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INTERACTIVE INFORMATION SYSTEMS IN THE HOSPITALITY INDUSTRY

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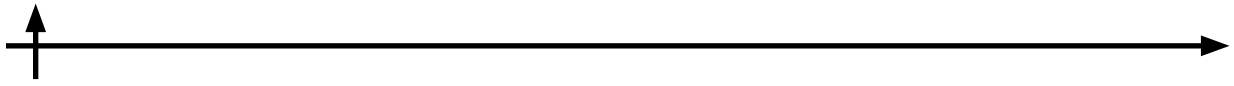Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia

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Abstract. In the changing landscape of the hospitality industry, the integration of modern consumer interaction technologies has become a must for hotels to remain competitive and meet the changing expectations and needs of guests. Thus, more and more collective accommodation facilities are implementing innovative solutions to enhance comfort, safety and personalization of service. This article is devoted to analyzing the possibilities of interactive systems in the enterprises of the hospitality industry. The study considers the main information systems of hospitality enterprises, methods and options for providing an interactive map, identifies functional requirements for project implementation in ArchiMate, and determines the socio-economic effect of implementing additional interactive information systems.

Keywords: interactive map, information technology, hospitality industry, mobile application, interaction interface

ИНТЕРАКТИВНЫЕ ИНФОРМАЦИОННЫЕ СИСТЕМЫ В ИНДУСТРИИ ГОСТЕПРИИМСТВА

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Аннотация. В условиях постоянно меняющегося ландшафта индустрии гостеприимства интеграция современных технологий взаимодействия с потребителями стала обязательным условием для отелей, чтобы оставаться конкурентоспособными и соответствовать меняющимся ожиданиям и потребностям гостей. Таким образом, все больше коллективных средств размещения внедряют инновационные решения, направленные на повышение комфорта, безопасности и персонализации обслуживания. Данная статья посвящена анализу возможностей интерактивных систем на предприятиях индустрии гостеприимства. В исследовании рассмотрены основные информационные системы гостиничных предприятий, методы и варианты предоставления интерактивной карты, выявлены функциональные требования к осуществлению проекта в ArchiMate, а также определен социально-экономический эффект внедрения дополнительных интерактивных информационных систем.

Ключевые слова: интерактивная карта, информационные технологии, индустрия гостеприимства, мобильное приложение, интерфейс взаимодействия

Introduction

In an evolving marketplace, businesses in the hospitality industry need to focus on information systems in order to remain competitive. The key technologies that are most prevalent at the moment are discussed below.

Smart rooms represent a fundamental advancement in the solutions used by hotels to meet the needs of their guests. These technologically advanced rooms use IoT (Internet of Things) to create an immersive and personalized customer experience. Equipped with built-in smart sensors and devices, these rooms allow guests to control various aspects of the environment, including lighting, air temperature and more, from a central control unit. The smart room can function with the help of a tablet tethered to the system or a voice assistant. Innovations were also reflected in the way the rooms are opened. In most hotels, traditional keys have given way to electronic cards, simplifying the process of opening a room. These cards, equipped with RFID or NFC technology, allow guests to access their rooms with a simple touch.

In addition, it is worth mentioning biometric technologies such as facial recognition and fingerprint scanning. These are being incorporated into hotel systems to open a room without the need for handy tools, which is certainly a convenient solution, so that a guest can leave the room without having to take a key or access card with them. Despite concerns about privacy and data security, hotels that implement biometric technology often prioritize transparency and
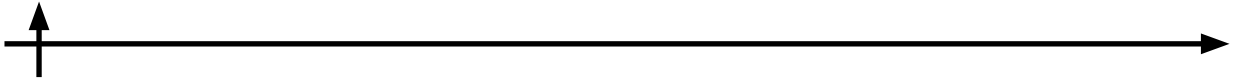
compliance to ensure guest trust and loyalty.

Interactive maps have also become an indispensable tool for guests to comfortably navigate areas of modern hotel complexes. Integrating augmented reality (AR) technology and the use of geolocation, these maps offer guests a dynamic and interactive way to explore hotel facilities, amenities and nearby attractions. Guests can use their smartphones or in-room tablets to access interactive maps that provide all the information they need in real time. This solution helps to increase self-management of vacations, which is increasingly valued by guests (Types of interactive maps, 2024).

