



Water Contingency Management in the Sava River Basin

**Cluster 2 – Pilot table-top exercises
simulating the incident and the
response of transboundary flood event**

Output T3.2

(3/5)

*(Report from Exercises simulating the incident and the response of
transboundary flood event in the Sava, Una, and Vrbas areas)*

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Version	1.0
Date	30.9.2022.

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1. Introduction

On 19 May 2022, the WACOM project reached one of the key project milestones – the execution of the third table-top exercise (TTX), which was carried out in Slavonski Brod, Croatia. This document represents the summary of the main objectives, outcomes and organisational activities of the TTX. It also describes how the exercise was performed and points out the lessons learned from it.

1.1 Table-top exercise objectives

The general objectives of the TTX are aimed on verification, utilisation and confirmation of existing protocols and procedures of response to emergency situation. Additional objective is related to the use and evaluation of the new WACOM tools used in the emergency situations. More specifically (as it was already explained in the preparatory elaborate of the TTX (*D.T3.3.2 - Report on the requirements and planning of table-top exercise*)), the objectives of the Table-top exercise are the following:

- To introduce the methodology of the TTX execution in the form of the explanatory – coordinated type of the table-top exercise,
- To introduce the “imaginary” scenario of flooding,
- To involve all active participants to cooperate and jointly develop the strategy of the response to the accident,
- To familiarize the participants with the new WACOM tool set and to utilize them during the execution of the TTX,
- To assess the usability of the new WACOM tools.

The project partners have identified and capitalized on the importance of the exercise execution for the active groups participating in realistic events of floods, or other types of the any other type of hazardous events. The execution of such TTX proved that keeping response institutions, forces, or even administration employees, aware of emergency situations and enabling them get to know each other and share their on-field experiences or response plans helps build a strong response body with a high-level of awareness of the emergency situation response plans.

2 Execution of the Table-top exercise in Slavonski Brod: Floods in the areas of the Una, Vrbas and Sava rivers (HR/BA)

The TTX was carried out on 19 May 2022 in Slavonski Brod, Croatia, in the Brod-Posavina County Hall. The hall could accommodate up to a hundred participants; however, due to the necessary arrangement of the participants' work in the headquarters and their individual use of personal computers, maps and accompanying materials, the capacity of the hall was halved, which was the reason why some could not be accepted as exercise participants. The passive participants, i.e. observers were placed at the back of the hall.



Figure 1: The participants of the TTX

For those participants who could not participate at the TTX venue, an on-line link (ZOOM) was established. It was not foreseen that the on-line participants cooperate in the active face-to-face communication; however, they could leave the comments, ideas, etc. in the chat area of the on-line platform.

The TTX was chaired and lead by the Mr. Primož Banovec, a representative of the lead partner of the WACOM project - University of Ljubljana. He presented the scope of the TTX, WACOM tools, as well as narrated the accidental pollution scenario and encouraged the intercommunication among all participants of the TTX.

Additional support on the presentation and utilization of the WACOM tools was provided by other members of the partner UL, the developer of the WACOM tools.



Figure 2: The Narrator, Primož Banovec (UL), conducting the TTX

2.1 Participants of the Table-top exercise

The TTX was attended by 40 participants in total - 20 from the project partners and 20 from external institutions representing the target groups.

As shown in the table below, several headquarters were involved in the active participation in the TTX. At the municipality level, the headquarters were joined by several institutions that formed the multiagency headquarters, while some institutions formed the single-agency headquarters.

Table 1: Active Headquarters (Active participating headquarters at the venue)

Headquarters	Other companies or institutions in the Headquarter
Croatia	
Croatian Waters	International Sava River Basin Commission (Sava Commission, ISRBC)
Ministry of the Sea, Transport, and Infrastructure	Centre for Security Cooperation RACVIAC
Port Authority Slavonski Brod	JANAF
Port Master Office Slavonski Brod	HESS-Hydropower plants of Lower Sava River (SI)
State Inspectorate	University of Ljubljana (SI)
Mountain Rescue Service (HGSS)	
Civil protection Administration, Vukovar	
Civil protection Administration, Slavonski Brod	
Civil protection Administration, Osijek	
Unit for Civil Protection Planning and Measures	
Bosnia and Herzegovina	
Civil Protection Administration of the Republika Srpska (RUCZ)	AZUR- Association for Risk Management
Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina	
Ministry of Security of Bosnia and Herzegovina	
Civil Protection Administration of Brod	
Municipality of Šamac	
Oil Refinery Brod	
Sava Watershed Agency Sarajevo	
Public Company "Vodovod i Kanalizacija", Tuzla	

2.2 Introduction to the Table-top exercise

The introduction of the TTX began with a short presentation of the WACOM project, its main objectives and developments. Mr. Primož Banovec introduced the purpose of the TTX in relation to the WACOM project.

