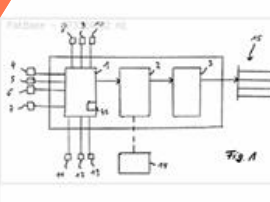
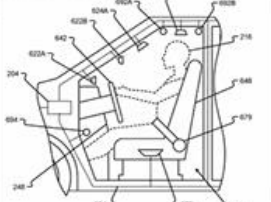
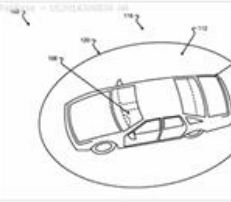


Synthetic, AI-assisted inventing as part of the IP design process for the digitalization of parking uptoIP® and ABP

	US2016249853A1 59%	US2016249853A1 6/6 59%	US2014306834A1 6/6 59%
			
parking slot detection, providing up-to-availability data.	76% One basic item of information concerning the target parking spot or an available parking spot is its availability, that is, information as to whether ...	75% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...	75% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...
LED displays direct drivers to the nearest available parking spaces.	61% The vehicle parking assistance system may send to each individual vehicle a signal describing a target parking spot or a route that leads the car from...	61% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...	61% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...
Users can view real-time availability, reserve spots, and receive navigation assistance.	1.3 54% • means for receiving availability data and/or attractiveness data that are linked to one or more parking spots;	52% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...	52% In the context of parking, the presence detection/alert module 2312, is able to cooperate with one or more vehicle sensors and optionally with one or ...
and log vehicle access control	53% A new driver/vehicle may be directly granted access to a local database that has already been calibrated, for instance one belonging to the parking ar...	58% The above aspect, wherein an image capture device detects the presence of the emergency vehicle.	58% The above aspect, wherein an image capture device detects the presence of the emergency vehicle.
	63% The system may thus additionally provide a financial balance between parking area occupants who also charge for the parking service.	53% FIG. 30 outlines an exemplary method of locating parking spaces. In particular, control begins in step S3000 and continues to step S3004. In step S300...	53% FIG. 30 outlines an exemplary method of locating parking spaces. In particular, control begins in step S3000 and continues to step S3004. In step S300...

Importance and role of parking in the real estate sector

Parking is a critical component of the real estate sector, playing a crucial role in property development, management, and overall urban planning. The importance of parking cannot be overstated, as it directly impacts property values, tenant satisfaction, and the overall functionality of a real estate project. In this section, we will explore the significance and role of parking in the real estate sector.

One of the primary reasons why parking is essential in the real estate sector is its influence on property values. Adequate parking facilities can significantly enhance the value of a property, making it more attractive to potential buyers or tenants. Properties with ample parking spaces are in high demand, especially in urban areas where parking is scarce. Investors and developers often consider parking availability when assessing the value of a real estate project, as it can have a direct impact on the property's marketability and profitability.

Parking also plays a vital role in tenant satisfaction and retention. Tenants, whether residential or commercial, are more likely to choose a property that offers convenient and secure parking options. Insufficient parking facilities can lead to tenant dissatisfaction, increased turnover rates, and difficulty in attracting new tenants. By providing adequate parking amenities, property owners can improve tenant retention rates, enhance the overall tenant experience, and create a competitive edge in the market.

Moreover, parking is essential for the overall functionality of a real estate project. Well-designed parking facilities help to manage traffic flow, improve accessibility, and enhance the overall user experience. Efficient parking layouts can reduce congestion, enhance safety, and optimize space utilization within a property. Properly planned parking spaces also contribute to the overall aesthetics and functionality of a development, creating a more inviting and user-friendly environment for residents, visitors, and customers.

In addition to its direct impact on property values and tenant satisfaction, parking plays a crucial role in urban planning and sustainability. As cities continue to grow and urbanize, the demand for parking spaces has intensified. Sustainable urban

planning practices emphasize the importance of integrating parking facilities with public transportation systems, promoting alternative modes of transportation, and reducing reliance on private vehicles. By incorporating sustainable parking solutions such as bike racks, electric vehicle charging stations, and car-sharing services, real estate developers can contribute to building more environmentally friendly and livable communities.

Furthermore, parking requirements and regulations imposed by local authorities and zoning codes also influence the design and development of real estate projects. Developers must comply with specific parking standards and guidelines to obtain necessary approvals and permits for their developments. Understanding and addressing parking regulations are essential for successful project planning and execution in the real estate sector.

In conclusion, parking plays a crucial role in the real estate sector, impacting property values, tenant satisfaction, urban planning, and sustainability. Adequate parking facilities are essential for enhancing property values, improving tenant satisfaction, optimizing traffic flow, and contributing to sustainable urban development. Real estate developers and property owners must recognize the importance of parking in their projects and prioritize the implementation of well-designed parking solutions to create successful and sustainable developments.

Market size and structure

The parking market within the real estate sector is a significant and dynamic industry that continues to evolve in response to changing demographics, urbanization trends, and technological advancements. The market size and structure of parking in the real estate sector are influenced by various factors, including demand for parking spaces, property types, location, and regulatory requirements.

The market size of parking in the real estate sector is substantial, with billions of dollars invested annually in parking facilities worldwide. The demand for parking spaces is driven by factors such as population growth, urbanization, economic development, and car ownership rates. In urban areas, where land is limited and congestion is a common issue, the value of parking spaces is particularly high, leading to significant investments in parking infrastructure by real estate developers and investors.

The structure of the parking market in the real estate sector is diverse, with a range of players involved in the development, ownership, operation, and management of parking facilities. Real estate developers typically integrate parking spaces into their projects to enhance the marketability and value of their properties. Parking management companies specialize in operating and maintaining parking facilities on behalf of property owners, providing services such as valet parking, security, and revenue collection.

Furthermore, technology is playing an increasingly important role in shaping the structure of the parking market within the real estate sector. Innovations such as smart parking systems, mobile payment solutions, and automated parking facilities are revolutionizing the way parking is managed and accessed. These technological advancements not only improve the efficiency and convenience of parking but also provide valuable data and insights for property owners and operators to optimize their parking operations.

In summary, the market size and structure of parking in the real estate sector are substantial and multifaceted, driven by demand, location, regulations, and technological advancements. As urbanization continues to increase and sustainability becomes a key focus in urban planning, the parking market is likely to undergo further transformation, presenting new opportunities and challenges for stakeholders in the real estate industry.

Market trends

Market trends in parking within the real estate sector are continually evolving in response to changing consumer preferences, technological advancements, urbanization trends, and sustainability concerns. Understanding these trends is crucial for real estate developers, investors, and parking operators to stay competitive and meet the evolving needs of tenants, customers, and communities.

One prominent trend in the parking market is the increasing adoption of smart parking solutions. Smart parking systems leverage technology such as sensors, data analytics, and mobile applications to enhance the efficiency and convenience of parking operations. These systems provide real-time information on parking availability, enable cashless payments, and optimize parking space utilization. As

urban areas become more congested, smart parking solutions are becoming indispensable for improving traffic flow, reducing emissions, and enhancing the overall parking experience for users.

Another significant trend is the integration of sustainable parking practices within real estate developments. With a growing emphasis on environmental sustainability and reducing carbon footprints, developers are incorporating green parking solutions such as electric vehicle charging stations, bike-sharing facilities, and green roofs into their projects. Sustainable parking initiatives not only align with regulatory requirements and corporate social responsibility goals but also appeal to environmentally conscious tenants and customers.

Furthermore, the rise of shared mobility services and the increasing popularity of ride-sharing platforms are impacting parking trends in the real estate sector. As more people opt for shared transportation options over private car ownership, the demand for parking spaces may shift, leading to changes in parking requirements and strategies for real estate developers and operators. Flexibility in parking design and management, such as convertible parking spaces and partnerships with ride-sharing companies, are becoming essential to adapt to the evolving mobility landscape.

The market trends in parking within the real estate sector are shaped by technological innovations, sustainability considerations, and changing mobility patterns. Real estate stakeholders must stay abreast of these trends and proactively incorporate innovative parking solutions to meet the evolving needs of tenants, customers, and communities while remaining competitive in the dynamic real estate market.

The classical business model of parking garages

The classical business model of parking garages revolves around providing a physical space for vehicles to park in exchange for a fee. This traditional business model has been a staple in the real estate sector for decades, serving as a reliable source of revenue for property owners and operators. Parking garages typically operate on a straightforward revenue model, where income is generated through hourly, daily, monthly, or long-term parking fees.

One key aspect of the classical business model of parking garages is the pricing strategy. Parking garages typically set their rates based on factors such as location, demand, competition, and operational costs. Prime parking locations in busy urban

areas command higher prices due to high demand, while parking facilities in suburban or less congested areas may offer more competitive rates to attract customers. Pricing strategies may also vary based on time of day, day of the week, and special events, allowing parking operators to adjust rates dynamically to maximize revenue.

In addition to basic parking fees, parking garages may offer additional services to enhance the customer experience and generate supplemental revenue. These services may include valet parking, car wash services, electric vehicle charging stations, reserved parking spaces, and loyalty programs. By diversifying their offerings, parking garages can cater to a wider range of customers and differentiate themselves in a competitive market.

Operational efficiency is another critical component of the classical business model of parking garages. Efficient operations help to minimize costs, maximize revenue, and provide a seamless parking experience for customers. This includes optimizing staffing levels, implementing technology solutions such as automated payment systems and license plate recognition, and maintaining a clean and well-maintained parking facility. By streamlining operations and providing excellent customer service, parking garages can increase customer satisfaction and loyalty while driving profitability.