The emergence of virtual concierge services, in turn, has completely changed the concept of providing support during a hotel stay. Chatbots, accessible via mobile apps or in-room devices, instantly respond to guest queries, provide various recommendations on request, and facilitate the booking of additional services.

Not to be overlooked are another IoT devices, such as smartwatches and wristbands, which have also found their way into the hospitality industry to enhance guest convenience. They can perform a number of functions at the same time and serve as electronic room keys, allowing guests unhindered access to rooms and other secured areas.

Some forward-thinking hotels are already implementing robotics to enhance the guest experience. Robots equipped with artificial intelligence can perform routine tasks such as delivering food to the room, assisting with quick check-in and check-out of guests, and booking services.

Having reviewed the existing methods used for consumer interaction with various systems, it is worth noting that the hospitality industry will undoubtedly master more innovative and exciting technologies as they emerge. It is important to emphasize that in order to be successful, collective accommodation facilities must remain flexible, regularly introducing new solutions that meet the preferences of modern travelers and contribute to not only a comfortable but also memorable stay for guests.
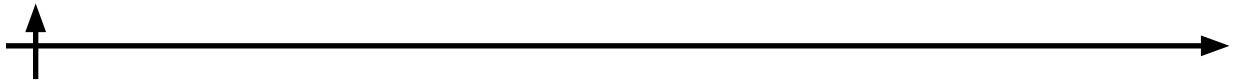
Materials and Methods

The research adopts a mixed-methods approach, blending qualitative and quantitative data to comprehensively analyze the effects of implementation of interactive information systems in hospitality industry. Central to the study is an extensive literature review, encompassing academic papers, government reports, and industry analyses, to understand the current dynamics of hospitality. Quantitative data collection focuses on key results related to the implementation of information technologies in hospitality industry

A descriptive analysis method is employed to present a clear picture of current hospitality landscape, highlighting its reliance on information technologies. The study also incorporates case studies of successful projects providing practical examples of theoretical strategies in action.

Results and Discussion

An interactive map is a digital mapping tool that allows users to actively engage and interact with geographic information in real time. Unlike static maps, interactive maps allow for dynamic exploration, customization, and integration of different data layers, providing a more immersive and personalized spatial experience. In addition to the information conveyed to users through traditional map exploration, interactive maps contain hidden data that becomes available through certain user actions, such as hovering over an object.

An interactive map can also significantly improve the efficiency of resort management by employees. Decision-making based on data obtained from the program can optimize the management of resources and operational processes in the resort complex. The key technologies and functionalities of interaction of the interactive map with other services of the hotel enterprise

aimed at guests are presented in Table 1.

Table 1. Functionality of the interactive map aimed at guests

Function	Description
Geo-spatial view	A visual representation of the hotel grounds, including buildings, room locations and outdoor spaces; Interactive zooming and panning features that allow users to explore various hotel facilities in more detail.
Points of interest (POI)	Identification and highlighting of key points of interest within the hotel, such as restaurants, lounge areas, fitness centers and meeting rooms; Clickable icons or labels that provide additional information about each point of interest.
Information on rooms	Integration with the hotel's reservation system, allowing guests to view each individual room and its location in the building, check availability, view rates and make reservations (seamless transition between the interactive map and the reservation process); Real-time updates on room availability.
Navigation and route finding	Step-by-step instructions and a standard set of several itinerary options for first familiarization with the area will help guests spend their time productively and get from one place to another with ease.
Information on events and activities	Map display of scheduled events, conferences and activities taking place at the hotel with location; Integration with event calendars and promotion of events within the hotel.
Guest-oriented offers	Integration of an AI questionnaire that provides an opportunity for guests to customize their vacation by indicating preferences for amenities and services of interest, which will subsequently be highlighted on a map and a personalized route will be generated to reach them.
Booking	Integrating service reservations directly through the interactive map, this could represent a reservation for a table in a hotel complex restaurant, spa services, tennis court and so on.
Local attractions and places of interest	Some interactive maps go beyond the hotel and show nearby attractions, restaurants, shopping centers and other points of interest, so integration with external data sources allows guests to get comprehensive information about the surrounding area.

Based on this table, it can be seen that interactive maps interacting with hospitality businesses provide a variety of functionality to improve the customer experience.

