



Polish Air Navigation Services Agency

REQUEST FOR INFORMATION

Traffic Complexity Tool (TCT)

for

Polish Air Navigation Services Agency

Warszawa, 22st August 2017



I. General information

1. Enquirer: Polish Air Navigation Services Agency (PANSa)
Wieżowa Street 8, 02-147 Warsaw
2. Person in charge: Hanna Kalita, Traffic Complexity Tool Project Manager,
email: hanna.kalita@pansa.pl, phone no: +48 22 574 6381
Artur Kinowski, TCT Technical Expert,
email: artur.kinowski@pansa.pl, phone no: +48 22 574 50 10
5. Aim of the enquiry: The need to plan funding due to the announcement of public contract known as: „Traffic Complexity Tool”
7. Reply date: **no later than: 30th August, 2017.**
- The answer to the query is prepared for the sole expense of the answering party.
- The following query is not a public tender procedure announcement, according to the Civil Code or the Public Procurement Law. The answer for the following question shall not constitute an offer within the meaning of the art. 66 of the Civil Code.
- Copying and distribution of this document, in whole or in part, in any form, is prohibited without the prior written consent of PANSa.
- The information contained below may be used only for their intended purpose, i.e. to prepare a response to the Request for information about the price.
- PANSa reserves the right not to respond to questions that go beyond the scope of this query.

II. The subject of the query

The area of PANSA's activity is the Flight Information Region Warszawa better known as FIR WARSZAWA. Air traffic control is provided by area control (1 ACC established to control en-route air traffic), approach control (4 units set up to control air traffic in reference to arriving and departing traffic) and airport tower control (15 TWRs).

The chapter contains the list of functional requirements for the main project stakeholders within PANSA.

II.1 Module: Flow Management Department (FMP)

The FMP together with ACC department are interested in purchasing an air traffic prediction tool with user friendly CHMI to be used by both FMP and Supervisor positions to monitor the traffic in FIR Warszawa.

The FMP / ACC module of the Traffic Complexity Tool is planned to replace the currently used CHMI by delivering the full CHMI functionality expanded with many new options. The system will be used for all the ATFCM phases: strategic, pre-tactical, tactical and postoperative. During the tactical phase, this tool is intended to assist in the dynamic sector and capacity management. In the strategic and pre-tactical phase the system will allow to precisely plan the day of operation and prepare for special events. In the postoperative phase, the tool will be used for all analyzes and reports.

Number of Component	Description	Category
FMP01	The system shall work 24/7	Required
FMP02	The system must have a built-in "What-if"	Required
FMP03	The system must have a built-in "Configuration Optimizer"	Required
FMP04	The system shall retrieve data from various sources: ETFMS, ASTERIX Cat62, CPR messages, OLDI (copies of ABI and ACT messages) and ADS-B receivers	Required
FMP05	The system shall download weather data from the METEO system	Required
FMP06	The system shall keep the data in the archive for at least 5 years	Required
FMP07	The system shall show current and planned traffic and its complexity for 24 hours forward (FTS tool)	Required