Following the introduction, the active participants who played important roles in the TTX accidental pollution scenario introduced themselves and briefly explained their activities and roles in the emergency situation. They were gathered in an improvised headquarters that operated as a single unit in the further TTX activities (reporting, measures, etc.).

The narrator proceeded with the initial information about the TTX and introduced the provisional methodology of TTX execution to all participants. He explained the role of participants, their tasks during TTX, and tools they will be using during the TTX, WACOM tools.

The TTX had a cross-border nature and applied the flood scenario on the Sava, Una, and Vrbas Rivers on the territories of Croatia and Bosnia and Herzegovina. As part of this exercise, a simulation of the decision-making process for large floods on the rivers Una, Vrbas and Sava was carried out.

2.3 Introduction to the WACOM tools

During the TTX, the tools developed and prepared for the use among stakeholders, were presented and demonstrated. These include:

- The tool for improving the coordination of the activated headquarters
- The tool for improving the situational awareness about the accidental event, and
- The tool for improving the modelling of the accidental pollution propagation (optional).

Table-top exercise participants gathered in headquarter groups utilised those tools via mobile phones and laptops.

3 Execution of the Table-top exercise

The TTX execution can be divided in several activities: simulations/predictions; discussions; use of existing tools (e.g. WACOM tools, AEWS, etc.). In this part, the dynamic of TTX will be briefly presented.

Simulation of flood event

Mr. Banovec started with the analysis of the meteorological situation 48 hours before the event based on the warning provided by the Croatian Meteorological and Hydrological Service (DHMZ) (announcement of a red weather alert). The headquarters defined the following steps in the procedure:

- RHMZ RS (Republic Hydrometeorological Institute of the Republika Srpska) and DHMZ gives the first forecast and 48 hours before issue a warning (announcement of a red weather alert), forecasting a large amount of precipitation during the next 24 hours in the area of the Una river basin and the lower Sava river basin.
- RUCZ receives a warning from RHMZ RS about the announcement of heavy rainfall in the next 48 hours and declares a red weather alert - a sudden rise in water levels is predicted. RUCZ warns the civil protection units in the region that the water flows of the main tributaries of the Sana, Una and Vrbas Rivers are expected to increase. They publish a written warning on their website and monitor the situation on the ground.
- The Agency for the Water Area of the Sava River of Bosnia and Herzegovina, after receiving a warning about possible floods, informs all civil protection centers in the Una and Vrbas basins about a possible scenario, with a call to be on alert.
- After receiving a warning from DHMZ, the Directorate of Civil Protection - the Operational Center of Civil Protection (OPCZ) informs all County Centers (ŽC) about the areas where heavy rainfall is expected. The Regional Office of Civil Protection informs, via ŽC 112, the JLP(R)S (*jedinice lokalne i područne (regionalne) samouprave* / local municipality and county administration) and the heads of the CP headquarters about the meteorological situation announcement, who then place their operational forces on alert. The Directorate of Civil Protection and the Regional Office of Civil Protection each establish communication with Croatian Waters at their own level.
- The Port Authority Slavonski Brod monitors the water levels (information from Croatian Waters).
- The Civil Protection Service Šamac informs all commissioners and all services to take all preparedness measures for rescue and possible evacuation of the population.