The key technologies and functionalities aimed at hospitality enterprise employees are summarized in Table 2.
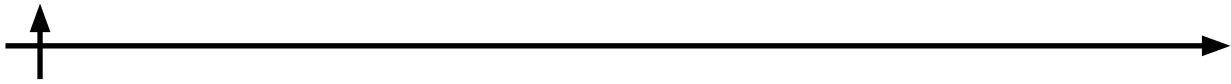
Table 2. Interactive map functionality aimed at employees

Function	Description
Operational efficiency: Staff guiding	Interactive maps help staff as well as guests to navigate the hotel territory, especially in large properties. This is especially valuable for new employees during the adaptation process.
Facility Management: Maintenance and cleaning	Interactive maps can be integrated with maintenance and cleaning systems to help staff identify areas that need attention. This contributes to faster response times and quality service
Event planning and organization: Conferences and banquet services	At hotels with event services, interactive maps can help event organizers coordinate logistics, organize exhibits, and manage conferences or banquets more visually
Resource allocation: Staff deployment	By integrating visualization of occupancy and demand in different areas of the hotel, management can optimize staff performance, ensuring that staff are allocated where they are most needed at any given time
Emergency planning: Evacuation routes	In the event of an emergency, employees can use interactive maps to access predetermined evacuation routes and emergency assembly points, ensuring a quick and organized response to critical situations
Improved communication: Interaction between departments	Interactive maps can serve as a centralized platform for interdepartmental communication, facilitating collaboration and information sharing between different departments within the hotel
Data-driven decision making: Feedback analytics	Data from guest interactions with interactive maps (namely integrated feedback on the points and services marked on the map) can be analyzed to identify areas for improvement, allowing the hospitality company to improve itself

Based on this table, it can be noted that collective accommodation facilities can derive many benefits from the implementation of interactive maps, in addition to the convenience for guests. These benefits extend to internal operations and, consequently, the efficiency of the organization's management. It is important to note that interactive maps also include the ability to integrate processes to organize work activities. In this way, hospitality businesses using electronic maps for personal purposes can optimize their internal processes, improve communication between departments and, as a result, improve overall productivity and management performance (Cooper, 2021).
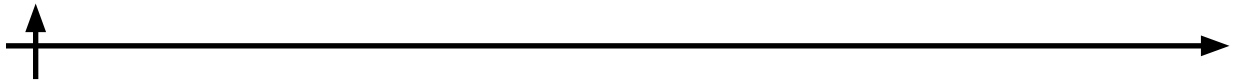
For the purpose of this study, the Park Hotel Lazurniy Bereg was selected as the case study. It is a four-star resort complex located in the suburban village of Dzhemete, in the resort area of Pionersky Avenue, in the north of Anapa.

The Lazurniy Bereg resort complex features a small number of technological solutions aimed at consumer interaction, including electronic cards for opening a room, smart watches for entering the gym and spa area, and a "smart room" system for higher room categories.

In addition, for the convenience of the guests of the resort complex they have introduced a technological solution in the form of smart bracelets, which provide access to such free areas of the hotel as a gym and spa zone, as well as work as a "payment meter" for the tennis court and air hockey, which records the time of entry and exit from the territory of the service and allows guests to comfortably spend their leisure time and pay afterwards at any convenient time.

Moreover, in the nearest future the hotel company is going to introduce the bracelet payment system also in the bar areas by the pool and the sea on the territory of the resort complex "Azure Coast", so that the guests are not forced to carry valuable things with them and can enjoy their vacation feeling that the hotel cares about the personal belongings of the clients and their safety.

These bracelets are integrated with the access and identification system using IoT (Internet of

Things) technology, which allows guests to freely use the amenities of the resort complex without having to carry additional items, which is often inconvenient. As the statistics of reviews on various booking sites show, this innovative approach is very much appreciated among guests and is often noted in customer feedback.

It should also be noted that for guests choosing higher category suites, the Azure Beach resort complex offers a unique "smart room" system, which includes not a wide but sufficient range of features, including automated control of lighting and temperature in the room, as well as audio system. This is controlled via a tablet that each top-tier room has, which is a practical solution and does not require guests to install a separate app on their smartphone.

Nevertheless, despite the sufficient number of successfully functioning technologies of interaction with the consumer in the hotel "Lazurniy Bereg", in the reviews on various booking platforms in the feedback section there is a pattern of frequent complaints about the complex infrastructure of the resort complex, the lack of signs on the territory of the hotel and the general layout of facilities.