FMP08	The system shall present data (listed in FMP07) in the form of bars, charts, tables, 3D and 4D imagery	Required
FMP09	The system must be able to download and send data using the NM B2B network (entering the current configuration, putting the regulation, SI, sending READY messages, Slot Extension, etc.)	Required
FMP10	The system must have an ENVIRONMENT database containing EPWW FIR structure data (Capacity, Occupancy, TV, sector configurations, opening scheme, runway and taxiway operating parameters at controlled airports, taxi time, RWY in use, etc. with exact textual descriptions	Required
FMP11	The system must be able to recalculate incoming traffic after putting ATFCM measures (regulation, STAM, FL scenario, RR or AR scenario) with the "What-if" tool	Required
FMP12	The system must be able to set parameters for putting ATFCM measures in the "What-if" tool (e.g. duration, window width, etc.)	Required
FMP13	The system shall show what changes will result in the application of the putting ATFCM measures with the "What-if" tool	Required
FMP14	The system must be able to use the NM algorithm or introduce its own with ATFCM measures calculation in the "What-If" tool.	Required
FMP15	The system shall (the "What-if" tool) propose a set of three most advantageous solutions in the situation of planned traffic congestion	Required
FMP16	The system must be able to edit the parameters and edge conditions of the "Configuration Optimizer" tool.	Required
FMP17	System shall (the "Configuration Optimizer" tool) generate a report / graph showing workload (Workload)	Required
FMP18	The system shall (the "Configuration Optimizer" tool) indicate the optimal configuration, and in the absence of a controller it will propose a solution that will solve the problem by generating as little delay as possible	Required
FMP19	The system shall automatically calculate the optimal configuration ("Configuration Optimizer") every 10 minutes	Required
FMP20	The system shall generate a configuration change alert if the automatic calculation generates another configuration ("Configuration Optimizer")	Required
FMP21	The system must have a built-in FMP monitor indicating the periods in which the normative values exceed the sector / TV norms, according to user settings	Required
FMP22	The system must have a built-in PREDICT tool that generates an pre-tactical report containing information on the planned optimal sectorization for the next day, the possible need for ATFCM measures, and the amount of traffic forecasted for the next 6 days at specific intervals	Required



FMP23	The system must be able to generate daily, pre-tactical, postoperative, regulatory analysis, saturation of sectors for which data will be defined in the system settings and editable (output in MS Excel or MS Word format)	Required
FMP24	The system must be able to create a template for any report	Required
FMP25	The system must be able to run any tool from any active window	Required
FMP26	The system must be able to personalize the appearance and settings of individual tools under the individual user	Required
FMP27	The system must be able to create and save up to 100 layouts (workspaces)	Required
FMP28	The system shall inform you that the maximum number of saved layouts (workspaces) has been exceeded	Required
FMP29	The system shall provide internal interactivity - the ability to switch from any window to collaborating tools (e.g. through the pop-up menu)	Required
FMP30	The system shall allow to manually insert, edit or import the ETFMS or xls data file with the structure of EPWW FIR (Environment). Especially about borders and capacities of each sector/TV ACC and TMA (Capacity, Occupancy, SID, STAR) and data about controlled airports (RWY in use, Capacity, Taxi Time, opening hours).	Required
FMP31	The system shall allow to manually insert, edit or import the ETFMS or xls data file with the planned traffic load in EPWW FIR. Output data will be presented in bars/charts/tables (Traffic Counts and Flight Lists).	Required
FMP32	The system shall allow to manually insert, edit or import the ETFMS or xls data file with traffic flows, defined by user (Flow Counts): a. Associated flows b. Linked flows	Required
FMP33	The system shall allow to manually insert, edit or import the ETFMS or xls data file of Flight List about different parameters (filter of time, flight level, a/c type, AO etc.)	Required
FMP34	The system shall allow to manually insert, edit or import the ETFMS or xls file of necessary parameters to perform the calculation of Traffic Complexity and ATCOs Workload within the implemented algorithm for calculating these indicators.	Required
FMP35	The system shall allow the edition of parameters to activate the capacity overload alert (definition of complexity ratio, bounding value etc.).	Required
FMP36	The system shall edit work parameters of each tool: • Configuration Optimizer – assignment of bounding value, blocking of configurations in use, setting priorities roster vs demand etc. • What-if – assignment of bounding value	Required



FMP37	The system shall allow to make screenshots, saving the graphic data, store data on the drives or in a virtual „cloud”	Required
FMP38	The system shall allow edition of general system settings – size of font, size of windows, color settings	Required
FMP39	The system shall allow to use and save personal settings for each individual user.	Required
FMP40	The system shall be able to produce charts / tables showing number of aircraft within planned and chosen TV. Charts can show results by type: a. Entry Hour / 20 min b. Entry Hour / 10 min c. Entry Hour d. Entry 20 min e. Occupancy (duration from 1 min up to 20 min) f. Lines Occupancy Sustained/Peak g. Differentiation with different colors of a/c (tactically activated, with FSA expected, from CDM airports, without FSA, FLS etc.) h. Access to additional information is available from each graph, i.e.: flights list, regulation description and flight list of a/c within this regulation, data about specific flights etc. i. Running the „What-if” or „Configuration Optimizer” is available from each graph	Required
FMP41	The system shall be able to produce charts / tables showing the share of the defined traffic flows in the selected TV. a. Associated and Linked flows b. Differentiation of the contribution of traffic flows c. Possibility of displaying one or more traffic flows within the TV d. Possibility of access to additional information and tools from each graph	Required
FMP42	The system shall be able to show line or bar charts of Workload / Complexity a. Possibility of edition parameters and boundary values b. Preference with color of time period, when Workload / Complexity parameter exceeds the user-defined values	Required
FMP43	The system shall be able to show flight list including a/c planned into or within airspace of chosen TV in selected time period: a. Possibility of selection display data b. Sort by any value	Required