- The Public Safety Brčko District informs the mayor about the current situation. All services are put on standby and all local communities are informed about the possible scenario.
- The Port Authority of Slavonski Brod, after receiving the decision on flood protection measures by Croatian Waters, issues a statement to the shipping industry.
- The Public Utility Company Tuzla, who in such situations works on the preparations within their company, carries out the measures of drainage and sewage water spills.
- In the event of floods, the Ministry of Security of Bosnia and Herzegovina forwards the information to the entities and the Brčko District, as well as the Ministry of Defence of Bosnia and Herzegovina. They perform activities related to the action plans of the protection and rescue services, publish a written notice for the public and citizens on their websites, and inform other relevant ministries to perform appropriate activities within their scope of work and responsibilities.
- The Civil Protection Bosanski Brod informs the commissioners and the public about the situation. They pointed out that the prediction of floods within 48 hours is too short a period and that the conditions for floods cannot be created in that period, which was refuted by a representative of the BiH Ministry of Security who cited the example of recent floods in Sarajevo.
- Croatian Waters emphasized the importance of the cooperation with DHMZ and the 112 center. The Flood Defence Center keeps records of data in cooperation with DHMZ. In a case of announced increased rainfall and possible increased water levels, looking back 48 hours, the Flood Defence Center regularly reports to its Regional Center in Slavonski Brod based on the latest water level readings. In the aforementioned case and with the notification received, the Regional Center determines the state of their available resources and, if necessary, requests a supplementation from the administration. The Regional Center is in constant contact with the Regional Center of Civil Protection of the Republic of Croatia.
- Croatian Waters noted that in the case of confirmed elevated water levels (of the rivers Sava, Una and Vrbas), they inform the (regional) companies they have signed contracts with, which in such situations act 24/7 on first call. The call is made by the head of the Main Flood Protection Center.
- 24 hours after the beginning of the situation, the Center informs the Regional Center about the water level height and announces possible floods. The Regional Centers of Civil Protection are also issued a warning to activate all headquarters of the county, city and local communities.

- The Civil Protection Headquarters put their Regional Headquarters on standby – they prepare the population via statements in the media and issue instructions to operational forces in the field. There is regular communication with the Regional Offices of Croatian Waters.
- RUCZ, along with the activation of all services in its scope, also activates the services, firefighters, police, Red Cross, diving clubs, utility companies and others.
- Heavy floods affect the area of the city of Prijedor. In the floods in the Prijedor area due to overflowing of the Sana River, 1,350 households are flooded. There are also torrents. The water level of the river reaches the level of 460 centimetres, which is 40 centimetres higher than the critical water level of the river when the first level of preparedness for flood protection measures was declared. In Novi Grad, the Sana and Una Rivers have increased water levels. The Una level in Bosanska Kostajnica is above the level of regular flood protection as well.
- RUCZ sends the rescue teams on and under water to the threatened area. The timely evacuation of the population and animals is carried out. The population in the threatened area is supplied with food. The chief inspector of the Republic comes to the field.
- The Slavonski Brod Port Authority prepares resources (machinery, sand, etc.) for flood defence after a notification from the CZ headquarters.
- The Slavonski Brod Harbor Master's Office issues a ban on navigation.
- Croatian Waters, based on received information about the situation in BiH, i.e. increased water level of the Una River, expects that the water level of the Una River near Hrvatska Kostajnica will increase and reach the level for introducing a flood defence emergency. Croatian Waters sends a request for engagement of the CP units and CP operational forces.
- The Directorate of the CP of the Republic of Croatia - the water wave of the Una and Vrbas is at its peak when entering the Republic of Croatia. A part of the population is evacuated. Instructions on how to behave in a threatened area.

Water Safety Planning Procedures Decision Support System (WASP DSS)

The WASP DSS was used during TTX (link: <http://wasp-dss.apps.vokas.si>) and it was possible to see in the WASP DSS which Headquarters were active, their location and the Headquarters structure during the event.

The participants also discussed the security measures during the intervention. It was emphasized that the Headquarters should inform the staff about the safety measures (about the safety equipment, use of drinking water, etc.).

4 Analysis of the Table-top exercise

The main part of the Table-top exercise was the analysis of the performed activities, with a critical overview of the TTX execution, preparation and involvement of the participants (target groups), as well as the assessment of the new WACOM tools.

The analysis of the TTX was based on four activities:

- Analysis done by the TTX participants (anonymous questionnaire for the participants),
- Analysis done by the TTX evaluation group (questionnaire for the evaluators),
- Analysis done by the individual institutions participating in the TTX,
- Lessons learned by the project partners (which will be shown in chapter: **“Findings (lessons learned) and conclusions of the Table-top exercise” (Chapter 5)**).

