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Organization and Management of Transport Provided for the Guests and Participants of the Olympic Games

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Abstract: Based on the study of foreign experience of the use of computer-based navigation systems in passenger services formed the requirements for an automated planning system in passenger services as part of a subsystem of the passenger transport (SSPT) automated control system (ACS), a logistics transport center (LTC). The analysis of the structure of computer-based navigation systems in passenger services. Subsystem architecture is proposed operational planning custom transport based on the requirements worked out earlier. Conducted an experimental study in which based on the developed architecture was created software for planning tasks.

Key words: Automated control system · Process modeling and information processing systems · Methods and management tools in the field of transport · Modeling · Passenger transportation

INTRODUCTION

The basis of a general description for the organization and management of transport provided for the guests and participants of the Olympic Games is an intermodal approach, that is, the joint use of several modes of transport [1-8]. The general concept of the intermodal transport management system is focused on the fact that the spectators, staff and participants of the Games will arrive using rail, air, road and water transport and movement between the Olympic venues will be carried out by rail and road transport, as well as a cableway.

The main part of all subsequent processes of this approach is a combined Olympic Operational Transport Master Plan (OOTMP) developed on the basis of the Olympic schedule, taking into account the location of different venues, accommodations for the athletes and other elements of the Olympic infrastructure. According to the OOTMP principles, it is necessary to design and create the infrastructure for the selection and order of vehicles. Accordingly, the management system must provide the required level of the transport service quality. The intermodal transport control system can be developed on the basis of OOTMP, infrastructure and vehicle characteristics.

When conducting such a mass event, the process of conveyance and transportation of accredited persons divided into client groups to the Olympic venues is extremely important [9, 1-3].

Then there is a need for the automated subsystem to plan the transportation of accredited persons that takes into account the number of required parameters sufficient to produce the most accurate and consistent transportation plan.

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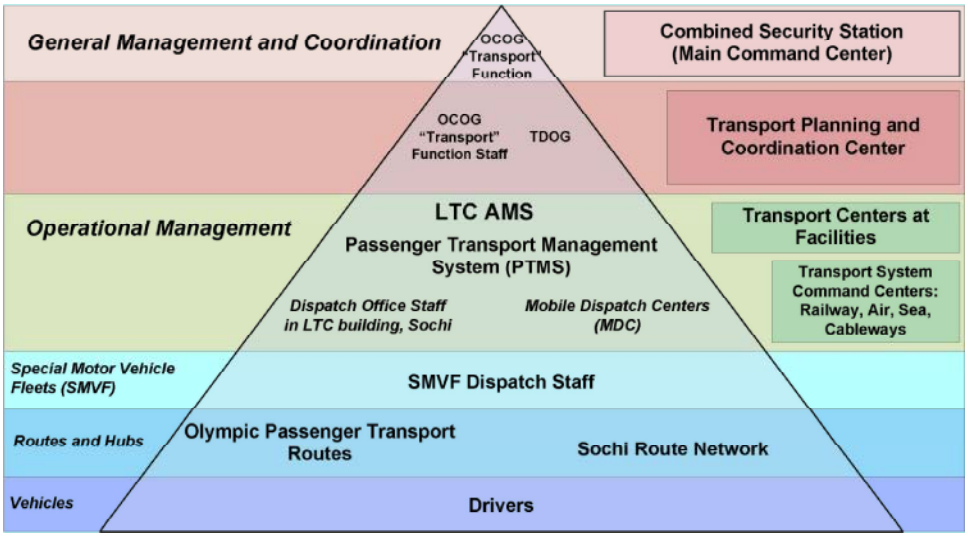

Fig. 1: Main levels of the process management of transport services for guests and participants of the Olympic Games

Process Management of Transport Services for Guests and Participants of the Olympic Games: The main levels of the process management of transport services for guests and participants of the Olympic Games are given (in the form of enlarged diagram) in Fig. 1.

The advanced Combined Security Station (Main Command Center) provides transport services for major client groups before and during the Games via the "Transport" function and coordinates transport services with external concerned parties at the strategic level as a whole.