	c. Preference individual a/c according to user parameters, i.e. Intruders, a/c within regulation, or OOA (Out Of Area) traffic.	
FMP44	b) The system shall be able to show flight lists from controlled airports with possibility of choosing each controlled airport directly from the open window.	Required
FMP45	The system shall be able to show flight data for selected a/c, including flight plan information, regulations etc.	Required
FMP46	The system shall be able to show operational log for selected a/c	Required
FMP47	c) The system shall be able to produce the Monitor FMP view showing the timeline parameters of movement situation of selected sectors: a. Belt along the time line for each of the selected TVs separately showing the traffic load in Capacity or Occupancy parameter b. Preference the period of time when Capacity or Occupancy parameters are exceeded c. Timeline bar showing the timing of the adjustment application and the delay information d. Preference with different colors of delays (up to 15 min, 15-30 min, 30-45 min, over 45 min) e. From the Monitor level you can run Configuration Optimizer, What-if or Flight Data	Required
FMP48	The system shall alert the user by the automatically opened window when a/c „Intruder” is detected by the system. Possibility of acceptance/refusal/modification of flight plan of selected a/c from the alert window level	Required
FMP49	The system shall alert the user by the automatically opened window when the optimal configuration has changed by Configuration Optimizer tool.	Required
FMP50	The system shall show the 4D movement situation: a. Possibility of change of scale b. Possibility of selected one more a/c to present on map c. Possibility of indication of difference in initial/actual trajectory d. Possibility of showing flight plan points e. Possibility of selection one or more sectors f. Possibility of using filters of time, flight level, a/c type, departure/destination airports, flight plan points etc. g. Automatic refresh every 30 sec.	Required

II.2 Module: Area Control Department (ACC)

ACC is looking for a tool that can provide fast time simulation (FTS) which can be used to airspace improvements on strategic level.

Number of Component	Description	Category
ACC01	The system shall be a stand-alone application that allows to combine it with other modules (TWR, TMA and En-route)	Required
ACC02	The system shall create the possibility to build the realistic, detailed models of EPWW FIR airspace.	Required

II.3 Module: Approach Control Department (APP)

Warsaw Approach Department is interested in acquiring a simulation tool to identify and test the possible modifications of the TMA airspace in terms of: airspace structure and procedures as well as workload of air traffic controllers.

Number of Component	Description	Category
APP01	System shall be able to perform simulations and to adapt the airspace structure elements to the current needs (sectors shape to be dynamically defined) as well as simulating SID and STAR procedures including altitude and speed restrictions and holding procedures to determine the impact of sector entry points changes, radar vectoring for final approach, a/c transfer rules and other elements on the air traffic flow and the actual sectors capacity.	Required
APP02	The system shall be able to simulate the impact of intersecting runways on sectors capacity as well as sequencing of departures and arrivals. The system shall simulate a/c movements in the vicinity of the airport (TMA) to determine the necessary intervals between departing and approaching a/c (conflicts in configurations: one departing after another; approaching vs. departing, one approach after another).	Required
APP03	The system shall evaluate ATCOs workload taking into account RTF, system handling, traffic monitoring, radar vectoring to avoid conflicts, adverse weather conditions (e.g. low visibility conditions, CB clouds, strong winds in APP sectors) to determine the complexity parameter for APP Warsaw.	Required