Moreover, location plays a crucial role in the success of parking garages under the classical business model. Proximity to high-traffic areas such as commercial districts, entertainment venues, airports, and public transportation hubs can significantly impact the demand for parking services. Strategic partnerships with nearby businesses or property owners can also help parking garages attract customers and drive foot traffic, benefiting both parties through revenue sharing or cross-promotional opportunities.

Overall, the classical business model of parking garages continues to be a viable and essential component of the real estate sector. By focusing on pricing strategies, additional services, operational efficiency, and strategic location, parking operators can optimize their business model to meet the evolving needs of customers and remain competitive in the dynamic parking market. Adapting to technological advancements, changing consumer preferences, and sustainability trends will be

crucial for parking garages to thrive in an increasingly competitive and innovation-driven business landscape.

What is a business model?

Before discussing the change in business models through the digital transformation, a short definition of business models and their constituents should be made. A business model describes the ways in which companies generate revenues and make profits. A business model explains the mechanics, resources, and competences to generate products and services along a value chain and explains the company's market access and position and how customers are reached and attracted.

A useful visualization tool for describing, developing and analysing a business model is the business model canvas developed by Alexander Osterwalder. In the business model canvas 9 different building blocks of a business model are systematically described.

Those 9 building blocks are:

- The cost structure
- Key partners
- Key activities
- Key resources
- The value proposition
- Customer relationships
- Channels
- Customer segments
- And revenue streams

The segments are logically ordered in the business model canvas based on the market and resources sides. The resource side elements are on the left side and the market side elements are located on the right side, while the financial perspective with the cost structure and revenue streams is located on the bottom of the business model canvas.

The resource-based elements are the key partners, key activities and key resources in the business model and the related cost structure. The market-based elements are the customer segments, customer relationships and channels as well as the related

revenue streams. The link between both sides is the value proposition, which is describing the value the company is offering to the customers compared to the competition.

The business model of parking garages revolves around providing parking space for vehicles in urban and high-traffic areas, where the demand for parking often exceeds the supply. The key elements of this business model include the revenue model, business partners, and cost structure.

Revenue Model

The primary revenue source for parking garages is the fees charged for parking vehicles. This can be categorized into several segments:

- **Hourly/Daily Parking Fees:** Charges are based on the duration a vehicle is parked. Hourly rates are common in high-turnover areas like downtown districts, shopping centers, and airports.
- **Monthly/Long-term Parking:** Subscriptions or leases are offered for regular users, typically residents or employees in nearby buildings. This provides a stable and predictable income stream.
- **Event-based Pricing:** During events such as sports games, concerts, or festivals, parking garages can charge premium rates due to increased demand.
- **Valet Services:** Some parking garages offer valet parking, where attendants park and retrieve cars for customers, allowing higher charges for the added convenience.
- **Advertising:** Spaces within the garage can be leased for advertising purposes. This can include digital displays, posters, and banners.
- **Additional Services:** Some garages provide car wash, maintenance, and electric vehicle charging stations, generating additional revenue.

Business Partners

Parking garages often collaborate with various partners to enhance their service offerings and streamline operations:

- Property Owners/Developers: Many parking garages are part of larger real estate developments. Property owners may partner with parking operators to manage the garage and optimize its use.
- Municipalities: Public-private partnerships with local governments can be established, especially for garages in city centers or near public transport hubs. This can also include revenue-sharing agreements.
- Technology Providers: Collaboration with companies providing parking management systems, mobile payment solutions, and automated ticketing systems enhances efficiency and user experience.
- Transportation Services: Partnering with ride-sharing companies or public transportation authorities can create integrated mobility solutions, promoting the parking garage as a transit hub.
- Retailers and Businesses: Agreements with nearby businesses can include validation programs where customers receive discounted or free parking with a purchase, driving traffic to both the parking garage and the businesses.

Cost Structure

The costs associated with operating a parking garage can be significant and are divided into several categories:

- Initial Investment and Maintenance: Building or acquiring a parking structure involves substantial capital expenditure. Ongoing maintenance costs include repairs, cleaning, and general upkeep to ensure safety and usability.
- Labor Costs: Staffing is necessary for management, security, and customer service roles. Automated systems can reduce labor costs but still require oversight and maintenance.
- Technology and Equipment: Investment in parking management systems, security cameras, payment kiosks, and other technological infrastructure is essential for efficient operations.
- Utilities and Services: Costs for electricity, water, and waste management are ongoing operational expenses. This is particularly relevant for well-lit and climate-controlled garages.
- Insurance and Taxes: Property insurance, liability coverage, and local taxes are significant cost components that must be accounted for.
- Marketing and Promotions: Expenses related to advertising and promotions are often needed to attract customers and maintain occupancy rates.

The business model of parking garages is multifaceted, involving various revenue streams, partnerships, and a complex cost structure. Effective management requires balancing these elements to maximize profitability while ensuring a high level of service for users. By leveraging technology and strategic partnerships, parking garage operators can enhance efficiency, reduce costs, and create value for both themselves and their customers.

New digital business models for parking garages

The advent of digital technology has significantly transformed the business models of various industries, including parking garages. New digital business models for parking garages leverage technology to enhance user experience, improve operational efficiency, and create new revenue streams. Here are some innovative digital business model elements for parking garages:

- **Smart Parking Solutions:** Smart parking solutions utilize IoT (Internet of Things) sensors, cameras, and automated systems to manage parking spaces more efficiently. These technologies enable real-time monitoring of parking space availability, reducing the time drivers spend searching for a spot. Apps and digital signage can guide drivers to available spaces, improving user satisfaction and reducing congestion.
- **Mobile Payment and Reservations:** Digital payment solutions have revolutionized the way customers pay for parking. Mobile apps allow users to pay for parking via their smartphones, eliminating the need for cash or physical tickets. Additionally, reservation systems enable users to book parking spaces in advance, ensuring they have a spot when they arrive. This not only enhances convenience but also allows parking operators to manage occupancy rates more effectively.
- **Dynamic Pricing Models:** Dynamic pricing models adjust parking rates based on demand, time of day, and other factors. Digital platforms enable real-time price adjustments, helping to maximize revenue during peak times and attract more customers during off-peak hours. This model is akin to surge pricing used by ride-sharing services and can be implemented through mobile apps and online platforms.
- **Subscription-Based Services:** Subscription-based models offer regular users the option to pay a fixed monthly fee for unlimited or discounted parking access. Digital platforms facilitate the management of subscriptions, providing

users with a seamless experience. This model ensures a steady revenue stream for parking operators and enhances customer loyalty.

- **Integration with Mobility Services:** Parking garages are increasingly being integrated into broader mobility ecosystems. Digital platforms can connect parking services with ride-sharing, car-sharing, and public transportation options. For instance, a user can park their car in a garage and seamlessly transfer to a shared bike or electric scooter for the last mile of their journey. This integration promotes multimodal transportation and can attract a broader customer base.
- **Data Analytics and Insights:** Digital technologies enable parking operators to collect and analyze vast amounts of data on usage patterns, customer preferences, and operational efficiency. Advanced analytics can provide insights into peak usage times, preferred payment methods, and customer demographics. This data can inform marketing strategies, optimize pricing models, and improve overall service delivery.
- **Contactless and Autonomous Solutions:** The COVID-19 pandemic has accelerated the adoption of contactless solutions. Parking garages are implementing contactless entry and exit systems using QR codes, RFID, or license plate recognition. Additionally, autonomous parking systems, where vehicles park themselves using sensors and AI, are being explored. These innovations enhance safety, reduce labor costs, and provide a futuristic user experience.

New digital business models for parking garages are transforming the industry by enhancing efficiency, user convenience, and revenue generation. By embracing smart technologies, dynamic pricing, subscription services, and integration with broader mobility solutions, parking operators can stay competitive and meet the evolving needs of urban mobility.

Digital business model description

A digital business model is a framework that outlines how a company creates, delivers, and captures value using digital technologies and platforms. At its core, it leverages digital channels, data, and technology to transform traditional business processes and interactions, to drive efficiency, agility, and innovation.

Central to a digital business model is the integration of technology throughout the value chain. This can involve digitalizing core operations, such as production, distribution, and customer service, to streamline processes and to enhance customer experiences. For example, an e-commerce platform utilizes digital channels to showcase products, facilitate transactions, and manage inventory, providing customers with a seamless shopping experience from browsing to purchase.

Data plays a pivotal role in digital business models, serving as a foundation for insights-driven decision-making and personalized interactions. Companies harness data analytics, machine learning, and artificial intelligence to analyze customer behavior, predict trends, and optimize operations. By leveraging data-driven insights, businesses can tailor their offerings to meet individual preferences, improve targeting strategies, and enhance customer satisfaction.

Moreover, digital business models often embrace platform-based approaches, where companies act as intermediaries connecting producers and consumers, or multiple stakeholders within an eco-system. Platform businesses capitalize on network effects, economies of scale, and ecosystem dynamics to create value for all participants. For instance, ride-sharing platforms bring together drivers and passengers, leveraging digital technologies to match supply with demand efficiently.

Monetization strategies in digital business models vary, ranging from subscription-based models to freemium offerings, pay-per-use models, and advertising revenue models. The ability to capture value hinges on delivering unique value propositions, fostering customer engagement, and continuously innovating to stay ahead of the competition.