Taking into consideration the shortcomings observed, which undoubtedly affect the overall impression of guests from their vacation at Azure Coast Hotel, it is recommended to implement an interactive map to improve the experience of guests and facilitate their orientation in the complex. Such an innovative solution contributes to providing visitors with more convenient access to information about the various places provided for recreation and leisure activities, presenting a detailed layout of the location of facilities and travel routes.
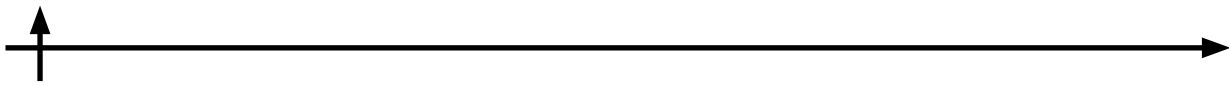
The interactive map, available in one of the options: in electronic format via a mobile application, on the hotel website or on the installed information stands in the main points of the resort complex, will allow guests to easily find the objects of interest, and not only to familiarize themselves with the services and entertainment offered, but also to book them. This approach will significantly reduce the time of searching for a place of interest, thus reducing the number of complaints about the complex infrastructure of the large territory of the Park-Hotel "Azure Coast" and increasing the overall satisfaction of guests.

The introduction of the interactive map also helps to increase the attractiveness of the resort complex for potential visitors, allowing them to plan their stay more efficiently and feel comfortable during their stay. This innovative approach to providing convenience and information to guests is in line with modern requirements for service in the hotel business and contributes to improving the reputation and competitiveness of "Lazurniy Bereg" in the market of resort services.

To ensure the smooth operation of all the above innovation solutions it is necessary to understand the positive and negative sides of each technology used in the hotel in order to identify in advance both the threats and in general the necessity of functioning of this or that system both for consumers and for the enterprise.

Table 3. Evaluation of information technologies of interaction with the consumer in the resort complex "Lazurniy Bereg"

| Advantages	Disadvantages
Implemented technologies	
Electronic card	
Ability to control access and set time limits	Dependence on power supply
Increased security	Problems with card demagnetization
An attractive element of modern guest service	Not all guests may be familiar with the use of electronic devices
Easy to make additional copies for one room	

Advantages	Disadvantages
Smart bracelet	
Can be integrated with other hotel systems	Technological disruptions
Ability to customize access depending on the individual preferences of the guest	A lost or stolen smart wristband can lead to guest billing issues
No need to carry extra things with you on vacation	The ability to track entry and exit from the property may raise privacy concerns for guests
Ability to track who entered or left the territory and at what time	
Smart room	
Allowing guests to customize their in-room environment to suit their preferences	Continuous updating of software and replacement of obsolete equipment
The use of room control technology gives the hotel a modern and innovative look	Hotel staff should be trained to maintain and solve possible problems with the use of tablets
Increases demand for upgraded rooms	Software failures that cause malfunctions in smart number management
Can be integrated with other hotel systems	
Planned technologies	
Interactive map	
Increasing the convenience for guests to find the location of facilities and services in the hotel	Requires regular updates and technical support for up-to-date information and correct operation
Improved visualization of the hotel infrastructure to guests	Difficulty in use by guests unfamiliar with technology
Ability to personalize information for each guest based on their preferences and requests	Risk of technical failures in the system
Ability to integrate with other hotel systems	

Based on this table, we can conclude that the main negative factors of using these innovative solutions are the risk of technical failures in the system and the need for their constant updating and monitoring of their work for timely troubleshooting. Also among the minuses can be seen "human factor" - not all guests may have an understanding and mastery of modern technologies, which will make it difficult for them to use the above systems. It is worth noting that these threats can be circumvented by allocating a separate position to constantly monitor the operation of these devices to prevent possible problems before they occur. Staff should also be trained on the basics of interacting with innovative devices so that they can provide further instruction to guests who need it.

Nevertheless, it is also worth noting the number of positives, which include the ability to integrate each device with other hotel systems, making their use even more convenient and justifiable for a business to utilize. Also, undoubtedly, each of the technologies gives the hotel a modern look and increases its competitiveness. It is impossible not to mention the fact that the decision to implement a smart room system increases the demand for the "luxury" category, which brings more profit to the resort complex due to a competent approach to modernization of rooms of high categories.

