MASAI
WHITEBOOK

A digital concierge in everyone`s **pocket**

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1. EXECUTIVE SUMMARY

MASAI IS A THREE-YEAR (2015-2018) R&D PROJECT ABOUT SEAMLESS TRAVEL IN THE HORIZON 2020 EU PROGRAMME. The vision of MASAI is to satisfy the overall requirements for services dreamed by each mobile citizen: a tailor-made aggregation of features - a digital concierge in everyone's pocket. MASAI approaches this aim by building up a community of stakeholders, progressively contributing with adequate evolutions and improvements for the development of the core elements of a digital concierge, allowed by an ever-accelerating progress of technology.

The MASAI mission is to empower key stakeholders in the travel and tourism industry (Travellers, Concierges, Service Providers) in order to enable a seamless travel experience. This means that MASAI aims to serve:

- All stages of the travel process, considering changes in travellers' mobility patterns.
- Long-distance travel as well as local travel including all related services (transportation, accommodation).
- Customers travelling for business as well as for leisure purposes.

The MASAI mission is made possible by creating an open ecosystem ("MASAI Mobility Community") characterized by:

- Its openness for innovations serving the customer needs.
- Its adaptability and scalability fostering cooperation in a competitive environment
- Its potential for direct discovery and connection between all MASAI Community stakeholders, while travellers are put in full control of their personal data.

WHY MASAI?

Contributing to a Single European Transport Area

Implemented under EC funded EU HORIZON 2020 Programme MASAI is mainly supporting the idea of a Smart, Green and Integrated Transport area, addressing fragmentation in Intelligent Transportation Systems (ITS) deployment in Europe. The consolidation and deployment of high-quality integrated multimodal travel services and cooperative ITS are required. On this path the major aim consists in linking existing heterogeneous services to enable their integration in a Single European Travel Market. The necessary development of EU-wide common minimum standards for interoperable services comes alongside with the need of an integrated approach with fair and equal access to quality multimodal-multi-services in the travel and tourism industry. The use of communication network architectures and solutions for real-time information exchange is becoming crucial.[1]

MASAI aims at contributing to an efficient and integrated mobility system by improving service quality and reliability. This comprehends amongst others the support of measures necessary for further integrating different passenger transport modes to provide seamless multimodal door-to-door mobility, as well as the enhancement of framework conditions for the promotion of the development and the use of intelligent systems of interoperable and multimodal scheduling, information, online reservation systems and smart ticketing.[2]

Complying with growing urbanity and an increasing global travel

Over half of the more than 7 billion people living on our planet are inhabiting cities and urban areas. The urban share will rise to over 60% in 2030 and to 70% in 2050, when 2 billion more people are expected to become urban residents. Urban areas will contribute 86% of world GDP in 2025 with a strongly increasing urban mobility, coming to 64% of total mobility. Cities and their mobility systems are required to think carefully about the challenges associated with such rapid growth - like avoiding over-stressed public transit infrastructure and reducing traffic congestion. Many emerging cities currently are characterised by underdeveloped mobility systems (e.g. Manila, Dubai, Bangalore), while some mature cities like Stockholm or Hong Kong are already remarkable for their high share of public transport, walking and cycling options. New business models for the improvement of urban mobility performance need to be adopted to gain sustainable solutions responding to the interests of all stakeholders. Good-practices, technology and business models are available. Top-performing cities already apply working technologies (e.g. advanced parking systems, Segway, automatic monorail) and mobility applications (e.g. bike and car rental). Emerging technologies like automated cars or solar roadways are developing. Despite all these progresses the dream of seamless travel has not yet been realized.

A networking system, as MASAIs Mobility Open Network of Services (MOONS), competent to share concepts based on innovative thinking for a seamless integration of heterogeneous systems is required for the necessary shift towards sustainability and for improving mobility performance in growing cities.[3] This distinguishes MASAI from existing approaches like existing Online Travel Agencies (OTA) or Service Providers of vertical industries, who are designed as homogeneous systems built out from a diversity of services.

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[1] European Commission 2014.

[2] MASAI mainly refers to sections 22, 23, 27 of the European Commission's Whitepaper „Roadmap to a Single European Transport Area-Towards a competitive and resource efficient transport system"; see European Commission 2011, p. 6-7.

[3] see Lerner, van Audenhove 2012; see Google Europe 2015.
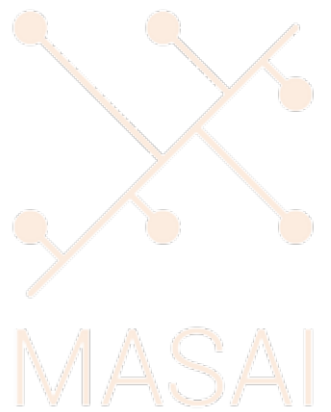
Tackling mobility with technology

Consumers research, purchase and share online about travel. According to the Google Travel Study 2014 about 80% of business travellers and 78% of leisure travellers are using online sources in their travel planning and on their path to purchase.[4] 25% of total global travel sales are online sales – rapidly increasing, air transportation being the leading sector (46% of total air travel sales), followed by accommodation online sales (23%). The US and Europe are the leading regions in terms of online travel sales with the Asia Pacific region expected to double its online travel sales by 2017. In Europe, online hotel sales are experiencing a rapid growth with expections by 2017 for Western Europe to have an online sales rate of 40% and for Eastern Europe 24% of total. OTAs offering superior site tools and options (e.g. Expedia, Priceline, Sabre) are increasingly consolidating on the traveller market, leading to a tough competition with direct suppliers. OTAs from emerging markets are expected to expand in advanced markets in the near future.[5] According to the World Travel Monitor about 70% of international travellers are active social media users, with social media influencing approximately 25% of all international trips, especially destination (about 40%) and accommodation (about 30%) choices. Nearly 50% of travellers are posting their experiences on review sites (e.g. TripAdvisor) and travel blogs / forums.[6] The trend to share travelling related reviews and content on social media in recent times is expanding towards a second stage when sharing travel services (e.g. Airbnb, Bla Bla Car, Vayable) arise with active consumers providing apartments, cars, meals or tours. Shared usage platforms are changing the travel economy, giving people new options about where to stay, what to do and how to get around. The adaptation to the realities of the sharing economy by monitoring user-generated content and cooperating with social media is becoming of interest for the travel and tourism industry and its destination management.[7]

Big Data[8], increasingly gathered by digital sensing devices and networks, allow Concierge and Service Providers to supply customers with targeted options and personalised offers for a more tailored travelling experience. The customer's demand for real-time services is rising with services required to be easily accessible via multiple devices (desktop/tablet, smartphone) with a 24/7 availability. As poor site experiences lead to negative impacts on brands / companies a flexible technological architecture is required to reach consumers on all screens. Concierge and Service Providers need to adopt a holistic approach being able to follow customers through all stages of their travelling process[9] (dreaming, planning, booking, anticipating, en route, destination).[10]

The promotion of seamless travel requires a closer cooperation between a large variety of industry and policy makers in order to design services as integrated ticketing/pricing and infrastructures responding to the needs of all travellers. Multi stakeholder governance models require the alignment in a multi stakeholder environment (authorities, citizens, private sector) and a supported implementation based on a suitable standard as a major driver of innovation for making travel more comfortable, efficient and sustainable.[11]

After many years of dreaming about seamless travelling – why should it –become possible now?

The travel and tourism industry is changing due to consumer demands and new possibilities brought to the travel and tourism industry by technology, providing new business opportunities at a fraction of the cost that they were years ago. The future of travelling is based on an open ecosystem providing a seamless multimodal door-to-door travel experience.