A digital business model encompasses the strategic integration of technology, data, and platforms to drive value creation, enhance customer experiences, and achieve sustainable growth in today's digital economy. By embracing digital transformation, companies can unlock new opportunities, optimize operations, and adapt to evolving market dynamics in an increasingly interconnected and technology-driven world.

Strategy Development has to explain which market access routes the business uses and which market position should be reached in order to leverage customers' willingness to pay in the most advantageous way. Digital technologies have led to the development of new market positions such as platforms (e.g. iTunes), marketplaces

(e.g. Amazon), free information with advertisements (e.g. Google), access-over-ownership (e.g. Airbnb), and on-demand (e.g. Uber).

Finally, the differentiation must be communicated based on the USP offered. In this sector, new channels like mobile devices, smartphones, cars, and augmented reality are used to create new and unique customer experiences.

Thus, digital technology can be applied in all sectors and in more than one sector of the business model description. Typically, digital business models are also not solely based on digital or intangible aspects. Digital business models combine digital and physical assets for value creation and delivery, and it is the smart and specific combination of these assets that creates a competitive advantage.

Digital business models can be distinguished from traditional, physical business models in three generic aspects: content, customer experience, and platform.

- Content refers to what is consumed, e.g. digital content such as digital music.
- Customer experience means how the product is packaged, e.g. streaming enables music lovers to consume music anywhere and at any time on a smartphone.
- Platform refers to how the product is delivered: a digital platform brings the product and service offers, e.g. musicians and record labels, together with customers and creates a new digital marketplace for music.

The digital business model of parking garages

The digital business model of parking garages is a modern approach that leverages technology to optimize operations, enhance customer experience, and create new revenue streams. This model integrates various digital tools and platforms to streamline parking management and maximize efficiency. The key components of this digital business model include the revenue model, business partners, and cost structure.

Revenue Model

The digital transformation of parking garages introduces several innovative revenue streams:

- **Dynamic Pricing:** Utilizing data analytics and real-time monitoring, digital systems can implement dynamic pricing models. Rates can be adjusted based on demand, time of day, and special events, similar to surge pricing used by ride-sharing services. This maximizes revenue during peak times and attracts more customers during off-peak hours.
- **Mobile Payments and Reservations:** Mobile apps enable users to pay for parking and reserve spaces in advance. This convenience encourages more frequent use and allows for flexible pricing strategies, such as offering discounts for advance bookings or peak-hour reservations.
- **Subscription Services:** Offering subscription-based parking plans for regular users provides a stable and predictable revenue stream. Digital platforms facilitate the management of these subscriptions, offering features like automatic renewals and flexible plans.
- **Value-Added Services:** Additional services such as car washes, maintenance, electric vehicle (EV) charging stations, and valet parking can be seamlessly integrated into the digital platform. These services provide additional revenue streams and enhance customer satisfaction.
- **Advertising and Partnerships:** Digital screens and mobile apps offer advertising opportunities. Local businesses can partner with parking garages to promote their services to users, creating a new advertising revenue channel.

Business Partners

Digital parking models rely on partnerships with various stakeholders to enhance service delivery and expand market reach:

- **Technology Providers:** Collaborations with technology companies that provide IoT sensors, mobile payment systems, and data analytics platforms are crucial. These partners supply the necessary infrastructure to implement and maintain digital parking solutions.
- **Automotive and Mobility Services:** Partnerships with car manufacturers, ride-sharing services, and public transportation providers can create integrated mobility solutions. For example, users can park their cars and seamlessly transition to public transport or shared mobility options, promoting a holistic travel experience.
- **Local Businesses:** Nearby businesses can collaborate with parking garages to offer validated parking, discounts, or promotions. This not only drives foot

traffic to local businesses but also enhances the value proposition for parking garage users.

- Municipalities and Urban Planners: Working with city governments and urban planners can help integrate parking solutions into broader urban mobility strategies. Public-private partnerships can facilitate the development of smart city initiatives, benefiting both the parking operator and the community.

Cost Structure

The digital business model introduces both initial and ongoing costs associated with technology adoption and maintenance:

- Technology and Infrastructure: Significant investments are required for the installation of IoT sensors, automated payment systems, and data analytics platforms. These technologies are essential for real-time monitoring, dynamic pricing, and efficient management.
- Software Development and Maintenance: Developing and maintaining mobile apps, reservation systems, and digital platforms involve ongoing costs. Regular updates and improvements are necessary to keep the systems secure and user-friendly.
- Data Management: Collecting, storing, and analyzing data requires robust IT infrastructure and cybersecurity measures. Ensuring data privacy and compliance with regulations also adds to the cost.
- Labor Costs: While automation can reduce the need for manual labor, skilled personnel are still needed to manage and maintain the digital systems. This includes IT support, data analysts, and customer service staff.
- Marketing and Customer Acquisition: Promoting the digital services and acquiring new customers involves marketing expenses. Digital marketing campaigns, partnerships, and promotions are necessary to attract and retain users.

The digital business model for parking garages transforms traditional operations through technology, creating new revenue streams, enhancing partnerships, and introducing a modern cost structure. By leveraging dynamic pricing, mobile payments, and value-added services, parking operators can optimize their offerings and meet the evolving needs of urban mobility.

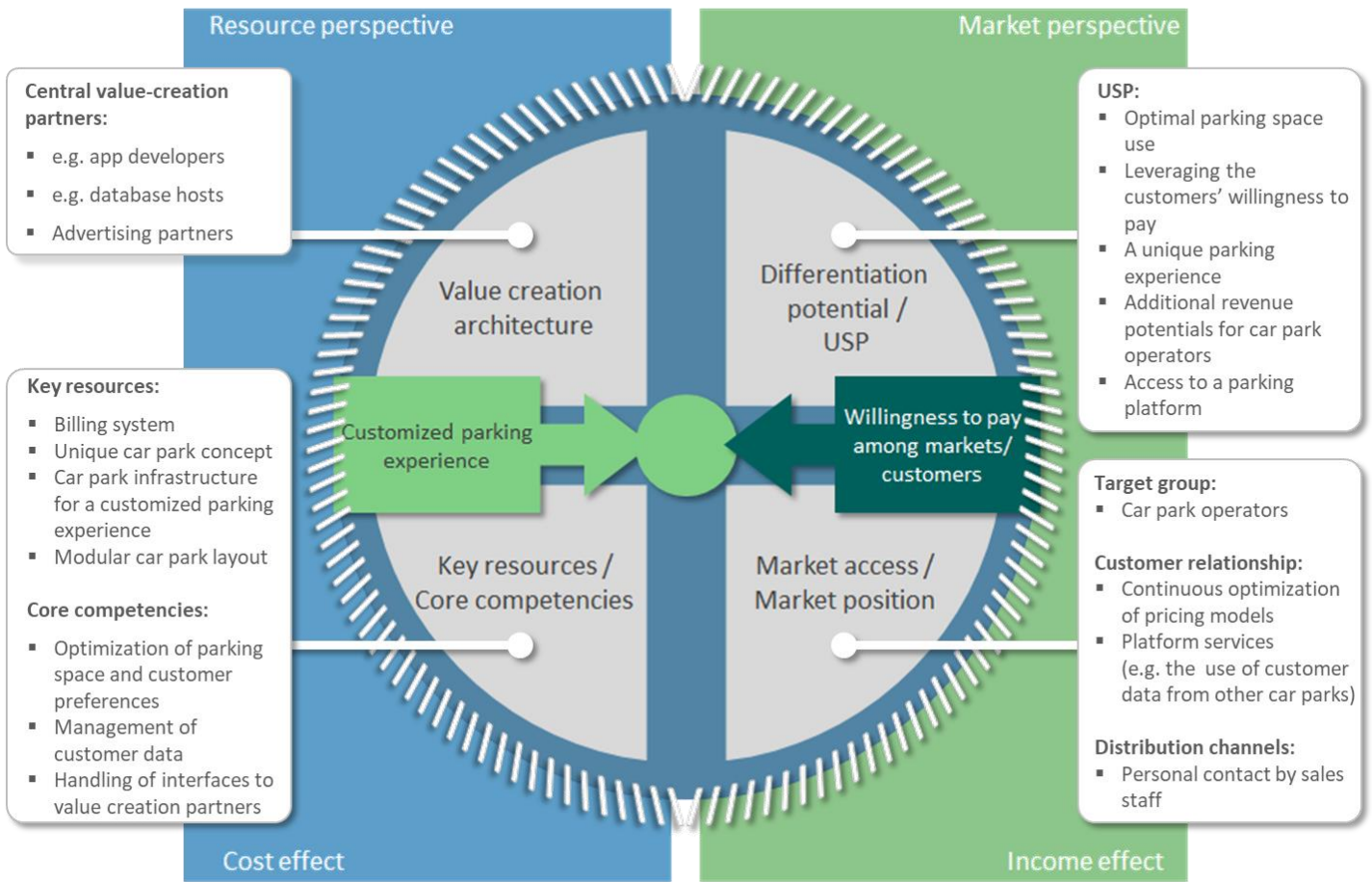


Figure 1: Business model analysis for a customized parking experience.

IP design for the digitalization of parking

Introduction to IP design

The starting point of a company's organization is the appropriate division of labor. The challenge is to quantitatively distribute the workload and qualitatively distribute the various requirements for the work to be performed. The division of labor creates interfaces and interactions between employees and organizational areas that need to be optimized according to business objectives such as efficiency, flexibility, result orientation, effectiveness, and controllability. The overall organizational objective should be an organization designed to fulfil the strategy structure fit requirement: The organizational structure as a control system and infrastructure to implement a strategy. The strategy-structure fit thus specifies a quality criterion for an organizational structure.

