bit about

21 applications. So in your opinion, what are future

22 applications of blockchain technology in general?

23 I2: In general or in hospitality?

24 I: So a different question will be like in general, whatever, if it's, I don't know,

25 banking or payments. So just in general. And the question afterwards

26 would be in detail about hotel industry.

27 I2: Okay. And you're cutting in and out again,

28 it's quite difficult to hear you, but I think I got that.

29 I: Okay.

30 I2: I would differentiate between public

31 blockchains and private blockchains, or if you prefer,

32 distributed ledgers that are not public blockchains. I think
33 public blockchains have application anywhere where there is
34 now a requirement for a trusted intermediary. So any
35 financial transaction is obviously one where typically the
36 banks or other financial intermediaries have played that,
37 the role of the trust provider. I think you can certainly
38 look at that any process of brokering a product between a
39 buyer and a seller where sales aren't always direct, there's
40 an intermediary involved, and that would be a potential
41 application. Because the intermediary often provides trust,
42 so that the seller knows they're going to get paid and the
43 buyer knows they're going to whatever it is they purchased.
44 So whether it's tickets or consumer goods or hotel
45 reservations, or anything else. I think there's application
46 there. Not necessarily for every transaction but for the
47 ones where trust is needed.

48 I2: Yeah, I think blockchain has applications for
49 some situations where there's conditional transfer of value
50 based on the performance of certain things or the occurrence
51 of certain events. So if, for example, insurance policies,
52 you could see some of those having a good value for
53 blockchain because it gets the insurance company out of the
54 business of having to have somebody tracking whether or not
55 the event has occurred that would trigger the payment of
56 insurance premium. I'm thinking about things like crop
57 insurance now, would be a good example, where it's based on
58 weather that can be measured and the occurrence of the
59 certain lack of rain, or temperature range, or whatever

60 could trigger an insurance payment without requiring any
61 labor or effort. So the smart contract concept can be
62 applied in a lot of situations like that.

63 I2: Distributed ledger technology I think is, it
64 has probably a lot more applications where you have need for
65 databases to be somewhat loosely coordinated across multiple
66 locations. Where for performance or resilience reasons or
67 other reasons, you want to not have a database just in one
68 place but have it in multiple places. On the other hand,
69 distributed ledger tends to not work as well when there is a
70 requirement of immediate updates. So sometimes for things
71 like reservations, for example, it doesn't work as well,
72 because there's not really a guarantee that what you're
73 looking at reflects all the latest transactions. Whereas a
74 public blockchain will allow you to determine for certain
75 that you've got that room and somebody else didn't book it
76 before you. May take a little longer to get the
77 confirmation. So I think that distributed ledger technology
78 isn't new, and to me isn't all that interesting.

79 I2: I think the private blockchains that use the
80 blockchain technology can deal with the concurrency issue,
81 and making sure that if there's one thing left, that only
82 one person gets it, which straight distributed ledger
83 technology without the encryption layer of blockchain can
84 do. So the private blockchain layers that encryption layer
85 on top of what a DLT might have, and therefore provides
86 that. But just doesn't provide the layer of trust that a
87 public blockchain does. And that's not always important.

88 D. Hochschwarzer: Okay. So very interesting approach. So
89 where do you think blockchain technology can be used in the
90 hotel industry?

91 I2: I think there are a number of use cases that
92 can make sense for it, and probably a number of others that
93 people that have tried to say would make sense, but that may
94 not really make sense.

95 I2: I think one obvious area is in the payments
96 arena. There's a lot, particularly the B2B payments arena,
97 there are a lot of transactions that occur between, let's
98 say, corporate clients or tour operators, wholesalers, and
99 travel suppliers, hotels obviously being a major component
100 of that. And they can be fairly complex transactions. They
101 often can benefit from the presence of a clearinghouse, just
102 in a traditional form, that will take credits and debits and
103 offset them and then balance them across potentially
104 multiple payers and multiple payees. The blockchain can
105 simplify all of that quite a bit, while providing trust and
106 avoiding the margins of the intermediary. I think when
107 you're looking at corporate settlement, or settlement of
108 bulk accounts, corporate, wholesaler, et cetera, those are
109 often done by credit card, and credit card will have fees
110 associated that can range up to two and a half or three
111 percent. I think those are areas where the principal value
112 that the credit card is providing is trust, and blockchain
113 could deal with that.

114 I2: I think in the reservations space, blockchain
115 could be used to enable suppliers to more definitively

116 state, "If you want my content, you want my availability, my
117 rates, my inventory; if you want to send me a booking, if
118 you want to make a payment to me, this is how you do it."
119 The blockchain can provide a absolutely guaranteed record
120 that says that the way you get content for this hotel is
121 this way. The way you send a booking is this way. And you'll
122 know that if you use that way, and particularly if there's
123 public APIs that are supported by the blockchain, then it
124 can make it much easier for somebody who wants to put up a
125 booking platform, whether it's consumer or business or
126 whatever, to be able to establish the kinds of relationships
127 they need with hotels. I think that's still a concept that
128 hasn't really been proven out yet, but I believe it probably
129 can happen, and may very well happen within the next few
130 years.

131 I2: That there was lots of hype early on in the
132 blockchain world that blockchain-based reservations would
133 displace the online travel agencies and eliminate the high
134 commissions that they charge. And I never thought that there
135 was any validity to that argument. Because the reason that
136 the OTAs charge high commissions is that they spend tons and
137 tons of money creating an environment that consumers want to
138 come to. And that many customers will come to before they
139 would ever go to a hotel's own website or a brand's website.
140 They own the customer. They own the customer, because they
141 have what the customer wants, which is a wider choice of
142 hotels for customers who are not particularly brand-loyal.
143 So the idea that a blockchain-based distribution system

144 would replace the OTAs, I think, was just a silly dream that
145 was never going to happen.

146 I2: On the other hand, I think that a
147 blockchain-based distribution system can create a lot more
148 competition in the online travel space, by making it easier
149 for a company, whether it's a big company like Amazon, or a
150 small startup that has some particularly, a particular angle
151 on travel, or a niche that it wants to fill, to get
152 inventory from a wide variety of properties without having
153 to enter into contractual relationships with them all or
154 build custom connectivity to them all. That's still some
155 period of time off, but I know that's a model that some of
156 the companies that are playing in the blockchain
157 distribution field are following.

158 I2: I think that there's some areas in particular
159 where there are bigger opportunities for blockchain. One of
160 them, I think, is corporate bookings for hotels. Corporate
161 bookings today typically, if they're done electronically,
162 they're generally done through the global distribution
163 systems, and the reason for that is that's the only
164 environment that has both a wide variety of hotels that most
165 of the major hotels that people, business travelers, would
166 want to stay in, listed. And has the ability to discriminate
167 in terms of the rates to honor corporate arrangements or
168 travel agency arrangements, where a particular company or
169 travel agency or combination is entitled to get a particular
170 rate, but no one else is allowed to see that rate. That
171 means what they are enforcing is a knowledge of that the

172 identity of the person booking is someone who is entitled to
173 see and book a particular discounted rate. And that can be
174 done very easily on a blockchain. Right now the global
175 distribution systems are charging fees, probably somewhere
176 between \$7 and \$10 to do that booking.

177 I2: And really, all they're doing is ensuring
178 that the only authorized bookers see that rate, which is
179 something a blockchain could do basically for zero cost, or
180 whatever the cost of putting a transaction on the blockchain
181 is. Which is pretty minimal. So I think that's an area that
182 could be disrupted. Will it mean that everything goes to
183 blockchain? Maybe not. Will it mean that there's downward
184 pressure on the prices that are charged by the GDSs? Quite
185 possibly.

186 I2: Yeah, there are a few other areas where you
187 could consider using blockchain. I'm less convinced that
188 they're as viable, but in terms of identity management,
189 being able to determine that somebody walking into a hotel
190 and checking in on the guest app and using their thumbprint
191 or taking a picture of themselves is now totally
192 authenticated is that person. Well, blockchain can do that.
193 But there are challenges to the hotel industry trying to do
194 that on its own. I think that's something that's more likely
195 to happen at the governmental or travel industry level, or
196 perhaps some combination. And then perhaps hotels can take
197 advantage of it, but I don't see it as something that hotels
198 can really take advantage of today.

199 I2: I think when you look at physical security

200 within a building, that's another area where you want some
 201 assurance that the person who's presenting a key card at a
 202 guest room door is in fact the occupant of that room, and
 203 not somebody who picked the card up somewhere in the hall
 204 and happened to know which room it went to. So is it worth
 205 the additional security by putting in some additional
 206 identity management through the blockchain to do that? I
 207 think that the, I'm not sure the cost effectiveness is there
 208 for that today. If 30% of rooms were being broken into, it
 209 would be different. But that's a pretty trivial problem
 210 today.

211 I: Okay. So we talked a lot about application
 212 and what blockchain might be. I would like to switch now to
 213 some challenges that the technology is facing. So what do
 214 you think will be the technical difficulties in adopting
 215 blockchain technology in a hotel company or the hotel
 216 industry?

217 I2: I think that that's really too general a
 218 question. You'd have to say technology challenges in
 219 adopting it to do what? And there's so many different things
 220 you could try to do with it. I'm not sure I can answer that
 221 question.

222 D. Hochschwarzer: Okay. So in general, the technology
 223 itself, where do you see technical difficulties? Or would
 224 you perceive it as a market-ready technology?

225 I2: There are challenges. I don't know that I'd
 226 call them technical difficulties. The technology does what
 227 it's supposed to do, and what it's documented to do, by and

228 large. There are certainly people out there and resources
229 out there to figure out how to implement it. I don't really
230 see that as a problem. There are some inherent challenges in
231 the way the technology is designed, in terms of if you're
232 talking about a public blockchain, most of them have some
233 challenges in terms of the time required to confirm a
234 transaction. They may have challenges with costs or
235 capacity, or the ability to deal with high-volume, rapidly
236 changing technologies. Public blockchains have issues with
237 dealing with personal information, because they're
238 permanent, and there's no way for a company who's added a
239 record about a person to a public blockchain to honor the
240 right to be forgotten, as required by GDPR and some other
241 regulations.

242 I2: And there are technical solutions to some of
243 these things that have people that figured out ways to use a
244 blockchain without necessarily having all of these issues.
245 But it often means not doing certain things in the
246 blockchain that you had originally envisioned doing on the
247 blockchain, but rather doing them in an off-chain database,
248 or using some other technology approach. The technology, and
249 those limitations vary depending on which ecosystem of
250 blockchain you're talking about, whether it's public or
251 private. And if it's private, how it's been designed. And
252 sometimes they're relatively trivial limitations. And
253 sometimes they're significant limitations.

254 I2: I think probably the bigger issue is not the
255 technical limitation, but the ability of company management

256 to understand what the risks and what the value proposition
257 are of blockchain. And there's a lot, frequently, a
258 disconnect between technical people who are saying this
259 technology can do this, that, that, and something else, and
260 the business people who are looking at it not just as a
261 technology but as something that is supposed to be providing
262 business value and limiting business risk. Those
263 conversations have not gotten very sophisticated. I mean,
264 it's not that different than where mainstream IT might have
265 been 40 or 50 years ago, when senior management just didn't
266 understand a lot of the issues that the technical people
267 understood. But the technical people didn't understand the
268 business issues that the business leaders were trying to
269 communicate. So that's not really a technology limitation as
270 much as it is a sign of the immaturity of the acceptance of
271 the technology within the broader business community.

272 I: Okay. Okay. Interesting. So in your
273 opinion, what would be the best first step to adopt
274 blockchain technology? Let's say, in a hotel process?

275 I2: I would say that the only first step I would
276 really be looking at right now is to have one, or depending
277 on the size of my IT department, maybe have one or two
278 people spend a little bit of time in the blockchain world,
279 learning some of the key tools, maybe doing a pilot project,
280 or a hackathon type of thing to get some exposure to it. And
281 have a little bit of expertise on your staff that you can go
282 to to ask questions. I think otherwise, I think the hotel
283 industry is not well positioned to be an adopter of

284 blockchain. I think they're going to depend on third party
285 vendors to do that. So that the advantage of having somebody
286 who understands blockchain is, at least when you're talking
287 to a third party vendor, you can have somebody who can ask
288 some technical questions that might lend some perspective on
289 how realistic a particular solution is.

290 I2: But yeah, I would say that the vendor
291 community is in a much better position to actually start
292 doing things than hotels are. I can't think of a single
293 hotel company that I would counsel to actually start trying
294 to do things in blockchain itself. Unlike airlines, by the
295 way.

296 I:Okay. So currently there is a certain
297 variety of different blockchain technology types and
298 suppliers. In your opinion, which type would be most useful
299 in a hotel industry context? So we touched on this a bit
300 before when we talked, when you talked about private and
301 public blockchain?

302 I2: I don't think there's a single answer to
303 that. I would have to answer that in the context of a
304 particular application.

305 I:Okay. Okay. So let me specify a bit. How
306 would you describe private versus public blockchain in a
307 hotel industry context?

308 I2: Again, it would depend on the application.

309 I:Would you see use ... Okay.

310 I2: There is no single answer to that. I would
311 look at the, what's the problem set that you're trying to

312 solve with a particular application, and what are the
313 advantages and disadvantages of any particular blockchain
314 solution to that.

315 I:Okay.

316 I2: And I think you're going to get a different
317 answer depending on what the application is.

318 I:A duplicate. Okay. Okay. So in your
319 opinion, what do you think are the main barriers to adopt
320 blockchain technology in a business or hotel process?

321 I2: Probably the biggest barrier is it has not
322 reached critical mass. Which means that anything you do with
323 blockchain, you're pretty much doing on your own. And most
324 of the usecases where blockchain seems to make sense, are
325 not ones where you're doing something on your own, but ones
326 where you are in a many-to-many relationship between say,
327 suppliers and distributors, or customers and merchants.

328 I2: To me, the basic issue at this point is kind
329 of like the question you would have asked at the very
330 beginning of when the first telephones were introduced,
331 which is, what are the barriers to adoption of telephones?
332 Well, the biggest answer is, nobody else has one. So there's
333 nobody to call. And eventually that changes if the
334 technology has value, and I think it will change with
335 blockchain. But there's lots of people who figured out how
336 to do lots of interesting things with blockchain in this
337 industry, but they haven't found anybody to do it with. So I
338 think that is, by far, the biggest one.

339 I2: On the technology side, there are challenges

340 with the public blockchain in terms of the speed of
341 transactions, the ability to confirm things quickly, the
342 unpredictability of the costs to a degree because of the
343 fluctuation in the value of the cryptocurrencies. I don't
344 think those things alone are the biggest barriers, but they
345 are barriers. And those, mostly, I think will, there'll be
346 technological advances over time that will address those
347 issues. And they'll probably get solved before they really
348 need to be solved from an adoption standpoint. Because as I
349 said, the bigger issue is just getting a critical mass of
350 other people using it.

351 I2: About the only thing you can look at where
352 there was a critical mass that made sense, and it was still
353 not very large, was Bitcoin. And Bitcoin's been around now
354 for 11 and a half years. And it probably just got critical
355 mass like a couple of years ago.

356 I1: So from the perspective of a hotel
357 company, which motivations do you see to adopt blockchain
358 technology?

359 I2: Well, I would say for most hotel companies,
360 none. They're going to wait until they see a reason to use
361 it.

362 I:Okay.

363 I2: There are a few hotel companies that I have
364 seen out there looking at ways to get onto the blockchain
365 wagon a little bit sooner. And I think their motivation is
366 disruption. Being seen as thought leaders. I think in many
367 cases it's actually not even a corporate motivation, but

368 rather a personal motivation of a particular executive who
369 wants to get more exposure, advance their career through
370 being seen as a technology leader.

371 I2: I could probably identify half a dozen people
372 like that and maybe one or two companies that have have
373 reasons to, or have actually thought that it was a good idea
374 to push blockchain forward. And I think the one or two
375 companies I can think of are basically looking at it
376 primarily as, "We need to disrupt an inefficient
377 distribution system, and blockchain is a good way to do it."

378 I: Okay. So in your opinion, what kind of
379 pressure is there, if any, for a hotel company to adopt
380 blockchain technology?

381 I2: None.

382 I: None. Okay. Okay.

383 I2: Not today, anyway. But maybe in a couple of
384 years there will be.

385 I: Yeah. So I would like to ask maybe a
386 broader question about your perception of IT in general and
387 the adoption of IT in the hotel industry. So what is your
388 broader picture, just brief, about IT in relation to hotel
389 industry?

390 I2: It certainly has evolved over the 30-plus
391 years that I've been involved in the industry. I think for
392 many years IT was viewed as the group of people that made
393 sure that the numbers added up at the end of the month. It
394 was not an important business function, other than that it
395 produced some numbers that mattered, and produced them a

396 little bit more efficiently than accountants using pencil

397 and paper.

398 I2: That that has evolved. I think over time,

399 hotels have started to realize that IT, an effective IT

400 organization can, it can help produce revenue, it can help

401 ... There's starting to be recognition that it can help

402 reduce costs, although that's even more recent. And in some

403 cases, it can create competitive advantage. I think there's

404 still a variation depending on what part of the world you're

405 talking about.

406 I2: I think in North America and in some other

407 parts of the world, in Asia in particular, a few countries

408 in Asia, the IT department moved up from a group that

409 reported into finance, because their job was to crunch

410 numbers, to a job that reported into the executive, was part

411 of the executive committee, were reporting into the CEO of a

412 managing director. That has but been much slower in Europe.

413 And as a result, you have a lot more IT departments that are

414 focused on producing numbers than on producing revenue or

415 cost savings. And you have much, I would say, less qualified

416 IT departments in general, and there's obviously exceptions

417 in Europe than in some other parts of the world. And in all

418 parts of the world, probably less, it still is less

419 important at the corporate level than it would be in a lot

420 of other companies in different industries.