The economics of innovation becomes altered with **cloud based applications.** New opportunities can be tested and piloted without major start-up costs. The mobile app ecosystem and connected services are suitable for immediate adaptation, allowing to purchase resources in real time. The cloud's inherent ability to dynamically scale up or down the infrastructural commitment when demand changes on a pay-as-you-go basis has a valuable impact on the service provider's costs. Risks can be reduced preserving the potential return.[12]

Alongside with this a growing **API**[13] **economy** is changing our world into an ever pluggable one. Starting as a development technique in the R&D and IT field based on the need of sharing information and enabling transaction processing APIs - supported by the trend of integration in sophisticated ecosystems - elevated to become business model drivers, highly complex technical products able to close the gap between business and IT.[14]

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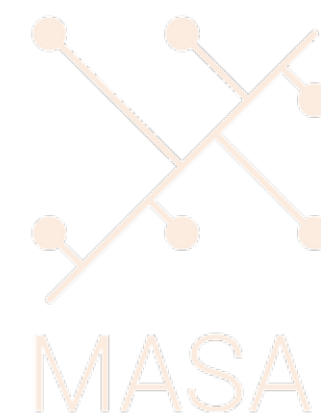
[4] see Google 2014.
[5] see Euromonitor International 2014; see Google 2014.
[6] see ITB Academy Berlin 2015; see Euromonitor International 2014.
[7] see OECD 2016.
[8] The terminology refers to a changing data ecosystem, where rapidly growing complex sets of available data are challenging traditional data processing applications and where advanced data analysis methods suitable for extracting values are of increasing importance.

[9] see chapter 3 for a more detailed examination of travelers stages of travel.
[10] see Euromonitor International 2014.
[11] see World Economic Forum 2014.
[12] see Koulopoulos 2012.
[13] Application Programming Interface
[14] see Nijim, Pagano 2014; see Deloitte 2015a.

The fast growing market and the advancements in **artificial intelligence (AI) and semantic tools** has major impact on future interfaces between humans and IT systems. Semantic technology invading the travel and tourism industry creating a positive scenario when unrelated data and disparate systems are being integrated and put in meaningful relationships to provide relevant offers and a pleasant well-tailored end-to-end experience to the customer.[15] Artificial intelligence tools are widely available and progressive platforms like IBM Watson are opening access to their intelligence to developers via open web APIs. A disruptive trend is coming with emerging chatbots. A wide range of chatbot applications working as domains of knowledge are entering the market, offering customer services (e.g. Aetna, CBD, Swedbank), virtual assistance (e.g. Apple Siri, Microsoft Cortana, Amazon Alexa, Facebook M, Google Assistant/Now) and human mimicry (e.g. Smarter Child). Chatbots intended as an evolution of messaging offer conversational interfaces as a viable interaction layer between business and consumers opening more natural ways in acceding service offers. According to the Forrester's Mobile Audience Online Survey 2015 31% of consumers prefer voice to apps or web for getting answers to quick questions.[16]

The technological progress impacts the travel and tourism industry. Hybrid and electric vehicles, as well as new power-train technologies (e.g. optimized ICE) will significantly transform mobility and urban spaces. Studies predict that the mobility needs of people will be provided as a blend of public and shared mobility business models.[17] Therefore partnerships between private and public sectors beyond the boundaries of today will be a critical factor for success. In automotive competition a trend is visible towards connected and autonomous vehicles (robotic or self-driving cars). A radically accelerating innovation of technologies and services (e.g. BMW, Tesla) and new technology companies entering the market, as well as new mobility concepts in an increasingly urban market (e.g. car-sharing, ride-sharing) with their potential to lower transportation costs are supporting this trend.[18] According to a McKinsey Report self-driving cars could account for 15 percent of all cars sold by 2030 if technological and regulatory concerns are resolved. Likewise the trend shows a decline in private car ownership, with an increasing shared mobility. The experts' assumption is, that 10 percent of new cars by 2030 will be shared vehicles owned by service companies with an upward trend. By blurring the distinction between private and public modes of transportation ride sharing and car sharing options are predicted to have a major impact on urban mobility, reducing cars by 80%.[19]

[15] see Cole 2012.
[16] see Ask et al. 2016.
[17] see Hannon et al. 2015.
[18] see Viereckl, Ahlemann, Koster et al 2016
[19] see Hannon et al. 2016; see Gao et al. 2014.

What is the MASAI approach?

The MASAI idea originates from the classical concierge model – conceptionally introducing the role of a concierge between the traveller and the Service Provider which can be principally taken on by anyone in the ecosystem. In fact this model already exists on a physical level in the form of hotel concierges and travel agencies as well as in the electronic form of OTAs and travel product related search engines. Tech start-ups betting on fully artificial intelligence enabled concierges [20] are continuously being launched. Big companies like BMW with their Concierge Start-up Challenge [21] are supporting this trend by challenging for creating the most humanoid artificial concierge. Due to the fact that up to now exclusively fixed static environments have been built, there is a lack of open and dynamic approaches. MASAI's aim is to fill this gap. MASAI is **traveller focused** by introducing a traveller controlled travel wallet (e.g. preferences, itinerary) called the MASAI Folder and a Concierge App which allows for an interconnection between various Service Providers. [22]

MASAI **supports Service Providers** by introducing tools and components to pilot new seamless travel models which further on can potentially be incorporated in their own service environments. [23]

MASAI is an **open community** driven approach kicked off with a set of specifications, tools, components and proofs of concepts (POC) based on the latest technology in traveller demand driven projects, connected with other EU projects in the field and providing pilot test pads with travellers and Service Providers. [24]

[20] The complaints that a man in the middle in the form of a concierge only selects the most expensive product to earn the most in commission is not relevant anymore if anyone is equipped with his own artificial intelligent assistant only costing CPU power which can help in travelling and all other personal demands.
[21] see http://www.bmwstartupgarage.com
[22] For details see chapter 3 MASAI's journey to serve the traveller
[23] For details see chapter 4 MASAI to serve the Service Providers
[24] For details see chapter 7 Starting the MASAI Journey by Joining the M2C Community

How is MASAI able to position itself in the travel and tourism industries competitive ecosystem?

MASAI implements the initial specifications, proof of concepts and the support of self-financed business-driven pilots which demonstrate the capabilities of the system. Moreover MASAI progressively empowers a community of stakeholders burning for a seamless travel experience in Europe. Besides building up relationships with players such as Open Travel Alliance for the hospitality industry, Full Service Model initiative in the train market, and others. MASAI also gets inputs from start-ups and innovation labs who want to try out new ventures in the form of POCs and pilots. For them the MASAI Community provides a playground where ideas, technologies and concepts can be field tested and new commercial opportunities can be assessed. Wherever possible the MASAI Community links with other open communities and open source related technologies (e.g. OpenTravel OTM-DE project on GitHub, Apache Marmotta, Apache Stanbol, Rocket.Chat) to help assess commercial business.

The MASAI consortium

MASAI is made up by a technology-driven European consortium composed of innovative SMEs - (MTA – Mobility, Ticketing & Applications SPRL, CARD4B Systems SA, DIGIMOBEE SAS, Ximedes B.V. and DB Systel, the IT company of Deutsche Bahn group - working closely related to public and private transport and surrounding services like business and tourist services on a local, regional and European level. All partners of the consortium have previously been involved in projects aiming at the completion of partial approaches by considering the whole travel and tourism industry's eco-system within a plug&play mobility services vision (e.g. Icare, Calypso, Triangle, IFM, Europtima, EBSF).

The evolution of this Whitebook

In the sense of a continuous learning process, the present Version 1.0 of the MASAI Whitebook presents a preliminary edition, which – according to MASAI progresses - is to be continually revised and adapted in order to obtain an updated final version at the end of the project in 2018. Details about MASAI can also be found on the Project Website http://masai.solutions/.

MOBILITY LANDSCAPE ADDRESSED BY MASAI

AT THE TURN OF THIS CENTURY, TRAVELLERS MIGHT HAVE ENTAILED A VISIT TO THE LOCAL TRAVEL AGENT. Since then the travel and tourism industry has been disrupted several times and a lot has changed. All competing players should adapt to these changes in order to remain competitive. Further, in our present fast-moving times, people think that disruption in the mobility sector is the new normal and future disruption will be rather an evolution than a revolution. [25] This chapter describes the steps of disruption, the current landscape of the travel and tourism industry formed by disruption and the consequences for the market itself and the stakeholders participating.

2.1 STAGES OF DISRUPTION AND THE EFFECTS ON THE EUROPEAN TRAVEL AND TOURISM INDUSTRY

The disruption of digitalization

The first disruption was triggered by digitalization, which enabled all other following disruptions. But still, the digital disruption did not reach its peak. In Germany, for example, 65% of all leisure travel bookings have been finalised through offline distribution channels in 2015. [26] But Phocuswrite claims that within 18 months, Europe will be the world's first region to see online overtaking offline as the leading booking channel for travel products. The continent's digital penetration for bookings will move past that of North America to reach 52% by the end of 2017. [27] Apart from final bookings, the internet is already the top source for travel planning used by almost 80% of all travellers. [28] The new shared economy start-ups don´t bother with these legacy distribution systems anymore and position themselves directly between Service Providers and the travellers either direct or through APIs. Their business model is usually based on a commission which is paid by the end user and/or Service Provider.