Alfred D. Chandler defines strategy as the determination of the basic long-term goals and objectives, the adoption of courses of action and the allocation of resources necessary for achieving goals. He defines structure as the design of the organization through which the business is administered including the lines of authority and communication and the data that flows through these lines. The consequence of Chandlers work is clear: When a company wants to implement IP design, it needs an appropriate organization. IP design is the ability of an organization to optimize IP impacts according to its business needs, which means especially that the organization is able to create the needed IP on purpose to enjoy the suitable exclusivity for the respective business model.

The dominant businesses strategy in which IP design is used is a differentiation strategy. Such a market and competitive strategy focuses on customer-relevant unique selling points (USPs) and thus avoids an insulated price comparison with competitive offers by the customer. This strategy is addressing immediate customer benefits which are perceived by customers and reported by a willingness to pay for the added value. Opposed to this are general product characteristics, in which from the customer's perspective it is not clear which kind of benefits they provide.

What is a customer benefit?

A customer benefit refers to the advantage or value that a product or service provides to its users. It is the primary reason why customers choose to purchase a specific product or service over others. Customer benefits can be tangible, such as improved performance, cost savings, or enhanced features, or intangible, like convenience, satisfaction, or a sense of well-being.

Understanding customer benefits is crucial for businesses as it helps them align their offerings with customer needs and preferences. This alignment not only enhances customer satisfaction but also drives loyalty and repeated purchases. By focusing on the benefits, companies can effectively communicate the value of their products, differentiate themselves from competitors, and justify their pricing strategies.

Customer benefits are typically categorized into three main types: functional, emotional, and social. Functional benefits relate to the practical or utilitarian aspects of a product, such as durability, efficiency, and ease of use. Emotional benefits are linked to the feelings and experiences that a product elicits, such as happiness, confidence, and security. Social benefits arise from the social impact or status that comes from using a product, such as prestige, acceptance, and belonging.

In essence, identifying and delivering customer benefits is essential for creating products and services that resonate with customers, meet their needs, and drive business success.

How to identify a customer benefit in IP design?

The customer benefits can be determined in multiple ways. The preferential method is to make a survey about the customer needs and to identify the customer benefit aspects with it. This guarantees that the creation of spheres of exclusivity concentrates on those characteristics of the product or service which are perceived and actually desired by the customer and which influence the willingness to pay. In addition to a survey the customer benefit aspects should be investigated in workshops.

The required information comes primarily from departments with high market intelligence, such as product management, marketing, and sales. However, also other workshop participants, for example from the R&D department, should be integrated in the discussion, as this often brings new customer benefit aspects to light that were previously unknown to the market side or were only considered to a limited extent.

			Customer benefit							
			Flexibility	Investment protection	Cost-effective manufacturing	Output quantity	Low scrap	High machine utilization		
System components	System component Layer 1 ▼	System component Layer 2 ▼	System component Layer 3 ▼							
	Control system	Autonomous subsystem registration				x	x		x	
		System control based on actual status				x	x		x	
		Rule-based control (machine / system)	Restrictions				x	x		x
			Prefered attendance (e.g. special orders)				x	x		x
	Rules (e.g. tool change)					x	x		x	
	Interface	Management of total availability		x		x	x		x	
	Quality inspection	Identification of quality drift			x	x	x	x		
		Confirmation of quality parameters			x	x	x	x		
	Maintenance	Remote maintenance / remote diagnostics	Available (traceable) error data	x	x		x			
			Self-diagnosis	x		x	x		x	
			Protocol of the interchanges		x	x	x			

Figure 2: Principle of an intellectual property function deployment (IP-FD)

If the IPFD (Intellectual Property Function Deployment) methodology is used in an early phase of product development as it should be, it may also make sense to include customer benefit aspects which are not yet implemented according to the current state of development. In this way, the procedure can be used to expand the scope of the project and thus to achieve unique exclusivity positions that are more market-driven and secured by IP.

In the case of multi-layered customer benefit arguments, and if this corresponds to the customer’s understanding of the product or service, the aspects of customer benefit can be structured and summarized into complexes. For example, the customer benefits of high energy efficiency, high system availability and simple and fast maintenance could be summarized under the complex of Total Costs of Ownership.

This usually leads to a reduced complexity and a better structuring of the subsequent discussions.

It is also essential that the customer benefit analysis relates precisely to the object specified in the target definition. The system limits of the product or service under consideration must therefore be considered. If a single product, for example a metalworking machine, is dealt with, only the customer benefit elements for this machine need to be determined. If services that are complementary to the system, such as external performance monitoring to optimize maintenance cycles, are offered, the additional customer benefit aspects are only relevant if the overall system is considered.

In order to clarify the importance of the individual customer benefit aspects for the business model and to be able to weight the importance of the resulting fields of action, priorities should be set for all aspects. For this purpose, criteria should be used that apply to both the business model and the innovative product or service in its competitive environment as good as possible. Examples of criteria for prioritizing customer benefits and related questions can be:

- Recognizability for the customer:
 - Does the customer perceive the specific benefit?
 - Does the customer perceive the added value directly or does marketing or product design make the customer aware of its existence?
- Relevance for pricing:
 - Does the offer of this customer benefit influence the customer's purchase decision?
 - Is the customer willing to pay a higher price for the added value?
- Significance in the (planned) customer communication:
 - Is the offering of the customer benefit aspect mentioned in the customer communication (e.g. in marketing and sales documents)?
 - How strongly is the concrete added value emphasized compared to other customer benefit aspects?
- Correspondence with the brand promise:
 - Does the customer benefit aspect match the value proposition that the brand makes to the customer?
 - Is the customer astonished by this added value based on the current brand associations?

- Degree of differentiation from competitive offers:
 - Are the same customer benefits also offered by competitors?
 - Does the customer assume that the innovation provides a higher benefit in this aspect than competitive offers?

These examples for prioritizing aspects of customer benefits are by no means exhaustive and should be determined individually depending on the innovation project and business model.

Several criteria can be used for a finer differentiation. However, their meaning should not overlap in order not to weight individual aspects twice. In addition, it is advisable not to introduce too many prioritization criteria into the discussion, since a high number of criteria usually leads to little gained knowledge, but at the same time to increased complexity and confusion.

Creation of a cognitive walkthrough for the “customized digital parking” use case

What is a cognitive walkthrough?

A cognitive walkthrough is a usability evaluation method used to assess the effectiveness of a user interface. It focuses on understanding the cognitive processes that users undergo when interacting with a system, particularly when they are unfamiliar with it. The goal is to identify potential usability issues that might hinder a user's ability to achieve their objectives efficiently and effectively. Even if the cognitive walkthrough is primarily used to optimize user interfaces, it is also suitable for identifying potentially patentable solutions in the innovation's operating system.

In a cognitive walkthrough, evaluators follow a structured approach to simulate a user's experience with the interface. This involves a series of steps:

- Preparation: Define the user profile, including their background, knowledge, and goals. Specify the tasks that the user is expected to perform using the interface.
- Task Selection: Choose representative tasks that are critical to the system's functionality. These tasks should be realistic and relevant to typical user scenarios.

- Action Sequence: Break down each task into a sequence of actions that the user would need to perform. Each action is analyzed to determine if it is likely to be performed correctly by the user.
- Evaluation: For each action, evaluators ask four key questions:
 - Will the user try to achieve the right effect? (Is the user's goal clear and correct?)
 - Will the user notice that the correct action is available? (Is the relevant control or information visible?)
 - Will the user associate the correct action with the effect they are trying to achieve? (Is it clear that this action will achieve the desired result?)
 - If the correct action is performed, will the user see that progress is being made toward their goal? (Is feedback provided to confirm the action was successful?)
- Recording and Analysis: Document any problems encountered during the walkthrough. Analyze these issues to understand their severity and potential impact on the user experience.

Cognitive walkthroughs are particularly useful in the early stages of design when major changes can still be made without significant cost. They provide insights into how intuitive and learnable an interface is for new users, highlighting areas where design improvements are needed. This method helps designers create more user-friendly interfaces by focusing on the cognitive aspects of user interaction, ultimately enhancing overall usability.

How does it look for the “customized digital parking” use case?

The cognitive walkthrough method is used to think through the use of a system by a particular customer. It was originally developed as a design method for investigating user interfaces in order to analyze the usability of products without a concrete observation of the customer. In a cognitive walkthrough, the user of the method puts himself in the shoes of a hypothetical user and analyses expected actions. He assumes that the user will take the path of least cognitive effort.

The implementation of a cognitive walkthrough first requires the definition of a specific user for whom the usage actions are determined. The individual steps of the usage process are then intellectually reconstructed for this user. When applying the method for IP design, system activities can be added to the actions triggered by the

user. For the usage scenario of a digital parking experience, this usage process (in an abbreviated form) could be illustrated as in the figure below.