421 I2: There's been some back and forth over the

422 years. Right now it's not uncommon in North America for IT

423 to have been moved under marketing, because there's a

424 perception that its most important role is producing revenue
425 and therefore it should be being directed by marketing. And
426 that has some advantages in terms of getting IT focused on
427 delivering revenue, but it also causes IT not to look at
428 things that don't matter to marketing, like operational cost
429 savings, or financial reporting, and things like that. I
430 think there's kind of a natural ebb and flow where IT
431 departments get too close to one area of the business and
432 too far from another one, and then they're reorganized to
433 report into a different part of the business.

434 Douglas Rice: I still question the wisdom of companies,
435 though, that don't think that the Chief Information Officer
436 should be at the table with the Chief Human Resources
437 Officer and the Chief Financial Officer, and the Chief
438 Operating Officer, and a Chief Marketing Officer. Because
439 it's integral to the health of an organization, as any of
440 those departments. But that's not a widely recognized fact,
441 I think, within the hotel industry, not as widely as it is
442 in other industries.

443 I: Okay. Okay. Interesting. So we are almost
444 at the end of the interview, so is there anything else you
445 would like to add to the topic of application of blockchain
446 technology in the hotel industry, which we have not
447 discussed so far?

448 I2: Not that I can think of.

449 I: Okay. Okay. Well then, thanks a lot for
450 taking the time and talking to me, and answering the
451 questions. So ...

452 I2: I hope it's useful to you, and good luck with
 453 the project.

Interview 3

1 Interview 3

2 IP3

3 I don't have a problem if you want to quote me. I mean, it
 4 can be confidential if you want to but I don't mind that my
 5 opinions are shared more widely.

6 I

7 Okay, great, thanks a lot. Before we start I would like to
 8 learn a bit about your background. Could you please tell me
 9 the current company you work for as well as your previous
 10 company and tell me a bit about the function you have there.

11 IP3

12 Well, that's a little bit... that might be a little bit
 13 complicated for me because there are a lot of companies. If
 14 we go way back, I grew up on a farm about two hours west of
 15 Chicago and when you grow up on a farm you learn to be quite
 16 resourceful at a very young age because you have to solve
 17 all your own problems. There's just nobody around to help
 18 you and it turns out that problem solving is what I love
 19 most as an adult but specifically solving business problems
 20 by applying new business models and innovative technology.
 21 Today I guess we would call those people entrepreneurs but I
 22 didn't learn that word until perhaps 15 years ago and by
 23 then I had already started 5 or 6 companies and 'Currency

24 Alliance' is my twelfth company. I didn't create all those
25 companies with the ambition of becoming the next Amazon. In
26 some cases it was for much more tactical reasons but I've
27 had quite good luck during the years so I've also been able
28 to invest in 23 companies as a Business Angel investor and
29 I'm quite active as a mentoring coach for early stage
30 companies because I just love driving innovation - with
31 purpose - the purpose being to solve real problems. Anyway,
32 so 'Currency Alliance,' and the industries that I've worked
33 in - I worked for Accenture for 5 years, I worked for
34 eDreams, ODIGEO, as an online travel agency for 3 years
35 where I was head of business strategy acquisitions driving
36 innovation for the group and investing in companies, but
37 otherwise I've largely been working within my own portfolio
38 of companies. Quite a lot of them have been focused on
39 technologies. I installed the first large local area network
40 in 1986, the largest network outside of the US military with
41 Novell Netware - if you remember that. So I've been
42 designing really complicated databases for Sears & Roebuck
43 and the United Kingdom Healthcare Service and things like
44 that. Anyway, quite a technical background and my current
45 company is called 'Currency Alliance'. 'Currency Alliance'
46 is a technology platform, it is a software as a service
47 platform that runs in the Amazon Web Services cloud. It's
48 oriented towards managing loyalty point transactions with
49 large loyalty programs and we make it much easier for
50 loyalty programs to connect with complementary brands so
51 that customers can earn the loyalty points they really want

52 from many more places that they shop. Four years ago when we
53 started designing our platform we were quite intrigued by
54 blockchain and so we studied blockchain quite extensively at
55 that time because we thought maybe we should build our
56 technology platform on top of blockchain and we consciously
57 decided not to build our platform on blockchain at that time
58 for three fundamental reasons. The first one was, private
59 blockchains didn't exist at that time so it was really only
60 public blockchains where we anticipated that there would be
61 transaction fees associated with every transaction on a
62 public blockchain. Well, we could not accurately forecast
63 what those transactions fees would be and in most loyalty
64 transactions you're giving the customer 20 or 40 cents worth
65 of loyalty points and you can't be paying 20 cents in
66 transaction fees let alone 2 dollars or 3 dollars to process
67 the transaction. The second issue was, it was clear to us
68 that blockchain was still in the hype stage and that there
69 was quite a lot of innovation taking place with blockchains
70 and therefore blockchain technology would be evolving very,
71 very quickly and we felt that if we built the platform on
72 top of blockchain we would probably spend more time just
73 maintaining the system to keep it running because the
74 underlying infrastructure was changing so quickly that it
75 would prevent us from adding functionality. So we didn't
76 want to get into a situation where our maintenance costs
77 were extremely high and unpredictable. Then the third issue
78 was, I think the beauty of blockchain is it allows partners
79 to connect with each other in a trusted environment but at

80 that time there weren't any other brands really using
81 blockchain so there wasn't anybody to do business with. Well
82 anyway, we consciously decided not to build our technology
83 on blockchain at that time - and we continued to re-evaluate
84 that every 6 to 12 months. I do think blockchain has evolved
85 quite dramatically in the last 4 years. There are an awful
86 lot of use cases and I think I've identified 13 use cases
87 just in the loyalty sector. Anyway, and then we have built
88 some blockchain solutions, so for example with IATA - the
89 International Air Transport Association - we built a
90 reconciliation and settlement platform on blockchain but we
91 did it in what I think is a very clever way. It would be
92 naive to believe that a big hotel group like Marriott or
93 Hilton is only ever going to be using one blockchain. I
94 think it is likely they will be using dozens of blockchains
95 depending on whether it is their supply chain or the
96 reservations or inventory management or asset management or
97 loyalty. At the same time it would be naive to believe that
98 any airline or an airline will only be using one blockchain,
99 they are going to be using dozens of blockchains. So we
100 built the platform for IATA where you can manage user
101 authentication and smart contracts at a layer above the
102 blockchain, so sort of they can be blockchain agnostic what
103 the transactions can then be recorded to any blockchain and
104 that allows a brand like Hilton to allow one of their users
105 to access the platform, authenticate himself, manage their
106 smart contracts - which basically represent their commercial
107 agreements with other brands - and then the transactions get

108 recorded in whichever blockchains are relevant to the
109 entities involved in that transaction. Anyway, so we've
110 deployed some blockchain solutions and certainly in 2017 I
111 was getting a lot of inquiries from hotel groups and
112 airlines about loyalty in blockchain. In 2018 I got almost
113 zero inquiries and I think it is because the executives felt
114 like they learned enough in 2016 and 2017 to realize that
115 there were not any immediate needs for them to do anything
116 right away, anyway they were knowledgeable enough not to make
117 intelligent decisions and therefore most of them took a
118 'wait and see' attitude, you know like they'll just monitor
119 what's going on with blockchain but they're not going to
120 invest heavily in it. I do think from my experience with
121 'htng' and thinking through the different use cases for
122 hotels; I believe that there will not be just one blockchain
123 for loyalty and the hospitality industry. I think there
124 could be several. I think that if... but I think the
125 industry needs to sort of get ahead of the curve and if the
126 industry wants to simplify operations in the medium to long
127 term it probably should take a leadership position in
128 defining how one or several blockchains should be managed on
129 behalf of the hospitality industry. I also think that if
130 every hotel is mining blocks then the energy costs will be
131 too high and therefore the transactions costs will be too
132 high, but if the industry could agree that 6 or 10 major
133 brands would each be a miner on a node that would be enough
134 distributed consensus that there would be trust but the
135 energy consumption would be low enough that you could get

136 the transaction costs under 1cent per transaction. So I
137 think that there could be or even should be some industry
138 initiative to try and migrate more of these loyalty
139 transactions onto a blockchain but it probably should be a
140 private consortium-type solution. Then the 6 or 10 miners
141 would be the core members of the network but they would open
142 it up to anybody else that wanted to use that.

143 I

144 Okay, thanks a lot - I think we have covered a lot of topics
145 in there with the first question with very interesting
146 insights for me, I would just like to go back one step. I
147 think you touched on a lot of issues and possible
148 applications so, in general, you mentioned before, you see
149 13 applications. Could you, in short, summarize where you
150 see future applications of blockchain technology.

151 IP3

152 Well, I'll send you a presentation that I made on
153 blockchain. In fact I think this presentation has become a
154 video for 'htng' so I'm not sure if you've seen the
155 'Blockchain for Loyalty' one video but, anyway, the 13 uses
156 are on that.

157 I

158 Okay, great, to specify a bit more, where do you see
159 blockchain technology in the hotel industry? You mentioned
160 loyalty as one possible application; do you see other
161 possible applications?

162 IP3

163 Yes, maybe I'll articulate a little bit more on loyalty. I

164 think the reason why blockchain makes sense for a hotel is
165 because a hotel is typically collaborating with various
166 airlines, various rent-a-car companies, possibly tour and
167 activity companies, on the earnings side where the partner
168 is issuing the loyalty points from the hotel but also on the
169 burn side where the hotel is willing to let the customer
170 redeem their points for a tour or an activity. In order for
171 those hotels to collaborate with 5 brands based on sort of
172 legacy technology they would need to create 5 point to point
173 connections between their computer systems whereas with
174 blockchain they could create one connection to the
175 blockchain and then be able to connect through the
176 blockchain network to the other 5 hotels. So with 5 maybe
177 the cost savings to do one connection to blockchain versus 5
178 point to point connections is not that significant. Take
179 Hilton Hotels that has 110 partnership partners, they are
180 not going to want to do 110 point to point connections. Now
181 all of a sudden one connection to blockchain gives them
182 enormous economies of scale plus they can manage to do all
183 those commercial agreements through the smart contracts
184 which greatly reduces the administrative and back office
185 work using e-mail and spreadsheets to manage all those
186 partner collaborations, define the commercial terms and
187 conditions, all of that. So I think that blockchain can
188 bring huge economies of scale in terms of administering
189 these collaborations between brands, and collaboration
190 between brands is essential to the success of the business
191 because customers just can't spend enough money with any one

192 brand, so the only way the customer really benefits from a
193 loyalty program is when many brands collaborate together and
194 that's where, I think, the benefits with blockchain come in.
195 Beyond loyalty I think there will be use cases for managing
196 inventory, which could be assets within a hotel, the
197 inventory of the rooms and availability, the booking price
198 per room, could be managed through blockchain, which may
199 give the hotel more efficient distribution of their content
200 and availability because today you may know that there are
201 about a dozen intermediaries that make most of the inventory
202 distribution and those intermediaries tend to be quite
203 expensive. Then I think even special... like from a
204 marketing and sale perspective, blockchain could manage
205 offers, vouchers, gift cards, for redemption which could
206 reduce some exposure to fraud that hotels suffering today.
207 Then, you know, payments, hotels typically have to reconcile
208 and settle with many different suppliers so maybe blockchain
209 could make that more efficient, reduce accounting and
210 payment costs, and then there's the whole issue around
211 customer payments. Today most customers are able to make a
212 hotel booking but they don't pay until they get to the
213 hotel, they pay when they check out, but then there are
214 other hotel bookings where you have to pay in advance and
215 sometimes it is not cancelable so if you don't end up
216 staying in a hotel you lose your money. Blockchain could
217 facilitate managing those bookings and payments with an
218 escrow facility where the pay was locked up in the
219 blockchain until the customer actually consumed the goods

220 and then the funds were released to the appropriate partner.

221 Anyway, so those are the use cases that sort of popped in

222 mind.

223 I

224 Okay, interesting, thanks a lot. What do you think will be

225 the technical difficulties in the adoption of blockchain

226 technology in the hotel company or industry?

227 IP3

228 Well, probably the biggest limitations are the legacy

229 systems in the hotels. Most of these legacy systems are not

230 very open; many of them do not have APIs. There's a lot of

231 XML messaging that takes place in the travel industry and

232 obviously an XML message could be accepted into a blockchain

233 and then processed downstream on the blockchain and that's

234 exactly how we implemented this project for IATA. We were

235 receiving XML messages from fictitious hotels or airlines

236 and then recording that transaction in the blockchain. But

237 the legacy systems tend to be difficult to integrate with

238 third party platforms and sometimes there's a lack of

239 motivation to integrate with third party platforms because a

240 vendor wants to maintain control within their exclusive

241 environment. Then there are thousands of technology vendors

242 selling into hotels, there's no ubiquity or consistency of

243 systems, it's just like spaghetti all over the place and so

244 I really see just the technical architecture that already

245 exists in a hotel as a limitation to being able to use

246 blockchain. Having said that, Blockchain could actually

247 solve many of those problems. I mean, if you - I don't know

248 if you've talked to a guy named Floor Bleeker who was the
249 chief technology officer for Mövenpick Hotels and he was
250 acquired by Accor Hotels, but he'd always be a pretty
251 interesting person to talk to I think in your study - he
252 must be one of the most pro-active and forward thinking
253 Chief Technology Officers in the hospitality industry. I
254 think Flor might look at blockchain as actually a solution
255 to a lot of these legacy system problems where with
256 blockchain you don't have to convert all the systems to work
257 with blockchain immediately you can do them one by one and
258 so you can just start picking off features that you want to
259 enable with blockchain and therefore you could define a
260 roadmap over 3 to 5 years where you could gradually migrate
261 more and more of these systems to blockchain. But again, I
262 think it's not clear what the long term operating costs of a
263 blockchain solution will be and I think there is in fact a
264 fairly high degree of trust within the hospitality industry
265 - not necessarily between the hotel and the intermediaries
266 but certainly between the hotels and many of their other
267 suppliers. So legacy technology, just basic internet
268 technology, might be good enough. It certainly is good
269 enough for many things today and so maybe there's no
270 compelling cost savings advantage in migrating to
271 blockchain. Anyway, for me it's just not clear. I think you
272 can do almost anything in blockchain but that's not a good
273 reason to do things in blockchain. So we'll just have to see
274 how the future unfolds and where interesting use cases
275 evolve and where economies of scale are achieved and then

276 which vendors are going to be involved and how much they are
277 going to want to charge.

278 I

279 Okay, thinking again about technical difficulties, there are
280 discussions about lack of scalability, lack of processing
281 transaction speed, would you have any thoughts on such
282 limitations?

283 IP3

284 Well, I think on public blockchains there are capacity
285 constraints or scalability issues, on private blockchains I
286 don't think there need to be constraints like that but this
287 isn't my area of expertise. I also think there are some new
288 consensus mechanisms that will overcome these issues around
289 capacity.

290 I

291 Okay, okay, currently there is a big variety of different
292 blockchain types and suppliers, in your opinion which type -
293 or which types - are the most useful in the hotel industry
294 context?

295 IP3

296 Well again I think it depends on the context, you know,
297 whether it's distribution of inventory where openness and
298 transparency is an advantage and therefore recording data in
299 a blockchain and having it visible and transparent to many
300 different partners is an advantage whereas on the loyalty
301 side most hotels want to protect the data about their
302 customers. They don't want it to be exposed. They wouldn't
303 want the competition or any supplier or downstream service

304 provider to be able to get access to their member data or
305 even, if they didn't know the members' personally
306 identifiable information, they wouldn't want information
307 about frequency and volume to be very visible in the market
308 place. I tend to think private or a consortium blockchains
309 are probably where the industry would be most comfortable
310 progressing. I kind of think public blockchains probably
311 don't make a lot of sense for an industry application unless
312 it affects consumers and payment, yes. But I do think the
313 private consortium blockchains are probably... is the area
314 where the most opportunity exists and then the question
315 becomes whether you want a third party like SAP or IBM to be
316 running that for you or whether you just want to create a
317 peer group of partners that runs the blockchain.

318 I

319 Overall, in your opinion, how ready is blockchain technology
320 for the application in hotel companies?

321 IP3

322 Well, I think blockchain as a connectivity layer to manage
323 transactions is pretty ready. I mean, you can do a lot with
324 basic connectivity in transaction processing blockchain
325 today but that doesn't solve the big problem for hotels in
326 my opinion because they have existing methods of doing that.
327 Where the hotels could really benefit is one more
328 value-added application layer of logic is available that's
329 tightly integrated into blockchain and that could allow
330 hotels to migrate off of legacy systems onto more modern
331 systems but I don't see very many of those value-added

332 applications coming to market yet. I think we still need
333 time - I don't know if it's a year, five years or something.
334 Then many of the Legacy vendors have been playing around
335 with blockchain also but I don't see a lot of those Legacy
336 vendors bringing blockchain solutions to market.
337 I
338 Making a move now into organizational strategy, in your
339 opinion which organizational strategies are important to
340 adopt blockchain technology in a hotel company?
341 IP3
342 I think this is primarily an IT issue and in fact I think
343 whether the technology systems that serve the Human
344 Resources Department or the Purchasing Department or the IT
345 Department or the Marketing Department or the Sales
346 Department, those people should not even know or care
347 whether the technology involves blockchain or not. So,
348 because blockchain is kind of an infrastructure layer in my
349 opinion, and therefore that's an IT issue, and so maybe the
350 Marketing Department is using an application that uses
351 blockchain but the Marketing Department shouldn't need to
352 know or care whether it's on blockchain or not.
353 I
354 What would be the best first step into adopting blockchain
355 technology?
356 IP3
357 I think you need to define the use cases first. I think... I
358 can understand that question from your research perspective
359 but I think it is actually the wrong question you're

360 supposed to be asking, but it is the primary question that
361 people have been asking for 4 years: What can I do with
362 blockchain? Well, you can do a lot of things with blockchain
363 but should you do those things with blockchain? I think that
364 as hotels think about their business requirements they
365 should be articulating those business requirements to solve
366 real business problems, real business objectives, and then a
367 blockchain solution could be one of the alternatives to
368 solve that problem. But I don't think you should just go out
369 looking for possible things that you could do with
370 blockchain.