APP04	The system shall simulate non-standard situations such as aerodrome circle flights, operations on the other runway than in use, a/c after missed approach procedure, and sequencing to the next approach.	Required
APP05	The system shall simulate the effect of different distances between approaching a/c on final on traffic flow and sector capacity.	Required
APP06	The system shall assess the impact of environmental related delays (noise, emissions, etc.) on air traffic flow.	Required

II.4 Module: Tower Control Services (TWR)

Warsaw Tower Control Services Unit is looking for an IT solution that can provide either fast time simulation which can be used to look solely at airport infrastructure improvements, either run modelling of schedule as well to show indicative delay across an operational season. The idea is to verify possibility of planned schedules execution, look at infrastructure changes and their impacts/improvements as well as to devise daily operational plans. In-build module containing weather information that creates predicted traffic outputs with high degree of accuracy would be highly appreciated.

Number of Component	Description	Category
TWR01	The system shall be a stand-alone application that allows to combine it with other modules (TMA and En-route) and providing complete terminal-to-terminal simulation capability,	Required
TWR02	The system shall create the possibility to build the realistic, detailed models of airports ground layout including all ground airport structures including runway entries/exits/crossings/stop bars, taxiway segments, gates, remote parking positions, long term parking positions, aprons, hangars, de-icing pads as well as associated usage restrictions,	Required
TWR03	The system shall be able to perform rule-based parking position allocation and management (arrival, departure, long-term, turnaround, stand-off),	Required
TWR04	The system shall have the capability to model airside movements with rule based logic to control push back flow based on runway departure sequence or CTOT	Required
TWR05	The system shall be able to create the customizable strategies to achieve TTOT: at gate or taxi to wait at waiting area	Required
TWR06	The system shall have the capability to model movements of the ground vehicles like: tugs, maintenance and airport authorities cars (the vehicle and aircraft movements have to be done in the same model), to evaluate different usage strategies (e.g. push/pull, close to or far from the runway lining, enabling	Required



	late engine start), and to compare them, considering, among other things: fuel consumption, emissions, delays	
TWR07	The system shall import DXF or DWG file (import and display of airport layouts)	Required
TWR08	The system shall include the rule-based engine allowing the end-user easily define all typical airport controller tasks, such as: runway entry/exit selection and usage, runway crossing procedures, runway lining-up procedure, allocation of gates/parking positions/stand-off positions/hangars, flight plan connections and turnaround management, towing operations, de-icing procedures (at gate or at dedicated stations), re-routing, stop-and-wait, runway departure/arrival separations	Required
TWR09	The system shall include the flow management features to support the modelling of random gate delay, (DMAN/AMAN), push back or take off target time	Required
TWR10	The system shall be able to model an optimized take-off sequence in order to achieve a maximum queue size at the runway or at the runway entry/entries or to bring the taxiing traffic to the runway entry/entries following a pre-computed optimized departure sequence	Required
TWR11	The system shall be able to perform the reporting of ATCO workload that can be simulated dynamically, and can be customized for all types of airport controllers (apron, taxi, runway). The workload model should associate work duration to any event (e.g. start-up/push back/taxi/runway crossing/lining-up/start take off clearances, allocation of parking position locations/stand-off locations/runway entry/de-icing station, re-routing, stop-and-wait). It should take also into account the monitoring of flight activities of all types (taxiing, stopped at crossing/stand-off, waiting for clearance etc.)	Required
TWR12	The system shall be able to show the work duration associated to event handling that can be split into generic user defined activities (radio com, monitoring, conflict resolution etc.), and the duration spent per event type and per activity can then be logged per rolling hour	Required
TWR13	The system shall generate the customizable event log created by the user should be ready to export to Excel files or an SQL database. Events should be related to any action taken by a controller or an aircraft (start take off roll, lift off, runway touch down, runway exit, runway crossing reach, arrival at gate, start push back, start engine, start taxiing/runway crossing/lining-up etc.). Each event must be logged, together with information related to the current status of the aircraft (aircraft type, airline, landing/departing runway, speed/attitude,	Required