The introduction of an interactive map in the Lazurniy Bereg plays an important role in the endeavor to provide a comfortable and informative stay for every visitor. Thus, the right choice of how to provide maps becomes a key factor in meeting the needs and expectations of guests.

As it was established earlier, the use of interactive maps as a means of navigation and information provision for guests of the resort complex leads to increased convenience in planning leisure activities on the territory of the hotel, as well as optimization of time resources
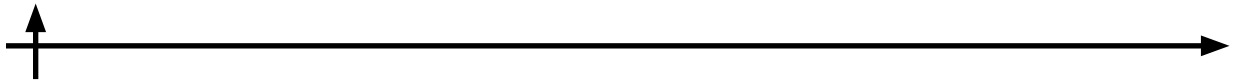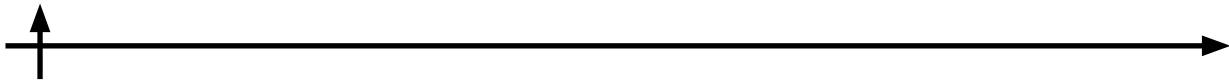
of visitors. Therefore, the main emphasis should be made on this factor when determining the methodology.

Resort hotel complexes can provide their guests with interactive maps in various ways, depending on the technological capabilities and needs of customers. Undoubtedly, at the present stage the most effective way is a mobile application. Creating a special mobile application of the resort complex, in which guests can access an interactive map, as well as book some services. The application can be available for download on smartphones and tablets.

The initial stage is the classification of requirements, which allows structuring information, prioritizing and dividing requirements into main categories, which provides a more efficient development process and also contributes to meeting the users' need in the best possible way (Voronova, 2020; Klimova, 2022).

Table 4. Requirements for a mobile application with an interactive map of a resort complex

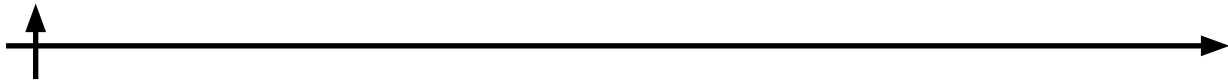| Type of requirements	Detailed requirements
Business requirements	− Increasing the attractiveness of the resort complex for potential clients − Increasing the competitiveness of the complex on the market − Improving guest service and customer satisfaction − Efficient use of company resources to maximize profits
User requirements	− Ability to view an interactive map of the resort complex with the display of objects (cottages and buildings, restaurants, swimming pools, sports grounds, etc.). − Ability to search for and create routes to specified points − Access to information about current events and activities on the territory of the complex − Ability to book services and activities through the application − Notification system about important events and offers at the resort − Personal user account to manage reservations and view booking history, as well as to create individual vacation offers − Intuitive and simple interface for easy use even by inexperienced users
System requirements	− The application must be available for installation and use on mobile devices running iOS and Android operating systems − The system should support working on different screen resolutions of devices − Optimized use of resources (memory, processor) to reduce the load on devices and extend battery life − Secure and reliable methods of storing data on the server − Backup and restore data to prevent data loss − Interaction with services (service booking system) − Integration with geolocation services to determine the user's location and display it on the map of the resort complex
Functional requirements	− User registration and authentication − Personal cabinet with the ability to view booking history, edit profile and notification settings − Display of an interactive map of the resort complex with markup of objects − Possibility to zoom in and zoom out the map − Search for objects on the map by name or category − Plotting an optimal route from the user's current location to a selected point on the map − Information about each object on the map (name, description, contact information, working hours) − Functionality of booking various services (restaurant tables, SPA procedures, sports grounds, etc.) through the application − Booking confirmation with notifications sent to the user − Notification system about important events on the territory of the complex