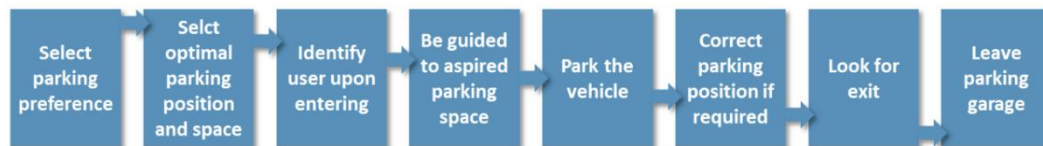


Figure 3: Cognitive walkthrough for the customized parking experience

Introduction to White Spot analysis

White spot analysis is a strategic tool used by businesses and organizations to identify gaps or opportunities in the market that have not yet been exploited. The term "white spot" refers to areas within a market that remain untapped or underserved, offering potential for growth and innovation. This type of analysis helps companies understand where they can expand their operations, introduce new products, or improve existing services to meet unfulfilled customer needs.

The process of white spot analysis involves several key steps:

1. **Market Segmentation:** The first step is to segment the market into different categories based on various criteria such as demographics, geography, behavior, and psychographics. This helps in identifying specific groups of customers and their unique needs.
2. **Data Collection:** Gather data on current market trends, customer preferences, competitors' offerings, and overall industry performance. This data can be obtained from various sources including market research reports, customer feedback, sales data, and competitive analysis.
3. **Gap Identification:** Analyze the collected data to identify areas where customer needs are not being fully met. This could involve looking for segments with limited product options, underserved geographical regions, or emerging customer trends that competitors have not yet addressed.
4. **Opportunity Evaluation:** Once potential white spots are identified, evaluate their viability. This involves assessing the size of the market opportunity, the level of competition, potential barriers to entry, and the resources required to capitalize on the opportunity. It's important to ensure that the identified white spots align with the company's strategic goals and capabilities.

5. Strategic Planning: Develop a strategic plan to address the identified white spots. This could involve creating new products or services, modifying existing offerings, entering new markets, or enhancing marketing efforts. The plan should outline specific actions, timelines, and resource allocation to effectively exploit the identified opportunities.
6. Implementation and Monitoring: Execute the strategic plan and continuously monitor its performance. Adjust the strategy as needed based on market feedback and changing conditions to ensure sustained success in capturing the identified white spots.

White spot analysis is beneficial for several reasons. It helps companies stay competitive by constantly seeking out new opportunities and avoiding market saturation. By identifying and targeting underserved segments, businesses can differentiate themselves from competitors and build a loyal customer base. This analysis also fosters innovation, as it encourages companies to think creatively about how to meet unmet needs and explore new market possibilities.

Moreover, white spot analysis can reveal potential threats and weaknesses within the market. By understanding where competitors may be lacking, businesses can proactively address these areas and prevent competitors from gaining an advantage. It also helps in resource optimization, ensuring that investments are directed towards the most promising opportunities rather than spreading resources too thin across multiple areas.

In the context of product development, white spot analysis can guide the creation of tailored solutions that precisely address customer pain points. This targeted approach not only increases the likelihood of product success but also enhances customer satisfaction and loyalty.

In conclusion, white spot analysis is a powerful tool for businesses seeking to identify and capitalize on untapped market opportunities. By systematically analyzing the market to uncover gaps, companies can develop strategies that drive growth, foster innovation, and maintain a competitive edge. It is a proactive approach that ensures businesses remain agile and responsive to changing market dynamics, ultimately leading to sustained success and profitability.

The role of patent information in white spot analysis

Patent information plays a crucial role in white spot analysis, serving as a primary data source for the entire process. It can be used for:

- **Identifying Technology Gaps:** White spot analysis aims to uncover areas of technology that are underdeveloped or have potential for innovation. Patent databases offer a comprehensive overview of existing technologies, enabling researchers to identify gaps where new inventions could emerge.
- **Mapping the Patent Landscape:** By analyzing patent data, researchers can create detailed maps of the patent landscape within a specific field. These maps visualize the distribution of patents across different technologies, highlighting areas with high patent density (mature technologies) and areas with few or no patents (white spots).
- **Generating New Ideas:** The insights gained from patent analysis can spark new ideas for research and development. By understanding the current state of technology, inventors can identify areas where they can contribute novel solutions and potentially gain a competitive advantage.
- **Assessing Novelty and Patentability:** Before investing resources in research and development, inventors can use patent information to assess the novelty of their ideas and their potential for patentability. This can help avoid duplicating existing inventions and ensure that new developments are legally protectable.

In summary, patent information is a key tool of white spot analysis, providing the essential data needed to identify technology gaps, map the patent landscape, generate new ideas, and assess the potential for innovation and patenting.

White Spot analysis for “customized digital parking”

A white spot analysis for customized digital parking involves identifying unaddressed needs and untapped opportunities within the digital parking industry. This process can help parking service providers develop innovative and tailored solutions that better meet customer demands, enhance user experience, and optimize operational efficiency.

Market Segmentation

The first step in conducting a white spot analysis for customized digital parking is to segment the market. This can be done by dividing the market into different categories based on factors such as:

- **Geography:** Different regions may have varying levels of demand for parking services. Urban areas with high traffic congestion and limited parking spaces will have different needs compared to suburban or rural areas.
- **Demographics:** Consideration of different user groups, such as daily commuters, occasional visitors, tourists, and commercial drivers, each with unique parking needs.
- **Behavior:** Analyzing parking behaviors, such as the frequency of parking, duration, and preferences for convenience or cost savings.
- **Technology Adoption:** Segmenting users based on their willingness and ability to adopt new technologies, from tech-savvy users to those less familiar with digital solutions.

Data Collection

Gathering comprehensive data is essential for white spot analysis. This includes:

- **Current Market Trends:** Patent information and other data on the latest trends in digital parking solutions, such as mobile payment systems, reservation platforms, and smart parking technologies.
- **Customer Preferences:** Feedback from users about their parking experiences, preferences, and pain points. Surveys, interviews, and online reviews are valuable sources of this data.
- **Competitor Offerings:** Analyzing competitors' services and patent portfolios to understand what solutions are currently available and identify any gaps.
- **Industry Performance:** Statistics and reports on the performance of the digital parking industry, including growth rates, user adoption, and revenue figures.

Gap Identification

Analyzing the collected data helps in identifying specific areas where customer needs are not fully met. Potential white spots in the customized digital parking market might include:

- **Real-time Availability:** Lack of real-time information on parking space availability, leading to user frustration and inefficient parking searches.
- **Payment Flexibility:** Limited payment options that do not cater to all users, such as lack of support for mobile wallets or cryptocurrency.
- **Customization:** Generic parking solutions that do not allow users to customize their experience based on their preferences, such as choosing preferred or individualized parking spots or receiving tailored notifications.
- **Integration with Other Services:** Insufficient integration with other mobility services, like ride-sharing, public transportation, or electric vehicle charging stations.
- **User Interface:** Poorly designed mobile apps or websites that are not user-friendly, making it difficult for users to navigate and utilize parking services.

Opportunity Evaluation

Once the white spots are identified, evaluating their viability is crucial. This involves:

- **Market Size:** Assessing the potential size of the market opportunity and the number of users who could benefit from the customized solutions.
- **Competition Level:** Evaluating the level of competition, e.g. based on patent information, in the identified white spots and the ease of entering these market segments.
- **Barriers to Entry:** Identifying potential challenges in addressing the white spots, such as technological requirements, patenting activities of competitor, regulatory constraints, and investment needs.
- **Alignment with Strategic Goals:** Ensuring that the opportunities align with the company's long-term goals and capabilities.

Strategic Planning

Developing a strategic plan to address the identified white spots involves:

- **Solution Development:** Creating customized digital parking solutions that address the identified gaps, such as real-time availability tracking, flexible payment options, user-customizable parking spots and other individualization features and protecting them with patents and other IP.
- **Partnerships:** Forming partnerships with technology providers, local businesses, and other mobility service providers to enhance the offering.
- **Marketing Strategy:** Crafting targeted marketing campaigns to promote the new solutions to the identified market segments.
- **Resource Allocation:** Allocating the necessary resources, including budget, personnel, and technology, to implement the strategic plan.

Implementation and Monitoring

Executing the strategic plan and continuously monitoring its performance is essential for success. This includes:

- **Feedback Loops:** Establishing channels for user feedback to continuously improve the service.
- **Performance Metrics:** Tracking key performance indicators (KPIs) such as user adoption rates, satisfaction levels, and revenue growth.
- **Adjustments:** Making necessary adjustments based on feedback and performance data to ensure the solutions meet evolving customer needs.

A white spot analysis for customized digital parking involves a comprehensive approach to identify and exploit market gaps and associated gaps in the patent landscape. By understanding and addressing the specific needs of different user segments, parking service providers can develop innovative, tailored solutions that enhance user experience, drive growth, and maintain a competitive edge in the digital parking industry and protect them with patents.

AI-aided white spot analysis

Artificial Intelligence (AI) can significantly enhance the process of white spot analysis by providing advanced tools and techniques to identify market gaps and opportunities more efficiently and accurately. AI leverages data processing capabilities, pattern recognition, and predictive analytics to uncover insights that might be missed through traditional methods.