4.1 Analysis of the Table-top exercise – Hot-wash

After termination of the TTX, the hot-wash was carried out, which was based on the predefined questions, and allowed each headquarter to give their assessment of the TTX.

The main conclusions and findings of the participants were the following:

- so far, no TTX has been organized for cross-border flood events, and information on such floods has not been systematically collected, stored, and managed as a database or as a place to "report" a flood event. Simulation exercises are carried out at a time when there are no indications of possible threats;
- during the TTX, the participants concentrated on the shortcomings that were observed during the execution of the exercise, thus the execution of the exercise was reviewed as a free exchange of critical views and information, which created an opportunity for pointing out things that had an impact on every aspect of the action. The critical review of the performance of the TTX demonstrated professionalism and the desire to constantly improve the way one acts during an emergency;
- the participants of the TTX actively engaged in the discussion and contributed by providing insights gained from the exercise, but also from observing and remembering events from the not-so-recent past, such as floods in Croatia. They also worked on issues that helped strengthening human and material capacities;
- during the exercise, the participants identified both their own mistakes and the mistakes of others, and indicated the need for their correction. The approach applied to TTX "Flood Intervention Management" was assessed as mostly effective. The post-implementation

review relies on the collection of data to assess performance. The learning culture ranked cooperation and exchange of ideas based on an integrated approach very highly;

- as one of main conclusions of TTX is that there is a need for better coordination, communication and training of local representatives for disaster response.

4.2 Analysis of the Table-top exercise – the survey

As already mentioned, analysis was conducted on several levels. This analysis of the TTX was performed through the survey. The questionnaires were prepared both for the participants and the evaluators.

4.2.1 Analysis of the anonymous questionnaire completed by the participants

The questionnaire had a total of 15 questions, of which some had sub-questions. A total of 27 exercise participants completed the questionnaire. The questions and short observation on answers are presented below.

Question No. 1 *Is the material presented at today's workshop as you expected? If not, what did you expect differently?* All participants responded positively to the question, meaning that the materials prepared for the workshop were useful.

Question No. 2 *Do you think that emergency response protocols and the development of IT tools need to be tested in such exercises involving actual participants in interventions?* All participants who answered the questionnaire responded affirmatively.

Question No. 3 *Should other significant headquarters participate in such exercises? If so, which ones?* A part of the participants (11) responded positively and stated the following: Public Institution "Vode Srpske", media, police, firefighters, military, everyone who is actively involved in the field, Red Cross, hydrometeorological institutes. The comment is that some of the invited participants did not respond to the invitation, while some of those who wanted to come could not be accepted due to the capacity of the venue. These responses show that the different systems are very numerous according to the actors involved and that it is challenging to organize the presence of them all at such exercises.

Question No. 4 *What grade would you give today's exercise? (1-poor... 5-excellent)?* A part of the participants (nineteen) rated the exercise as excellent, a part (seven) as very good, and one participant rated the exercise as average.

Question No. 5 *Do you estimate that the topic of the exercise is sufficiently elaborated for quality pilot testing of new IT tools? If not, please suggest which is not sufficiently elaborated in your opinion.* The vast majority of participants (23, with one participant undecided) answered positively, which shows the correctness of the chosen approach to testing new IT tools in such exercises.

Question No. 6 *Do you have access to data on the headquarters and management structures of various institutions in the event of an emergency and intervention?* The answers are very different: eleven participants answered “Yes”, four participants answered “No”, while twelve participants did not write any answer. The above distribution of answers indicates that a significant number of participants do not have access to data on the headquarters and management structures of various institutions in the event of an emergency and intervention, or they did not know what to answer, which is also a very important indicator. Therefore, WACOM project partners believe that the new IT tools developed and presented within this project – if implemented in practice – could significantly fill the gap in this challenge.

Question No. 7 *Assess the quality of information on the functioning of individual headquarters during interventions? (1-poor... 5-excellent).* The distribution of responses is very wide: nine participants responded with “5”, six participants with “4”, two participants with “3”, while ten participants did not respond. As with the previous question, it can be observed that applying the new IT tools in practice could reduce the gap between the need for information and its use by different actors.