The OCOG tasks related to the coordination of client services, implementation of transport simulation and preparation of basic transport schedules are fulfilled by the OCOG Transport Planning and Coordination Center. To fulfill these tasks, OCOG has developed its own model that provides the operational simulation of transport services during the Olympics.

The TDOG tasks are related, first of all, to the organization of management and control of the client group conveyance before and during the Olympics.

The tasks of providing transport services for the client groups at the Olympics are fulfilled by the staff of the Olympic Transport Management Center (OTMC) that includes the following main departments:

- Traffic Management Center (TMC);
- Logistics Transport Center (LTC).

Traffic Management Center (TMC) organizes and controls traffic through the use of hardware and software of the automated traffic management system (ATMS).

Traffic Management Center (TMC) is a division of the Ministry of Internal Affairs and is located in the LTC building. Main TMC tasks:

- Automated traffic stream monitoring;
- Automated detection of accidents and disturbances in the traffic stream on the city highways;
- Operational passing of passenger and special transport.

The transport services for the client groups at the Olympic venues are provided by specialists of the OCOG transport centers at the venues using special software of automated workstations connected to the PTMS database.

Developing the Subsystem Architecture for the Operational Planning of Ordered Transportations: The operational planning for ordered transportations is based on the formation of transportation tasks that are then transmitted to the driver in the form of an assignment (waybill). The input information for creating the task can be the incoming data on the arrival and departure of passengers obtained through the transport racks, WEB portal or OGMS service (Olympic Games Management System, OCOG Functional Information System) that is processed by the experts at the Transport Planning and Coordination Center (Fig. 2) [10-12].

After receiving the planning information, PTMS experts (primarily senior dispatchers responsible for providing transport services for certain client groups) form a master assignment for the transportation of arriving