Non-functional requirements	— Convenience and ease of interaction with the interface, attractive and functional design — Reliability and guarantee of long-term operation without malfunctions — Optimal performance even with a large number of simultaneous users — Ability to remain productive after changes in system size and volume
Requirements of the subject area	— The application should have up-to-date and accurate map data of the resort complex — Ensured that resort data is updated and updated in real time — Accessibility for users with limited skills in using mobile applications is ensured and various instructions for use are prescribed — Ability to choose the language of the application interface for the convenience of users from different countries and regions — Provision of information in a language understandable to the target audience (Russian and English)
Product requirements	— The application should load quickly, response time to user requests should be minimized — Optimize the use of device resources to reduce power consumption and data traffic — Intuitive interface with easy access to the main functions of the application — Easy navigation through maps and resort facilities — Accessibility for users with different skill levels — Minimize the likelihood of glitches and errors when using all app features
Organizational requirements	— Compliance with all company policies related to software development and data protection — Implementing security and privacy measures in accordance with company requirements — Regular monitoring of application performance, timely updates and support
Integration requirements	— Preliminary development of test scenarios to verify the operation of the application — Provide for the possibility of integration with the reservation systems of the resort complex — Define data exchange standards and protocols for integration with existing company systems — Conduct integration testing with existing systems to verify data exchange

This structuring is an important element in the further development of the mobile application and contributes to the competent modeling of the system taking into account all the identified and considered requirements.

Let's consider the functionality of each of the services in Table 5 to study the necessity of API application in detail.

Table 5. Main functions of API services for a mobile application with an interactive map

Service	Areas of responsibility	Main fuctions
Geo-location service	Responsible for providing information about the current geographical position of the user or object based on GPS coordinates	Determination of geographical position by IP address, monitoring and tracking of object movement in real time
Mapping and geo-data service	Responsible for providing cartographic data	Map display in various modes (satellite images, topographic maps, etc.), conversion of addresses or place names to geographic coordinates and vice versa
Object search service	Responsible for providing the ability to search for various objects and locations on the interactive map	Search on the map by various criteria such as names, categories, addresses, etc., filtering search results
Routing service	Responsible for building optimal routes between given points	Determining the fastest and most optimal path between two or more points on the map, providing several route options for the user to choose from

Service	Areas of responsibility	Main fuctions
Reservation management service	Responsible for managing and coordinating the booking process for various services through the mobile app	Providing functionality for users to book various services, displaying free windows for specific dates and times, the ability to view, edit and cancel existing reservations by the user
User data analysis service	Responsible for processing and analyzing users' personal data obtained from questionnaires to provide personalized recommendations	Analyzing user responses when filling out a preference questionnaire, classifying users by specific interests, providing users with individual recommendations
User behavior analysis service	Responsible for collecting and analyzing data about user actions in the application	Determining the category of the most frequently requested objects when searching on the map in the application, generating reports and statistics on user behavior in the application
Service for sending notifications	Responsible for organizing and sending notifications to mobile app users based on various news events and other conditions related to the interactive map	Scheduling and sending notifications to inform about important events
Local geo-data storage service	Responsible for storing and managing geographic data to enable offline navigation capabilities	Caching map data on the device for access without a network connection, building routes between points on saved maps that do not require an Internet connection
Data synchronization service	Responsible for automatically updating local data from the server when an Internet connection is available	Providing the latest downloaded maps and routes for quick access when the internet is not available

Thus, based on this table we can see that each API service fulfills an important role in the aggregate representing a powerful tool for navigation and interaction with geographical information for users of the mobile application.

Realization of the project on implementation of mobile application with interactive map, as well as any innovation, requires detailed financial planning. Calculating the costs of implementing and operating an interactive map allows you to determine the effectiveness of investment, anticipate potential risks, and develop a strategy to maximize the return on investment.

Let's start with a detailed analysis of the one-time costs required to develop and implement the interactive map. This stage represents a key moment in the project realization process. The following specialists will be involved in the development of the mobile application:

1. Project Manager - responsible for planning, control and coordination of the team's work, management of resources and project timelines;

2. UI/UX designer - develops user interface design and determines how users will interact with the map;

3. Frontend developer - creates the client side of the application, where the interactive map will be displayed. 4. Backend developer - creates the client side of the application, where the interactive map will be displayed;

4. Backend developer - develops the server part of the application, which provides processing and storage of data required for the map operation;

5. Tester (QA engineer) - tests the application for errors and faults, as well as checks the correctness of the interactive map.