Question No. 8 *How do you assess the availability of data on the operation of individual headquarters during the interventions? (1-poor... 5-excellent)* The distribution of the answers is extensive, with as many as eleven participants who did not answer this question. That again shows how the exercise participants need greater data availability, in which technology can be helpful. So there is a belief that the IT tools being developed within the WACOM project can allow the actors to address their data availability challenges at different levels.

Question No. 9 *Do you often communicate with other headquarters during interventions?* The most significant number of answers was “Yes” (fourteen participants), three participants answered “No”, while ten participants did not answer this question.

Question No. 10 *Has there been a situation in which you found it difficult to establish communication with other headquarters or found it difficult to find contacts with other headquarters?* Thirteen participants answered “Yes”, eleven participants answered “No”, while three participants did not respond. Regarding those participants who answered that it was a

situation in which they found it difficult to establish communication with other headquarters or found it difficult to find contacts with other headquarters, WACOM project partners believe that the full and active practical application of the tools developed within this project by all headquarters could solve this challenge.

The answers to the following 3 questions (No. 11 *Would a platform that would offer information on the activities, organization and contacts of individual headquarters be useful for you?*; No. 12 *Would such a platform make it easier for you to operate during interventions?*; No. 13 *What is your assessment of the presented WACOM platform?*) confirm the analysis of the answers to the previous questions. All participants who answered the questions think that the presented tools / platform would be useful for their work and enable them to work more easily during the intervention. In addition, all participants are very positive towards individual applications (Pollution propagation in the Sava River area, ICS 207, ICS 209), with a different distribution of responses between very useful and useful.

Question No. 14 *What is your assessment of today's workshop? (1-poor... 5-excellent)?* All participants gave very high or high grades to the conducted workshop.

The comments and suggestions written in free form on the last question 15 *Please provide additional comments, remarks and/or suggestions* are especially valuable. Only two very short comments were received on this question (Best praise. Keep it up. All praise).

4.2.2 Analysis of the questionnaire completed by the evaluators

The questionnaire had a total of 19 questions, of which some had sub-questions. A total of three evaluators completed the questionnaire. The questions and short observation on answers are presented below.

The first three questions (No. 1 *Have you read the documents for the TTX preparation (scenario, contingency plan, master scenario list, report)?*; No. 2 *Are the purpose and goals of the simulation of the TTX understandable? (1-not understandable...5-fully understandable)*; No. 3 *Do you find the structure of master scenario event list understandable and adequate? (1-not understandable...5-fully understandable)*) referred to the materials prepared for the exercise. The evaluators rated this part positively.

Question No. 4 *How do you estimate the participants' understanding of their tasks and the TTX objectives? (1-not understandable...5-fully understandable)?* The evaluators gave high positive grades, with one comment: "Many participants were already present at the previous TTX and are therefore already familiar with the tools."

Question No. 5 *Other comments relative to the preparedness of the TTX*, one evaluator wrote the following comment: “The MSEL sets out general activities and does not give a detailed response of institutions, which is not bad as the scenario is formed in real time during the discussion.”

Question No. 6 *How do you evaluate the introduction to the TTX? (1-poor...5-understandable and well done)?* One evaluator gave the highest rating to this unit.

Question No. 7 *Assess the narrator’s role during the TTX and provide suggestions for improvement. (1-poor...5-understandable and well done)*. One evaluator gave the highest rating to this unit, with additional suggestion: “The participants participated more independently on the second day of the TTX, which indicates that it is necessary to acquaint the participants with the method of carrying out the TTX in advance.”

Question No. 8 *Assess the role of active participants (participating headquarters) – all and individually (1-poor...5-well done)*. One evaluator gave the maximum score.

The same answers were given to the next question 9 *Assess the timeline following the master scenario event list (1-poor...5-well done)*, with one comment: “Because the detailed activities are not specified, it is easier to follow the MSEL as more detailed content is determined in real time.”

The next 7 questions are related to the level and quality of participation in the exercise and usage of IT tools (No. 10 *Assess the adequacy of the activation/deactivation of headquarters and information exchange on the activation of headquarters (ICS 207) – did all HQ used it and how? (1-poor...5-well done)*; No. 11 *Assess the overall usage of the situational awareness tool (201, 209) – did all HQ used it and how was it accepted? (1-poor...5-very usable)*; No. 12 *Assess the usage of forecasting tools (oil spill - forecasting model) (1-poor...5-very usable)*; No. 13 *Assess the quality of communication among the active headquarters during the exercise (1-poor...5-well done)*; No. 14 *Other comments*; No. 15 *Assess the de-activation progress and closure procedures of the TTX (1-poor...5-well done)*; No. 16 *Assess the hot-wash procedures after the TTX (1-poor...5-well done)*). In general, the evaluators evaluated the participants’ active exercise contribution with high grades.