Disruption through innovation and technology

The next disruptive step comes with cognitive providers and new technology start-ups (e.g. Viv.ai, WorldMate, Digital Assistants, etc.) using innovation and new technology for providing additional services to travellers by including additional service providers. New user interfaces introduced by technology companies in the form of robots, avatars and virtual digital assistants will bring more diversity. In the future, self-driving cars and buses are expected to extend the offer of local transport opportunities

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[25] see Alvis 2014.
[26] see Statista.com 2015.
[27] see May 2016.
[28] see Google 2014.

External forces on the market: growth of urban population

The European travel and tourism industry has to deal with another additional problem, the growing urban population. All around the globe people are flocking to cities. Now more than half of the world's population lives in urban areas. That proportion is set to rise to 60% by 2030 and 67% by 2050.
This trend brings a lot of challenges to cities. Today, 80% of the people still use their own car. But the growing urban population will increase traffic jam and chaos. To avoid these problems people will ask for alternatives and the demand for public transports will increase. New solutions like self-driving cars or buses have to be promoted.

URBAN MOBILITY DEMAND EXPLODES

Urban mobility demand 2010–2050
(trillions pkm p.a; %)

+ 55%

+ 68%

67.1

43.2

25.8

2.6x

2010   2030   2050
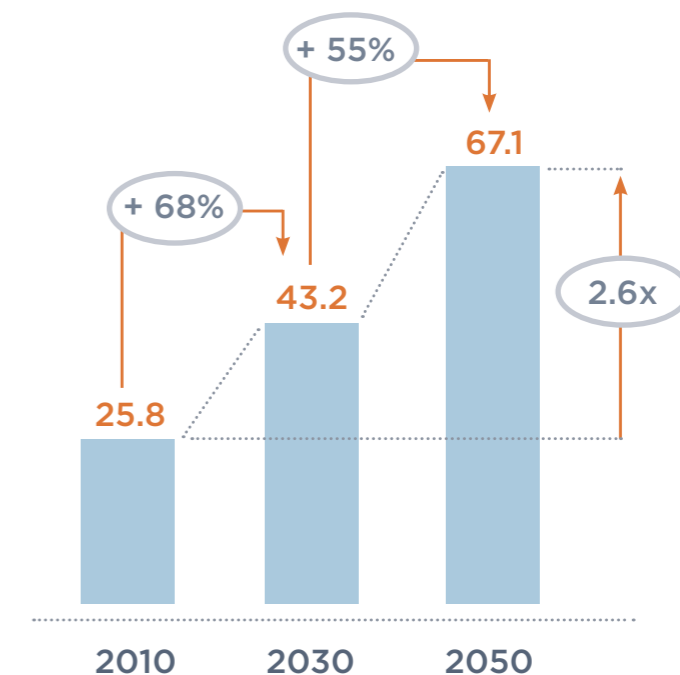
2.2 THE RESULT: A SCATTERED MOBILITY LANDSCAPE IN EUROPE

All disruptions and forces over the last few years have led to a scattered mobility landscape in Europe. The problem is that all distribution channels – like direct Service Providers, shared economy providers or indirect GDS or OTA – have in common that they try to sell to their traveller based on the product they origin from. While trusted brands and loyalty rewards are appealing, the potential ease and convenience of mobile travel is eroded.

Economically the competition is about distribution costs and the lock-in of travellers. The lock-in mechanisms are of course different depending on the origin. The spectrum starts from special information and services only available in a direct channel to crowd sourced information independent from single Service Providers.

The illustration below shows a simplified abstract of the scattered mobility landscape addressed by MASAI. The illustration is simplified because in reality the picture is unclear and consists of thousands of Service Providers, new ventures with their own infrastructure – combined recently with new cognitive Service Providers which provide additional values and insights for both – other Service Providers and travellers.
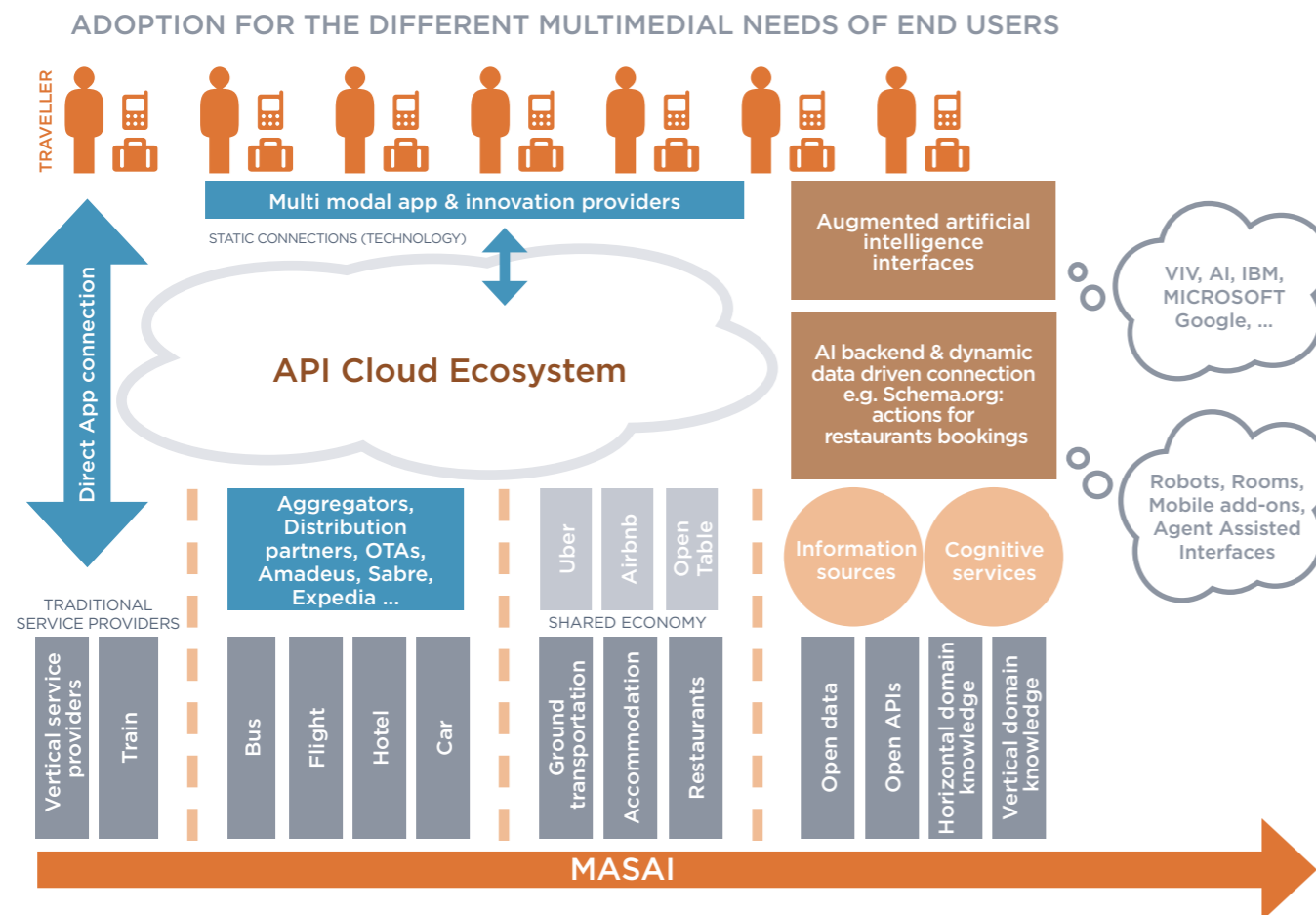
The following paragraph will show the consequences of the picture: the transformation of the travellers as shown in the picture and new challenges for Service Providers coming along with them.