371 I

372 Great answer, thank you! Thinking about barriers, what do
373 you think are the main barriers to adopting blockchain
374 technology in a hotel process?

375 IP3

376 I think hotels in particular are very risk averse and they
377 tend to - I mean most hotels sort of follow the herd
378 mentality, sort of a herd of cattle - and so until some
379 leaders in the industry embrace a blockchain solution and
380 can demonstrate material benefits from the blockchain
381 solution the other hotels won't move. So in terms of where
382 can we adopt blockchain, I think that has to be driven by
383 business objectives and then only after 2 to 3 years of
384 somebody measuring actual results will the rest of them be
385 willing to consider whether they should also do that but
386 it's possible that the results will not be as good as
387 alternatives for what they're doing today, in which case the

388 results of that testing might encourage most of the other
389 hotels not to do anything.
390 I
391 So within the organization do you see any barriers, is it
392 like education or risk averseness which you already
393 mentioned? Are there any other practices that you can think
394 of?
395 IP3
396 Well, I think that the Compliance Department or the Legal
397 Department is going to have a strong opinion about whether
398 blockchain can meet the requirements of a hotel because, as
399 you know, all data in the blockchain is transparent and it
400 cannot be deleted. So in the context of GDPR a lot of data
401 cannot be recorded in the blockchain because if under GDPR a
402 customer requests to be forgotten you can't undo previous
403 transactions. There are ways around that, but I think the
404 Legal Department will have quite a lot of influence and
405 probably a veto over certain blockchain-type
406 implementations. So IT is going to have to be conscious of
407 GDPR, legal and compliance requirements or to define those
408 in a way that don't violate any laws. Then, in the context
409 of loyalty I think that most hotel groups will never create
410 or convert their loyalty point currency into a crypto
411 currency - like a loyalty token, in large part because they
412 might have to comply with crypto currency regulations in
413 many different countries in the world and hotels don't want
414 to become a regulated entity in 80 different countries in
415 the world.

416 I

417 From the perspective of a hotel company which motivation do

418 you see to adopt blockchain technology?

419 IP3

420 The hotels' motivation to adopt the technology?

421 I

422 Yes.

423 IP3

424 Well, I think some hotel groups - and this is a small set -

425 might be motivated to experiment with new technology and it

426 might create a more interesting work environment for some of

427 the employees to be able to play around with new technology,

428 but again I think this goes back to the issue of what's the

429 business objective that you're trying to accomplish? So the

430 motivation could be to reduce cost, to increase agility,

431 accelerate decision making, improve reporting, but the

432 motivation has to be linked to those business objectives not

433 linked to the technology.

434 I

435 In your opinion what kind of pressure is there for a hotel

436 company to adopt blockchain technology?

437 IP3

438 Zero! There's no pressure.

439 I

440 No pressure, okay.

441 IP3

442 I think two years ago the Board of Directors was exerting

443 pressure on the organization saying, "Hey, we've got to do

444 something with blockchain! Blockchain's really disruptive;
445 we've got to do something!" But that pressure doesn't exist
446 anymore.

447 I

448 So there is no pressure from competitors or any new
449 competitors coming up with new business models?

450 IP3

451 Well, I think if 'Winding Tree' for example is doing some
452 experimentation. If 'Winding Tree's' distribution capability
453 turned out to be equal or superior to Expedia, Booking.com,
454 and some of these other intermediaries, then there could be
455 pressure to use blockchain for inventory distribution in
456 order to avoid paying 16% to 25% commissions to the
457 intermediaries but that use case is unproven.

458 I

459 One final question - a general one - may I ask you for your
460 perception about IT in the hotel industry and the ability of
461 adoption of novelties in the hospitality industry?

462 IP3

463 Yes, in my experience the Chief Information Officer, the
464 Chief Technology Officer person, usually is very well
465 educated and a very sophisticated person who understands the
466 business objectives of the hotel - and that's great! But
467 most of the rest of the people in the IT Department in hotel
468 groups have been working there for 10 or 20 or 30 years and
469 they're just risk averse. I even think there's a cultural
470 issue where hotels attract IT professionals that don't want
471 to take risks and actually want to go home at five o'clock

472 at night. And I think that bureaucracy is going to kill them
473 in the medium to long term because you've got the executives
474 launching forward with some business strategy and all the
475 supply chain - which is basically their employees - are
476 stuck in the mud.

477 I

478 You know, I personally think that the business model of the
479 major hotel companies, with not owning their hotels, working
480 together with owners, franchisees and stuff in general make
481 the industry not very flexible so that if you want to change
482 one simple process in some cases you need to get approval
483 from 5000 hotel owners to perform the change which, I think,
484 makes it very difficult in the hotel industry.

485 IP3

486 Yes, in fact there's another layer. Many hotels are owned by
487 one entity which might be an asset, a real estate asset
488 management company, but then the operator of the hotel is a
489 completely different company and then the hotel chain or the
490 marquee is basically an OTA. So, yes, you've got to get all
491 those people on the same page and so you've got a hundred
492 hotels in your portfolio that might have already different
493 stakeholders they have to convince and because you need
494 consistency across every property in order to serve guests
495 effectively, if one of those 40 people says 'No', you can't
496 do it.

497 I

498 Yes, I think we're almost at the end of the interview and I
499 would like to ask you if there is anything you would like to

500 add to the topic of the application of blockchain technology
501 in the hotel industry which we have not covered in our
502 conversation so far?
503 IP3
504 Well, simply that - you know, I was involved with IP network
505 technologies starting 35 years ago and I sort of watched how
506 IP networks took off and then there was a proliferation of
507 other packet switching technologies, like ATM and Fast
508 Ethernet and all types of other things and then effectively
509 we ended up with industry standards around IP technology.
510 You might even remember Apple launched their own Token Ring
511 technology, so for me - and then HTML - that's another
512 classic example where HTML sort of invented in the mid-1990s
513 and has gone through this evolution and now most people are
514 working with HTML5, but I think blockchain is following a
515 classic curve of adoption, sort of you could map it almost
516 perfectly onto some of these previous technologies. So
517 whatever that Gartner curve is called - you know that has
518 the trough of death or something after the hype cycle before
519 the technology takes off - I personally believe blockchain
520 is a very transformative technology, it will have massive
521 impact on businesses and society over the next 10 to 40
522 years. It's hard to predict 40 years in the future based on
523 technology change today but I think it will have a
524 significant impact and if not based on the technology today,
525 at least based on the concept of a distributed consensus
526 mechanism. But right now we're sort of in the trough of
527 disillusion - or whatever it's called - and I think we're

528 still on the downhill side of that curve but I do believe
529 that over the next 2 to 5 years there will be some very
530 interesting applications that come to market and the
531 technology will take off. But the technology will most
532 likely take off in areas related to consumer services more
533 than business services, I think. But once it really takes
534 off for consumers then we'll have more international
535 standards, the technology will be more robust, more
536 industrial strength, there'll be clear third party service
537 providers, kind of like Amazon Web Services where you just
538 plug in and it works. And then I think the technology will
539 take off and have huge impact, but right now I still think
540 we're 3 to 5 years away from that.

541 I

542 Okay, so that will be all of my questions, thanks a lot for
543 your time and for your willingness to share your know-how
544 with me for my research. My next steps will be, I will do
545 some other interviews - get all of this written down, do
546 some analysis, and then hope to come up with the results of
547 my research by the end of September. This is primarily
548 aiming for hoteliers or non-tech people to get an
549 understanding of what technology and the current phase,
550 because from my experience with conversations with top
551 executives they know that there is blockchain and they know
552 that there is something going on but they are not aware of
553 the relevance for their businesses or hotel industry and
554 this research gap I would like to fill with my research.

Interview 4

1 Interview 4

2 I: So before we start off, I would like to learn a bit about
3 your background. Could you let me know about your current
4 company and maybe your previous company you worked for?

5 IP4: Yeah. Yeah. So my current company is ... well I work
6 for two companies right now, but they're sister companies.
7 One is Data Travel, which is the company who created HAPI,
8 the HAPI platform, which is a cloud hospitality type of
9 solution. And I also work for our sister company as well,
10 which is called [Akiva] labs, which specializes in
11 Salesforce specific development. We're a Salesforce PDO, and
12 we do quite a bit of hospitality work on Salesforce, and
13 with development on Salesforce. So you should be somewhat,
14 have a little relative connection to that, being from
15 Marriott. You guys have built quite a thing on the
16 Salesforce platform for hospitality. So we do that in that
17 company.

18 IP4: So I work in both. On the Hapi side, on that side, I
19 work in end product strategy and product marketing. And then
20 on the Akiva side I'm working in the solution visioning,
21 solution designing, solution engineering type of work. I've
22 been in hospitality ... I graduated from college in 1999,
23 and then my first job I was hired on the first training team
24 in America for Opera PMS. I have a CD with Opera version
25 0.98, some relic in my closet here somewhere. I installed
26 the third Opera hotel ever. So yeah, that's where I came

27 from originally. I worked there for seven years at Micros
 28 Opera, installing Opera all around the world every day. For
 29 five years I traveled 320 days a year. Then I moved to Las
 30 Vegas and was in charged of deploying into the casino
 31 market. We opened an office there and I joined there, and
 32 did the Wynn Las Vegas was our first casino hotel. Lots of
 33 good memories. And then, as you might know, pretty much then
 34 we began a takeover process of Las Vegas in the casino
 35 market with Opera.

36 IP4: And then after that I moved over to work actually in
 37 the hotel management company space and the technology
 38 operations management for hotel management companies. I was
 39 a little tired from the supplier side so I wanted to switch
 40 over. And so I switched over for five years. I worked in
 41 hotel operations management, director of IT at various
 42 management companies. I started at a hotel group, the Setai,
 43 the GLH hotel group Setai. So, did that. And then I did that
 44 for five years, then I moved back over to the supplier side.
 45 I started working for Newmarket which was acquired by
 46 Amadeus. And then I worked for Amadeus for five, six years.
 47 And I was in product development for a couple of different
 48 products that we have.

49 I: Interesting. So you know hospitality from the very little
 50 detail on, right?

51 IP4: Yeah, I mean this five years I spent in technology
 52 operations management in the hotel group directly certainly
 53 enriched my experience a lot, gave me a better
 54 understanding.

55 I: I wanted to ask this question later, but maybe I'll
56 anticipate it. So may I ask you just very in brief, because
57 this is not the real detail of my research, what is your
58 perception of IT and IT adoption in the hotel industry? Just
59 very global overview.

60 IP4: I think what pops to my head first is the fact that
61 the lack of attention to properly funding this area, I think
62 that's generally what you'll see. I think maybe it's changed
63 a little bit, but generally what you see is you just see a
64 hotel ... if it's a small hotel it might just outsource it
65 to a local service group that doesn't really spend all day
66 on the property and connect with staff. If it's a hundred
67 plus rooms, maybe a hundred and fifty plus rooms you might
68 have a dedicated guy or girl, but it's just one person
69 trying to run around with their hair and ... I think overall
70 it's just an underfunding department. It's non-revenue
71 generating which is like kryptonite to a hotel management's
72 ... I think they look at IT as a cost center that they have
73 to do rather than an opportunity to improve guest
74 interactions and guest behavior.

75 IP4: I think generally speaking, that's what I can say
76 about, historically at least, about how IT's been treated in
77 hospitality. Kind of like, we have a saying in the U.S.,
78 kind of like the red-headed stepchild. But you try your best
79 to make that perception ... it's a thankless job in some
80 ways. But I guess that's what I can say about it.

81 I: Okay, okay. So we talked a bit about your background and
82 IT in general. I'd like to dive into blockchain now. Could

83 you let me know what are your experiences with blockchain

84 technology so far?

85 IP4: Yeah, it's pretty limited actually. It's funny because

86 its really been more in a research mindset like yourself

87 almost, because one of the things that I try to avoid is

88 just sticking to everything that you already know. I think

89 that's one of the problems in hospitality, in technology

90 maybe specifically, is not really trying to uncover new

91 ideas or be open to new ideas. People just like what's

92 worked for them forever. But I've tried to stay open. I've

93 actually been just mostly researching my own. It's a similar

94 reason why I joined a blockchain group as you did. I started

95 to develop some ideas of my own about how I might use

96 blockchain or what blockchain I think could be used for the

97 best. Really, it's not been a very ... and I think you can

98 say this in general, it's really been a big buzzword that

99 hasn't really had tangible adoption to much.

100 IP4: I mean look at Winding Tree, who has had the closest,

101 what you would call, maybe the closest form of adoption to

102 some degree. They have a few customers, some big names, was

103 it Nord- ... in the hotel space, I think they have, what,

104 Nordic Hotels or-

105 I:Scandic [inaudible]

106 IP4: Yeah, Scandic ... I'm not ... and they have an airline

107 customer, I think was it Lufthansa or someone on board with

108 them. But honestly, there's a couple of ... there's a

109 loyalty stored value system, SVS, stored value system

110 points, loyalty type company, that has an offering that I'm

111 familiar with, that uses blockchain to manage the points and
112 awards that people acquire as a service that is tacked onto
113 existing loyalty systems. There's really not a whole
114 tangible lot of hands on experience I've had with it because
115 really there's not a whole lot of tangible deployments there
116 in the world. So I've just focused my time on trying to
117 evaluate what actual use cases is this going to be useful
118 for and why? Because I actually, it's such a buzzy word,
119 that I really try to just figure out how can this actually
120 be used and make sense and be beneficial.

121 IP4: Some of those things I've thought of include ... I do
122 support the loyalty use cases where you can share your
123 rewards with your family or other people. And it's easier
124 because there's clarity and there's consistency and there's
125 accountability for that and think the whole idea of stored
126 value, transfer of stored value and loyalty. Like loyalty
127 points are, I think, at an end of life, so I think there's
128 an opportunity there to fill a void in that area. But it's
129 not so easy to think of valid actual use cases for it right
130 now. I think the accountability aspect of it is the thing
131 that it has going for it for the most part.

132 IP4: I think there's some use cases that involve escrow,
133 deposits in hotel, hotel deposits. I think deposit and
134 cancellation policies is an area that is interesting for
135 blockchain for me. I think that's a problem area that hotels
136 deal with a lot, whether it's various circumstances that
137 could apply different policies, is enormous. And I think
138 that hotels want to be able to be flexible, to be able to be

139 very variable in this area and secure, and keep it all
140 together. But they have trouble in this area. So I think
141 that's another area where it can be used also.
142 I: So you touched on this already a bit, so in your opinion
143 what are the benefits of blockchain technology in the hotel
144 industry? Is it just the transaction cost or is it the
145 efficiency or...?

146 IP4: I think the number one thing is the transparency
147 combined with the accountability it offers. I think that's
148 the number one thing for me. I don't really think that
149 blockchain is going to be great at replacing too many
150 existing things. I think for blockchain it's more about
151 creating a new thing, a new paradigm. A completely new way
152 of handling deposits in escrow. A completely new way of
153 handling something rather than trying to say let me just
154 retrofit blockchain over this and it's going to make it
155 better. I think it's going to take a set of innovation
156 ideas, so then you can leverage the strength of it.

157 I: Okay. So in terms of technical challenges, what do you
158 think will be the technical difficulties for the adoption of
159 blockchain technology?

160 IP4: Well one of them is like if there's a blockchain in a
161 payment use case, one of the issues is maybe the speed of
162 the transaction. I think I've heard that it's not the
163 fastest thing. I think that's one thing it has negative
164 going for it a little bit. If it's trying to replace
165 processes that require high speed transactions to occur, I
166 think that it doesn't seem to do a good job, or will do a

167 good job of that right now. So I think that's one problem it
168 might have.

169 IP4: The question was just some of the downsides?

170 I: Yes, like technical difficulties, challenges you can
171 think of.

172 IP4: Yeah, that's the only one I can really think of.

173 Obviously there's the security. You wake up every couple
174 weeks and hear about someone's bitcoin being stolen. But I'm
175 not that intimately familiar with the security challenges
176 personally, but I will say that one high level challenge
177 overall is just market education. Because, like I just said,
178 people actually equate bitcoin to blockchain and they think
179 that it's the same thing. And I think that a lot of people
180 think that way. So I think one of the challenges it has is
181 actually education in a general sense in the marketplace as
182 well.

183 I: So currently there is different blockchain types on the
184 market. So in your opinion, which types are the most useful
185 for hotel industry?

186 IP4: Okay, yeah. So this goes into that debate about
187 private blockchain and public blockchain. Honestly, I think
188 the private ... I think for suppliers looking to build a
189 solution with blockchain, I think the private one is the
190 most relevant one because it allows for these contracts to
191 be built, so that you can define some boundaries of what a
192 system can create on the blockchain, a purpose driven
193 blockchain. Just seems like the private option would be
194 better.

195 IP4: I mean I don't know what you mean by type, other than I
196 just think of private versus public. And then this whole
197 concept of in the private blockchain you have these smart
198 contracts that can be established so that you can interface
199 between each ... has a standard interface, almost, between
200 each part of the blockchain. I think private is the more
201 likely type of blockchain that will emerge as the most
202 common because of that.

203 I: So in your opinion how ready, in general, is blockchain
204 technology for the application in a hotel company?

205 IP4: I think blockchain itself, I think there's ... like I
206 said I think there was some things that they had some
207 achilles heels from the technology perspectives themselves.
208 Maybe some of the achilles heels is this speed aspect. It's
209 not the fastest. I guess because it has to update all the
210 other sister servers. Technically, I'm not even sure. I have
211 to go back to my notes about it. But I think that achilles
212 heel's going to hurt a bit. I think there's a sense that
213 it's not so secure. That may just be a false mindset. It may
214 be very secure but I think it has a sense of security to
215 people. And I don't think people know what it is.