Here's how AI can assist in white spot analysis:

- **Data Collection and Processing:** AI can automate the collection and processing of vast amounts of data from diverse sources such as market reports, customer feedback, social media, and competitor analysis. Natural Language Processing (NLP) allows AI systems to analyze textual data, extracting valuable insights from customer reviews, surveys, and online discussions. This comprehensive data collection ensures a more accurate and complete picture of the market landscape.
- **Market Segmentation:** AI algorithms can perform detailed market segmentation by analyzing customer data to identify distinct groups based on demographics, behavior, preferences, and purchasing patterns. Machine learning models can detect subtle patterns and correlations that humans might overlook, enabling more precise segmentation. This helps in identifying specific customer groups that are underserved or have unique needs that are not currently addressed.
- **Predictive Analytics:** AI-powered predictive analytics can forecast market trends and customer behavior based on historical data. By understanding how markets have evolved in the past, AI can predict future changes and identify emerging white spots. This forward-looking approach allows businesses to proactively develop strategies to exploit these opportunities before competitors do.
- **Competitor and Patent Analysis:** AI tools can continuously monitor competitors' patenting activities, product launches, pricing strategies, and customer feedback. Therefore, AI can identify gaps in the market that competitors have not addressed. This real-time analysis helps businesses stay ahead by spotting opportunities to differentiate their products and services.
- **Customer Sentiment Analysis:** Using AI for sentiment analysis helps understand customer opinions and emotions related to existing products and services. By analyzing social media posts, reviews, and feedback, AI can gauge customer satisfaction and identify pain points. This insight reveals areas where current solutions fall short, highlighting potential white spots for improvement or innovation.
- **Optimization of Product Development:** AI can help optimize the product development process by suggesting features and improvements based on identified white spots. For instance, AI can analyze user data to recommend specific functionalities that would meet unmet needs or enhance user experience. This targeted approach ensures that new products or features are directly aligned with market demand.

- Resource Allocation: AI can assist in strategic planning by analyzing potential white spots and evaluating their viability. It can assess the size of the opportunity, competition level, and required resources. This helps businesses prioritize the most promising opportunities and allocate resources efficiently, maximizing return on investment.

AI-assisted analysis of the patent landscape

Especially, the AI-assisted analysis of the patent landscape offers companies a broad range of advantages that can be used for a white spot analysis, such as:

- Automated Data Extraction and Processing: AI algorithms can efficiently extract relevant information from the vast patent databases, saving patent searchers time and effort in manual data collection and processing. This allows for a more comprehensive analysis of the patent landscape in shorter time and identifies white spots more effectively.
- Advanced Text Mining and Natural Language Processing (NLP): AI-powered tools can analyze patent documents using NLP techniques to identify key features, and relationships between inventions. This enables a deeper understanding of the patent landscape, facilitating the identification of white spots.
- Semantic Search and Similarity Analysis: AI-powered semantic search can identify patents with similar features, even if they use different terminology. This helps patent searchers discover relevant patents that might not have been found using traditional keyword-based search methods.

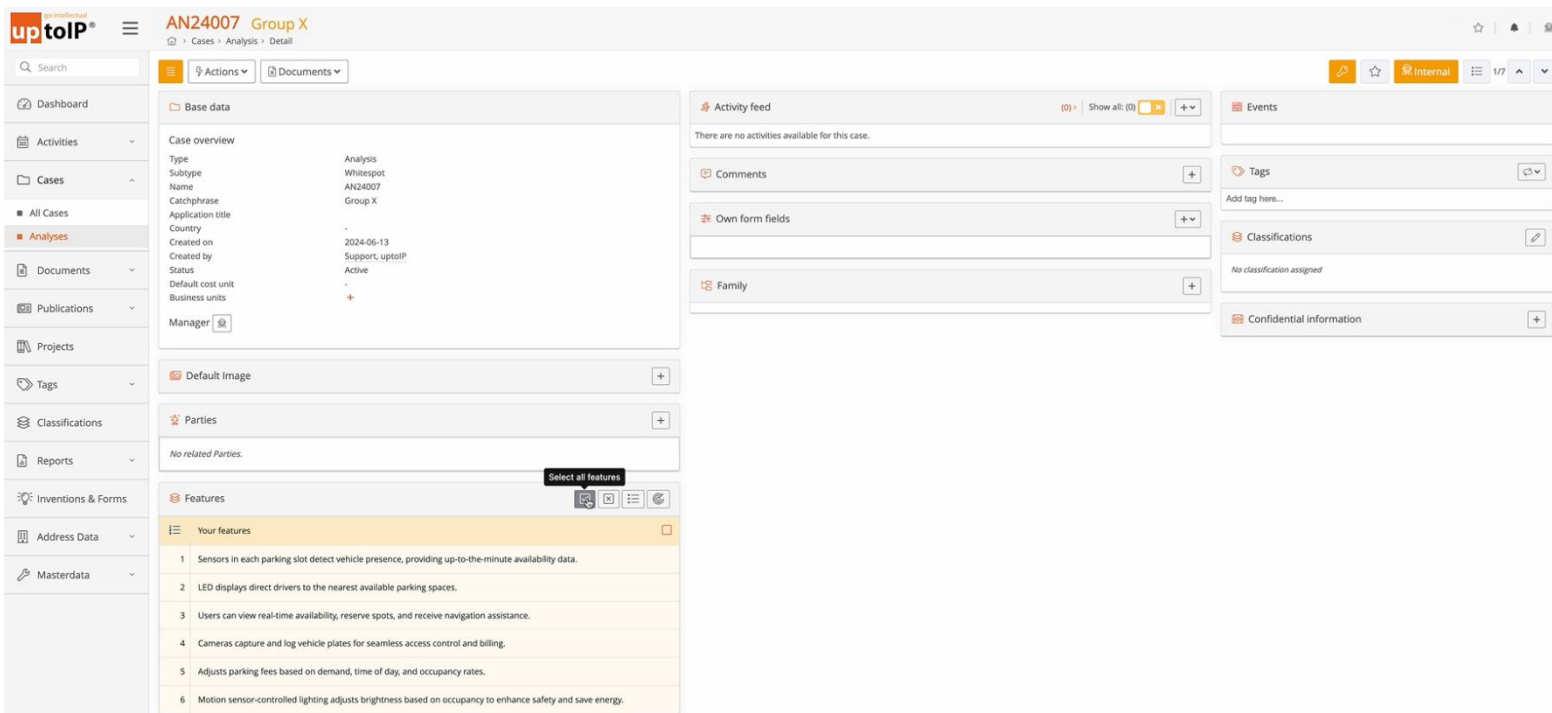
Practically, a white spot analysis with an AI-based patent search tool can be performed with the following steps:

- Identify the features which should be protected for the chosen use case (e.g. marking an individualized parking spot)
- Search with the AI-tool for patents, which have similar features, and compare them
- If patents with a high degree of similarity are found, modify those features to come closer to white spots in the patent landscape
- Iterate this process until a white spot, which can protect the initially desired features is identified

AI-assisted analysis of the patent landscape with patentbutler.AI by uptoIP® & ABP PATENT NETWORK

An AI-assisted white spot analysis of the patent landscape can be setup within the patentbutler.AI tool with the following few steps. In the first step the initial features of the desired patent, which should lie in a white spot need to be defined within the system as a starting point. This can be done by the “create features” function of the tool. An initial set of features for the use case of “customized digital parking” can comprise e.g.:

- Sensors in each parking slot detect vehicle presence, providing up-to-the-minute available data
- LED displays direct drivers to the nearest available parking spaces
- Users can view real-time availability, reserve spots, and receive navigation assistance
- Cameras capture and log vehicle plates for seamless access control and billing
- Adjust parking fees based on demand, time of day, and occupancy rates
- Motion sensor-controlled lighting adjusts brightness based on occupancy to enhance safety and save energy



The screenshot shows the uptoIP interface for case AN24007. The 'Features' section is expanded, showing a list of six features defined for the patent analysis. The interface includes a sidebar with navigation options like Dashboard, Activities, Cases, Documents, and Reports. The main content area is divided into sections for Base data, Activity feed, Comments, Own form fields, Family, and a list of features.

Figure 4: Definition of the features which should be compared with the chosen patent literature to identify similarities in the uptoIP® environment.

Once the features are defined, any set of them can be used to identify patents with similar features within a chosen patent portfolio, in this case a portfolio relevant for digital parking solutions. The found patents can then be analyzed based on the similarity and relevance of individual features or combinations of features. The similarity is indicated by the shade of the green background color for each feature, with dark green meaning a high similarity and white less than 50 % similarity. To get more information about the similarities found in the patent document and to get a more concrete understanding of the results the patentbutler.AI tool provides detailed information for any compared feature, e.g. where the information can be found in the original patent documents.

Based on the found similarities of the initial set of features with the patent literature, in the next step features must be edited, deleted, added or combined to feature combinations to identify features (or feature combinations), which are less covered in existing patents. For example the above chosen set of features can be modified by regrouping the features to multiple feature combinations and addition of new features:

- Feature Group 1:
 - Sensors in each parking slot detect vehicle presence, providing up-to-the-minute available data
 - LED displays direct drivers to the nearest available parking spaces
 - Users can view real-time availability, reserve spots, and receive navigation assistance
 - Cameras capture and log vehicle plates for seamless access control and billing
- Feature Group 2:
 - Adjust parking fees based on demand, time of day, and occupancy rates
 - Motion sensor-controlled lighting adjusts brightness based on occupancy to enhance safety and save energy
- Smartphone assisted

This process of regrouping, editing, adding and deleting features can be iterated until a desired degree of low similarity compared to the existing patent literature is reached and a white spot is identified.