2.3 THE CONSEQUENCES FOR STAKEHOLDERS

Stakeholders must adapt to the fragmentation of the market. The traveller is experiencing a transformation towards a new way of interacting with travel services. As opposed to former days, the traveller has not one touchpoint (with an offline travel-agency), but he is forced to choose between many offers. He can use many devices and select among thousands of apps. There are many different touchpoints, booking options with direct suppliers or opportunities to use multimodal concierge provider apps. Looking at the actual spending of technology companies into new artificially assisted intelligence (AI) and new interfaces we expect this journey to continue. New user interfaces introduced by technology companies in the form of robots, avatars and virtual digital assistants will bring more diversity into the travel industry's ecosystem and will change the market shares for service providers who actually have direct access to the traveller. By virtue of an increasing range of products offered and of information available online, consumers have been empowered. As a result, travel and mobility has evolved from a seller's to a buyer's market. Fragmentation and heterogeneity of solutions have made it difficult for businesses to track consumer activity across devices and to engage with them on a deeper level. Therefore, in the following chapters, we will show how MASAI helps to serve the traveller *(chapter 3)*, how MASAI uses the role of a concierge *(chapter 4)* to connect them to service providers *(chapter 5)*.

ADOPTION FOR THE DIFFERENT MULTIMEDIAL NEEDS OF END USERS

3. MASAI'S JOURNEY TO SERVE THE TRAVELLER [29]

The Six Stages of Travel

- Planning
- Booking
- Anticipating
- En Route
- Destination
- Dreaming

DURING EVERY TRAVEL, THE TRAVELLER PASSES THROUGH DIFFERENT STAGES, SHOWN IN THE IMAGE ABOVE. [30] It shows the complexity of travel in a demonstrative way. Travel planning and booking is a process like a puzzle. The customer often starts using search engines with only a fragment of an idea, before refining it on the basis of further inspiration. Especially at the beginning, he relies heavily on consumer reviews and social media in the decision-making process. During the different stages, the traveller switches devices, interfaces, apps and websites on many occasions in order to research destinations, to compare prices and to book transportation or additional services. While according to some sources travellers visit about 6,5 different websites on average per booking. [31] Expedia research shows that average segment travellers visit up to almost 40 pages during the booking stage. [32] Some professionals quote an average of 80 to 100 clicks to efficiently organise a convenient accommodation solution. Travellers rely on the Internet at all stages of travelling, but some devices are more frequently used in certain phases than others. Using smartphones and tablets for research, consumers switch to their laptop or computer to make their final booking. Statistics show that nearly half of those who use their smartphone for leisure travel information ultimately don't use this device for booking. [33]

The problem is that – as seen above - the traveller has to choose from many alternatives and he has to put a lot of effort in the travel (booking) process. He can use different devices, being confronted with a variety of touchpoints and he has to choose from a high number of distribution channels, websites and apps. The fragmentation of the travel and tourism industry described above is passed on to the traveller on an individual basis and leaves him to solve the complexity coming along. The traveller therefore is somehow lost and left alone in the process. Travel (planning) in the age of digitalization should be easy, fast and convenient, but in reality, it is often a complex challenge.

3.1 KEY FACTORS TO IMPROVE THE TRAVELLER'S EXPERIENCE

The question is how to respond to the traveller's current situation. Statistics show that the traveller's experience is critical for a booking decision. Travellers are looking for a high quality experience and for a personalised and integrated solution. When looking at the estimated impact of key trends and technologies it becomes obvious that mobile technology, ancillary and customized services and new customer payment solutions assume a key role. [34] Even if on the one hand these technologies bring desired benefits in convenience, ease of use, availability and access to relevant information, [35] on the other hand they also bring concerns regarding data security and safety, costs and quality. [36] Especially the quality of services to improve the traveller's journey is highly important. Since, for example, poor mobile experiences may incur travellers displeasure and lead to fatal consequences when the potential customer switches to a competitor's website or posts negative review. [37] A positive experience with travel websites is crucial for the final purchase decision and results in a sustained satisfaction.

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[29] see also http://masai.solutions/travellers/
[30] Although the image is not complete as it does not include the seventh step of after-sales it shows the complexity of travel in an demonstrative way.
[31] see Vivion 2014.
[32] Expedia Media Solutions & MillwardBrown Digital 2014.
[33] see Expedia Media Solutions & MillwardBrown Digital 2014.
[34] see Carlson Wagonlit Travel 2015, p. 12.
[35] see Carlson Wagonlit Travel 2015, p. 19.
[36] see Carlson Wagonlit Travel 2015, p. 20.
[37] see ETTSA 2010.

The MASAI consortiums picks up these findings to create an integrated solution. MASAI uses and complements standardizations to aggregate services of many Service Providers in the travel and tourism industry. The aim is to provide a seamless intermodal travel experience for travellers through all stages of the travel process mentioned above. To do this, MASAI integrates new technology innovations like artificial assisted intelligence, mobile technology and payment solutions.

3.2 MASAI'S APPROACH TO SERVE THE TRAVELLER AT ALL STAGES OF TRAVELLING

Practically, MASAI leads the traveller through all stages of travel in an integrated way. To do this, MASAI uses the role of a Concierge, human or artificial [38] to connect the aggregated mobile service offers with the traveller through interaction and personalization. The touchpoint for the traveller is – at any time – only one Concierge App which is useable on the traveller's preferred device. In this way, MASAI overcomes the problem of the inconvenience of thousands of touchpoints. To provide the Concierge App with full functionality, the MASAI consortium developed different components, whose functionality in context of the traveller will be explained in this chapter. [39]

Dreaming and Planning with MASAI

From the first phase of dreaming and inspiration, travellers can use the MASAI Concierge App to get new ideas through interaction with the concierge community. They can interact through one interface with other people; his friends or travel experts who are also part of the group, to dream, discuss and plan about the next journey.

When it comes closer to the final booking, the digital Concierge will recommend hotels, look for best prices – all automated without any effort. To do this in a customised way and to respect personal preferences, the Concierge App accesses – with the traveller's permission – the traveller's personal data. All personal data from previous trips are stored in its personal MASAI Folder, which is, for reasons of security and data protection, in full control of the traveller at any time. The more information and travel preferences the traveller provides, the more accurate the search results and offers will be.

Booking and Paying with MASAI

With MASAI, booking is done fast, simple and convenient. The MASAI Concierge's offered proposal only needs to be confirmed and booking is finalised automatically. By employing state of the art payment solution providers the payment handling and distribution of the payment to the selected Service Providers can be done easily. There is no need for the traveller to go through several transaction processes or to take care of many clearings or bills, he simply needs to confirm once. Moreover trips are stored in the MASAI Folder and can be easily pulled by the MASAI Concierge for recurring trips to speed up the process.

Ticket Organization and Travel Management with MASAI

After booking, all tickets will be stored in the MASAI Folder and displayed in the Concierge App in one central place, according to trip and date. This provides an easy overview of all tickets avoiding hassles with printed tickets or several apps to check. The MASAI Concierge will inform the traveller of unexpected changes and will provide him with real time travel updates and information also during the actual travel phase.

MASAI's complementary offers at destination

The MASAI Concierge – artificial or human - accompanies the traveller during his trip on his smartphone. He provides suggestions about local events or restaurants – all based on the traveller's preferences.

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[38] see chapter 4 MASAI to serve the Concierge for a more detailed description of the MASAI Concierge.