216 IP4: Hospitality ... You probably know this, I think it's a
217 little bit different in Europe, but I think it's still
218 pretty much the same. General managers, especially as you go
219 down into non-corporate hotels. Adoption into the
220 independent market will be harder and harder because they
221 don't have a technology staff looking over their shoulder
222 saying, "It's okay. We know about this and it's okay, we

223 want to do this." I just think it's a little bit nervous,
224 and it's a scary topic for people because they don't
225 understand it. I think these are the two biggest threats,
226 maybe, to blockchain.

227 IP4: I was just at a Salesforce conference, and they're
228 using blockchain in Salesforce for their transportation and
229 logistics stuff, for package tracking. I mean this could
230 apply to hotels too. They're using it for logistics and
231 package delivery and tracking. Great use case for it. That
232 type of use case would be on an edge case for hotels. So
233 then it becomes like, well that would be cool to be able to
234 do that for our concierge team, to have an nice app that was
235 able to leverage it, but then you go back to the point of,
236 well we can just use this system we already have. There's
237 not a compelling, override ... that's why I think it has to
238 be a whole new idea that really is like a blockchain native
239 idea, in order for it to be successful.

240 IP4: And I think the Winding Tree case with distribution, I
241 think although it's not a new innovation in terms of we're
242 distributing hotel content to hotel rooms, I mean this is as
243 old as history, but I think they're taking a different whole
244 approach to it, which could work out for them. Because if
245 they differentiate themselves enough, then there may be an
246 adoption. But as you can see the adoption is pretty slow on
247 that. And they came out of the gate probably the most well
248 funded hospitality venture on blockchain, and I haven't seen
249 anything in the news lately about them. I think they've gone
250 quiet. I don't know how their projects are going. It's just

251 a tough world out there. Hospitality people don't really
 252 appreciate IT even in its current form. And some of the
 253 newer, more obscure technologies, hospitality people, most
 254 of them, are not willing to be on the cutting edge too much.

255 I:Okay, so in your opinion which organizational strategies,
 256 from within, are important to adopt a blockchain technology
 257 project? I mean even though it's far away, what can you
 258 imagine, what would be important from within?

259 IP4: Yeah, I think the adoption's going to come, when it
 260 comes, it's going to come from one of the top 10 hotel
 261 companies in the world. I think there's probably already
 262 proof of concept. I know for a fact there is already proof
 263 of concept projects running, probably in all top five
 264 companies right now. To some degree there is probably a
 265 proof of concept running, whether it's with Winding Tree,
 266 whether it's with another company. I think it's going to be
 267 one of the bigger companies that goes to market. I think
 268 it's going to be something that probably ends up being a new
 269 type of innovation. But I don't know behind the scenes
 270 what's going on. I really don't see much adoption at all. I
 271 know there's a lot of articles written. I think it's going
 272 to take a larger company to conceptualize something to do.
 273 And I don't really see that really coming to market for at
 274 least another three to five years even.

275 I:So what do you think would be the best first, from a
 276 hotel perspective, what would be the best first step into a
 277 project aiming to adopt blockchain technology?

278 IP4: Basically, I think with any new project, to establish

279 a business case for it, you want to look at a glaring
280 problem in your organization today, try to solve it. I keep
281 coming back to this deposit, cancellation, no show, all
282 these types of policies that surround rate distribution and
283 such. I feel like rate parity is a problem. I mean I think
284 you've got to start ... I mean obviously it sounds cliché,
285 but you've got to start with the organizational problem that
286 someone is trying to solve. Right now the only examples that
287 I can tangibly point to where people are solving real world
288 problems with blockchain is in transportation and logistics.
289 Because there's a thing that moves around all over the world
290 and there's multiple people who want to be where it is. So
291 if you can try to think of that in terms of hotels, what is
292 the thing in hotels that is moving around all the time and
293 that multiple people want to see?

294 IP4: I mean you could say it's the guests, right? It's the
295 frequent traveler or the guest, you could say. So I think
296 that's maybe the outline of the formula. What is it we want
297 to track and the multiple entities or people who want to be
298 able to track it, and what exactly, is there something
299 inside of this package that we are specifically trying to
300 know or track.

301 IP4: I really don't know what that is today. Of course you
302 could go with some easy deposit, using it for deposit
303 escrow. Or easier ways to transfer your deposit to someone
304 else. But I really don't know the answer to that question. I
305 just know that the formula that seems to have the most
306 tangible benefit to an organization is the tracking of

307 something where multiple people need to see where it is.

308 That's the formula, but I don't know exactly what that might

309 be.

310 I:Okay. So in your opinion what would be the main barriers

311 to adopt blockchain technology in a hotel process?

312 IP4: The main barrier is education and understanding of how

313 it's actually going to benefit a particular process. Whether

314 it's digital transformation that a company strategy has for

315 digital transformation. You've got to have a company come

316 and vouch for the underlying technology. It's not like there

317 are people from blockchain that are sales people from

318 blockchain, that can go out and educate the market. So you

319 have to have a company who's decided that they're going to

320 build their technology using that. And they have to champion

321 that. And they have to go into their pitches, and they have

322 to explain the underlying ... sometimes they have to explain

323 the underlying blockchain technology and sell the

324 technology, and then their product. Selling both things

325 really.

326 IP4: I think the biggest barrier is the fact that they have

327 to sell both things. It's hard enough to just sell what your

328 solution is. You have to sell people on that blockchain. And

329 I think it still has a notion of insecurity. It still has a

330 notion of where's my data. It still has the notion of a

331 little bit of slowness. Those are the challenges and

332 barriers I think.

333 I:So from the perspective of a hotel, which motivations do

334 you see to adopt blockchain technology?

335 IP4: It has to be something that makes ... it can be guest
336 facing or it could be just staff facing, but it has to be
337 something that makes a difference in someone's day. It
338 really has to provide some level of business automation
339 where it's significant enough for them to take a closer
340 look. If you can save an accounting person's half a day
341 every day of an accounting person's job, and then multiply
342 it over 50 hotels. I think building ROI cases around it, but
343 you've got to find cases where you can use it to automate
344 business processes that are today manual. I think what
345 really is going to motivate people is money and time. I
346 think these are the oldest things in the world. I think it's
347 still the same.

348 IP4: I mean of course there's always those hotels that are
349 on the cutting edge of ... you've seen hotels where their
350 whole theme is like, "We like to use the latest technology."
351 They always get the nicest integration, the nicest systems.
352 They might just do it because it's a good press release. But
353 I think in order to establish a wider adoption, you really
354 have to have a solution come out and make an existing
355 process extremely easy, or create new process that has
356 indirect benefits to other areas.

357 IP4: I think there's a guest facing part. I think it can be
358 a motivation. If you can make your guests happier. If you
359 can get them to come back. If you can get them to talk about
360 you. If you can get them to come back to your hotel, become
361 a loyal guest, obviously the formula for that is not so
362 easy, but that's another motivation.

363 IP4: If there's a blockchain solution that allows you to
364 store your loyalty reward points and lets you do whatever,
365 you could donate them to charity, you could freaking cash
366 them in for some apples, you could send them to your friend,
367 you could send one of your points to one family, one to
368 another. If there's some app that magically allows you to
369 enhance your existing loyalty system by adding some new
370 features, some flexibilities, that's not enough to sell into
371 as a separate product. That's like an add on feature to your
372 already existing loyalty. That's why I keep saying maybe top
373 10, top five companies in the world with a little room to
374 explore these new features, I think this is most likely ...
375 I:Okay, okay. So what kind of pressure is there, in your
376 opinion, for a hotel company to adopt blockchain technology?
377 IP4: Zero. Zero. There's no pressure because there's no
378 significant ... you know what pressure is, right? And you
379 know this is finance. Pressure is not being PCI compliant.
380 Pressure is not being GDPR compliant. Blockchain has not
381 risen itself to some level of value anywhere near the
382 spectrum of those two items. So there's no pressure. It's
383 only waiting for a value oriented thing to come out with
384 blockchain, that's valuable enough for people to actually
385 start paying attention. That's for me, zero pressure.
386 I:Okay. So we're almost at the end. Is there anything you
387 would like to add to the topic that we haven't discussed
388 within the last 30 minutes?
389 IP4: I can't really think of anything to add other than the
390 fact that I probably need to go back and refresh my own

391 information about what's the latest going on in the world
392 there. I think the blockchain group is actually going to
393 pick up and do something else soon, I can't remember. But
394 not really. Unfortunately, I don't know what exactly ... it
395 seems like it has a little bit of a curse around it,
396 blockchain and hospitality. Because it's so hard to educate
397 the hospitality market. I mean it's hard to explain to a
398 general manager let alone ... it's hard to explain to them
399 the benefits of integrating your accounting system
400 sometimes. You know, "Why should I pay there thousand
401 dollars for this interface."

402 IP4: It's an uphill battle man. I think that's my biggest
403 takeaway is it's such an uphill battle.

404 I:Okay. I think that's it. So thanks a lot. Some of the
405 questions I asked might some really basic for you and not
406 advanced in terms of sophistication. But you know in
407 academia we do tiny little steps and there is not a lot of
408 research out there, nor on particularly this topic. So I
409 would like to fill this research gap and-

410 IP4: That was perfect because on this particular topic area
411 I am not actually very technical. So just talking about
412 business context with you and high level, I mean that was
413 actually perfect.

414 I:Well, thanks a lot. And it's really nice. Thank you for
415 taking the time. I really appreciate that. And I appreciate
416 you a successful day. I'll keep you updated on the progress
417 of my research and to stay in touch.

Interview 5

1 IP5a: Oh. Hey. Sorry. I apologize. You were asking me. Don't
2 remember the question now. The question is... I run the R&D
3 group here in Toronto, and that encompasses a variety of
4 different initiatives, including our core analytics and our
5 marketing automation platform, and more recently we've taken
6 on... We'll introduce Catherine in a second, but we
7 purchased Catherine's company and have incorporated it into
8 our group, where we're implementing blockchain technology in
9 support of our overall cross-brand marketplace.

10 I:Okay. May I ask you about your personal background? Are
11 you more of IT background or more business-wise? Just about
12 your education and personal, professional background.

13 IP5a: Oh, sure. So I've been in the technology industry for
14 25 years. I have a Master's degree in computer science but I
15 sort of have had a foot in both the technology and the
16 business realm, so I run as a... I've run consulting
17 companies, I've been the VP of marketing for tech companies,
18 I have been the CTO for tech companies, and I have worked as
19 a management consultant in a variety of different domains
20 across hospitality, retail, media, and logistics,
21 principally. And I guess, way back when, finance and
22 industrial design. But suffice to say I like a lot of
23 things.

24 I:Okay. Great. And Catherine, may I ask you for your
25 background as well?

26 IP5b: Sure. So as Max had mentioned, prior to the

27 acquisition of our company, Xtreme Blockchain Labs, I was
28 managing director of that company and head of product for
29 one of the subsidiaries, Cosynex, Inc., and so what we have
30 done is built a trading platform, digital assets and
31 cryptocurrency trading platform, from the ground up, and of
32 course, that was blockchain based. We also had a company
33 that was involved in securitized token offerings, and so we
34 were in the midst of building a platform for that
35 organization to enable them to issue tokens and ultimately
36 to have those tokens trade on our platform. That company, I
37 think I started there in January of 2018.

38 IP5b: Prior to that, I worked in sales and marketing
39 management capacities at a couple of other technology
40 companies, one of them being Q4 Web Systems, where I was a
41 founding executive there, and that goes back to 2006. And I
42 was involved with the web ever since the commercial
43 inception so I guess that was late 90s, and have mostly been
44 involved in online communication strategies and user
45 experience. So basically, everything that happens on the
46 front end and business requirements and ensuring that those
47 can then all be moved into technical specification and
48 development. So that's my background.

49 I: Okay. Okay. Thank you. So you already mentioned that you,
50 obviously as you're working for a company, both in
51 blockchain, may I ask you your experience with blockchain
52 technology so far is purely because of the enterprise you
53 work for or have you been involved in other projects as
54 well?

55 IP5b: No, I have not been involved in other projects. You
56 know, Dave, the fact that the company was planning on moving
57 into the blockchain space was something that very much
58 interested me, just to get involved myself and learn more
59 about the technology because it just seemed like it was
60 going to be a game changer, ultimately. Obviously, there's
61 some growing pains along the way, which there always is with
62 every technology, but I sought out a position specifically
63 for that reason.

64 I: I would like to start off from a general approach. So my
65 first question will be, what do you think of the future
66 applications of blockchain technology in general? So not
67 particularly on an industry. In general. I know this is a
68 very broad question, but just from a bird's-eye view.

69 IP5b: I think there are a lot of applications related to
70 identity. I think that where the web has gone, it's very
71 difficult for people to maintain any privacy and to be able
72 to have your identity recorded on the blockchain and to be
73 able to release only parts of the information that different
74 organizations and government bodies need from you. I think
75 that holds a lot of promise. Also related to that would be
76 the ability to vote, the ability to have your secure
77 financing more easily because of that, to have KYC tied into
78 your identity. I think to me that's one of the things that
79 really excites me.

80 IP5b: And then of course, all the opportunities related to
81 processing transactions more quickly without having
82 intermediaries and also to be able to settle those

83 transactions quickly and at significantly reduced costs. So
84 those are some of the things that I find really interesting.
85 I know the whole idea of tracing origins in the food chain,
86 that's interesting as well. Of course, the information is
87 only as good as the source, so I still think there's a lot
88 of things that need to be worked out on that one. Well, on
89 all of it.

90 I:Max, also for further questions, if you would like to add
91 something or clarify something, just jump in and interrupt
92 me in case I move on too quick.

93 IP5a: Nope. I would say that it's quite interesting that in
94 my opinion at the moment is that we've gone through the
95 trough of disillusionment relative to blockchain
96 applications. We've moved, since we talked about, ironically
97 I never got to convince everybody on that working group to
98 my point of view which where I was talking about blockchain
99 versions 1, 2, and I thought we were moving towards 3, where
100 Bitcoin was version 1 and kind of premiered the idea.
101 Version 2 was Ethereum, a more platform approach with the
102 introduction of smart contracts, but still suffering from
103 being a completely P to P public system with expensive
104 cryptographic implementations to what I was, about a year
105 ago was thinking of the generation 3, which was more like
106 Hashgraph and Hyperledger and other alternate approaches
107 that supported both public and private, and it could operate
108 much more efficiently.

109 IP5a: So I'm excited now to see the applications in other
110 domains have continued to advance the overall concept, and

111 that the important aspects of the public-facing parts are
112 coming under regulation. So I think those are all things
113 that will help in the ultimate adoption. I think really you
114 can think of it less about a technology and more about an
115 approach. And so at that level, the piece that we're most
116 interested in is around smart contracts and the ability to,
117 in essence, package business logic in a mutable form, such
118 that it can execute on its own when distributed.

119 IP5a: We see applications in various industries, but
120 selfishly the part that we're interested in is in
121 hospitality, and we see that that capability affords
122 interoperability amongst all the trading partners. The
123 hospitality industry is a very complex collection of
124 partnerships with many, many, many relationships necessary
125 to fulfill global travel. So the ability to transact
126 quickly, efficiently, and securely amongst those trading
127 partners is really important, as well as, obviously, there
128 are various different aspects beyond just purchasing. The
129 other areas that would be of interest would be providing
130 consumers with incentives, and those incentives in the form
131 of some type of loyalty system that could again be shared
132 across parties. We're quite enthusiastic of the current
133 state of the market.

134 I: So you already stepped a bit into hospitality/tourism
135 industry, so in particular in this industry, but do you
136 think blockchain can be used beneficially?

137 IP5a: Certainly, I think that our summary of the working
138 group came up with around the four different areas,

139 identity, distribution, loyalty, and payment, all those
140 areas are evolving. As Catherine said, identity is really
141 the domain of state actors, or will work best in the global
142 travel industry if we have some sort of adoption at a state
143 level and we can move towards allowing people's identity to
144 move on to some form of global ledger, that so we can be
145 much more efficient. Of course, unless that really happens
146 at a global scale, it's a moot point. At least from travel
147 perspective.

148 IP5b: Yeah. [crosstalk]

149 IP5a: We need the equivalent of either interact or
150 something like that of the global identity clearing house to
151 make that work. I don't think that the payment piece is,
152 well, there's lots of different things in the tourism
153 industry that people are trying to do to attract attention
154 right now. The Amish, for instance, saying they're going to
155 have their own currency. These things are great ways of
156 attracting attention. Personally, I don't think that they're
157 going to play out particularly well.

158 IP5b: Yeah. The whole adoption on the other side of it, if
159 you have a currency, if it's a national currency and it's
160 widely distributed, that's a different thing, but even
161 looking at cryptocurrency, you can have it, but when you
162 take it outside of an exchange and try to purchase things
163 with it, your options are really limited. There's a long way
164 to go before that's going to be a viable currency for
165 anything other than trading, for the most part.

166 IP5a: So that sort of leaves the two last pieces, which

167 it's interesting you said we need to move slowly and that
168 you may not feel it and that we're at the leading edge, but
169 the reality is that we kind of are a bit myopic because we
170 focused on the use cases that we're interested in and don't
171 necessarily look beyond what isn't right in front of us. And
172 so the pieces we're more interested in are distribution and
173 loyalty. They're the, interoperability, the ability to
174 encode membership and entitlement onto the blockchain is of
175 particular interest, and when you have larger private-member
176 groups, you can use this as an internal cost/savings effort,
177 an internal initiative that enables you to work with your
178 partners but one that does not necessarily have to be
179 presented or manifested in the consumer's eyes or the
180 member's eyes as being something that's blockchain-based.
181 You can literally give them all of the traditional
182 mechanisms for their interaction, including access cards on
183 a resort and all the other components, but behind the scenes
184 be modeling all of their transactions on a ledger,
185 independently of the consumer knowing that it's being done.
186 IP5a: But then, for instance, if one were to exchange, if
187 one had a loyalty program that was blockchain based, they
188 acquired another resort group that had a loyalty program
189 that was also blockchain based, it would be very easy to
190 contemplate merging those two systems. Much more so than if
191 these are token-based systems running on common networks, it
192 would be relatively easy to support integration. So that's
193 an area that we think that, as the market evolves and people
194 start deploying these things, these'll be some of the

195 benefits that come to light.