	departure/arriving/long term allocated parking position, aircraft/airport delays)	
TWR14	The system shall be able to measure ground delays accurately per aircraft and be logged at different records. Those ground delays include gate delays, taxi delays (dep/arr/total), departure runway delays, runway crossing delays (dep/arr/total). Delay calculation should takes realistic aircraft acceleration and deceleration into account, as well as a user defined (and optionally random) ground speed which can depend on the aircraft phase and/or the aircraft location in the airport	Required
TWR15	The system shall be able to accurately model ground fuel burn and emissions of aircraft engines and APU for all phases of the aircraft (waiting for push back, pushing back, starting up and warming up engine, taxiing, stopped etc.). Statistics should be reported at the level of an airport, a runway or group of runways, or portion(s) of taxiways	Required
TWR16	The system shall be able to generate plot that includes throughput (gate, runway), controllers workload, as well as average/total delays compared with arrival en-route/AMAN delays and TMA sequencing/holding delays	Required

III. TCT Deployment

On the base of the modules specifications stated in II.1, II.2, II.3 and II.4 PANSA plans to deploy the TCT in following steps:

Number of step	Description
ST01	Purchase software (and hardware).
ST02	Make a model of the entire FIR Warszawa (including aerodrome, approach and area control infrastructure) aimed to get the functionalities defined in TWR, APP and ACC specifications of modules.
ST03	Build the FMP module based on the FIR Warszawa airspace model.
ST04	Launch the FMP module fed by data from ETFMS (data same as CHMI).
ST05	Launch the FMP module powered by data from ETFMS and additionally dynamic data coming from: - ASTERIX cat62,



	- CPR messages, - OLDI messages, - MET sensors and databases, - ADS-B sensors, and other available data.
ST06	Build and run the Configuration Optimizer.

Comment

By Configuration Optimizer PANSA means tool based on a built-in algorithm (NM or user-defined parameter and boundary value definitions), including the predicted traffic load and traffic complexity, the number of available staff in each time interval, and the predicted weather phenomena will generate a report / ATCOs Workload graph.

On the same basis, it will indicate the optimal configuration, and in the absence of a controller staff it will propose regulation (type, sector/TV, a/c), which will solve the problem by generating as few delays as possible.

The optimal configuration calculation will take place automatically every 10 minutes.

If the system will propose a configuration other than last "refresh", a configuration change alert will appear.

IV. Hardware

Our intention is to buy all required components, software (including database) and hardware, to build the simulation platform to leverage the purchased system.

If you sell the system with hardware including both server and workstations, please attach appropriate hardware configuration specification with quantity and price list.

If you do not provide hardware please attach minimum hardware requirements to run software you offer taking into account appropriate number of attached workstations. Please do as follows:

Component	Parameter	Recommended value/name
Server	CPU	
	RAM	
	Minimum database/HD data space	



	Number of attached workstations	
	Operating system	
	(others considered important)	
Workstation	CPU	
	RAM	
	Graphics/Video Card(s)	
	Minimum database/HD data space (for thick client)	
	Internet Web browser (for thin client)	
	Size of monitor screen	
	(others considered important)	

V. Response

V.1 Requirements you can deliver

The response to this RFI shall provide the data for the modules mentioned in the Chapter I.

Please provide responses in a form of table.

Number of Module/Component	(Yours) Software Module/Component	References to Functional Requirements the Module Covers	Quantity of Module Licence	Price for Licence	Total

Sample filling table

Number of Module/Component	(Yours) Software Module/Component	References to Functional Requirements the Module Covers	Quantity of Module Licence	Price for Licence	Total
1	En-route	FMP01, FMP02, FMP04, ...	2	1000	2000
2	TWR	TWR01, TWR02, FMP01, ...	1	1000	1000



V.2 Requirements you can not deliver

On the base of the modules specifications stated in II.1, II.2, II.3 and II.4 please enumerate the requirements you can not deliver for now. We will be grateful to know if and when you plan to add these functionality to your product.

V.3 Maintenance

Service type	Service name	Annual Fee

V.4 Training / Consultancy

Number of Module	Training/Consultancy Type	Quantity (needed)	Unit Price	Total

V.5 Delivery

Number of Step	Number of Days After Agreement Inked to delivery
ST01	
ST02	
ST03	
ST04	
ST05	
ST06	

Note

If you consider to add some additional steps please complete the table.