[39] For a further description of the MASAI architecture and its components, see chapter 8 MASAI Detailed Organization

4. MASAI TO SERVE THE CONCIERGE [40]

4.1 THE TRAVEL AGENCY SERVICES COMPETITIVE LANDSCAPE

The travel agency services industry comprises companies engaged in tour wholesaling, retail travel agencies and companies providing travel and reservation services. The arrangement of travelling and accommodation stands at the core of the business of a majority of companies - travel agents, tour operators and other services like ticket offices. While the global travel agency services industry is experiencing a strong growth, core services are notably changing. Amongst the major multinational companies with offices worldwide appear the US based Carlson Wagonlit, Expedia, Priceline and Sabre Holdings, as well as the Dutch company BCD Travel, the British company Thomas Cook and German TUI Travel. Large companies can operate highly developed websites and to provide a huge amount of services especially focusing on the corporate and mass market. Small companies' competitiveness is depending on their potential for innovation, e.g. by specializing in service, niche products and offerings, local markets or a limited number of large customers. [41] According to the OECD the travel industries structures are developing: tourism services are mainly offered by micro to medium-sized providers often represented by industry associations, while other sectors like aviation and OTAs are dominated by globally operating multinational companies. [42]

Trends in consumer behaviour related to the digital economy makes it evident that tourism is getting more and more digitalized. Travellers are increasingly using online booking platforms (e.g. travel agents, airlines, trains, rental cars, Uber), social networks for reviewing, assessing and booking accommodations, restaurants and other services (e.g. Airbnb, TripAdvisor, thefork, MyTable, OpenTable). [43] World Travel Monitor figures show that 75% of international travellers use online information in their trip planning, whilst just about 33% are considering travel agencies. [44] European figures show that only 18% of European travellers consider travel agencies or tourism offices as being important in their decision making. [45] According to the Google The 2014 Traveler's Road to Decision Report only 10 % of the global leisure travellers refer to travel agents in their travel inspiration process. 40% of leisure travellers and 45% of business travellers are considering OTAs (e.g., Expedia, Travelocity, Priceline, Orbitz) sites or apps for travel planning. [46] Amongst the major players stands Priceline or Expedia, while new specialized companies emerge (e.g. Hotel Tonight , Blink by Groupon) and OTAs from emerging markets - the most rapidly growing ones – are expected to soon expand in advanced markets. [47] World Travel Monitor figures show that the quota of travel agencies bookings in recent years have dropped at a global level, while bookings on the internet increased. In the European Travel Market travel agency bookings decreased to about 20%, whilst online bookings reached about 65% in 2015. [48]

Nonetheless, according to the Ibis World Market Research Report some "brick-and-mortar" travel agents in recent years could successfully retain their relevance and competitiveness by reinventing themselves. [49] Specialized travel agents e.g. aligned with a consortium or TMCs (Travel Management Companies) also in present times are capable to offer a special added-value to the traveller's experience. Those putting on a high qualitative customer care infrastructure specialised in providing reliable, cost effective and fully compliant solutions (e.g. better and direct flights) while offering working mobile components that are prospected to persist. Also, while arranging the most convenient products and a robust programme to the traveller they bring more profit to the airlines. [50]

4.2 THE FUTURE OF CONNECTED TRAVELLING: BUTLER SERVICES AND AI

Connecting services will shape the future of travel. Tomorrow's travellers expect a seamless travel experience, connecting travel around their individual needs - from inspiration to purchase, to travelling, up to solutions in case of unavoidable disruptions.

In travelling as well as in other areas of life we see an emerging trend towards personal concierges, offering everything one needs, providing inspiration, advice, planning, purchase and research. Starting a few years ago a huge amount of innovative venture capital financed start-up butler services emerged. International private and corporate concierge services like **Quintessentially, Preferred Group, Vertu** or **Les Concierges** [51] are offering comprehensive dedicated assistance 24/7/365, operating through SMS, Facebook, WhatsApp, App or by contract. Amongst the most notable German ventures stands e.g. **GoButler, James bitte, Sixtyone Minutes, Alfredoo or myWichtel.**

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[40] see also http://masai.solutions/concierges/
[41] see Hoover's (ed.) 2016.
[42] see OECD 2016: p. 46.
[43] see OECD 2016: p. 34.
[44] see ITB Academy 2015: p. 18.
[45] Luxemburg presents the highest quota of people considering travel agencies as meaningful in their travel process (33%), while only 7-8% of Bulgarian and Hungarian travellers consider travel agencies as important sources; see European Commission 2015: p. 19.

[46] see Google 2014: p. 6, p. 11.
[47] see Euromonitor International 2014: p. 24, p. 27.
[48] see ITB Academy 2015: p. 6.
[49] see Ibis World 2016.
[50] see Skift Trends Reports 2016; Coza 2015.
[51] see Gross 2005.

Various concierge services are specializing on customers travel related requests. **Lufthansa Mission Control** e.g. offers comprehensive 24/7 services in travelling, from ticket purchasing to restaurant reservations or to the calculation of travel expenses, all based on the travellers predefined individual preferences and working via SMS communication. The **DB Reisebuddy** offers SMS based information, reservation and booking services, also 24/7.

Having access to a wealth of information (e.g. traveller's profiles, histories, preferences) the travel sector is suitable for AI. Recent start-ups in the travel sector rely on real-time communication and AI based concierge services mainly using natural language processing and machine learning technology.[52] **Viv.ai,** an artificial intelligence based platform aims to allow developers the distribution of their products via an AI based conversational interface.The Hamburg start-up **Voya,** created in 2015 offers chat based solutions for a next generation business travel experience. **Pana,** an on-demand travel agent combining natural language processing (NLP) with data on traveller preferences operates via messaging and uses AI in providing relevant choices. Also the **KLM Messenger** operates 24/7 via a Facebook Messenger bot, providing travellers with all relevant information and documents related to their travel. The travel management software **30 Seconds to Fly** through its virtual assistant Claire supports business travellers in their booking process. **HelloGbye** offers a virtual assistant supporting travellers in all flight related issues. Related to the accommodation sector **Hilton Connie,** a learning robot concierge powered by IBM Watson and Wayblazer is created in order to answer guest's questions related to local amenities and services. With **Exa,** a voice automation tool is created, letting hotel guests deliver their requests. **SnapTravel** is a messaging bot integrating with Facebook Messenger, Slack and SMS for hotel booking. Applying AI tools to travel data is opening up new opportunities for improving the traveller's experience, when a more personalised offer combined with simplifying and shortening processes becomes possible. The automation of lower priority tasks can support human travel agents in value adding tasks.

4.3 THE MASAI APPROACH TO SERVE THE CONCIERGE

MASAI addresses the interconnection of digital services to facilitate mobility in heterogeneous and varying environments. The MASAI core idea originates from the traditional concierge offered by hotels serving the traveller personally. The MASAI Concierge is a digital concierge linking up the traveller's demand with the products and services offered by all Service Providers connected to the MASAI Community. The traveller enters in contact with a MASAI Concierge Provider by using his favourite MASAI Concierge App. In order to provide the traveller with a convenient and compliant offer the Concierge Providers module is then linking to the modules of the multiple Service Providers participating in the MASAI Community.

MASAI Concierge Services: An open community of Concierge Providers

Coming from the view of the traveller MASAI aims at addressing all sorts of traveller´s requirements, including those of special user segments' needs. In order to comply with this target MASAI aims at interlacing a wide range of differing Concierge modules from human operated concierges to fully automated systems without human intervention offering a variety of interfaces (e.g. text messaging butler services, chat services, chat bots).

MASAI Concierge Providers are major connecting points in the MASAI Community. The MASAI Concierge Apps represent the consumer's entry point to travel planning and purchasing, addressing the traveller´s need for a seamless travel experience by combining the service offer of several Concierges and Services Providers. Travellers using MASAI Concierge App components are enabled to comfortably connect with the MASAI open ecosystem for their travel planning and purchasing process. Via the MASAI Discovery Service they are connected to MASAI Concierge Providers linking up travellers demands with Service Providers' products and services. The MASAI Concierges are not the spearhead of a Hub gathering services from a closed ecosystem, but modules proposed in a competitive and open environment.

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[52] see Peltier 2016; Eggleton 2016.
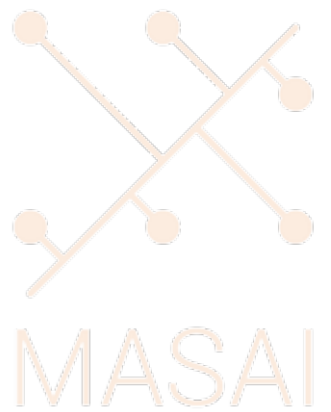
MASAI MOONS: Allowing Concierge Providers for a dynamic integration within the MASAI ecosystem

MASAI as an alternative to centralized integration platforms opens up a Mobility Open Network of Services (MOONS), which represents an interconnected distributed environment, on which any service module can be easily plugged to interact with others by using most recent standardisation environments. MASAI aims at making existing Concierge Providers easily mappable and compliant with MOONS architecture and interfaces towards using regional and local feeds of information, services or apps (e.g. calling a local ticketing, payment or museums app). MOONS, by favouring plug & play services (e.g. for trip planning, ticketing, community services, infotainment) in an open ecosystem creates an interchange mechanism between all stakeholders in the travel and tourism market. By doing this MASAI helps to translate the individual traveller's needs into a machine readable language to be used by Concierge Providers (e.g. travel agencies, OTAs, innovative new butler and concierge services). MOONS protocol, allowing Concierge Modules to interact with Service Providers Modules helps Concierges to easily discover and integrate with Service Providers via dynamic APIs facilitating Concierge Providers to easily adapt to changing offers.