196 IP5a: The other one that's really important is less about

197 payment and more about just the exchange of information and

198 the speed of settlement, and this is an area that we think

199 that the smart contract approach will definitely aid

200 business. So long term, we'd like to, this is many years

201 down the road still unfortunately, the settlement process

202 between bookings and commissions should be one that becomes

203 accelerated by having a common digital representation. So we

204 can move from a 60-day settlement to millisecond based

205 settlement.

206 IP5b: Similar to the way that settlements is, they're

207 working on this in the capital market area, to move

208 settlements from three days down to a few minutes. What that

209 could do to the market is tremendous. And to be able to do

210 that in the hospitality industry and have different parties'

211 fees calculated instantaneously, enabling disbursement and

212 settlement, as I said, within mere minutes, it just makes

213 the whole machine run more efficiently. And then the people,

214 instead of having to go through information with the level

215 of granularity that it needs to be done now, these people

216 can be involved in maybe higher-touch things with clients or

217 working on improving the experience overall, whether that's

218 from the way you market to what's going on in the hotels to

219 the types of packages that you can put together. Of course,

220 any area where you create efficiencies in a business, then

221 it just allows you to move people into other higher-value ad

222 areas.

223 I: So in my next question, I would more move to technical,
224 you might call it "challenges," so my question will be, what
225 do you think will be the technical difficulties in the
226 adoption of blockchain technology in the hotel company?

227 IP5b: I think there's probably been pretty heavy investments
228 in different types of systems, and with any new technology
229 people always want it to work the way that they're used to
230 working except better, and so there's that learning curve
231 where people are hesitant to do things differently. I guess
232 it's that whole ramp-in to get people to adopt and being
233 able to demonstrate the value. So I think it may be baby
234 steps where certain aspects of the business you introduce
235 blockchain and, you know, you're not going to change
236 everything overnight, so I think it's just where can the
237 greatest impact happens soonest and plan around that. You
238 probably have a lot of opinions on this.

239 IP5a: I agree that the process should, there will be
240 push-back around process, but I guess that's not always
241 technically driven. It's an optional thing. You don't have
242 to necessarily change the process if all you're doing is
243 accelerating it or replacing the underlying mechanisms that
244 are employed. And I think in most cases, blockchain will not
245 have a really public face, or presence. So I think that the
246 industry could move forward on a number of initiatives,
247 taking advantage if people are re-platforming the way in
248 which information is exchanged, that it's an opportunity for
249 new standards to emerge around the actual information that
250 is exchanged at that point, like the message content, not

251 just the mechanism in which things happen. And so at that
252 level, the challenge would be, how does one roll out a new
253 standard? And of course, these things always tend to take
254 much longer than one would anticipate.

255 IP5a: Looking at it right now, even were all the requisite
256 pieces available and agreed upon, it would still take many
257 years to happen. The hospitality industry unfortunately does
258 not move quickly, nor does it move particularly gracefully
259 towards common standards, right? Not only do we have
260 geography, we also have vendors for whom change is not
261 necessarily something that they want to embrace from a
262 strategic perspective. They're trying to maintain their
263 market position with some element of lock-in. So, that said,
264 when that sort of stuff happens, when you get actors like
265 that in a network, there's always a possibility that
266 somebody could do an end-run around them, and if somebody
267 makes it easy for people to adopt, it's quite possible to
268 make some big changes quickly. We'll just have to see.

269 IP5a: Particularly on the distribution side. I think that's
270 an area where blockchain affords some very new, unique
271 opportunities like we sort of talked about, like tokenizing
272 assets and supporting that type of thing. Those are brand
273 new. But if we were to look at traditional models of booking
274 and rates and availability, that type of information, that's
275 much slower.

276 IP5b: In your opinion, how ready is blockchain technology
277 for the application in, let's say a hotel company?

278 IP5a: The hospitality industry will probably take its cue

279 from some adjacent industries. Most notably, probably
280 logistics and global logistics in terms of tracking and
281 booking, I guess. Slightly different booking context. But,
282 where that's a more IT-driven industry and with very tight
283 time pressures on them, and I think once the DHL's and
284 FedEx's and others show a working system and can
285 specifically to the benefits of it, that's when I think that
286 we'll see some movement in the hospitality space. And
287 there'll probably in the hospitality one, again, I think air
288 will probably happen before hotels. It's just a game.
289 There's a lot of inefficiencies in that network, but there's
290 a limited number of actors. So it's pretty easy for the GBSs
291 and the airline, the IATAs and others to roll out common
292 standards much, much more so than the traditional hotel
293 industry at least.

294 IP5b: And some of them are already using blockchain. Cathay
295 Pacific has a loyalty program on the blockchain. So if
296 you're used to or if they've had experience in increasing
297 efficiencies or improving customer experience in one area,
298 then more likely to be open to it in another. I think that's
299 a good comparison, looking at supply chain managements
300 because in the travel industry, there're also many partners
301 and players. It's not like a straightforward transaction. So
302 looking to examples where there are multiple parties
303 involved, I think there could be a lot of learning taken
304 from that. When I think about it, I there're a lot of
305 capabilities that the blockchain has, and smart contracts in
306 particular, that can be exploited in the hospitality

307 industry, but there's also a lot of readiness that, the
308 groundwork needs to be set in the hospitality industry, even
309 to know how to approach some of the challenges with all of
310 the variables involved. It's just a lot of effort that would
311 go into mapping this whole thing out so it could actually
312 work properly. I mean, it's definitely doable. It's just a
313 challenge that would probably be a lot of fun.

314 I: This was an interesting point. So in your opinion, which
315 organizational strategies from within are important to adopt
316 blockchain technology?

317 IP5b: I'm sorry? I didn't hear that.

318 I: In your opinion, which organizational strategies are
319 important to adopt blockchain technology? You just mentioned
320 that a lot of groundwork on the requirements toward
321 processes and stuff from the side of, let's say a hotel, or
322 a company's required to define the use case, so which
323 strategies behind do you think are important?

324 IP5b: Well, I think that efficiency and improved customer
325 experience. There are organizations that, like if you take
326 Southwest, for example. Now, I don't know much about them
327 from what they're doing now with technology, but that's a
328 company that's put a lot of effort into continuous
329 improvements. And I know they've done a lot of things using
330 technology with their customers, like even just having
331 customer feedback, community feedback platforms with their
332 customers where their customers upload videos about the
333 kinds of experiences that they want to have at Southwest. I
334 can see a company like that that is already doing some

335 interesting things with other technologies and is hellbent
336 on continuous improvement, I could see a company like that
337 wanting to dip their toe in earlier than maybe some of their
338 peers. But that's a completely uninformed opinion in terms
339 of I don't know what they're doing with blockchain right
340 now. But I'd probably be knocking on their door.

341 I: In your opinion, what will be the first, the best first
342 step into a project relating to the adoption of blockchain
343 in a hotel context?

344 IP5a: We were just looking at one another. I would think
345 probably the loyalty side of things is the lowest risk and
346 probably the easiest to implement.

347 IP5b: There's already a structure for it. Right?

348 IP5a: There's already a structure, there's already a concert
349 of... consumers understand how those programs work. And in
350 essence, the actual technical demands in supporting
351 something like that are much less complex than, of course
352 depends on the program, but if you think of it as a single
353 source of, or a system that would record earning and
354 burning, it's an easier one than a multi-party settlement
355 system where there would have to be standardization across
356 multiple organizations.

357 IP5b: Back to the earlier point, if a company tries
358 something like that and they see positive results, they're
359 more inclined to move other things in that direction, right?
360 It's just like companies that started out with customer
361 surveys and now have moved into customer portals... The more
362 you get back from something, the more you're willing to put

363 into it. So I think that having a low barrier to entry to
364 get customers in the hospitality industry to try out
365 blockchain and some of their initiatives, that's kind of the
366 way to make it happen as opposed to revolutionary.
367 I: Currently there is a variety of different blockchain
368 technology types. In your opinion, which types would be the
369 most useful in the hotel industry?

370 IP5b: I definitely think smart contracts have a significant
371 implication in the hotel industry. There's Ethereum,
372 Hyperledger, there's a few that have smart contracts and so
373 I'm not sure which one will end up being the best, but I
374 certainly think that a blockchain initiative, or a
375 blockchain technology that involves smart contracts is
376 really important to the industry.

377 I: And talking about public, private, consortium types of
378 blockchains, do you have any thought or opinions on their
379 relevance for application in the hotel process?

380 IP5b: We just talked about that this morning.

381 IP5a: Yeah.

382 IP5b: Public or private.

383 IP5a: Yeah. I think that it will once you pursue a loyalty
384 program. It would depend on whether being based on the
385 public system would afford some sort of interoperability
386 across systems. If that was one of the components that was
387 specifically desired, then public would be the right way to
388 go. But if you're dealing with trading partners in more of a
389 closed group, there's really no need to be on a public
390 system. In fact, potentially being on a public system could

391 expose you to things that, and complications that, you
392 wouldn't want. I guess it comes down to, if you look at a
393 system like Rakuten Coin, where they want to bridge to fiat
394 currencies, and they're specifically thinking about a coin
395 almost from a transactional perspective, as opposed to a
396 more of a stored value within the network, then, again, make
397 a big, strong push towards public, but I think there's
398 definitely good use cases to support a private network as
399 well.

400 I: In your opinion, what are the main barriers to adopt
401 blockchain technology in a hotel process?

402 IP5a: I think in the marketplace, hotels tend not to be
403 IT-driven organizations, so unless somebody in the hotel
404 industry can, well, the hotels themselves are unlikely to
405 push for something. The driving force will likely be around
406 efficiency and so that would be two levels. One, a new
407 entrant could come in and say, "Hey, my approach is this
408 much more efficient," wrapped not only support or have a
409 blockchain-based solution, but also really do a good job of
410 packaging the solution such that it was very easy to adopt,
411 they could potentially come in and displace others'
412 incumbent solutions. The other side would be, one of the
413 larger incumbents, dominant suppliers in the system, could
414 be looking for operational efficiency in their approach, and
415 they could deploy blockchain in support of that. So it kind
416 of... Either David or Goliath could win, or could have
417 benefit and could actually be the one to bring it to market.

418 IP5b: And if a vendor is looking for some sort of

419 differentiating technology, something to get ahead of the
420 market, maybe you've got a player out there that's well
421 financed but they just can't gain market share because they
422 really don't have anything different, then that would be an
423 ideal plan for a company like that to start investigating
424 something like blockchain.

425 I: In your opinion, what kind of pressure is there for a
426 hotel company to adopt blockchain technology?

427 IP5b: What's that? I'm sorry? I didn't hear that.

428 I: What kind of pressure is there for a hotel company to
429 adopt?

430 IP5a: I think it's relatively low. If we look at what's
431 really concerning, what are the primary pressures on hotels
432 today, obviously they have all the things around their
433 infrastructure, staffing, all these other day-to-day
434 operational pieces, but then probably the biggest pressure
435 on them is their distribution. How much are they
436 surrendering to the marketplace to get their property
437 [crosstalk], bring bookings to their properties and how can
438 they improve their yield. I think blockchain in and of
439 itself doesn't really address either of those, the yield
440 problem or the margin problem, but potentially could be
441 packaged as part of a bigger initiative to try to help
442 hotels really gain more share of mind with consumers and
443 build a longer relationship with them. So where the
444 hotelier's able to bring a better loyalty program or loyalty
445 programs that provided with benefits beyond just their own
446 property to the consumer, then it's quite possible they

447 could have a longer-term relationship with them.

448 IP5b: I think that in a general sense, when there's any new

449 technology, typically the bulk of the corporate world sits

450 back and waits and just learns. They're waiting. They don't

451 want to be first movers. The companies that tend to move

452 first are either those who fear the technology, so in the

453 case of a blockchain where we've seen the whole financial

454 industry see their future business completely changing with

455 this new technology, they're the ones that are out there

456 pouring money into it. So unless you have a real innovator

457 at the helm, and whether that's in the CEO position or if

458 you've got a really strong CTO, then that might be a company

459 to wade in if they're not in that fearful position. So as

460 soon as you see some things happening and gaining profile in

461 the hotel industry, then, obviously, that's like everything.

462 You'll start to see it trickle in until it becomes more

463 mainstream.

464 I: I think we're almost at the end. I wanted to ask you if

465 there is anything you would like to add to the topic which

466 we have not discussed within the last 45 minutes or which I

467 did not cover in my question?

468 IP5b: That's always a good question.

469 IP5a: We didn't talk any about costs on the one side. But I

470 think they're negligible relative to what we're talking

471 about. We didn't cover off cryptocurrency, but again, I

472 think that that's not going to be driven by the hospitality

473 industry. We didn't cover off... I had another good one

474 that we didn't cover off. Which there's just so many things

475 but there was another one that's...

476 IP5b: We talked about tokenizing assets, we talked about

477 loyalty, membership.

478 IP5a: No, it was more of one of those other ones that might

479 come up in conversation but I just don't think it's

480 relevant. The transactions fee, any of these other

481 [crosstalk]

482 IP5b: Oh, yeah. Right. Right.

483 IP5a: Are those material for what it is we're talking about

484 here? Probably not. By the time this goes mainstream and

485 people are using it for various things, I think that we will

486 move far beyond the first and second generation of

487 blockchain platforms and settlement will be

488 near-instantaneous, right?

489 IP5b: Right. Yup.

490 IP5a: So yeah, I think, David, you captured a lot.

491 I: Okay. May I just ask one additional question regarding

492 the technical readiness in terms of transaction speed and

493 efficiency stuff? May I ask you for your opinion about the

494 readiness of the technology itself for an application in a

495 business process at the larger scale?

496 IP5b: Our experience with blockchain and now, as I mentioned

497 earlier, this was a trading environment and not for the

498 hospitality industry, but there was a lot of trial and

499 error, so the underlying technology holds a lot of promise.

500 But there's a fair bit of experimentation that needs to

501 happen as you're determining your requirements and then

502 building out a proof of concept in order to determine what's

503 the right way to go. It's not like configuring something
504 like SharePoint, where it's a fairly clear path. The
505 technology we found was pretty solid, but you have to find
506 your way around it. As far as I know, that seems to be the
507 case right now with most blockchain technologies. And even
508 though there are a lot more developers in the space now than
509 there used to be, it's still for most an early path.

510 IP5b: I think I should step out, David.

511 I:Okay.

512 IP5b: Thank you.

513 I:So Max?

514 IP5a: I'm still here.

515 I:Okay.

516 IP5a: We just lost Catherine to another call.

517 I:Okay. No problem at all. So thanks a lot for your time. I
518 really appreciate your input, and this is of big value for
519 my research, so I gained a lot of insights, and this will be
520 absolutely beneficial for my research. So thanks a lot,
521 again, for your support and your time, and I hope we stay in
522 touch.

Interview 6

1 Interview 6

2 IP6: Now I have to be careful.

3 I:On what you're saying, right?

4 IP6: You're recording. Yeah.

5 I:Okay. So the questions are short and open ended in case

6 you have any questions or not, getting something because of
7 technical issues or something, just let me know so I can
8 further explain.

9 IP6: Yeah.

10 I: So before we start off, I would like to learn about your
11 background.

12 IP6: Okay.

13 I: Could you let me know the company you worked for
14 currently and your previous employer just to understand your
15 background.

16 IP6: Yeah I work for IDeaS Revenue Solutions, we're the
17 leading revenue management and pricing software provider in
18 the hotel industry. We currently work with 12,000 hotels
19 around the world and we provide systems that help hotels
20 determine the optimal price and then we automate all that
21 pricing. We then calculate the price and send it to all the
22 different channels that the hotel wants to distribute prices
23 to. I've been with [inaudible] my current goal is to this,
24 it means having an ongoing dialogue with the industry about
25 future trends, including blockchain and any [inaudible].

26 I: I'm sorry to interrupt you, but the connection, I
27 can-

28 IP6: Recommend a strategy and the roadmap for development
29 for the next two years.

30 I: Okay, sorry to interrupt you. I have to say the
31 connection is really bad so I can barely hear you.

32 IP6: Okay. I'm stepping back out. Can you hear me better?

33 I: No, I think the connection is really bad, it's really cut

34 off.

35 IP6: Okay.

36 I: Maybe we should just log off and log in once again. Maybe

37 that helps?

38 IP6: Well, is it better now? I was in the building and I

39 just stepped out of the building.

40 I: Okay. Yeah. I can hear you clearly now,

41 IP6: Okay, good. I'll stay outside. That's fine.

42 I: Okay, thank you.

43 IP6: So let me maybe repeat what I said, right?

44 I: Mm-hmm (affirmative).

45 IP6: Okay, so I work for IDeaS Revenue Management

46 Solutions, and we are the world's largest provider of

47 revenue management and pricing software for the hotel

48 industry. We've worked with about 12,000 hotels around the

49 world, including most of the major chains. The hotels around

50 the world trust us with the determining their pricing and

51 pricing strategies, so we provide software that does that

52 for the hotels and when then we distribute the pricing

53 through all the different channels that the hotels want us

54 to distribute them to. My role is Chief Evangelist, which

55 means I have an ongoing dialogue with the industry about

56 future trends, and I help them educate the industry about

57 those trends as they relate to revenue management and

58 pricing. Also I help with IDeaS' strategy and roadmap

59 development as these trends become a reality.

60 IP6: My previous role was a head of revenue management and

61 pricing for Intercontinental Sales Group in Asia Pacific, so

62 I looked after a team of people that supported hotels around
63 Asia Pacific, anywhere between India and the Tahiti, and I
64 helped build revenue management and pricing strategies and
65 approaches and then helped educate the hotels in the region.
66 That's my background.

67 I:Okay, great. Thank you. Interesting. Interesting role and
68 I like your title. The Chief Evangelist, right?

69 IP6: That's right. Yep.

70 I:Great. Great.

71 IP6: Very unique title.

72 I:So before we dive into blockchain, I would like just get
73 a brief idea on your perception of IT and the general
74 adoption of IT in the hotel industry. Okay.