Thus, based on the data on the current situation in the labor market and average salaries, let's calculate the approximate salary for specialists in Table 6.
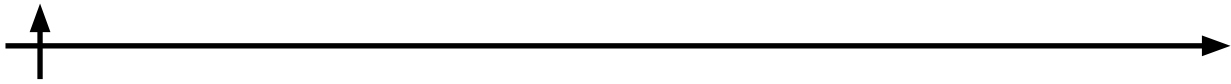
Table 6. One-time salary costs for specialists

Development of the application		
Position	Amount per month (rubles)	Amount per 7 months (rubles)
Project manager	90 000	90 000 * 7 = 630 000
UI/UX designer	80 000	80 000 * 4 = 320 000
Frontend-developer	90 000	90 000 * 6 = 540 000
Backend-developer	95 000	95 000 * 6 = 570 000
Tester (QA engineer)	60 000	60 000 * 1 = 60 000
Total	415 000	2 120 000

Based on this table, it can be noted that the total salary for all the listed specialists will amount to 2,120,000 rubles for 7 months. It is important to emphasize that each of the presented specialists will work a certain amount of time necessary to perform their main task. For example, the project manager is needed at all stages of development, the designer - only the first 4 months, frontend-developer and backend-developer all the time, except for the first month from the beginning of the project, the tester is needed only at the final stage and will perform his duties 1 final month.

Buying a server for a mobile app plays a key role in ensuring its stable and reliable operation, so it is more preferable than renting hosting. To summarize, it serves to store and manage data, so the mobile app can update, sync data across devices, and provide personalized content to users. Let's look at the data in Table 7.
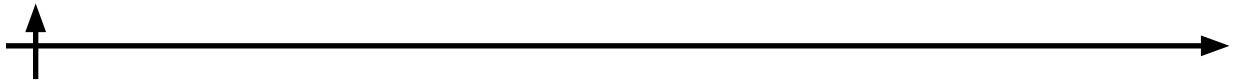
Table 7. One-time server purchase costs

Server	
Type	Amount at purchase (rubles)
Server (Datadase)	110 000
Linux (operating system license)	0
Total	110 000

Based on the data in the table, it is important to emphasize that Linux was chosen as the operating system for the server, which is a free solution. Thus, the total costs will amount to 110,000 rubles, which will be allocated solely for the purchase of server equipment.

The next one-time cost is the placement of the mobile application on a platform that allows users to download it. The data is shown in Table 8.

Table 8. One-time costs of placing the mobile application on the platform

Placement on the platform	
Platform	Amount at placement (rubles)
Play Market	2 300 (25$) singular pay at registration
App Store	9 500 ($99) at registration and every year
Total	11 800

Based on the figures in the table, the total cost of registering a mobile application on the two main platforms will be 11,800 rubles. In aggregate, the cost is quite low due to the fact that the developed mobile application will be provided to users free of charge, so the platforms will not charge an additional commission on top of the main fee. However, unlike the Play Market, placement in the App Store requires not only payment when registering the application, but also each subsequent year, which will be further reflected in the table with the current costs.

Thus, it is possible to calculate the total cost of developing an application with an interactive map:

$$2\ 120\ 000 + 110\ 000 + 11\ 800 = 2\ 241\ 800\ \text{rub.} \quad (1)$$

It is worth noting that the main share of costs is the salary of specialists, whose professionalism is critical for the development of a high-quality interactive system, so it is not recommended to save money at this stage.

Next, let's move on to the consideration of current costs required to maintain stable and uninterrupted operation of the mobile application, we will also start with the consideration of specialists.

The following specialists are needed in maintaining the functioning of the application with an interactive map:

1. Information Engineer - responsible for setting up and monitoring the infrastructure, including server provisioning (server maintenance) and application upgrades;

2. System administrator - provides information security support and protection of local networks and infrastructure, is responsible for creating database backups and preparing for possible failures, eliminates current failures;

3. Data Analyst - collects and analyzes data on the application usage by users to identify possible problems and improve its functionality.

Thus, also based on the available information on the average salary of these specialists, let us calculate their salary for the year in Table 9.

**Table 9. Current expenditures on salaries of specialists**

Application maintenance		
Position	Amount per month (rubles)	Amount per year (rubles)
Information engineer	65 000	65 000 * 12 = 780 000
System administrator	65 000	65 000 * 12 = 780 000
Data analyst	60 000	60 000 * 12 = 720 000
Total	190 000	2 280 000

Based on the data in the table, we can see that the total amount for employee salaries is 190,000 rubles per month and 2,280,000 rubles per year.

Further in Table 10 we will consider the current costs of the platforms through which users have access to download the application.