MASAI Discovery Service: Major options and greater visibility for Concierge Providers

Concierge Providers taking part of the MASAI communities open ecosystem are connected to the aggregated MASAI Discovery Service. MASAI Discovery Service as a central component of the MASAI architecture lists all services offered in the MASAI ecosystem, by publishing MASAI compliant apps and APIs. The component allows all MASAI Concierge Providers for an easy discovery and integration of MASAI compatible Service Providers services and products. Concierge Providers can be discovered by the travellers using MASAI Concierge Apps and thus acceding to the Discovery Service for their travel planning and purchasing. The seamless and open integration of components in the MASAI Discovery Service helps stakeholders (Service Providers, Concierge Providers) to arrange aggregated services while increasing their visibility within the MASAI ecosystem.

MASAI Folder: Helping Concierge Providers in conveniently serving the traveller

MASAI supports Concierge Providers by establishing a security supported MASAI Folder concept. Traveller preferences are integrated in a dynamic data model, which helps all stakeholders in the MASAI ecosystem to support the traveller's requirements at all stages of the travel process. When exposed as an API with dynamic attributes traveller´s data can easily be integrated by each Concierge Provider enabling them to offer the most convenient solutions to travellers.

MASAI

MASAI TO SERVE
THE SERVICE PROVIDERS [53]

5.1 MARKET OVERVIEW

The European travel and tourism industry is dynamic and continues to have a slow but sustained growth. As it comprises numerous sectors, mainly transportation, accommodation, food and beverage as well as adventure, recreation, attractions, events and conferences, it is characterised by the fact that it consists of innumerable Service Providers in each of the sectors. The number of enterprises active in the European tourism industry had reached according to Eurostat data, nearly 2.000.000 in 2009. Exploring the example of the European transportation sector, which mainly consists of air, sea, road and rail travel, it becomes obvious that the market apart from well-known enterprises consists of millions of Service Providers. The overflow of offers relates also to all neighbouring sectors.

The tourism industry worldwide is dominated by small businesses, in the countries of the European union, 99 percent of the companies in the vast field of tourism – apart from the airline and tour operators' industry – can be classified as SMEs. [54] The high prevalence of SMEs with a high fragmentation is a unique characteristic of this market.

MASAI discovered that the maturity level of technologies applied by Service Providers in the travel and tourism industry is highly diverging. Some Service Providers can easily be integrated into fully automatically IT systems via APIs, whose importance in the business world is constantly increasing, while others just dispose of a rudimentary IT infrastructure.

Service Providers face the challenge to sustain their position in the vast and dynamic market. Their services have to be up-to-date with the current trends in the sector – especially those who are connected with new IT technologies that offer the possibility to improve service delivery and satisfy the needs of travellers.

These developments include the chance of putting customer oriented improvements to practice and of gathering new business opportunities for Service Providers. The dream of seamless travel becomes tangible.

Taking into consideration the above described characteristics of the European travel and tourism industry it becomes obvious that neither a central standard nor a central hub can connect all of the market participants. Therefore MASAI introduces a decentralised and open community oriented approach.

5.2 WHAT DOES MASAI OFFER TO THE SERVICE PROVIDERS?

MASAI´s vision to realise the dream of a seamless travel experience in Europe is providing new business opportunities to Service Providers. New options enriches competitive ability in a dynamic and rapidly changing business world. MASAI supports Service Providers in getting visibility and increasing their delivery performance.

MASAI enhances direct discovery and contracting between customers and Service Providers. One of MASAI´s main strength is that it can connect to any Service Provider's environment as MASAI´s architecture permits each Service Provider to participate independently of its existing IT infrastructure. MASAI supports all Service Providers with its tools and instruments in form of a stage model.

Website

MASAI compliant
API Interface

WALLET   TRAVELLER PREFERENCES   MOBILE PAYMENT

MASAI CONCIERGE APP

MULTILINGUALES AI ASSISTED BACKEND FÜR HELPDESKS

Mobile Apps

OTM API Modelling Tool   Specifikation

MASAI API Modelling

POC & Pilot Playground   Reports & Insides

API Interface

MASAI
API Journey for SPs

MASAI Community

MASAI Service Discovery Service

Technology Innovation & Maturity

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[53] see also http://masai.solutions/serviceproviders/
[54] Čavlek 2002 2002.

Service Discovery

Service Discovery is a core component of MASAI. As a set of tools and mechanisms it is able to perform two main tasks: publishing services and searching for services within the MASAI ecosystem. [55] Service Discovery is open to any Service Provider enabling each of them to have access to a great number of services.

MASAI API & Modelling tools

MASAI uses the Open Source OTM Modelling tool also used by the Open Travel Alliance OTA and extends the model by generating an automatic software development kit (SDK) for fast implementations. The specification and modelling work is done hands on in online work groups directly in the tool. [56] The generated APIs then listed in the MASAI Discovery Service and used by MASAI Concierges or other MASAI Service Providers aiming at building aggregated services.

Use of standards

MASAI doesn't intend to invent a whole new set of standards, but rather relies on existing ones or industrial specifications already widely used (e.g. FSM, ISO, CEN, ETSI, DRV). To connect and fill the gaps between these standards, MASAI aims to collaborate with the organisations/bodies they belong to – such us Open Travel Alliance, FSM Full Service Model, Schema.org or in the field of authorisation and authentication OAuth/OpenID. [57] POCs and pilots should federate other stakeholders, give more momentum, and the feedback would enrich the initial set of specifications while facilitating adoption. After the project, the dedicated association "MASAI Mobility Community" (M2C), [58] a non-profit organization, will ensure the maintenance of the MASAI components (specifications and tools), including the relationship with involved standardisation bodies. Furthermore it will ensure the dissemination and promote the MASAI adoption, by promoting the building of new services to be connected to the MASAI ecosystem. M2C also ensures the building of trust around MASAI components (e.g. by verifying the compliance of Service Providers / Concierges joining M2C or by supporting stakeholders to implement MASAI components, demonstrations, pilots etc.).
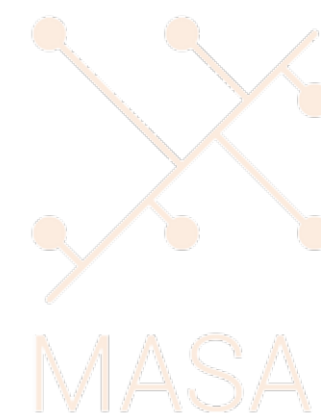
5.3 STRATEGIC IMPACT

MASAI aims at supporting the Service Provider's business. MASAI provides additional exposure, visibility and functionalities to Service Providers: As MASAI exposes services in an open environment and makes it easier to be discovered it helps to attract new customers. The expansion of focused services is supported due to the fact that MASAI provides a dynamic approach to adapt in real time specific response to fast moving user´s requirements. MASAI assists Service Providers to be a strong player in their ecosystem by providing service environments complementary to their business. As MASAI allows better understanding of user's requirements it facilitates business positioning.

A Service Provider once visible through MASAI is available and bookable to the whole travel and tourism industry. From a technological point of view the use of APIs will become state of the art in all enterprises. More and more enterprises try to spread their visibility through different channels using also APIs as additional channels.

The aggregation of services facilitates and promotes cooperation between stakeholders. Through APIs the integration of services from other Service Providers as well as the integration of own services in other existing services is made easier.

However, it does not implicate that enterprises have to be connected automatically with each other. The importance of commercial contracts is not touched, neither it is the individual business model of the stakeholders. But a good API fundament guarantees that enterprises can establish business opportunities without having to start a huge IT project.

Enterprises tend to leave the former trend of separately establishing their services via websites or apps but they make APIs available to the market for the construction of completely new services. [59]

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[55]   See D3.1. MASAI Components and Prototypes for more detail.
[56]   For further details see chapter 6.2 From slow moving standardisation towards dynamic specification.
[57]   see also D7.1. Promoting MASAI solutions to standardisation bodies of our MASAI specifications
[58]   For more details on M2C see chapter 7.1 M2C, the entry point

[59]   This is for example evidenced by the growth of salesforce.com.