75 IP6: You mean IT, right?

76 I:IT in general and how hotel industry adopts IT?

77 IP6: Yeah, I think at the moment it's a very dynamic area.
78 I think a lot of hotels have come to the realization that
79 technology in general, and IT specifically, is quite
80 important to create competitive differentiation. We've seen
81 a lot of investment in technology in IT in the last few
82 years. As it relates to revenue management and pricing,
83 we've seen a big shift in the attitude of hotels. Whereas a
84 few years back hotels would say, why do I need revenue
85 management? Now it's no longer a question of why, why would
86 people need revenue management software and technology? It's
87 more about who is the best solution that they can purchase.
88 I think over the last five years, the industry has really
89 woken up and embraced IT investments in many cases.

90 I:Okay. Okay. Thank you. So now let's start off with
91 blockchain. What are your experience with blockchain
92 technology so far in general?

93 IP6: Yeah, so I was part of the white paper development
94 that you were part of as well. I've kind of entered into
95 conversations with companies that are building out
96 blockchain technology for the industry over the last two
97 years or so. I think it's something that is on the horizon
98 and is growing quickly. But at the moment I haven't seen
99 really anyone proving the case that it really differentiates
100 and makes life easier or better. My experience at the moment
101 is been something to watch and observe and have
102 conversations about. But the technology adoption, I haven't
103 seen any success stories around that yet.

104 I:Okay.

105 IP6: True success stories.

106 I:Okay. So, there is this many discussions going on on the
107 topic. So in your opinion, what are possible future
108 applications of blockchain technology?

109 IP6: Well, I think a couple that are the most promising
110 that people haven't really talked about as much is people
111 mostly talk about distribution as an opportunity. I think
112 that's probably the furthest out because anyone who wants to
113 unseat the OTAs or disrupt the OTAs has to realize that the
114 OTA has billions of dollars of money to spend on technology
115 and it's probably all of them talk about it. I'm sure
116 they're looking at blockchain as an alternative as well. So
117 my bet would be on a consumer wallet and IDs, I think a

118 blockchain is very well positioned to create a global guest
119 ID or a traveler ID that you can then use a instead of your
120 passport, or any other form of identification when you
121 travel. So think about airline check-ins hotel check-ins, a
122 security controls and all that.

123 IP6: If you have an electronic wallet that proves who you
124 are, then you don't have to you know, all that moves online.
125 So a guest ID is a big area. Food Safety and quality is
126 another big area that I think is quite important that
127 blockchain can help with. That's especially in the area of
128 tracing the prominence of food. So if somebody says, says
129 this organic and biological foods, then with blockchain you
130 can prove it without a doubt, rather than than today where
131 we have to rely on the supplier to, it's kind of on the
132 trust in the supplier. Then the third one is maybe
133 distribution, but that's probably further out. In order of
134 kind of food safety, then digital. Hello?

135 I:Hello? Can you hear me?

136 IP6: Yep. Yeah, yeah, Sorry.

137 I:Okay. Okay. Because I think I have kind of a time
138 difference so I can hear with a slight delay because of the
139 connection problem.

140 IP6: Okay.

141 I:Okay. So you mentioned a few possible applications. What
142 do you think of the benefits of the application? Is it from
143 a cost perspective or from a traceability or transparency?

144 IP6: Yeah, I mentioned all three of them already. So when I
145 mentioned a global guest ID, obviously the benefit is that

146 you can prove who you are without having to bring any paper
147 passports or identification cards, so establishing a, that's
148 one and the second one, food safety and traceability.
149 There's clear benefits of improving where the food's coming
150 from and also if it's organic or not for example. And then
151 in the loyalty area it's the same thing, being able to
152 collect your loyalty points and have them in blockchain.
153 That's also quite important. So there's always the key
154 benefits to that.

155 I:Okay. Okay. Thank you. So what do you think are the
156 technical difficulties in the adoption of blockchain
157 technology in a hotel company?

158 IP6: Well, I think there's two at the moment. One is the
159 latency and the slowly-ness of blockchain, transaction
160 speeds compared to existing database structures are very
161 slow and that's obviously improving, but it's still far
162 behind what other transaction methodologies can do. I think
163 it hasn't been, what we haven't solved yet is the increased
164 cost of mining the blockchain, and the energy associated
165 with that. So you hear those blockchain mining companies use
166 an enormous amount of energy, which is obviously a concern.
167 Then I think the third one is just the general proof points
168 around blockchain. A lot of use cases that we see today in
169 blockchain can be solved with a normal database structure.
170 It doesn't need blockchain to solve it.

171 I:Okay. Okay. So currently there is a certain variety of
172 different blockchain technology types and suppliers.

173 IP6: Right.

174 I: In your opinion, which types are most useful in the hotel
175 industry?

176 IP6: You're talking about private versus public blockchain?

177 I: Yes, yes. About that, but also about different suppliers,
178 different platforms which are out there, but predominantly
179 about public, private. Yeah.

180 IP6: Right, I don't know, there's I guess two different
181 philosophies, right? Companies or foundations like Winding
182 Tree, they are very adamant that blockchain needs to be
183 public, and I think that's a great goal, to create some
184 decentralized network where the information is being stored.
185 I think reality is that the companies that have the money
186 and the funding and the resources will prefer a private
187 blockchain. So I don't want to say one is better than the
188 other. I think ultimately it's whatever solves the use case
189 the best that the particular company wants to solve. So I
190 think it's just a question of philosophy, right? Is one
191 better than the other? Well, they're both good. It depends
192 what you're trying to solve.

193 I: Okay. Okay. So in your opinion, how ready is blockchain
194 technology for the application in a hotel company?

195 IP6: Today it's very much an exploratory. So is it ready? No,
196 I think the two cases I have seen where it looks to be
197 already kind of working is, actually, there's only one case
198 that I've seen where TUI, the German operator has said
199 publicly that they have moved their entire inventory onto
200 the blockchain and that they're kind of matching suppliers
201 but demand, so the room inventory that they hold from all

202 their different hotels and accommodations. They've moved
203 that into the blockchain and it's easier for them to match
204 the demand with the supply. In the hotel industry or
205 hospitality industry that's the only real use case I've seen
206 that's been built and apparently seems to be working. I
207 haven't seen anything else yet that has worked.

208 I: Okay. Okay. So even though it seems like it's far away to
209 be actually implemented, in your opinion, which
210 organizational strategies are important to adopt blockchain
211 technology?

212 IP6: Which strategies you mean?

213 I: Yeah, like organizational strategies from within the
214 company.

215 IP6: I think at the moment it's important to watch it and
216 observe it and be part of the conversations. Like we're
217 having these conversations and we worked on the white paper
218 put together. I think it's important to be aware of it, but
219 I think for 95% of the companies today, it's too early to
220 invest because the risk is that you're going to invest in
221 something that you don't have to replace. You think about
222 years ago when there was a big dispute about which format of
223 videotape the industry, the world should adapt. The people
224 that betted on the wrong format then had to throw out all
225 their video players and had to replace it with the format
226 that ultimately won. So I think the company that invests too
227 quickly today has the risk that the investment will be
228 useless. So I would recommend 95% of the companies observe
229 it, be part of the conversation, understand what the space

230 is, but don't spend too much money on it today.

231 I:Okay. Okay. So in your opinion, what are the main

232 barriers to adopt blockchain technology, let's say in a

233 hotel process?

234 IP6: Yeah, I think I mentioned this before, I don't have

235 anything else to add there.

236 I:Right. Okay. Okay. So from the perspective of a hotel

237 company, which motivations do you see to adopt blockchain

238 technology?

239 IP6: I think efficiency and traceability is important,

240 especially around food safety. I think that's very

241 important, and purchasing. That's a big concern for any

242 hotel company. If that could be solved, that food could be

243 traced, tamper-proof and securely and that trust could be

244 established also for the customer. I think that will be a

245 big plus.

246 I:Okay. What kind of pressure is there in your opinion for

247 a hotel company to adopt blockchain technology?

248 IP6: None. No pressure.

249 I:No pressure?

250 IP6: No pressure.

251 I:Okay. I think we're almost at the end of the interview.

252 Is there anything else you would like to add to the topic of

253 the application of blockchain technology?

254 IP6: No, I think it's very exciting. There's some people

255 that I talk to, they believe that blockchain is going to

256 replace the Internet, and that might well be the case down

257 the road. So it's really important for any company to be

258 part of the conversation and not miss the boat. Right? Like
259 the hotel industry has missed the rise of the OTAs and stood
260 aside and watched it rather than be part of it. So I think
261 it's important to be part of it and then find the right
262 moment when to jump in. We can't disregard it, but at the
263 moment it's still too far away to really make any big huge
264 investments. That's what I would recommend.

265 I: Okay. Okay. Well Great. Well thanks a lot for sharing
266 your views and your perception about the topic. This was
267 really helpful. And again, some of my questions might appear
268 a bit superficial or basic, but in academia we make tiny
269 little steps.

270 IP6: Yeah, of course.

271 I: I think a lot of the topics we discussed, we already
272 discussed in HTNG when preparing the white paper. But
273 nevertheless, I think it's important also from a academic
274 perspective to have a look at the application and even
275 though I can see what the answer will be, I think it's very
276 interesting to get like an in depth view from industry
277 experts. So thanks a lot for that support.

278 IP6: Yeah, I agree. I agree. Are you talking to any
279 blockchain technology companies as well?

280 I: Yes. I'm constantly in contact, but it's difficult to
281 find interview partners. So I'm in contact with Winding
282 Trees and hopefully get an interview appointment with them
283 as well.

284 IP6: Okay. I can introduce you to another company called
285 Arise. They're based out of Silicon Valley. They're usually

286 very, very open to speak, so I can put you in touch with the

287 co founder there.

288 I: That would be really nice.

289 IP6: Yeah?

290 I: Yeah, absolutely. That would be great.

291 IP6: Okay. I'll do that. All right.

292 I: Well thanks a lot, Klaus.

293 IP6: No, no problem at all. I hope it's helpful, and I'm

294 looking forward to the research.

295 I: Absolutely. I will share the output with you.

296 IP6: Perfect.

297 I: Thanks a lot, Klaus.

298 IP6: Thanks. We'll be in touch.

299 I: Have a good day.

300 IP6: Yep. Thank you, bye.

301 I: Bye Bye.

Interview 7

1 I: It's about your background, and the current company where

2 you work.

3 IP7: I'm the CIO for Middle East and Africa of Accor

4 now--about three hundred hotels--and that's half my job. The

5 other half of my job is to work on strategic programs for

6 Accor, and I'm currently in charge of the replacement of the

7 central reservations and PMS platform for Accor

8 worldwide--but it's two completely different jobs. And then

9 in my free time, I'm the president of HTNG. But that you

10 probably knew already.

11 I: Okay, interesting, very interesting. So, let's just dive
 12 into blockchain technology now. May I ask you for your
 13 experience with blockchain technology so far, or your touch
 14 points?

15 IP7: So, personal experience is only with the
 16 cryptocurrencies, the real--or the most tangible things that
 17 I have done professionally. And I think about two years ago,
 18 it started. It seemed like a real high, because everyone was
 19 talking about it. Our board was also asking--I was with
 20 Movenpick at the time--"What are you doing with blockchain?"
 21 because everyone is working on blockchain. So, we looked at
 22 companies to acquire, startups that were doing blockchain.
 23 We looked at implementing it ourselves, and we hadn't really
 24 found any real applicable cases. So, we did a lot of
 25 research ... but it was mostly talk, and not a lot of real
 26 implementation.

27 I: In your opinion, outside the hotel industry and
 28 hospitality, what are possible implementations of production
 29 technology, if any?

30 IP7: What is very good about blockchain is the concept of
 31 having a distributed data base that is not owned by one
 32 single entity. And that could have huge implications on
 33 identification, contracting, money flows... Anything that is
 34 a formal contract or agreement between one party and
 35 another; however, in reality--even with the
 36 cryptocurrencies--it's very clunky and slow, so it's not
 37 really usable yet. But I think it will be there, and we need

38 to invest in it, and continue to develop. But I haven't
39 really seen a use yet, because most of these cases also
40 depend on speed, and it's just not there yet. It's too slow
41 to make a transaction even if you optimize everything, and
42 you use the latest technology. A reservation, for example,
43 or a loyalty transaction, or an identification verification
44 process... Those need to work in sub-second response time,
45 or sub-millisecond response time. And at the moment,
46 sometimes it takes hours in some of the ones that we have
47 seen. And that is just not quick enough.

48 I: You already mentioned a few use cases which might be
49 relevant for the hotel industry. Are there any other use
50 cases you can think of which would be relevant for the
51 hospitality or hotel industry?

52 IP7: From the ones that I saw, the ones that I loved most
53 are sort of an identification where everywhere you go, you
54 need to fill in forms, you need to show credit cards, you
55 need to show passports--you can make a booking online, or
56 you go into a hotel and you have to fill in the registration
57 form... If you had those preferences, if there was some sort
58 of blockchain-enabled identification and preferences that
59 you as the owner can choose whether you make it available to
60 the hotel, or to an airline, or to any other travel company.

61 IP7: I think it will be a brilliant use case, because then:
62 one, it's convenient because you don't have to re-identify
63 yourself everywhere, and re-put in all these details--even
64 preferences--like a CRM type. And you decide who you share
65 it with, and not the other way around. So if I want to share

66 certain marketing or certain preference information with one
67 hotel company but not with another, I can do it, and I can
68 revoke that again, as well. And I think there, blockchain
69 would be very, very useful because you own it. You own where
70 it is and not the company or the hotel. But that was one I
71 was most interested in. I have not seen any real good
72 implementation of it, but I think in the future that could
73 be really good.

74 IP7: The other one is a loyalty point. So, there's two
75 companies that do that. You might have work with the
76 Currency Alliance and a few others that store loyalty points
77 on blockchain. And then it becomes like a marketplace where
78 you can freely sell and acquire loyalty points and redeem
79 them for services. The third one is distribution where it
80 could be, theoretically, a way to ween off dependency of
81 booking, and Expedia, and those, if there is more of a
82 democratic way of distributing a room. But this requires
83 super high speeds that I haven't seen. The only ones that
84 did some tests were the ones in Nordic--hotels. They
85 actually managed to distribute some groups on the platform.
86 But that also is very immature and not ready for primetime.
87 But maybe in the future, that would be an option.

88 IP7: And the last one, of course, is just payment and
89 currency that I've seen, and that is the most mature one. I
90 do think some [inaudible] already expect cryptocurrency
91 would be something that should be mainstream in a few years'
92 time.

93 I: So what do you think will be the technical difficulties

94 in the adoption of blockchain technology in a hotel company?

95 IP7: Well, I'm not that technical myself, but what I've seen

96 is that the technology relies on a distributed architecture.

97 And if you look at some of the technology--clunky humps in

98 between, which makes it quite slow. Very reliable, but very

99 slow.

100 IP7: The other one is expertise, so we try to hire

101 blockchain developers, which, they're still very hard to

102 find. Or, then, we'll say, "Okay, we'll train our existing

103 development team or some people in it in proper courses"--at

104 the time, lacked a little bit as well. I'm talking about the

105 year or half a year since they try, but maybe things have

106 changed since.

107 I: Talking about technical difficulties, may I ask you for

108 perception of IT and general adoption of innovations in IT

109 in the hotel industry?

110 IP7: Sure, but it's not really fair to--I don't think we're

111 very advanced in technology in the hospitality industry and

112 there's a few reasons for that. But it's not very fair to

113 say that that's the reason why we haven't adopted blockchain

114 because it seemed really happening in other industries,

115 either. It's really our Indeed base, and there's little

116 projects here and there--but there's no, wherever you say,

117 except for currency. This is done really well and it really

118 created value.

119 IP7: But, beside from that, we are very slow on the

120 adoption of the technology for a couple of reasons. One is

121 that we are, by nature, a very distributed industry, so we

122 don't own the assets that we manage. So in order to make a
123 real technology investment, there's a lot of people that
124 need to be involved. The brand, the owners... Many owners,
125 many different countries. But also, everywhere in the world.
126 So you see often, very big innovations happening in one
127 country, like Uber or Facebook; they start in the U.S.
128 normally, or in China. And from there on, they conquer the
129 world. But then they have a massive skew in the home market.
130 In our case, that's very hard because if you're any big
131 hotel chain like Marriott, you're everywhere in the world.
132 They often manage to innovate something in their one country
133 and then it's very hard to port it to another country for
134 fiscal reasons or rights management on content, or lots of
135 excuses for it.

136 IP7: The last one is that, as an industry, we don't really
137 pay for technology. If we look at your finance, you see the
138 IT P&L of your property. You probably don't exceed one-half
139 percent of revenue on technology expenses. In other
140 industries, we're really at the bottom. But if you're
141 inventing--and these are all non-technology industries--it
142 might be eleven or twelve percent of revenue that is spent
143 on IT. On top, then you have a situation where it's very,
144 very complex because of the distribution and the
145 international nature; and a very low return. So once you do
146 something, it's very hard to sell it because you have to
147 sell it at many different levels, and hotels are not really
148 willing to pay a lot of money for it. So it's a very
149 unattractive business for technology companies to get into

150 and for startups to get funding for, because the ramp-up is
151 not like in other industries. But they can upscale very
152 quick.

153 IP7: Having said that, we seem to be happy to fork out
154 twenty, twenty-five percent of our revenue to OTAs and
155 stuff--so there is money, but we need to find ways to
156 rechannel that into other sources of technology, too. Those
157 are kind of the reasons why; but yes, we're definitely
158 behind many industries. If you stay at a hotel today, the
159 experience is not very different from twenty years ago, or
160 forty years ago--or even a hundred years ago. If you check
161 into a hotel, maybe they use two different tools, but the
162 process is kind of the same. Maybe we are ready for some
163 real revolution, or disruption.

164 I: Absolutely, absolutely. Coming back to blockchain
165 technology: In your opinion, how ready is it for the
166 application in a hotel company?

