Deliverable 5.4.1 Structure and design of the e-learning tool

The purpose of this document is to describe the structure and design of the DAREFFORT e-learning course (see Table 1.), and to facilitate the elaboration of the content of the e-learning modules (Deliverable 5.4.2., due on 31 October 2020).

Based on the requirements set up by the Application Form (AF), the main goal of the e-learning course is to provide the necessary information for the future professional users of the data exchange system elaborated by the Project, as well as to support the better understanding of flood and ice forecasting in general, and to represent the Project's contribution to this field and describe the main results achieved by the DAREFFORT project.

In order to transfer the knowledge gathered by the project, the course is designed in a way that

- is understandable for the different target groups taking into account their different level of background knowledge, and
- provides useful information considering their different interests and necessities.

Based on the AF requirements, the target groups appropriate for the e-learning course can be defined as:

1. Broad public (public): everyday people, no background knowledge, general interests.
2. National/regional public authorities (professionals): potential users of our data exchange software and/or of the future DanubeHIS, assumed background knowledge, interested in practical, actual information. Decision-makers of these authorities, assumed background knowledge, more interested in strategical and policy aspects.
3. Higher education and research (education): university students and researchers, assumed background knowledge (level BSc and Msc depending on the topic), interested in the scientific background and how is it applied in practice.

The project partners have agreed at the 3. project meeting in Bratislava, that Moodle[1] will be used as the framework for our e-learning course, as it is a widely used, open source platform, and there are positive experiences about previous uses of it within our partnership (UL). Besides Moodle enables a lot of activities (tools) that can be of good use e.g. Quiz, Lesson, Assignment, Chat, Forum, Survey, Wiki, Workshop[2]

First, a list of topics have been suggested by WP5 leader than refined and discussed with LP and involved partners. Based on this, the modules (and the topics they cover) have been defined and assigned to a partner who will be responsible for the elaboration of the content.

The course includes 10 modules covering various relevant topics, aimed at different target groups, referring to the outcomes of the DAREFFORT project where appropriate.

[1] https://moodle.org/
[2] https://docs.moodle.org/38/en/Activities

The inner structure of the modules will adapt to the targeted stakeholder group, they will all start with introduction, followed by the discussion of the covered topics. Modules targeted on "Professionals" and "Education" will also include control questions and/or exam exercises.

The material itself will include presentations, videos, excel sheets, world, pdf documents, links and images as appropriate and necessary considering the given topic and the targeted stakeholder group.

In terms of graphical design of the course, the requirements and recommendations of the "*Danube Transnational Programme Visual Identity Guidelines for Projects"* will be applied. The ppt template of the DAREFFORT project, in line with this document, is already in use, and available on our FTP server.

The structure of the DAREFFORT e-learning tool is described in the table below:

Table 1: Structure of the DAREFFORT e-learning course

Module title	Topics covered, questions answered by the modul	Recommended for target groups	Tools	PP responsible for content	Sources of content		
					DAREFFORT output/deliverable	from ASPs	other sources
1. Introduction to Flood and ice forecasting in the Danube River Basin	What is the Danube River Basin? Where is it? Major flood events in the basin What is flood and ice forecasting? Why is it important? How does it work? Who do it? How they are doing it? What is the contribution of DAREFFORT project?	• Public • Professionals • Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	VIZITERV	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • DAREFFORT video		https://environmentalrisks.danube-region.eu/elearning/index.html
2. Flood forecasting and warning systems	Flood forecasting systems – challenges, methods and models, data requirements, customization for warning purposes, forecasting uncertainties, forecasting efficiency	• Professionals • Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	UL	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national reports	ARSO sources (e.g. reports, documents…)	COMET MetEd, WMO, educational material of UL, …
	Flood early warning systems – challenges, supporting systems, warning products and dissemination, flood awareness, warning efficiency	• Professionals • Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links				
3. Hydrological and meteorological monitoring networks and real-time data acquisition	Hydrological monitoring networks – design and evaluation of hydrological networks, methods of observation, accuracy of measurements, data collection Meteorological monitoring network – precipitation measurements, rainfall monitoring techniques, measurements of snow, evapotranspiration, soil moisture Real-time data acquisition – automatic recording equipment, real-time data management, control and reporting	• Public • Professionals	• pptx • Moodle lesson activity • existing related materials • quizzes • links	UL	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national reports	ARSO sources (e.g. reports, documents…)	WMO, COMET MetEd, UCAR, meteorological and hydrological services, educational material of UL, …