Question No. 17 *Overall assessment of the contribution of the WACOM project to the improved transnational response based upon the TTX (1-poor...5-important contribution)*. One evaluator gave the highest rating to this unit and wrote the following comment: “Despite the fact that not much emphasis was placed on the WACOM tool, the TTX provided an important link between the institutions, an exchange of opinions on the flood scenario.”

No relevant answers were provided to the next two questions (No. 18 *Objective of the WACOM was to organize a first and basic level of a TTX exercise. Please state any suggestions for the next level of TTX*, and No. 19 *Other comments*).

4.3 Analysis done by the individual institution participating in the TTX

Regarding the individual experiences of representatives of the institutions that participated in the implementation of the TTX exercise, all the experiences presented during the exercise and after its completion were extremely positive and encouraging towards the continuation of such projects and activities of competent institutions related to activities at the cross-border level, all through the work of the Sava Commission. The participants of the exercise believed that it would be necessary to continue with the organization of such exercises at the international level and that the above should become a regular practice.

It was recognized and highlighted that it was necessary to solve open challenges, such as the lack of operational procedures and measures of action and cooperation between different institutions within each individual country, and especially at the international level. The participants of the TTX agreed that it is absolutely needed to identify the areas and processes for which it is necessary to create standard emergency flood defence operating procedures for different institutions within each individual country, as well as for countries on a bilateral and multilateral level. It is important to note that these issues of action and provision of mutual assistance in flood defence emergency situations are very clearly defined by the provisions of the “Protocol on Flood Protection to the Framework Agreement on the Sava River Basin”, as a binding international agreement.

Furthermore, all participants of the exercise emphasized their satisfaction with the WACOM project because it enabled discussions of these issues, experts getting to know each other and development of new IT tools. Some participants were of the opinion that the procedures and measures of cooperation in extraordinary events between different areas (civil protection, water management, navigation) were missing, and that the competent institutions should take more initiative in using the legal framework, mechanisms and all developed tools of the Sava Commission in order to encourage the cooperation among different countries. The need to encourage the creation of procedures for mutual notification of dangers, the way of crossing the state border, mutual notification and exchange of data on the danger of occurrence and the occurrence of other natural or other disasters in the border zone was highlighted.

As special activities, the need for the creation and promotion of best practices in emergency flood defences was highlighted, for the purpose of sharing experiences and using materials created for learning. Accordingly, it would be useful to create a guide or instructions for the implementation of best practices in water management and flood protection, all for the needs of the process of updating the Flood Risk Management Plan in the Sava River Basin. It would be ideal to develop studies of optimal measures in protection against extraordinary flood defences based on the best practices. Once the examples of good practice are developed, further proposals of the exercise participants related to the need for a development of operational procedures in the event of floods in the entire Sava river basin, whose aim is to improve the response to actions of mutual support of the states in the basin and to gain insight into what is necessary for making action plans for flood risk events for the entire Sava basin.

Furthermore, the importance of cultural heritage protection was highlighted, because of the evident lack of plans and manners of acting in prevention, preparedness and reaction during activities that should result in the protection of cultural heritage. In this context, an example of good practice of cooperation between states is the current EU H2020 project called SHELTER (Sustainable Historic Environments hoListic reconstruction through Technological Enhancement and community-based Resilience), in which the Sava Commission participates as one of the project partners, and the competent institutions from the basin as stakeholders.

Most participants of the TTX recognized that the cooperation and communication between different headquarters (crisis management bodies) was not at the level it could and should be in reality due to sometimes objective and sometimes subjective circumstances. However, the almost unanimous opinion of all participants was that the mentioned difficulties could be at least partially solved by using IT tools such as those presented in the exercise. In particular, there was an open discussion among individual participants about the need for a stronger cooperation between operational centers that provide support to different headquarters in the reception, analysis and forwarding of data and information. While such operational centers do not exist, it is necessary to encourage their establishment and to have an overview of the complete situation and contact information for mutual communication between the parties to the agreement. The need for high-quality and timely exchange of information and coordination of activities during operational flood defence was highlighted as a special value.