Case ID	Patent No.	Similarity %	Patent No.	Similarity %	Patent No.	Similarity %	Patent No.	Similarity %	Patent No.	Similarity %	Patent No.	Similarity %	
AN24007	US2014308902A1	58%	EP3324382A1	58%	US2014306834A1	58%	US2015061895A1	58%	US2023169851A1	56%	EP4024084A2	56%	
	US2014308902A1	75%	EP3324382A1	76%	US2014306834A1	75%	US2015061895A1	75%	US2023169851A1	74%	EP4024084A2	74%	
	US2014308902A1	61%	EP3324382A1	61%	US2014306834A1	61%	US2015061895A1	61%	US2023169851A1	60%	EP4024084A2	58%	
	US2014308902A1	52%	EP3324382A1	54%	US2014306834A1	52%	US2015061895A1	52%	US2023169851A1	50%	EP4024084A2	55%	
US2014308902A1	58%	EP3324382A1	53%	US2014306834A1	58%	US2015061895A1	58%	US2023169851A1	57%	EP4024084A2	52%	US2019251841A1	57%
US2014308902A1	53%	EP3324382A1	63%	US2014306834A1	53%	US2015061895A1	53%	US2023169851A1	60%	EP4024084A2	62%	US2019251841A1	55%

Figure 5: Overview of the similarities between the selected features and the chosen patent literature. Dark green tiles indicate high similarities with the patent document. White tiles show a low similarity.

Introduction to synthetic inventing

What is synthetic inventing?

Synthetic inventing as the basis for specifically created spheres of exclusivity as part of the development of a 360° IP strategy, where the IP needs are systematically identified and characterized. For this purpose, fields of action are defined in which the creation of strong exclusivity positions through IP leads to a high strategic benefit by applying the IPFD methodology and a fundamental understanding of the target business model. Also, goals must be formulated which should be realized using IP in the business model. This shows which types of IP rights are needed and what they refer to. However, especially for patents, the specific inventions which should be protected with IP are only in rare cases obvious at this point.

The implementation of a 360° IP strategy regularly requires the competence to systematically identify inventions in the desired places by a white spot analysis and to draft patent applications based on these inventions. This procedure can be described as synthetic, as it does not start with a specific invention, as in the classic patenting process, but rather focuses on the need for prohibition, which is realized by patenting specifically created inventions.

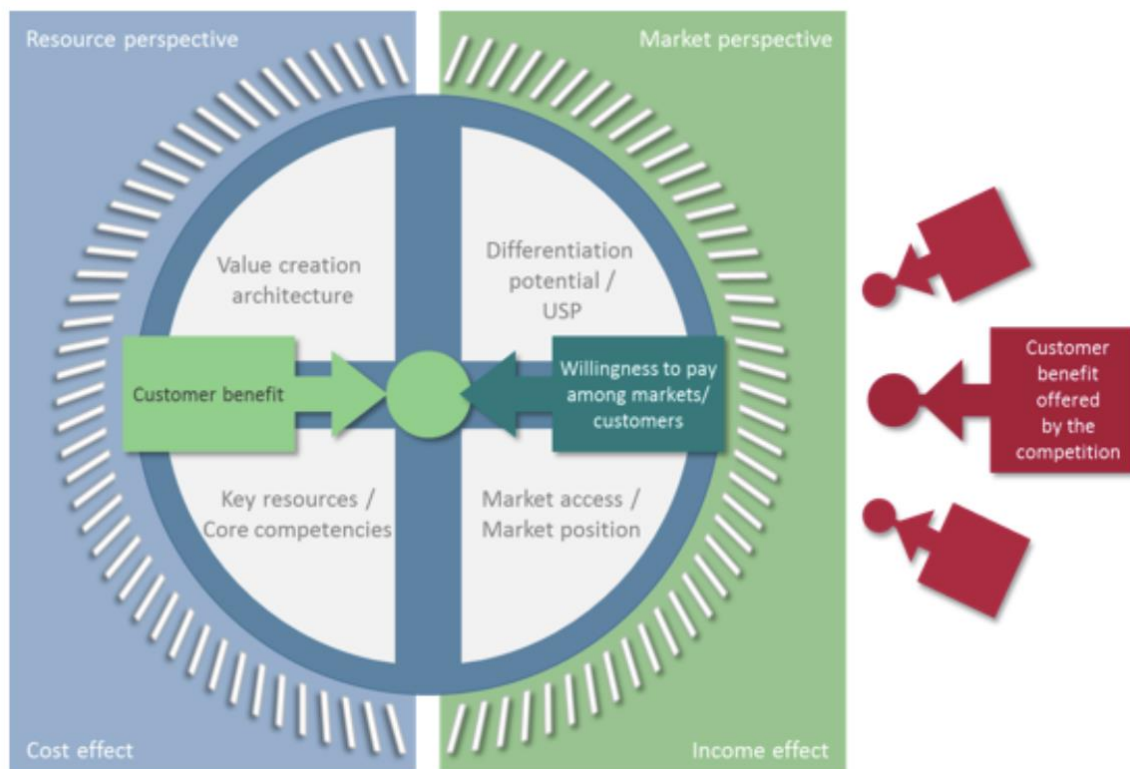


Figure 6: Business model for the creation of an IP strategy for differentiation: The business model has four sectors, namely on the resource side the value creation architecture and the key resources and core competencies and on the market side the market access and market position and the differentiation potential and unique selling proposition (USP). In a 360° Strategy the sphere of exclusivity is created around all four sectors of the business model.

Synthetic inventing is relevant for the implementation of the measures in two sectors of the 360° IP strategy. In Sector (II) “Suppressing imitation”, the methodology serves to use the company’s resources, especially the technical competencies created by R&D, as exclusively as possible and to maximize the return on innovation resulting from the use of the resources. Generally, it is not about the newly developed technologies per se, but rather about the customer benefits that can be offered on the basis of the technology use. The aim is to create legal positions that make it possible to prohibit competitors from providing an equivalent customer benefit, regardless of how this is technically produced.

While it is often difficult to identify objects of the invention at this point in order to protect the own solution against unauthorized use by third parties with patents, the creation of exclusivity of customer benefits represents a particular challenge. This makes it necessary to use methods, which identify the areas where the intended objects of the invention lie and which help to model these inventions to create protectability such as an IPFD.

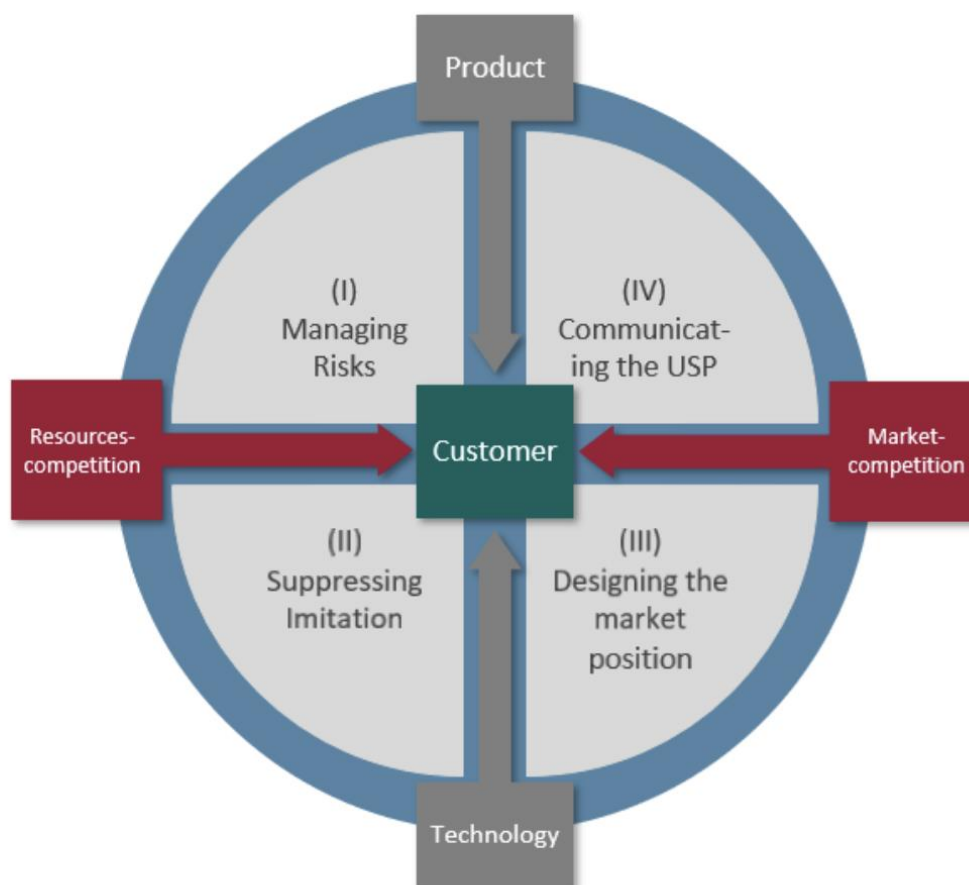


Figure 7: Generic 360° IP strategy for differentiation: In the value creation architecture sector (I) you need to manage the risks, so that you are free from the rights of third parties. In the key resources and core competencies sector (II) you need to suppress the imitation of your assets. In the market access and market position sector (III) you need to design our market position against third parties. Finally, in the differentiation potential and unique selling proposition (USP) sector (IV) you need to continuously communicate your USP.

In Sector (III) “Designing the market position”, synthetic inventing is used to consciously create a certain competitive situation. The design of the IP position can relate to a number of different goals, such as claiming positions for future developments, actively designing the value chain, or avoiding the compatibility of

external services with the own product. Here, it is necessary to identify the technical solutions whose protection through patents leads to the desired success.