Module title	Topics covered, questions answered by the modul	Recommended for target groups	Tools	PP responsible for content	Sources of content		
					DAREFFORT output/deliverable	from ASPs	other sources
4. Forecasting the formation and evolution of ice phenomena on rivers	Introduction, past ice events on the Danube River ice phenomena Ice cover monitoring in the Danube River Basin Bilateral agreements Theoretical background of river ice forecasting Formation of ice Water energy balance River ice freeze-up Ice cover breakup Disapperance of ice River ice forecasts of the National Hydrological Forecasting Services Disseminations of the results	Public Professionals Education	Pptx Moodle lesson activity Quizzes	OVF	O3.1. Evaluation report on flood and ice forecasting and connected deliverables, WP3 country fact sheets		Liptay Zoltán's PhD thesis on Numerical Hydrological Modeling and Forecasting of River Ice Conditions
5. Flash flood forecasting and warning	Particularities of Flash Floods generation mechanisms. Early warning systems for flash floods forecasting. Future needs and research priorities, for improving the monitoring and forecasting systems, to better support the flash floods warning process.	• Public • Professionals • Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	NIHMW	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national and project partners reports		WMO related documents and reports; Scientifical Journals related publications on this topics.
6. Verification of hydrological forecasts	General concepts for the hydrological forecasts verification process. Robust verification criteria for deterministic hydrological forecasts. Verification of hydrological warnings messages. Ensemble Verification System for hydrological forecasts (EVS). Potential use of hydrological forecast verification information to improve the forecasting process.	• Public • Professionals • Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	NIHMW	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national and project partners reports		WMO related documents and reports; Scientifical Journals related publications on this topics. Documentation of Ensemble Verification System for hydrological forecasts (EVS)

Module title	Topics covered, questions answered by the modul	Recommended for target groups	Tools	PP responsible for content	Sources of content		
					DAREFFORT output/deliverable	from ASPs	other sources
7. The Environet data exchange system (HYMEDES)	Basic concepts	Professionals Education		VIZITERV	• A4.2-. Development of the data exchange software		
	Userland services (Data nodes, the central web service)				• A4.2-. Development of the data exchange software		
	Developer services (Distribution nodes, Client nodes, the API system and more)				• A4.2-. Development of the data exchange software		
	Operating a service - running a distribution node				• A4.2-. Development of the data exchange software		
8. Data life cycle	Data sources – The purpose of common data exchange, what kind of data is collected and where does the data come from?	Public Professionals Education	pptx Moodle lesson activity quizzes links	STASA	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national reports		
	Partners of data exchange – Participating countries and data providers, which data is delivered by each provider, used methods of data acquisition and transfer, typical case studies	Professionals Education	pptx Moodle lesson activity quizzes links	STASA	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national reports • D4.1.4 Evaluation of questionnaire		
	The common data format – WaterML 2.0 specifications, description and how to use it, overview of the data structure, description of the common data model HyMeDEM	Professionals Education	pptx Moodle lesson activity existing related materials quizzes, links	STASA	• D4.1.1 Flood forecasting and IT expert recommendations		OGC WaterML 2.0 Documentation
9. Representative National Flood Forecasting and Warning Systems within the Danube River Basin	Representative National Flood Forecasting and Warning Systems in the Upper Danube River Basin - general description; input data; modelling components; main hydrological forecasts and warning products; needs and plans for development.	Public Professionals Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	Different partners coordinated by NIHWM.	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national and project partners reports		
	Representative National Flood Forecasting and Warning Systems in the Middle Danube River Basin - - general description; input data; modelling components; main hydrological forecasts and warning products; needs and plans for development.						

Module title	Topics covered, questions answered by the modul	Recommended for target groups	Tools	PP responsible for content	Sources of content		
					DAREFFORT output/deliverable	from ASPs	other sources
	Representative National Flood Forecasting and Warning Systems in the Lower Danube River Basin - - general description; input data; modelling components; main hydrological forecasts and warning products; needs and plans for development.						
10. Representative Regional Flood Forecasting and Warning Systems within the Danube River Basin	European Flood Awareness System (EFAS) - concepts and main objectives; input data; modelling components; main products; ongoing and future plans for development.	Public Professionals Education	• pptx • Moodle lesson activity • existing related materials • quizzes • links	Different ASP partners coordinated by NIHWM	• O3.1. Evaluation report on flood and ice forecasting and connected deliverables • WP3 national and project partners reports	JRC, International Sava River Basin Commission, WMO.	JRC, International Sava River Basin Commission, WMO regional projects related documents and reports.
	Flood Forecasting and Warning System for the Sava River Basin (Sava FFWS) - concepts and main objectives; input data; modelling components; main products; ongoing and future plans for development.						
	South East Europe Flash Flood Guidance System (SEE-FFGS) - concepts and main objectives; input data; modelling components; main products; ongoing and future plans for development.						
	South-East European Multi-Hazard Early Warning Advisory System (SEE-MHEWS-A) - concepts and main objectives; current status and implementation plan.						