All participants agreed that projects like WACOM contributed to solving open issues, but since projects had limited duration and impact, some experts emphasized the importance of existing cooperation mechanisms through the bodies of the Sava Commission, which should be used more by competent institutions. These institutions from the countries that are parties to the Sava

Commission should, through their working bodies, initiate a further process of elaboration and practical implementation of the WACOM project results and recommendations.

It is especially worth highlighting, that the written observation was expressed by the Directorate of Civil Protection of the Ministry of the Interior of the Republic of Croatia, which read: “In relation to your project and the exercises that are part of the project completed, I would like to emphasize that the Directorate of Civil Protection, i.e. the Operational Center of Civil Protection, is the international contact point for all civil protection issues, including early warning and alert notifications. We know that the Sava Commission, in addition to implementing such projects, also develops certain prognostic models of the occurrence and spread of floods. Such information would be of great importance to the Directorate of Civil Protection, and I ask that you, in your contacts with the Sava Commission, see at what stage the prognostic models are and what are the possibilities of establishing closer cooperation between the Directorate and the Sava Commission.” The aforementioned observation is extremely important, given that it is a reflection of the insight from the Directorate of Civil Protection on the current course of implementation of the WACOM project.

5 Findings (lessons learned) and conclusions of the Table-top exercise

Lessons learned by the project partners

After the execution of the TTX in Slavonski Brod, the project partners of the WACOM project gained new experiences and insights related to the preparation and execution of a table-top exercise. The main lessons learned were as follows.

- Preparatory stage:
 - It would be necessary that all preparatory documents should be prepared well before the exercise itself, so that they can be checked, customized and delivered in a timely manner to the institutions that are invited to participate in the exercise.
 - The preparatory documentation should not be too extensive, because the experience of this exercise has shown that too much documentation will result that the participants invited to the exercise will not ultimately attend, or will not have enough will to read all documentation and familiarize themselves with all details of the exercise
 - It would be necessary to foresee the participation of media representatives as participants in the exercises.
- Execution stage:
 - It would be necessary to ensure that all participants of the exercise bring a laptop, as this was necessary for the implementation of the exercise.
 - In order to avoid a situation where individual exercise participants cannot fully participate in the implementation of the exercise because they did not bring a laptop, it would be necessary to provide a certain number of laptops by the organizers in the following exercises in order to make the exercise as functional as possible.
 - Some participants were unfamiliar with what exactly they were supposed to do and with the competences of other institutions. This caused certain delays in the implementation of the exercise. In order to avoid such situations in the future, it is suggested that in the preparatory meetings before the implementation of an exercise, the future participants get to know each other and exchange basic information about what their institutions do.

- It would be necessary to involve media representatives in the implementation of the exercise.
- After-execution stage:
 - In addition to the hot wash analysis, it would be very useful to ask all exercise participants to submit their observations about the exercise in writing.

In terms of exercise implementation, TTX had several initial objectives, as follows:

- To introduce the methodology of the TTX execution in the form of the explanatory – coordinated type of the TTC;
- To introduce the “imaginary” scenario of the floods;
- To involve all active participants to cooperate and jointly develop the strategy of the response to the accident;
- To familiarize the participants with the new WACOM tool set and to utilize them during the execution of the TTX;
- To assess the usability of the new WACOM tools.

All stated objectives were achieved during the preparation and implementation of the exercise.

- i. There was a lot of interest for the participation in the exercise by the representatives of the institutions that are the target groups of this project. Due to the limited space in the hall where the exercise took place, all applications to participate could not be accepted by the organisers. For this reason, individual experts participated in the exercise via a video link that was provided, so that a certain number of representatives of the institutions that are the target groups, as well as representatives of the project partners followed the exercise and actively participated in it in this manner. **It can, therefore, be concluded that in view of the interest and response this exercise justified its organization and implementation.**
- ii. The exercise implementation had several parts. The first part was the general presentation of the WACOM project with a focus on flood management, so that all participants could have the same base of understanding of project’s efforts. This was particularly important for the participants who were involved in a WACOM project activity for the first time. The following was the presentation of the Sava GIS, Sava HIS and Sava FFWS systems so the participants are introduced to the structure, details and possibilities they have at their disposal to use in the exercise, if necessary. The third part consisted of the demonstration of the WACOM toolbox that will be used in the TTX. The applications