167 IP7: I think I answered that. At the moment, I have not seen
168 a single one that is really ready for full implementation,
169 except maybe the currency. But even that is slow. I don't
170 know if you've done these transactions yourself, but it's
171 not instant. So paying a bill directly without any brokers
172 in between from a cryptocurrency is also not very feasible
173 at the moment.

174 I: Even though it seems like blockchain technology is not
175 ready for implementation, what do you think, from today,
176 which organizational strategies are important right now when
177 you deal with blockchain technology?

178 IP7: In general, not just blockchain, but any new
179 technology--because blockchain is one of them, and there's
180 many others that currently look very promising for
181 hospitality or artificial intelligence, robotics... And
182 they're kind of at the same place where there's no real
183 application for them. And people are trying. You know
184 they're going to be important. But you don't know which one
185 is going to win. So we should continue to invest in R&D; we
186 should continue, and we do that through the funding of
187 startups, for example. This is the easiest way to really
188 trial-and-error a new tech.

189 IP7: So we should continue to do that in any technology
190 that we think will make sense and even some that we don't
191 think will make sense, but might come up as something later
192 on. Things are going quick, so what it is today, and with
193 blockchain and with our AI, robotics, and all the others...
194 Conceptually, you can see really, really well how it could
195 pan out. And that is great. That means that if things get
196 better and faster, more secure--more mature--there will be
197 applications for it. We just need to wait for that, and in
198 order to help move that along, I think we should continue to
199 support the startup community so they continue to innovate.

200 I: Maybe my next question is kind of a repetition, but maybe
201 you have something to add or clarify. What do you think
202 would be the best first step to engaging the blockchain
203 technology for hotels?

204 IP7: With adoption of new technologies, it works always best
205 when it's very, very simple. Also, when it resembles

206 something that was already there. For blockchain, I think
207 the easiest adoption is if we, somehow, try to accept
208 cryptocurrency as a payment method. Of course, we're not
209 really adopting blockchain with that. But it would be the
210 first sort of advance with blockchain.

211 IP7: The next one, I think--because it's not super
212 complicated--would be loyalty. It just needs to be a bit
213 faster, so a ledger to store your loyalty points and your
214 liabilities when it comes to identification... That will be
215 a bit further away and distribution will be even more far
216 away, I think, because it requires a lot of integration and
217 a much higher speed to conduct the transaction.

218 I: So in your opinion, what kind of pressure is there for a
219 hotel company to adopt blockchain technologies?

220 IP7: No, not really, because it's not anything that we
221 don't have today that blockchain will give us. It will just
222 give us a better way of doing things we're already doing. So
223 it's not that without it, we can't live. And it's also not
224 that someone is already doing this really well
225 somewhere--that if we don't jump on this, then we will be
226 out of business. It's not really a disruptor like you would
227 have had with when we just moved distribution online; that
228 was a disruptor for our industry because it really changed
229 the way we had to do business. But for the time being, it
230 will be a very good tool. But it will not disrupt the
231 industry as it is. We might change--we might make a couple
232 of things more secure, more efficient and all that. But
233 there's not a one-hundred-and-eighty degree change in how we

234 do things as far as I see it today. Maybe someone comes up
235 with a fantastic idea that we have to implement immediately
236 tomorrow, but so far, I haven't seen it. And maybe you know
237 a few that you can tell me, but you have done much more
238 research in it than I did. Especially recently.

239 I: I'm afraid I don't have any big--I mean, I have some
240 interesting insights, but I think the majority of the
241 answers I got is, "Well, it looks promising, but I would
242 take some time."

243 IP7: Yeah. You didn't encounter any companies or startups
244 that did something cool that would actually be used today?

245 I: There is Arise. They seem to be working already and are
246 in touch with big companies right now: major hotel
247 companies, as they told me. And they are pretty, pretty
248 advanced in what they are doing. But even still, they say
249 that there is a way to go, so, I would agree that it takes
250 another couple of years to get this ready.

251 I: I would have one more, that's kind of a technical
252 question: There is this question, and there is different
253 types of blockchains, names like public, consortium, private
254 blockchains... So in your opinion, which types are most
255 useful in the hotel industry, or which type?

256 IP7: It depends on the use case, of course. But by
257 definition, I believe that the public or consortium type of
258 blockchains will be more effective, because private
259 blockchain--then you might as well put a database in because
260 you control it, right? The beauty of blockchain is that it's
261 distributed ownership and that multiple entities could own

262 something independent. Maybe I forgot one I just remembered.

263 There was one company that did something. They tried to do

264 contracts from blockchain. You see it quite a lot in legal.

265 But they tried to build something specifically for hotel

266 management contracts, so that could be something interesting

267 as well to make the contracting process quicker or for a

268 hotel management contract.

269 I: Okay! Sounds interesting. So we talked already about the

270 majority of the technology--the nature of hotel industry and

271 IT in hotel industry--are there any other barriers you can

272 think of which might impede the adoption of blockchain

273 technology in the hotel process?

274 IP7: You've seen already a few times that blockchain was

275 already like the silver bullet, and then it seemed not to be

276 so secure as it first was supposed to be. And I think if

277 that happens a few times, it could be disastrous. If there

278 is security flaws that are being exposed that undermine the

279 whole premise of the blockchain, that could really be

280 something that will kill the adoption. If it's not secure,

281 then there's no point of doing it at all, because the main

282 premise is this anonymity and security. We've seen, already,

283 quite a few disasters--incidents, happen on the currency

284 side. I think if that happens a few more times, it could

285 kill it.

286 I: Besides all the barriers and challenges the technology

287 has, from your perspective, what could be the motivations

288 for the adoption of blockchain technology?

289 IP7: There needs to be absolute incentive for a business to

290 adopt it. It could either be something on the customer side,
291 so a better customer experience that we can't give today.
292 And I can really imagine with identification on blockchain,
293 that that can help; or, it should be an economic benefit to
294 the hotels, or cost-saving, or a revenue opportunity. On the
295 cost-saving side, maybe the transaction cost can go down of
296 a booking or of a financial transaction where if you don't
297 have credit card payment, transaction fees anymore.

298 IP7: Or, on the revenue side, it could be an opportunity to
299 attract certain channels that we don't have today--but I'm
300 just thinking out loud. But there needs to be either a soft
301 benefit in terms of the customer experience, or [inaudible]
302 experience, or it needs to be a real hard benefit in terms
303 of cost or revenue.

304 I:I think we are already at the end of the time window. Is
305 there anything you would like to add to the topic of the
306 application of blockchain technology which we have not
307 discussed so far, but you think is relevant?

308 IP7: No, no, not really. But I'm also not really the expert,
309 so... I think it's important that we continue to fuel
310 innovation, as I've said, to help startups, fund startups,
311 give them opportunities to try out new ideas even if they
312 sound crazy. And hopefully, one of them will take off and
313 make our industry better.

314 I:Absolutely. Well, thanks a lot. These were amazing
315 insights for me and this is absolutely valuable input for my
316 research. Thanks a lot.

Interview 8

1 Interview 8

2 I: So before we deep dive into blockchain, I would just like
3 to learn a bit about your background. Could you let me know
4 the company you work for and worked before just [inaudible]

5 IP8: Yes. So I actually at first don't have a hospitality
6 background, I have a finance, more of a background, but I
7 joined in 2012 as their first employee, a company called
8 Frontdesk Anywhere, which was... Which is one of the first
9 Cloud PMS, property management system for hotels. So when I
10 joined in 2012, they had like... they were just starting,
11 they had like 20 or 30 pilot hotels. So then I led sales in
12 partnership with that company, and stayed there for four and
13 a half years. So I mean, PMS, still not a very big company,
14 but we grew it to a little bit under 2000 hotels, so maybe
15 today they have 2000 hotels, I'm sure.

16 IP8: But so that was interesting for me because obviously
17 being a PMS, which is the core system that sits at the
18 hotel, you needed to understand everything on how things
19 work operationally at the hotel level, from again, front
20 desk operations, to accounting, to distribution strategy, to
21 housekeeping, to everything. Then also, how do you make the
22 data that sits in the PMS available for point of sale
23 partners distribute. So obviously, we had to connect to the
24 current distribution intermediaries that shape the
25 distribution chain today. So we had to connect to GDS,
26 Channel Managers, which is wholesalers and so forth.

27 IP8: So that's how we really got to see how things are
28 interconnected behind the scenes and how things work, what's
29 inefficient, where are often the problems occurring, and so
30 forth. So that's why we started Arise about a year and a
31 half ago now, because we saw clearly a need to improve how
32 basically data is being shared between hotels and point of
33 sale partners, and make it in a much more direct and
34 trustworthy and transparent way and efficient way compared
35 to how things have been designed in our interconnected today
36 behind the scenes. So that's just super high level. Yeah, of
37 everything.

38 I: Okay. So, you talked a bit about IT in
39 hospitality and that you've learned about it. So just in
40 brief, what is your perception of IT in the hotel industry
41 and the general adoption of idea indention's in hotel
42 industry?

43 IP8: Yeah. Well, actually, there are different aspects
44 there. Like if you see everything that is customer facing, I
45 believe the travel industry in general has always been
46 actually pretty active in terms of innovation. So, when it
47 comes to like the way the people can now search and book
48 online or through the mobile or the check-in experience even
49 at the hotel in some cases and whatnot. So all of this, but
50 the travel industry has always been trying to stay maybe not
51 ahead of other industries, but at least like they keep
52 innovating. But I believe the major problem over actually
53 the industry is limited in terms of how it can actually
54 really improve at a faster pace, or innovate at a faster

83 blockchain technology in general. So not particularly about
84 hotel or travel industry, but in general.

85 IP8: Yes.

86 I: So, what are your experience with blockchain technology?

87 Obviously, you have a lot as you working for a company
88 engaging in distributed ledger technology. So tell me a bit
89 about your background and your experiences.

90 IP8: Yeah. So for me personally, I'm... So in Arise, I'm

91 actually one of the co-founder and I'm more of the business

92 guy so I'm the CEO officially, so I'm not typically... So I

93 wasn't the one at first who had a lot of knowledge about

94 blockchain industry ledger technology. It's more my

95 co-founder who has been way more because he's been following

96 the evolution of crypto before the whole hype happens. So

97 I'm talking at least six, seven years ago when it started,

98 or even more. So anyway, like he basically explained how all

99 of this works to me and how it applies to travel. So that's

100 where my experience started. But otherwise, what we've seen

101 is blockchain is still too much associated with

102 cryptocurrency, which is why coming back to Arise in our

103 case, we very rarely, if not ever, actually even mentioned

104 the word blockchain. Because again, it's really more about,

105 in our case, distributed ledger technology, we actually use

106 hyper ledger fabric which is the IBM the one IBM pushed,

107 which is more of a private blockchain if you'd like.

108 IP8: But because even still today, people they hear

109 blockchain they think Bitcoin and Ethereum or whatever

110 crypto stuff. It's just which is completely not in line with

111 what we're actually doing or the problem we're solving. It's
112 tricky and so, yeah, that's basically... So the state of
113 blockchain I think, obviously, it was over-hyped, talked to
114 soon, over promised about deliverables throughout 2017,
115 early '18. So then, obviously, I believe the last year or
116 so, the hype is completely down and so then I believe now
117 that the actual strong projects are going to come out if
118 it's not already now for some of them, but at least in the
119 next two to three years is when we're going to see the
120 actual real viable project that do actually need and benefit
121 from such technology because I think the problem with how it
122 was over-hyped is that 90% of the project out there actually
123 didn't need blockchain at all. There was no real need for
124 it. It didn't bring any additional benefits instead of just
125 running this through a centralized solution.

126 IP8: So not all businesses are all use cases need actually
127 DLT or blockchain. So that I think was the problem a few
128 years back because too many basically, either dummy project
129 or project that were good but actually didn't need
130 blockchain got way more too much attention, then two years
131 later, fast forward to today, the results are not there. So
132 people lose bit of confidence. But I do see this like people
133 talk about similarities with the dotcom boom era where
134 basically internet was going to change everything at once
135 and then it crashed. But the ones who actually came out and
136 survived are now huge companies, right? So I kind of see a
137 similar trend here with blockchain which also, I think we
138 are going to then see use cases that are not for example,

139 associated with crypto, like you can see great project which

140 could be also on the [inaudible] to blockchain with DLT.

141 IP8: Hopefully, also ours be one of them, but there's many

142 other industries and verticals. So I'm expecting basically

143 now that the hype is gone, that the next three to five years

144 are actually going to now be the time where we're going to

145 see real validation of industry changing capabilities thanks

146 to that technology.

147 I:Okay, so you talked a bit about the technology evolving

148 now and possibly applications within the next years. So, in

149 your opinion, what are the future applications of blockchain

150 technology? I'm still talking about general not particularly

151 in travel or hospitality.

152 IP8: Yeah. Well, I mean honestly it's any industries where

153 you have multiple parties that needs to have some sort of

154 trust involved in the way they do business or transact or

155 share information. So the whole like the typical

156 characteristic of blockchain or DLT or the fact that is

157 transparent immutable and basically a visible by parties who

158 have access to it, I think is in a very important piece

159 which then can be applied to many types of industries. So

160 like I know some already I've seen great traction with like

161 some it's like with shipping... I've forgotten the name of

162 the company but they're doing this at a large scale already.

163 Walmart to track some stuff and the supply chain like,

164 again, when it comes to actually keeping track of pieces of

165 information where data today is fragmented among so many

166 different types of players where if you don't have kind of

167 like a shared ledger that people can trust at all time, that
168 is immutable and whatnot, it becomes kind of hectic, whereas
169 this is a perfect solution to bring more efficiency and
170 trust in terms of how, again, these parties work together or
171 share data together.

172 IP8: So, again, I'm sure then we can think of so many types
173 of industries and verticals where this could be applied to.
174 But this is the very straightforward, typical perfect
175 example of where I see, I believe will see a strong use
176 cases emerge in the short term.

177 I:Okay. So where do you think blockchain technology can be
178 used in the hotel industry?

179 IP8: Yep. So obviously, I can speak to what also we are
180 doing and I'm sure there'll be other use cases as well. But
181 so, today like as you know, there are so many different
182 types of players that shape hotel distribution or travel
183 distribution. So today, all these intermediaries rely on
184 cached information. Meaning they receive information that
185 caches in their own system, then they forwarded along to
186 other people who also cash it and so forth. So at the end of
187 the day, you have no standardization of data formats or
188 API's, but also everybody works have their own local cache,
189 which in some cases might be close to up to date but in some
190 other cases, completely out of sync, especially the more
191 players you have in the chain, the more out of sync the data
192 that you have becomes, right? So that's where I see
193 distributed ledger technology is kind of like instead of
194 everybody having its own cache, you now have kind of like a

195 distributed cache, which is the source of truth for
 196 everybody.

197 IP8: So it's like everybody runs up the same set of
 198 information and when a change is pushed to one local copy
 199 somewhere on the ledger, automatically other copies sync
 200 just a few seconds later. So it just solves many of the
 201 issues today when people again are completely working off
 202 out of sync information. It also solves the problem of total
 203 lack of visibility that today hotels have over there, or...

204 I mean, I say hotels because that's what we're focusing on.
 205 But the same problem will obviously be the case for the
 206 airlines and others. But so today, all of this is very
 207 opaque, meaning the supplier has very little control, if not
 208 any of visibility over where their data is actually going
 209 once it leaves their system. Because again, there is no
 210 transparent shared, again, ledger over who is accessing the
 211 data on the other side. So they send this to an
 212 intermediary, they cache it today, they send it along to
 213 other folks who also caches it to hotels or airlines have no
 214 visibility over that, right?

215 IP8: So DLT, again, brings that level of not only everybody
 216 works of the same set up to date information, but also they
 217 are given... they have visibility and control over who is
 218 actually accessing and doing things with their data. When it
 219 doesn't mean that's why we're working on a private
 220 blockchain where we can partition the data, because that's
 221 definitely where the public blockchain where this would mean
 222 that everybody can see what everybody does which in the case

223 of hotels, and I would expect airlines, that doesn't work,
224 it doesn't fit with how things work in that space because
225 obviously you don't want your Marriott, you don't want
226 Hilton to see what you're doing with the TMCs, with your TAs
227 and the special rating, the commissions and everything. So
228 obviously, data needs to be... There needs to be a level of
229 security and privacy, where you can basically partition the
230 data between what's visible to everyone versus what's more
231 of a peer to peer connection, right.

232 IP8: But coming back to DLT, that does solve, I believe,
233 many of the problems of again, working up to date
234 information, as well as giving visibility and control back
235 to the supplier and trust between who is accessing the data
236 and how they transact with [inaudible] that they want to
237 share data with. So that's where I see a great fit and then
238 there are specific really use case around like in our case,
239 we work for example around commission reconciliation as
240 well. So for instance, there are chains like Marriott and
241 whatnot. They work with... We have pilots going on right now
242 with large TMCs one being suitability. So it will cost the
243 model needs. But the same issue goes for BCD travel and AMAX
244 and so forth. Where again, due to the fragmentation of data
245 today and the lack of having a single trusted shared records
246 for each booking that contains the booking commission amount
247 with the rules attached to that rate and so forth, it's
248 super... It's called inefficient right now the process in
249 terms of how they are collecting commissions, and they use
250 their company's called Onyx for this also.

251 IP8: But again, because there is no single record that is
252 always accurate for each booking, it just completeness and
253 inefficient and expensive process right now. So again,
254 having a trusted shared record on a distributed ledger
255 solves that and makes that entire process way more
256 efficient. So that's a specific use case we're working on.
257 But again, a more overall vision, this can be tied to
258 overall distribution where again, everything is always up to
259 date and visible to the parties that will work and transact
260 together. Does that make sense?

261 I: Yeah, absolutely. Absolutely. I think that's a great
262 overview and better view of use cases and possible
263 applications.