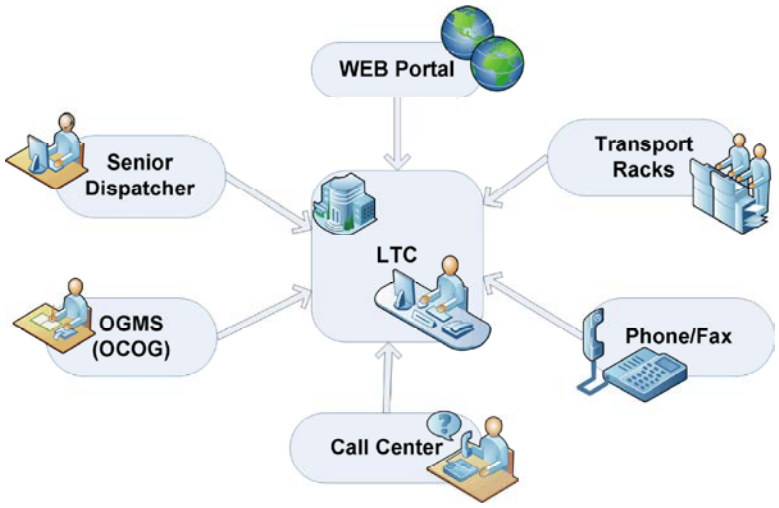

Fig. 2: Methods for receiving applications for transport services

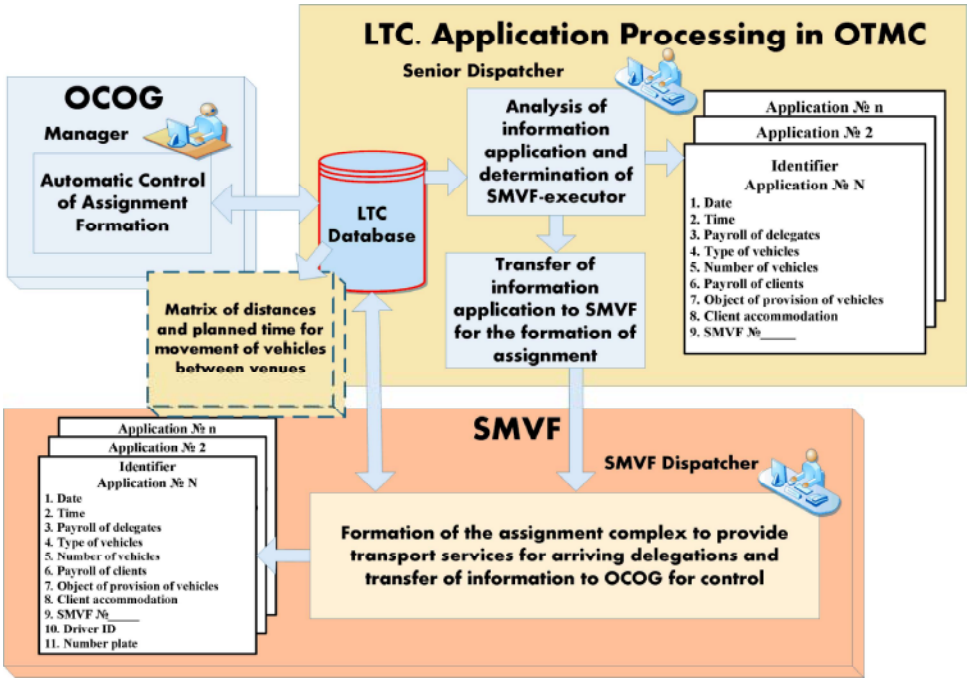

Fig. 3: Scheme for processing applications and forming assignments in LTC AMS

accredited persons. This master assignment is formed with regard to the estimates of required amount of backup vehicles (according to their types), which is provided by simulation of various situations related to transportation of arriving customer groups performed as part of the LTC AMS transport simulation subsystem. PTMS experts have planning information on specific facilities (airport, railway station, sea port) that are serviced by specific SMVF. The master assignment specifies SMVF, type and model of rolling stock in accordance with the requirements of the transport system, as well as the number of vehicles.

New operational tasks can be formed by PTMS experts according to the application of OCOG representatives - directly at the event locations using PTMS mobile terminals [13-15].

The scheme for processing applications and forming assignments in LTC AMS is given in Fig. 3.

The formed service plan is given to the drivers of SMVF vehicles as a route sheet. When the job is done, the assignment is sent to the archive. The complete life cycle of an application is given in Fig. 4.