6. MASAI METHODOLOGY

MASAIs mission to become the key enabler for seamless travelling in Europe is a complex and quite challenging undertaking. The expertise and synergy of the MASAI consortium are the basis to achieve the ground breaking innovation. The consortium unites organizations with expertise in advanced initiatives in the domain of digital services for mobility willing to offer and share their long-standing experience. MASAIs whole working process was generally based on two main principles: "thinking out of the box" to overcome own shortcomings and avoiding to work in an "ivory tower" by continuously taking ideas, analysis, concepts and implementations to the outside world for feedback.

## 6.1 FROM AN R&D CONSORTIUM TOWARDS BUILDING A COMMUNITY

MASAI began with the formation of a consortium composed of innovative organisations previously involved in developments in the sector of digitally enabled mobility services, namely MTA – Mobility, Ticketing & Applications SPRL, CARD4B Systems SA, DIGIMOBEE SAS, Ximedes B.V. and DB Systel GmbH. Each member of the consortium has been delivering IT systems and solutions for big Service Providers and operators in the travel and tourism industry for years. Initially it was especially relevant to gain a basic overview of the market. Thus, the industrie´s perspective was studied by creating a stakeholder map and by analysing the interconnections of these stakeholders. During this process of exploring the field more deeply it became obvious that bringing together major stakeholders of the travel and tourism market, innovative European technology companies and research labs was a fundamental step to the project´s success. The idea of building an open community supported by a non-profit association was born. The basis of MASAI is an open, flexible and as-most-as-possible decentralized architecture with open APIs towards the seamless aggregation of heterogeneous services and respective systems.

The consortium decided to expand towards a community via a non-profit association .

6.2 FROM SLOW MOVING STANDARDISATION TOWARDS DYNAMIC SPECIFICATION

It takes quite some time till a new international standard developed by organisations such as the European Committee for Standardization (CEN) evolve. As a consequence of the fast pacing technology a lot of industry standards are created. One of the MASAI's major goals is to lower barriers for creating industry specifications which can contribute to European standardisation wherever possible.

As technology industries are extremely dynamic a sequential design process, during which developers are bound to follow the procedure of conception, initiation, analysis, design, construction, testing, implementation and maintenance in a linear way, does not meet the MASAI's requirements. Thus, MASAI has modified the approach to gain business results which remain dynamic to suit customer expectations at all times. MASAI focuses on continuous testing with immediate modifications and improvements.
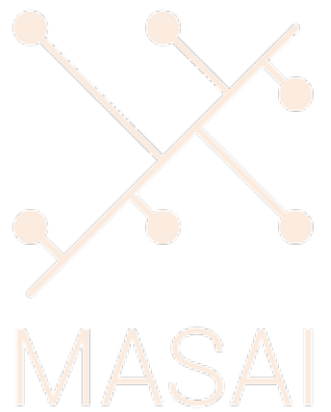
6.3 FROM THE STARTING POINT TOWARDS THE VISION OF SEAMLESS TRAVELLING

The whole working process towards the vision of seamless travelling was focused on the two main target groups of MASAI: the traveller and the Service Provider. The traveller´s point of view and especially his needs were explored by using different existing methods like the customer experience mapping method by James Kalbach, [60] complex user journey examples [61] and the creation of personas based on the methodology derived from user-centred design and marketing. The work was also inspired by the nine phases of a future travel journey (from inspiration to post trip) defined by Amadeus. [62]

In this phase, the focus relied on identifying the core challenges and on getting a good grip on the main issues. Personas are great for an initial analysis but retired concepts for real working systems because today's databases deliver hyper-personalized 360° customer views that are rich in individual learning. As an output there were designed customer experience maps suitable for the identification of touch points, opportunities for improvement and suggestions for actions.

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[60] see Kalbach 2016.
[61] A weekend trip of a family, a business trip and a group travel trip of young people.
[62] see Cowen 2016.

This work was the basis for focus group meetings and personal interviews with key stake-
holders of the various stakeholder groups. [63] The results were collected and visualised
in value proposition canvas, a method proposed by Alexander Osterwalder. [64]
How can MASAI position itself in the ecosystem of the travel and tourism industry? It was
quite obvious that it was not possible to reinvent things when big market players
spent hundreds of millions to solve issues of seamless travelling in vertical as well as in
horizontal markets. The Blue Ocean Strategy developed by the Korean economist W.
Chan Kim was identified as a useful tool in defining the "blue ocean" where MASAI can
contribute additional value to the industry while avoiding to get into the competition
of the "red ocean". [65]

In the fine-tuning process there was applied the Business Model Generation Method desi-
gned by Alexander Osterwalder [66] leading to the establishment of the "MASAI Mobility
Community" a.k.a. M2C ASBL, a non-profit organization, maintaining MASAI´s specifi-
cation and helping in the support of MASAI's projects. Internally as a team the MASAI
consortium – in a two week cycle - is working with SCRUM [67] and uses Scrumwise [68]
as a tool which proved to be a helpful tool for teamworking processes because of its
very intuitive interface and usability. In setting up a working communication strategy
the presentation method Pecha Kucha [69] proved to be very helpful in putting the sta-
keholder's communication in a nutshell.
"IT can do everything", however, the true value in business stems from real operational
results. This is the reason why MASAI is verified through POCs and pilots. Immediate
feedback from stakeholders as well as rapid adaptation are granting highly efficient
solutions.

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[63] Confronted with the results derived from the traveller-centred analysis stakeholders
were invited to contribute with their expertise to answer the essential question of
why seamless travel in Europe is not yet possible, although technology provides so
many possibilities. Stakeholders engaged with the question if limits in technology
driven approaches were hindering a successful implementation of seamless travel-
ling or if it was hampered by business constraints and market defects.
[64] See Osterwalder, Pigneur 2010.
[65] see Kim, Mauborgne 2015.
[66] see Osterwalder, Pigneur 2013.
[67] for more details see https://www.scrumalliance.org/.
[68] for more details see www.scrumwise.com.
[69] for more details see http://www.pechakucha.org/.

7. STARTING THE MASAI JOURNEY BY JOINING THE M2C COMMUNITY

7.1 M2C, THE ENTRY POINT

The foundation of the non-profit organisation "Masai Mobility Community", a.k.a. M2C, is strongly connected with the idea of expanding an open community which offers specifications and tools to make simple, seamless and personalised travel experiences possible. The motive of this association is as defined in the statutes "to ensure and promote the sustainability, adoption and associated follow-up development actions of the results of MASAI project for the benefit of Service Providers and mobile citizens".

M2C gathers Service Providers, who want to have their services visible and usable in third party concierge applications, who want to aggregate a lot of services in their front-end concierge applications, and authorities. The following graphics represents the three main M2C roles Promoting,[70] Structuring [71] and Building Trust [72].

7.2 JOINING M2C

To join M2C, interested stakeholders should contact contact@masai.solutions, to start the registration process. Members pay an annual fixed fee depending on their size and their role in M2C. Three types of membership can be distinguished:

- Founding members
- Partners of the MASAI project
- Run MASAI project from specs to pilots
- Bring resources through MASAI project to run the pilots
- Operational members
- The core of M2C
- Membership is related to signing a Memorandum of Understanding (MoU) on commitments from both parties
- First operational members will be mainly operators involved in MASAI pilots
- Observer members
- No active role
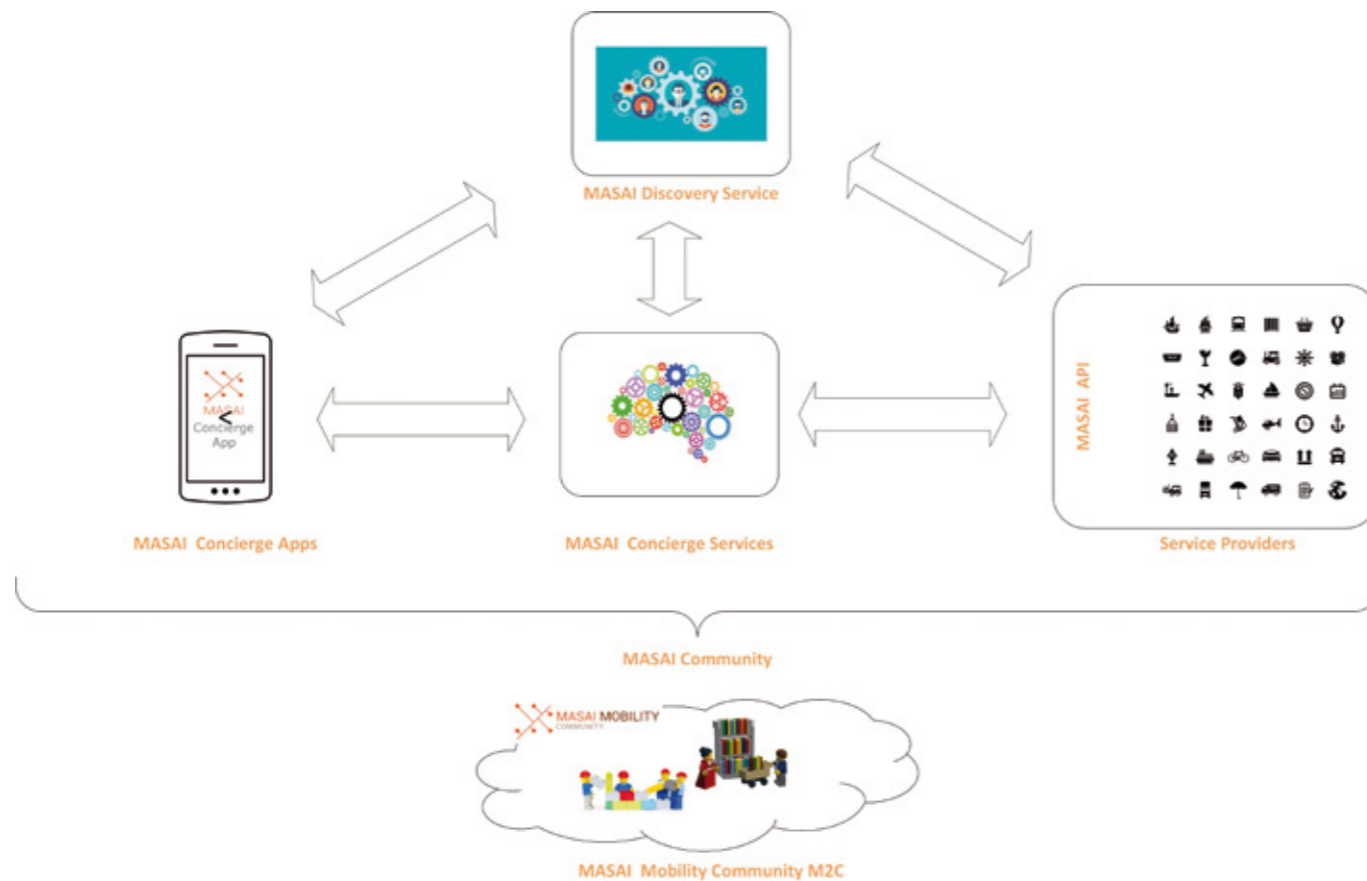- Mainly institutional

7.3 HOW TO GET MORE INFORMATION

For further information stakeholders can visit the **MASAI Community Website** http://www.masai.solutions which offers general information about MASAI, MASAI components and MASAI Proofs of Concepts and reference implementations. Additionally, the **MASAI Private LinkedIn page** https://www.linkedin.com/groups/8318865/profile can be visited.

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[70] Promote MASAI adoption by advancing the building of new services to be connected to the MASAI eco system. The more service providers join, the more the ecosystem has value.

[71] Structure MASAI components by maintaining MASAI specification and tools, especially their compliance with existing standards, extending the services covered by MASAI, prototyping and validating MASAI components and studying business models using MASAI solutions.

[72] Build trust around MASAI components by verifying and testing the compliance of the services provided by SP, verifying the compliance of the uses of Folder data, supporting the stakeholders to implement MASAI components, demonstrations, pilots, deployments and reviewing and enforcing security mechanisms.

8. MASAI DETAILED ORGANISATION

8.1 MASAI COMPONENTS AND INTERACTIONS

The following figure presents the overall interaction of MASAI components and the mirroring between an operational environment and the technical architecture:

MASAI Discovery Service

MASAI Concierge Apps   MASAI Concierge Services   Service Providers

MASAI API

MASAI Community

MASAI Mobility Community M2C

MASAI Service Discovery

The MASAI Service Discovery lists all services in the MASAI ecosystem for all stakeholders. MASAI Concierge Apps can discover MASAI compatible Concierge Providers and Services, whereas Concierge Providers can use it to find MASAI compatible Service Providers and increase visibility. Service Providers will use the Service Discovery for providing aggregated services and increase visibility.

MASAI Concierge App

The MASAI Concierge Applications are the entry point for the traveller to the MASAI ecosystem. Though MASAI is providing a reference implementation of the MASAI Concierge App, MASAI encourages developers to adapt the component to their niche market to address individual needs.

MASAI Concierge Providers

The MASAI Concierge Providers are the main connecting point for the MASAI Concierge Apps in a dialog scenarios where MASAI Concierge Providers make the bridge between travellers demands and Service Provider's services.

MASAI Service Providers

MASAI Service Providers are any providers of physical or digital services exposing a MASAI compliant API and exposing their APIs through the MASAI Discovery Service.

MASAI Folder Providers

MASAI Folder Providers store traveller data, travel preferences, itinerary of travellers with tickets as well as payment preferences and details on behalf of the traveller. The data of the MASAI Folder Providers is controlled by the traveller and exchanges this data between Service Providers.

8.2 MASAI POCS

During the creation phase of the various MASAI components the MASAI consortium tested various approaches with POCs, mainly in the field of API discovery and publishing services, API generation, concierge dialog services in combination with various messaging services and approaches for the MASAI Folder.

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[73]   See D3.1 MASAI Component prototypes of the MASAI specification for more details and D4.1 on the descripton of the POCS.

9. ANNEXES

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9.2 **MORE FIGURES ON THE MOBILITY ECOSYSTEM**

The travel and tourism industry although passing through diverse crisis (e.g. decrease in economic growth, terror, violent conflicts) has emerged as one of the fastest growing sectors and main drivers for global economic growth and development. The United Nations World Tourism Barometer reported a strong global tourism growth of 4,4% in 2015. In OECD area tourism contributes 4,1% of GDP, 5,9% of employment and 21,3% of service exports. Although arrivals to advanced tourism economies (6,4%) recently increased at a faster rate than the global average it is expected that emerging economies arrivals will grow at double the rate of that in advanced economies up to 2030 (OECD Tourism Trends and Policies 2016). City trips are driving the world's travel market, US and European Cities dominating the global travel intent (Euromonitor International: The new online travel consumer 2014). Europe led global growth (+5%), mainly driven by global geopolitical security concerns, a continued economic recovery and promising economic outlook with fastest growth rates since 2011 (+1,5% in 2015 with further growing rates in 2016/17) as well as a weak Euro. Tourists prefer European destinations over many alternatives - in 2016 21 out of 23 reporting European destinations announced growth in arrivals and overnights. European inbound travel is increasing and dominates travel intent for the region, with city trips – making about 20% of all holiday trips in Europe – being a top travel growth segment in Europe. Major European cities are key destinations for international tourism and cities like Paris, London, Barcelona, Munich according to the World Travel Monitor are amongst the World Top 10 Metropolitan destinations. (Staying power. European cities hotel forecast for 2016 and 2017; ITB World Travel Trends Report 2015/2016) The travel sector requires innovative and well integrated responses in order to cope with major challenges (as the rapidly growing traveller flows, new consumer trends, the digitalisation of the economy, security issues, the necessary adaptation to climate change) and to remain a competitive and sustainable sector, facilitating the necessary shift to more ecological transport options. As an integral element of the travel experience the transport system needs to ensure traveller mobility across a range of transport modes, including human powered mobility (walking, cycling). (OECD Tourism Trends and Policies, 2016; Travel and tourism sector: Potential, opportunities and enabling framework for sustainable growth, 2013)
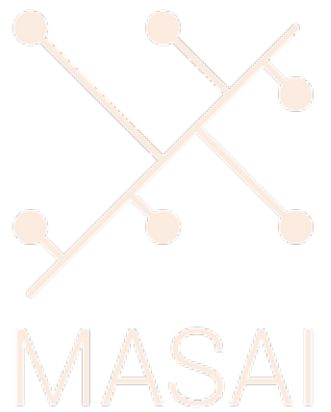
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