Table 10. Current costs of hosting a mobile application on a platform

Placement on the platform	
Platform	Amount per year (rubles)
Play Market	-
App Store	9 500
Total	9 500
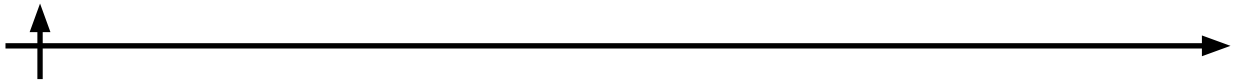
As mentioned earlier, placement in the Play Market is paid for once when registering a mobile app, while the recurring cost in the App Store is 9,500 rubles per year.

In order for the application to function, it is also worth considering the need for API services, which are required to interact with various external resources and systems. These services provide access to external databases, geolocation services, and other functional components, extending the capabilities of the application and thus enriching its functionality. Consider the data in Table 11.

Table 11. Current costs for API services licenses

API license	
Type	Amount per year (rubbles)
Yandex MapKit SDK	150 000
SmartGeo	80 000
Yandex Maps Geocoder	150 000
Nexign API Gateway	150 000
AppMetrica.Yandex	0
Ngrow	0
Gravitec REST API	0
Yandex DataSync API	0
Total	530 000

Based on this table, we can point out that exactly half of the selected API services provide their services for free, which is undoubtedly a significant advantage. Thus, the total amount for a license is 530,000 rubles per year.

To summarize, let's calculate all the current costs for one year:
$$2\ 280\ 000 + 9\ 500 + 2\ 819\ 500 \text{ rub.} \quad (2)$$
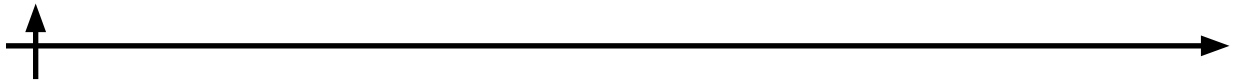
It is important to note that this amount is acceptable for the hotel enterprise "Lazurniy Bereg" and will ensure the quality functioning of the application and a high level of service for guests.

Conclusion

The key objective of each collective accommodation facility is to maintain the reputation of the organization and distinguish it in the hotel market. To achieve this result requires continuous improvement of service, as well as careful control by the management.

Social positive factors from the implementation of the interactive map are present for both top managers and customers. The area of interest of the enterprise includes such aspects as a significant increase in the competitiveness of the enterprise, as well as increasing the level of loyalty of visitors. In addition, the interactive map helps to stimulate the interest of guests to explore various facilities and amenities at the resort, which indirectly affects the increase in hotel revenue from the sale of additional services (visiting restaurants, spa services, paid sports grounds). It is also necessary to note the factor of optimization of staff workload by reducing the number of requests to the staff from guests about routes and locations on the territory of the complex.

The social factors for the consumer are increased satisfaction with the accommodation, as well as an improved overall experience of participation and involvement in the life of the resort, which guarantees a more interesting pastime. In addition, it is important to emphasize that the

implementation of an interactive map has a significant impact on reducing the level of stress and uncertainty when visiting an unfamiliar resort, as well as contributing to the reduction of time spent searching for facilities at the resort and, consequently, frustration due to problems with orientation in a large area. Not to be overlooked, this project contributes significantly to increasing the sense of a unique and personalized experience for each visitor.

To summarize, the implementation of a mobile application with an interactive map in the Lazurniy Bereg provides both social and economic justification. Undoubtedly, this project has the potential to significantly increase the competitiveness of the company in the hotel market, creating a positive image as an innovative and modern place for recreation with a high-tech level of service.

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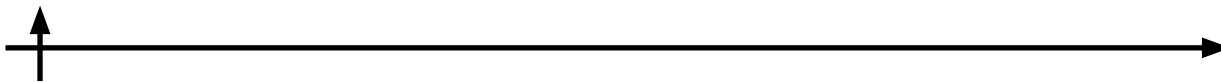
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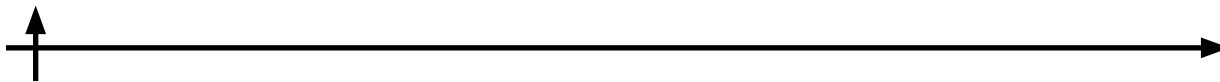
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