The starting point for implementing the 360° IP strategy through synthetic inventions is usually a workshop with the relevant market and technology experts. To this end, one of the previously defined fields of action for the innovation project is selected first. It is advantageous if the participants in this workshop are the same who have already created the IP needs matrix of the IPFD, as these people are informed about all technical and economic project relationships. If the processing of the selected field of activity requires specific technical or business model-related knowledge, then appropriate additional experts should be consulted. In this workshop, the technical solutions are identified, which are needed and which should therefore form the subject of the patent activities. These are then subsequently transformed into inventions and furthermore into patent applications in a collaboration between IP and technology experts and under consideration of a white spot analysis including the patent landscape.

Synthetic inventing for “customized digital parking”

When applying synthetic inventing on a practical case, it has proven to be expedient to depict the examined usage scenario in a swim lane. However, this structure should not be used in its original logic, namely, to show the interaction of various actors in a process rather a modified swim lane display should be selected that is adapted to the information requirements in the specific situation. For this it is advisable not to document the process steps assigned to a specific actor in a swim lane, but to use these lanes for certain types of context information, such as environmental conditions or customer expectations. This means that the context information that is collected for each process step must be defined in advance of processing.

The use of a swim lane display is of advantage for the procedure because it makes the process of product use and the relationships between the scenario elements immediately recognizable. In addition, by determining the information to be considered, it helps to steer the discussions in the workshop and prevents essential aspects from being ignored. The figure below shows an example of a swim lane

display in which a part of the usage scenario for customized digital parking was prepared for the purpose of synthetic inventing.

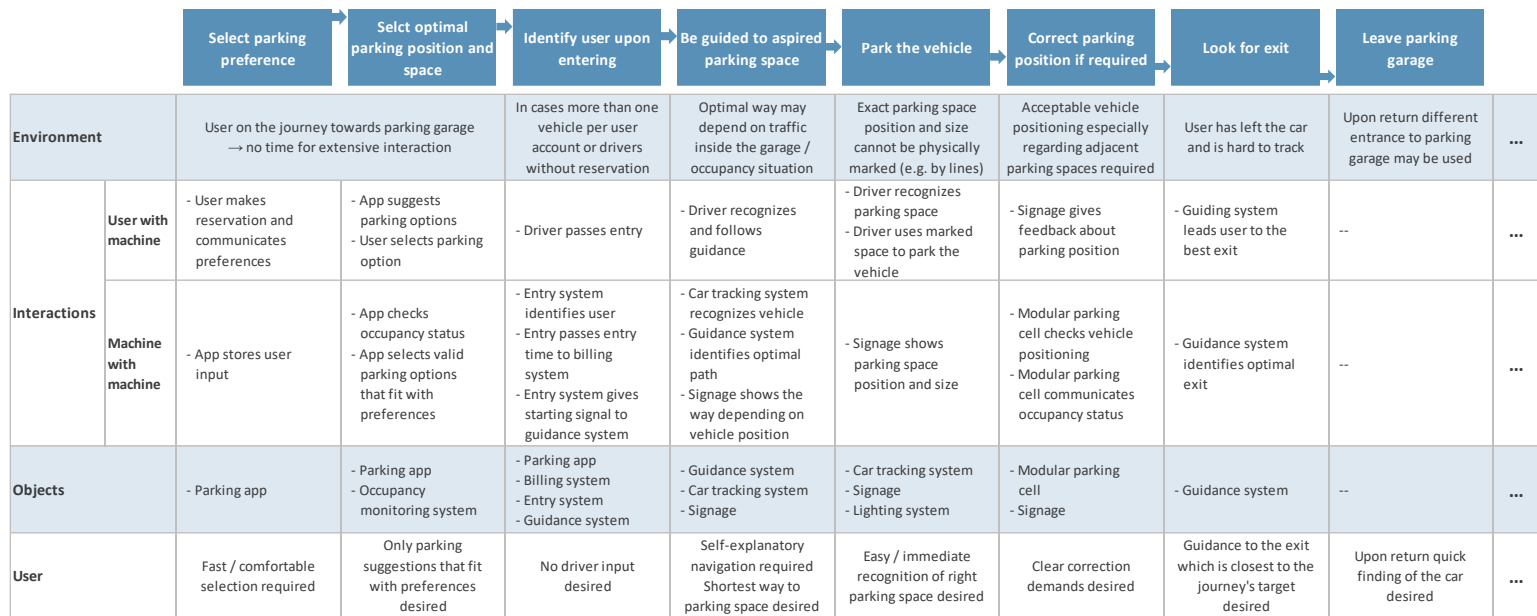


Figure 8: Application of IP design methods within a swim lane diagram for a customized parking experience.

AI-aided synthetic inventing

Artificial Intelligence (AI) has become an indispensable tool in the realm of synthetic invention, revolutionizing the way we identify new solutions to specific technical problems in a targeted way. Through advanced algorithms and machine learning techniques, AI accelerates the process of designing and optimizing synthetic inventions, leading to a fast identification of a broad range of options for innovation into technology fields, which are still unoccupied by competitors and patenting positions.

Practically, this can be done by letting an AI generate new inventive solutions based on known innovation principles, e.g. with TRIZ. TRIZ is a systematic methodology for problem-solving and innovation developed in the former Soviet Union by Genrich Altshuller and his colleagues. TRIZ is based on the idea that there are universal principles of innovation that can be applied across different fields and industries.

In the case of the smart parking use case, a possible starting prompt for an AI in AI-based systemic inventing is: *“Act as an experienced engineer and inventor familiar*

with the TRIZ principles. Apply the TRIZ principles to find new, and for an expert in the technical field non-obvious solutions to the following problem: A car with a human driver is supposed to park in a parking garage at a certain spot. This spot is not permanently marked, it can be a random spot in the parking garage. Focus on the following detail: What inventive ways are there to directly inform the driver or the car where the spot is where the car should park? Please describe the necessary system components and how they work together to solve the problem technically, such as lights integrated into the floor to inform the driver. Do not describe a solution that already appears in full in the prior art and patent literature. Describe 10 inventive solutions to the problem. For each solution, state which TRIZ principle was used in the solution.”

The answers will be different between various AIs, but here is an illustrative answer:

Solution 1: Dynamically Illuminated Parking Spots

- **TRIZ Principle:** Segmentation (Dividing an object into independent parts)
- **System Components:** LED tiles embedded in the parking garage floor, a central control system, and in-car display connected to the garage system.
- **Working:** The central system assigns a spot and illuminates the LED tiles forming an arrow pointing to the assigned spot. The in-car display confirms the spot and mirrors the arrow directions.

Solution 2: Augmented Reality Navigation

- **TRIZ Principle:** Taking Out (Removing a troublesome or harmful part of a system)
- **System Components:** Smartphone app with AR capabilities, parking garage cameras, and a cloud-based coordination system.
- **Working:** The app interfaces with the garage system, which assigns a spot. Using the garage's cameras, the app overlays a virtual path on the real-world view through the phone, guiding the driver to the spot.

...

Those new solutions have so far only applied a single TRIZ principle at a time, but also multiple principles may be used at the same time. When appending the prompt with the following line, “For each solution, use more than only one TRIZ principle and state which TRIZ principles were used in the solution.” you will receive more complex new solutions such as:

Solution 1: Gamified Parking Experience

- **TRIZ Principles:**
 - **Transformation of Properties:** Turns parking into a game.
 - **Humor:** Incorporates playful elements to make parking enjoyable.
 - **Psychological Inertia:** Leverages the human tendency to follow game rules and complete tasks.
- **Components:** In-car display with gamification elements, sensors in the garage, and a central control system.
- **Working:** Parking is presented as a game with points or rewards for accurate parking, time taken, etc.

Solution 2: Drone-Assisted Parking

- **TRIZ Principles:**
 - **Mediator:** A drone acts as an intermediary between the car and the parking spot.
 - **Copy:** The drone replicates the desired parking position for the car to follow.
 - **Pneumatics and Hydraulics:** The drone could potentially use air currents to nudge the car into the correct position.
- **Components:** Parking assistance drones, a central control system, and communication between the drone and the car.
- **Working:** A drone is assigned to a car and flies to the designated spot. The car follows the drone's movements to park accurately.

...

Based on such simple prompts a myriad of potential new and inventive solutions to a targeted problem can be created. Additionally, the AI can be directed to specific TRIZ principles, if they seem to be better suitable for the chosen use case. Finally, also additional constraints can be added such as a preference for cheap to produce solutions or solutions that use technology from a specific field, where the company has specific experience and already a good own patent portfolio or where white spots in the patent landscape were discovered. This allows a more targeted generation of the most promising solutions for the specific needs of a company instead of a generation of lists of interesting, but hard to realize solutions.

Lessons learned with uptoIP® by ABP

The use of digital tools, especially AI tools, is an extremely valuable contribution to improving the efficiency of the innovation process. This is freeing resources in the R&D and IP departments of companies causing lower development costs as well as shorter development times creating an important competitive advantages against the competition. With the use of the patentbutler.AI tool of uptoIP® companies can not only speed up the innovation process, but also improve the patent protectability of the developed solutions, which reduces IP risks, the costs of developing unprotectable solutions and helps to generate patent positions, which the company strategically wants to occupy.

The case study serves as a best practice example how AI-assisted patent analysis can help companies to protect their new digital business models, such as “customized digital parking”, based on a white spot analysis and synthetic inventing. This approach can be adopted also to other business models and showcases the importance of the use of AI-based patent intelligence as provided by uptoIP®.