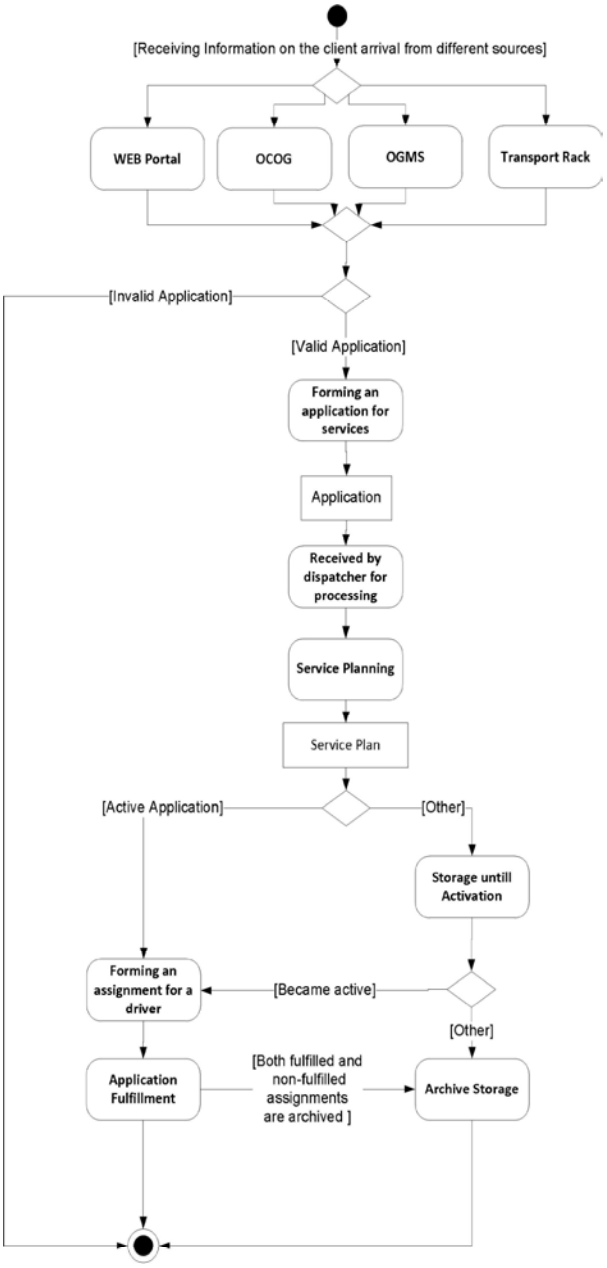

Fig. 4: Application life cycle

Analysis of the Planning Subsystem Performance in February-March, 2013: As a result of the study, all tasks were fulfilled. At the initial stage of the research, the subject area was studied in detail and its problem applications were defined; its full architecture was studied and functional peculiarities were defined. At a later stage - the theoretical study - a more detailed analysis of the subject area was conducted and the planning subsystem that is subject to further practical research was described [16-19].

The software of the passenger transport management subsystem as part of LTC AMS was successfully tested during the Test Games from February to March, 2013. The main tests were conducted on March 7, 2013 in the premises of the Autonomous Noncommercial Organization Transport Directorate of the Olympic Games (ANO TDOG) in Sochi with the use of vehicles of SUE Mosavtotrans and Burevestnik, LLC used to provide transport services during the Test Events in Sochi. The purpose of testing was to confirm the compliance of the software characteristics and functionality with the requirements chosen [21-23].

Analysis of the data on the number of applications by type of transport systems allows you to estimate how many transport operations were performed for different types of client groups. Estimated number of applications by type of transport systems is shown in Table 1 for the period from February 1 to April 1, 2013.

According to the data received, most applications are created for the service under the TA system (Fig. 5). T3 system tasks have the highest fulfillment percentage (77.82%) and T2 tasks - the lowest percentage (1.64%).

The subsystem use frequency can be estimated by analyzing the data on the formation of tasks according to SMVF for the period of time. If you divide the Test Events into nine weeks, you can assess the periods of greatest activity for the creation of applications for transportation service. Fig. 6 shows a graph of creating tasks for SMVF by weeks of the Test Events.

Table 1: Estimated number of applications by type of transport systems

Type of transport system	Share of the total number of applications	Share of fulfillment of all fulfilled applications	Share of non-fulfillment of all non-fulfilled applications
T1	0.0017	0.0009	0.0028
T2	0.0163	0.0004	0.0426
T3	0.1593	0.1991	0.0936
TA	0.3918	0.4378	0.3158
TF	0.1601	0.1333	0.2029
TM	0.0717	0.0520	0.1043
MP	0.1989	0.1763	0.2363