264 IP8: Yeah, and one application that we also then exploring
265 is the big problem... I mean, you're in the hotel space. So
266 you know they call this street leakage. So like, these
267 wholesale rates that end up being redistributed to logo TAs
268 like a MoMA.com, and bunch of other ones undercutting the
269 hotel's direct channels and meta search. That's also a big
270 problem due to how things are currently designed and work
271 today, right? Because it's so opaque. Once I'm Marriott, I
272 send my rates to hotel beds or whatever other bed bank, then
273 they can be... you have no visibility over what they do.
274 Even though you have a contract, they can actually do what
275 they pretty much want, you will have very little idea over
276 who is actually producing bookings unless you make fake
277 bookings, when you spot rates are undercutting your
278 channels, and even then you will only see the rate code

279 coming from the wholesaler delivering the booking. But then
280 you can call them up and they'll say, "Hey, we didn't do
281 anything bad, we resorted to another bed bank within maybe
282 broke contract."

283 IP8: So there is no pointing gun here like smoking gun. So
284 that's another thing that obviously DLT when you provide
285 that level of transparency and traceability of the data flow
286 up to the point of sale of who is actually accessing and
287 manipulating the data provide basically, you can become like
288 a trusted wholesaler in that case where again, hotels have
289 full visibility and control over what's going on. Because
290 also DLT allows to run without going into too much technical
291 details here, but it allows the complication to actually
292 cure the edges of the network instead of a centralized
293 solution and this allows us to do actually certain things to
294 prevent party that would be connected to the network from
295 trying to trick the system and resell to non-contracted logo
296 TAs.

297 IP8: So in this example, let's say if Arise acts like a
298 transparent wholesaler and to where Thomas Cook or whatever
299 access these package rate, and they were to try to trick the
300 system and either undercut the hotel's directional by
301 selling the rate of the hotel, let's say hotel only or
302 resell it to a MoMA or whatever. If they try to make a
303 reservation back into the network, it's not going to go in
304 because of basically it allows us to do certain things.
305 Because again, computations are [inaudible] on the edge of
306 the network. It allows us to capture piece of information

307 that otherwise would be very difficult to capture, which
308 basically prevents bookings that are not respecting the
309 rules on network from being push backs, it will
310 automatically get denied.

311 IP8: So that's basically great for hotels because not only
312 did they have visibility over who is accessing their
313 different types of rates, but also with the trust that these
314 policies accessing these rates, won't be able to trick the
315 system and make push reservations back in undercutting the
316 channels or breaking contract. So that's also a great
317 advantage. I think that this technology makes possible that
318 otherwise isn't possible today and available to hoteliers.

319 I: Absolutely. So in the next step, I would like to talk a
320 bit about actual adoption and possibly barriers or
321 difficulties. So what do you think will be technical
322 difficulties in the adoption of blockchain technology in a
323 hotel company?

324 IP8: So, I don't think actually, it is blockchain
325 technology itself the challenge, it's more how because we
326 don't expect actually many of these either supplier or upon
327 sale partners to even know or understand the underlying
328 blockchain technology. Because we, for instance, like they
329 can't connect using the standard API connection that they
330 know like JSON or whatever so to like standard API format
331 that they are used to today when they connect to like let's
332 say Expedia partner solution or wholesalers or GDS. So very
333 similar type of connection will allow them to talk to the
334 network. So we don't expect actually the industry to become

335 familiar, at least in the short term with blockchain
336 technology itself is not required. So the challenge itself
337 is more, how do you implement basically new capabilities or
338 new features without disrupting how things work today,
339 because obviously, suppliers cannot just shut down GDS or
340 wholesalers or whatnot, and just move everything to a new
341 distribution technology. right?

342 IP8: So this has to be incrementally the rollout and be
343 able to run in parallel to what hotels have in place today.
344 So that's basically completely doable, but that's the
345 challenge which basically, we are starting now, but this has
346 to be seen as basically a non-risky move for hoteliers to
347 first test so that they can see it and did the demonstration
348 and the validation that it does what's supposed to do and
349 beneficial for both them and the point of sale partner. Then
350 from there incrementally, basically roll it out and then
351 less and less over time where they be dependent on the
352 current technology they rely on. So again, incremental
353 rollout is key here and so the challenge is really just the
354 time that it takes for... Because obviously, to demonstrate
355 the benefit of that technology, you need both sides. It's
356 kind of like a chicken and egg problem, like a marketplace
357 almost problem where you have to get the supply on board,
358 but also the demand because if you only have supply,
359 obviously, if the demand is not feeding of this distribution
360 technology, then you're not proving anything, right? You
361 need both sides to close the whole loop and to demonstrate
362 the technology.

363 IP8: So that's basically the real challenge is solving the

364 chicken and egg marketplace problem which again, is

365 completely solvable if you bring value to both sides, which

366 here in this case does but it just takes time. So it's

367 really more the... It's more the time more than the

368 technical challenge, I would say if that makes sense.

369 I: Absolutely. Maybe you already gave the answer to my next

370 question. But in your opinion, what will be the best first

371 step to adopt blockchain technology in the hotel process?

372 IP8: Yeah. So we believe that it's by solving specific pain

373 points and so for instance, as I mentioned, like if you

374 talk... So it depends who you talk to. So if you talk to the

375 major chains, rate leakage is one of their top priority if

376 they have a solution to stop it, they'll gladly try it,

377 because they currently have no solutions to this. So

378 basically, as I said, our technology allows us to basically

379 act as kind of like this transparent, fully trustworthy

380 wholesaler. So that's one angle that we're going to

381 basically start demonstrating and obviously to start, it's

382 much easier to start in a relatively quick matter with

383 independence, like by connecting to their Channel Manager,

384 they are much quicker obviously to start and to test. So

385 that's what we're doing.

386 IP8: So we're already integrated with one first Channel

387 Manager, it's called D-EDGE which used to be called Availpro

388 and Fastbooking that are core but rebranded. It's called

389 D-EDGE now. So they have about 12,000 hotels. So that's the

390 first one we are going to demonstrate how basically their

391 hotels can also distribute their package in opaque rates,
392 but at this time in a fully trustworthy way, and transparent
393 way and we feed directly to tour operators and the relevant
394 parties on the other side. So that's one angle. If you
395 thought for example, we also have operators, as I mentioned
396 with CWT, they are like the big issue we have is around
397 commission reconciliation, which is also a problem for
398 hotels because they get currently pay OnyX, which also then
399 chase commissions up to 18 months after the checkout date to
400 try to recollect reconcile commissions.

401 IP8: So it's just inefficient and cost involved for no
402 reason. If you had this trusted shared record between both
403 sides, it would solve all of that until they wouldn't be all
404 these million spent of paying third parties companies and
405 chasing payments and bugging hotels. So that's another thing
406 that obviously our technology does. So those are basically
407 the two that we are focusing on at this time. It's basically
408 proving to hotels that this technology, you can have
409 basically this trusted shared record for each booking
410 status, which solves the commission part. But also, that
411 actually you can see that it can become kind of like this
412 transparent, fully trustworthy wholesaler. So that's the
413 angle we're taking.

414 IP8: So in terms of deployment, we start with independent
415 because again, we like integrate with the Channel Manager,
416 took us two weeks on bonding hotels, it's a piece of cake
417 because for them it's just enabling Arise as a channel index
418 Channel Manager, so it doesn't change really the flow of how

419 they work, which as I said, is important because otherwise
420 it would be a nightmare to try to convince but it also has
421 to fit with how they already do business today. Start
422 demonstrating the technology and then from there, you extend
423 the larger chains because they want to see this work,
424 obviously at a smaller scale first before allocating
425 resources and energy into this, but it's focusing on solving
426 problems that they care about. Meaning one of them being
427 rate leakage, which is a big problem and great if you can
428 also help us reconcile commission in much more easier way
429 where we don't waste time and money doing that, great. So
430 that's kind of the focus and then extend from there.
431 I:Okay. So from an organizational perspective, which
432 organization and strategies are important for a hotel
433 company to adopt blockchain technology?
434 Nadim: So, what do you mean? So you mean like what the
435 initial relevant partners to make this work?
436 I:Yes.
437 IP8: Yeah. Good question and that's
438 why we believe working with just small partners that bring
439 very little volume or very little value actually, to the
440 hotels means not much. So that's why we're focusing on
441 basically working with the major tour operators and the
442 major TMCs because those represent quite a significant
443 volume and we also are solving a problem that directly
444 impacts the way hotels currently do business with them. So
445 looking at the TMC side, obviously there is the whole
446 commission, reconciliation aspect, but also the fact that

447 currently these TMCs cannot work in a flexible or dynamic
 448 way with hotels, you should have things are currently
 449 tracked in design. It's like a fixed commission with fixed
 450 corporate negotiated rates and that's it. So that means some
 451 hoteliers don't want to work with them at all or if they do,
 452 they don't give them availability at all times, that they
 453 don't want to keep paying high fees or high commission with
 454 corporate discounts if it's during a busy time of the year.
 455 IP8: So having again, a trusted share record that keeps
 456 track of everything allows them to now work in a much more
 457 dynamic way, where commissions can vary on a daily basis if
 458 they want to. So they can be way more dynamic on how they do
 459 promotions and commissions and so forth, and how they do
 460 business together. So, again, if you look at TMCs, this is
 461 one use case. So working with relevant player so the BCDs
 462 are the celebrities of the world. So the guys who produce
 463 large volume is relevant. Same what goes with tour operators
 464 where again, hotels, they get a lot of like tour operators
 465 business through, I'm sure many travel agents and tour
 466 operators, but if you already work with the relevant ones
 467 who start solving and show that indeed, this they can work
 468 in a fully trustworthy and transparent way with them is the
 469 way to go because it starts attacking one of the major
 470 problems hotels have with the rates we get today.
 471 IP8: So, again, to answer your question, I think getting
 472 involved, even though it's not going to solve everything at
 473 once and for sure is they get reservations for many other
 474 parties as well, but at least demonstrating the benefit of

475 the technology that with party that matters is important. So
 476 it doesn't need to be like doesn't matter if you're not
 477 connect to a 100 demand partners to start, if you already
 478 work with a handful number that are real relevant to the
 479 hoteliers you work with, this is what matters, just that.

480 I:Okay. So I'd like to go one step back to technology. So
 481 currently, there are different types of blockchain
 482 technologies available. So in your opinion, which type is
 483 the most useful in hotel industry or for application in
 484 hotel industry?

485 IP8: Yeah. So that's why we again, come back to... We
 486 believe Hyperledger Fabric currently has been proven to us
 487 that it's a great... it's the most like enterprise ready
 488 framework or blockchain, I would say. So for us, we believe
 489 it's perfect for what we're doing and we're really-

490 I:Which is a private one, right?

491 IP8: Which is private exactly, because the difference with
 492 public is, in terms of the requirements for security,
 493 privacy and efficiency, it just doesn't fit. So efficiency,
 494 okay, for sure it doesn't fit the requirements in terms of
 495 how you know fast the look to book ratio and how much
 496 transactions they need to handle per second, and so forth.
 497 But even that is, let's say if this improves over the years,
 498 and it is indeed one day able to do thousands of
 499 transactions per second, which today we're as I'm sure you
 500 know very far from or talking 5, 10, 15, 20, whatever. So
 501 we're still very, very far from the requirements needed to
 502 be able to make it work in travel distribution. But even if

503 let's say this wasn't an issue, the fact that everybody on a
504 public blockchain can then see what others are doing just
505 doesn't work at all with how the industry works today
506 because as I said, like the example with like Marriott
507 versus Hilton or even within Marriott, you don't want the
508 other point of sale partners or partners that you work with
509 to see that like, "Oh okay, I have this type of agreement
510 with BCD, a different one with AMAX and this one was JSON
511 and within the OTAs different commissions" and whatever. All
512 of this needs to be not visible to all parties on the
513 network.

514 IP8: Then also, maybe you also want to have more control
515 over who is being... who is able to access your data, who
516 are the parties involved on the network. So I think a more
517 controlled network is just fits better with how the industry
518 functions today. So maybe things will evolve and in 10 years
519 from now, we could have a different conversation, but if you
520 look at how things work today or how things are going to
521 work over the next couple of years or even many years, we
522 don't see a fit for public blockchain for the reasons I just
523 described here.

524 I: So how ready is blockchain technology? I mean, you
525 already went in detail on public. But what about private?
526 How ready is private blockchain technology for the
527 application that?-

528 IP8: Yep. Well, we are actually fully already, we've been
529 running live transactions and tests and everything at the
530 pretty large volumes. So I mean, I'm sure we couldn't just

531 say we could handle the whole global volume today. But it's
532 already handling like close to 1000 transactions per second
533 and when I mean transactions, it's not the look-to-book
534 ratio, which I think is what, 10,000 plus, because this has
535 nothing to do with transactions. This is actually just
536 hitting a local copy of a node on networks. It doesn't
537 impact at all the network. So transactions means like, it's
538 when new information is actually pushed in a network meaning
539 the new booking is made on an OTA or [inaudible] or
540 whatever or let's say, if hotel updates a new picture of a
541 lobby or changes their rates and whatnot. So that's actually
542 an actual change pushed to all connected parties on all the
543 other nodes on the network.

544 IP8: Right now we can handle about 1000 changes per second,
545 so which is already pretty high, because people keep saying
546 like, "Oh, you need to be able to handle the look-to-book
547 ratio", because again, these requests are today hitting
548 whatever centralized solution. This is completely different
549 here. This is distributed among all the parties on the
550 network, and only those look-to-book search ratios are only
551 hitting local copies of the nodes, which people can scale
552 accordingly on their own infrastructure. So that's why I
553 want to make sure people understand that we could basically
554 already handle all what the [inaudible] and the experience
555 of the world do. So that's why I'm very confident that the
556 technology is pretty much ready and we'll keep improving and
557 that's again, viable and possible on private blockchains
558 completely different scale and different challenges on

559 public blockchain. So that wouldn't, they are not ready yet
560 to handle those for sure. But when it comes to being able to
561 handle at least 500 to 1000 changes or transactions on the
562 network where all nodes update in sync in a matter of like
563 right now, it's two or three seconds. Yeah, that can happen
564 as I said, we can handle about close to 1000 changes right
565 now per second.

566 I: Okay. So in your opinion, what kind of pressure is there
567 for a hotel company to adopt blockchain technology?

568 IP8: Not pressure, they just need to see validation. So
569 like, for instance, in our case, we've had great
570 conversations already with the large chains. I mean, not all
571 of them but many of them and they see this as a potentially
572 great viable solution moving forward to bring distribution
573 to another level and help them regain control. They just
574 need to see some validation. Because right now it's all
575 talks. Right? So it's not a pressure. I mean, I think the
576 pressure will come once. So let's say if I look at our case,
577 and again, it could apply for other companies that might
578 provide similar solutions in the future, right? But like,
579 once, they will have... Once hotel will see validation, so
580 meaning, let's say, independent start benefiting from this
581 tech, then it's going to become a race to, "Okay, I'm being
582 left out here. Like others are benefiting from this and I'm
583 not and I'm still struggling on the same old whatever ways
584 things are working today".

585 IP8: So that's where I think then the pressure will arise.
586 But not at this time, because until real, proven

587 demonstration and validation of the benefit of the tech is
588 shown to hotels, there is no pressure for them to do that.
589 But I think the pressure is more... So it's not pressure,
590 it's important for them to stay ahead of or at least aware
591 of what's going on so that then they don't miss the train,
592 right? So that they're not left behind, or jump into this
593 way later and have others benefit from its way ahead of
594 them. So I would expect the pressure to build up, let's say
595 hear hopefully, at least in our case, sometime next year,
596 because as they are going to start seeing the benefit that
597 others at a smaller scale are starting to have, and then
598 that most likely a larger ones are going to start onboarding
599 and that's when the pressure is like, "Okay, I don't want to
600 be left behind. Just make sure I get on this also." So
601 that's how I kind of would see it happening.
602 I: Okay, so we're almost at the end of the interview. I
603 wanted to ask you if there is anything you would like to add
604 to the topic, which we have not talked about?
605 IP8: No, we covered I think quite a bit to truly... I mean,
606 just to add a comment I think from the conversations we've
607 had is really, like very rarely do people actually care
608 about the underlying technology. What they really care about
609 at the end is, does this solve one or multiple problems they
610 have. So in terms of like, again, operations, cost or
611 whatever combination of all of that and that's why it's been
612 interesting. Like I think that was part also of the problem
613 is, when it comes to blockchain, people were trying to
614 explain to non-tech people because again, this is like

615 travel or hospitality, like we don't expect 99% of the
616 people to actually understand the underlying technology,
617 right? So that was I think, also the challenge because there
618 was a lot of high level conversation and trying to explain
619 what blockchain is to people who actually like they can't...
620 it's hard for them to associate what they are being
621 explained or shown to, "Okay, my day to day operation, how
622 does that actually impact or benefit me."

623 IP8: So that's why also, I think the hype, like people got
624 tired of hearing the word blockchain, presentations of
625 blockchain because these presentations were pretty much the
626 same for two, three years. Then at the end of the day, most
627 of these hoteliers are traveling people for they're like,
628 "Okay, how does this really impact me in my daily
629 operations?" So it was really important for us to kind of
630 like shift, kind of almost stay away from the technical
631 conversation. You really... We only have real technical
632 conversations about how all of this really works behind the
633 scenes with the large chains or like the CRS or like the
634 basically the tech providers that hotel use. But otherwise,
635 when it comes to hoteliers or again, it will be similar with
636 airlines and whatnot, all they care about is like how does
637 that really impact or solve problems.

638 IP8: So that's, again, just to point it out like it's even
639 though yes, we do provide this new distribution technology
640 that is going to provide unique benefits, at the end of the
641 day, it's really focusing on the benefits more than how the
642 technology really works behind the scenes that really

643 matters when we talk to, again, travel providers.

644 I:Okay, great. Well, thanks a lot. Yeah-

645 Nadim: I hope that's what... I hope I was helpful. Again

646 I'm-

647 I:Absolutely. So, as you can assume it's quite hard to find

648 experts in the field of blockchain and with also knowledge

649 about hotel-

650 IP8: Right, exactly.