and their use were presented, after which all participants logged into the applications and used them in the implementation of the exercise. This was followed by the main part of the exercise – Flood simulation, when the planned exercise was implemented with expert guidance of the project manager. During the implementation, all participants took a very active part in the exercise, providing comments, explaining situations and challenges they face in real situations, and jointly attempting to find solutions or proposals regarding a certain situation or open issue. **We can emphasize that the exercise was implemented at the top level, with a very active involvement of all participants.**

- iii. After the exercise, a hot wash analysis was conducted, in which all exercise participants took part. Among the numerous valuable observations, those most important should be emphasized. The participants agreed that it was necessary to create online forms for flood data uploads and that these forms must be user-friendly, especially since the character of the cooperation and interventions were international. There is currently no platform or application enabling exchange of flood data and information, and such solution is both necessary and vital. It would definitely improve the quality and efficiency of cooperation among different actors in flood defence. It was noted that the existing procedures during flood defence interventions should be simplified, which would accelerate activities. The following observation related to the development of communication plans, which do not exist at present, and which should prevent overlaps, double courses of action and misunderstandings. The next important link that is necessary is the development of plans of operational measures for different situations, where there are none, which is mostly the case in many places. The protection of the cultural and historical heritage was emphasized as an important issue, since there are generally no procedures regulating how to address and proceed in cases involving them. In some countries there are initial assumptions and activities on the solution of this challenge (Slovenia, Croatia); however, there is no comprehensive or integrated solution, which is even less so in other countries of the Sava basin (Bosnia and Herzegovina, Serbia). As an important issue, it was mentioned that there were no existing international operational measures during floods in the Sava basin, which certainly causes significant problems in the cooperation and coordination, provision of mutual assistance and support among different actors, and there was a great need to resolve this situation. The direct recommendation of the exercise participants was that there was a need for better coordination and communication between institutions and towards local communities, and the need for training of the local representatives for responding to accidents, as well as the need for a single line of command located at one place. The next observation was related to the management of volunteers, both in the

preparation for the intervention and on the intervention site, since previous experiences had shown different and uneven practices. Finally, all these observations and proposals are very valuable, and some of them are directly related to the goals of the WACOM project. However, **it is important to emphasize that it is possible to start solving, to a greater or lesser extent, the majority of these proposals through the cooperation enabled and facilitated by the Sava Commission, just as it is possible to solve them using different technical solutions, like the WACOM toolbox, in the future.**

- iv. An in-depth analysis of the exercise was performed subsequently and based on four activities: “Analysis done by the TTX participants” (anonymous questionnaire for the participants); “Analysis done by the TTX evaluation group” (questionnaire for the evaluators); “Analysis done by the individual institutions participating in the TTX”; “Lessons learned by the project partners”. In terms of “Analysis done by the TTX participants”, it should be emphasized that the exercise participants recognize the need for the organisation of such exercises and believe that the use of tools (such as the WACOM toolbox) can improve certain activities in the work of services, headquarters and mutual cooperation. In the “Analysis done by the TTX evaluation group”, the evaluators assessed the efforts invested in the preparation of the exercise as positive, as well as the active participation of the experts present during the exercise. The highest value comes from the “Analysis done by individual institutions participating the TTX”, in which the institution representatives expressed their observations related both to the WACOM project and continued cooperation among the institutions, countries and the Sava Commission. All participants agree that projects like WACOM contribute to the solution of open issues. However, since projects have limited duration and impact, the experts emphasize the importance of existing cooperation mechanisms through the bodies of the Sava Commission, which should be used more often by the competent institutions as the initiators of activities recognized within the WACOM project and aimed at encouraging the countries to resolve open issues. Finally, in the “Lessons learned by the project partners” analysis, the project partners recognized certain lessons that could be prepared and organised in a different manner for the following simulation exercises. **In conclusion, it is important to point out that numerous recommendations have been recognized in this part that are extremely relevant for the future and possible courses of action that the countries, institutions and the Sava Commission may take.**