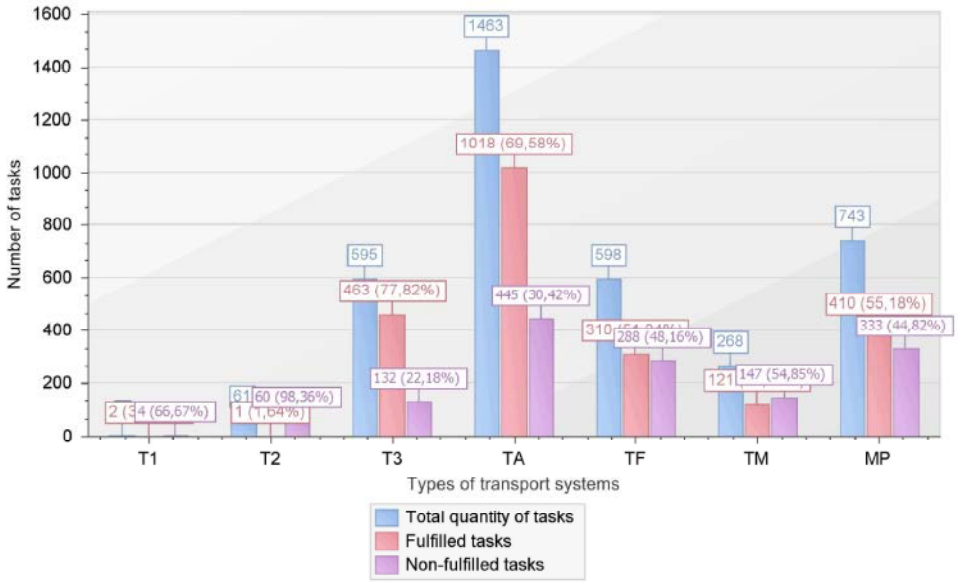

Fig. 5: Number of fulfilled and non-fulfilled tasks by types of transport systems

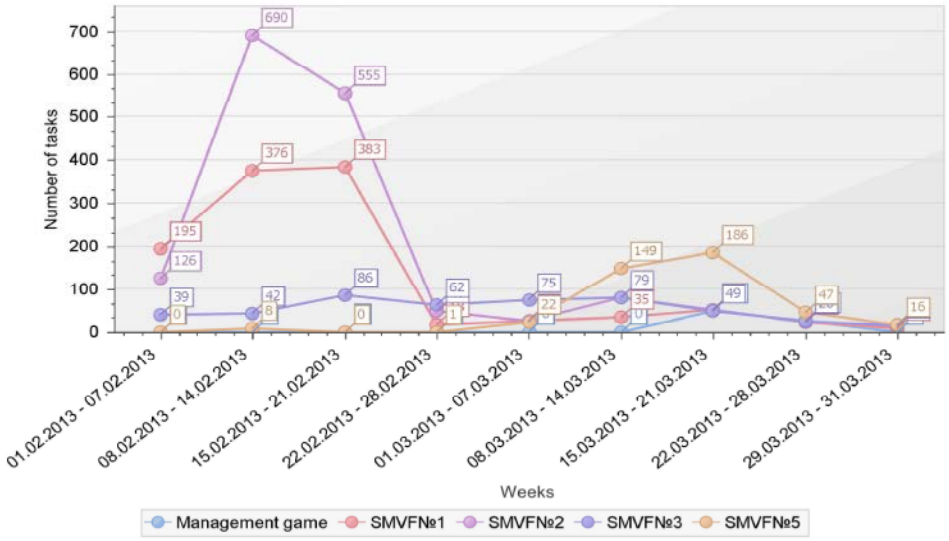

Fig. 6: Graph of forming tasks for SMVF

On the graph, you may notice a fairly strong difference in the number of applications created for different SMVF in the period from February 8 to February 14, 2013. Presumably, this is due to the training process of assignment clerks. In March, there is a relatively even distribution of the number of applications created for different SMVF. The data presented in the graph indicates the use of the task planning system to provide transport services for passengers.

On the basis of the data received and analyzed, it can be concluded that the developed planning subsystem has been successfully used to create tasks for the transportation of guests and participants of the Olympic Games. The experimental research has shown the validity of the design, development and implementation of the planning subsystem as part of LTC AMS. A set of programs designed to meet all the requirements provides the ability to make changes in the process of preparation for the Olympic Games. During the testing, some recommendations for use of the software were formed, in particular the need to specify the contact information of the volunteer (name, phone number), when forming an application for transportation services.

CONCLUSION

The approaches to the organization of the transport process when providing ordered transport services were analyzed. The basic principles of providing transport services that need to be considered when creating an automated navigation transport system were described.

The problems solved by the given subsystems were analyzed; the requirements for their architecture were formulated. Also, a detailed analysis of the planning subsystem design was performed. The task parameters and a number of restrictions and prohibitions related to its creation were specified.

The results of the experiment performed on the basis of the data obtained during the Test Games in February-March, 2013 were analyzed. The experimental results showed that the developed subsystem successfully operates as part of the Passenger Transport Management Subsystem of the Automatic Management System in the Logistics Transport Center and is used for its intended purpose: to create planned tasks for the provision of client groups with transport services.

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