ANNEX II: TERMS OF REFERENCE

1. BACKGROUND INFORMATION 2

1.1. Partner country 2

1.2. Contracting authority 2

1.3. Country background 2

1.4. Current situation in the sector 2

1.5. Related programmes and other donor activities 2

2. OBJECTIVES & EXPECTED OUTPUTS 2

2.1. Overall objective 2

2.2. Specific Objective(s) 3

2.3. Expected outputs to be achieved by the contractor 3

3. ASSUMPTIONS & RISKS 3

3.1. Assumptions underlying the project 3

3.2. Risks 3

4. SCOPE OF THE WORK 3

4.1. General 3

4.2. Specific work 4

4.3. Project management 4

5. LOGISTICS AND TIMING 4

5.1. Location 4

5.2. Start date & period of implementation of tasks 4

6. REQUIREMENTS 5

6.1. Staff 5

6.2. Office accommodation 7

6.3. Facilities to be provided by the contractor 7

6.4. Equipment 7

7. REPORTS 7

7.1. Reporting requirements 7

7.2. Submission and approval of reports 8

8. MONITORING AND EVALUATION 8

8.1. Definition of indicators 8

8.2. Special requirements 8

# BACKGROUND INFORMATION

## Partner country

Republic of Serbia

## Contracting authority

Public Library of Merosina, Cara Lazara 19, 18252 Merosina, Republic of Serbia

## Country background

The Republic of Serbia and Bulgaria share a common cross-border area where the development of sustainable tourism is a priority of public policies and EU programmes (RSO5.2). The project directly contributes to this objective by creating a new cross-border tourism product—hot-air-balloon tourism—in the Niš and Bor districts in Serbia and the Vidin region in Bulgaria, with an expected increase in overnight stays through the organisation of regular balloon flights. The role of local institutions and Bulgarian partners is to jointly develop and promote the service, including the establishment of a tourist information point at Lake Oblačina as a local infrastructure hub for service delivery and visitor information. Tourism promotion is a stated priority in the national strategies of both countries, and the project targets the “adventure/alternative” tourism market segment with a strong sustainability profile.

## Current situation in the sector

Overview of the sector and institutions. Balloon tourism in Serbia is at an early stage (predominantly tethered events), whereas Bulgaria (Belogradchik) has made progress in recent years with regular flights and festivals. The joint approach aims for Niš and Bor to become the first areas in Serbia with regularly organised free flights, while Vidin further strengthens its offer.

**Human resources and constraints** - The key bottleneck is the availability of EASA-licensed pilots; training is costly and can only be provided by certified organisations. The project therefore includes training for three pilots (one per balloon-holding partner) to ensure legal and operational sustainability of the service.

**Infrastructure** - Planned works include renovation of the facility at Lake Oblačina for the tourist information point (ticketing, souvenir shop), procurement of balloons, 4x4 vehicles and trailers for post-flight recovery, as well as development of a VR simulator for promotion.

**Market development and promotion** - Market growth is planned through festivals in the three regions, appearances at fairs in Sofia and Belgrade, and innovative VR promotion that brings the flight experience closer to the public. Target audiences include families, children aged 6+, persons with disabilities, and the wider tourist population.

**Information systems and flows** - At partnership level, regular communication and monitoring are foreseen (online/meetings), alongside public communication via a website, social media, PR, and promotional materials.

**Priority-setting and decision-making** - At six-month progress reviews, partners jointly analyse results and agree on next steps; the Lead Partner coordinates the meetings.

**Access to priority social groups** - Activities and communications are inclusive (family audiences, persons with disabilities), with a focus on safety and accessibility of the service.

## Related programmes and other donor activities

N/A

# OBJECTIVES & EXPECTED OUTPUTS

## Overall objective

Project objective is to create a new cross-border tourist product - balloon tourism to boost tourism development in the cross-border region of Bulgaria and Serbia. The increased number of tourist overnights are directly related with the number of passengers using balloon flight services and this is something all tourist service providers and local authorities will benefit from on the territory of districts Bor, Nis and Vidin. We expect organising 77 flights per year in each of the 3 districts.

## Specific objective(s)

The specific objective (Outcome) of this contract is as follows:

Specific objective (Outcome) 1:

The contract should support Public Library of Merosina in the process of development and installation of Software for the VR hot-air balloon simulator for project “Balloon tourism” financed under (INTERREG VI-A) IPA Bulgaria Serbia Programme.

## Expected outputs to be achieved by the contractor

The expected outputs of this contract are as follows:

Output 1 to Outcome 1 - Making of detailed 3D environment;

Output 2 to Outcome 1 - Development of the app

Output 3 to Outcome 1 - Installation of the developed app on the equipment of both partners

# ASSUMPTIONS & RISKS

## Assumptions underlying the project

N/A

## Risks

N/A

# SCOPE OF THE WORK

## General

### Description of the assignment

The purpose of this contract is to support the Public Library of Merosina in the development and implementation of specialized software for a Virtual Reality (VR) hot-air balloon simulator, as part of the project “Balloon tourism” funded under the INTERREG VI-A IPA Bulgaria–Serbia Programme.

The assignment includes three key stages:

* Design and production of a detailed 3D virtual environment, replicating the landscapes relevant to the cross-border tourist experience.
* Development of a fully functional VR application that integrates the created environment with the simulator hardware and user interface.
* Installation and configuration of the final software solution on the simulator equipment of both project partners (in Serbia and Bulgaria), ensuring compatibility, stability, and user readiness.

The contractor will be responsible for the end-to-end delivery of the software, including testing and technical adjustments required for its proper functionality within the provided equipment setup. The final product should provide an immersive, educational, and tourism-oriented VR experience.

### Geographical area to be covered

Merosina (Serbia) and Vidin (Bulgaria)

### Target groups

Project stakeholders

## Specific work

Software for the VR hot-air balloon simulator The development of the software includes 3 stages:

1. Making of detailed 3D environment;

2. Development of the app

3. Installation of the developed app on the equipment of both partners

The aim of the developed software is to create a hot-air balloon simulator where people can enter the basket, put on the VR headset and start a virtual flight over 1 location in Bulgaria and one in Serbia. As for the environment, it is necessary to make detailed environment of Belogradchik rocks in Bulgaria and Oblacinsko lake in Serbia in 3D, above which the simulated flight will take place. Digitize the environment using unmanned aerial vehicle in order to obtain photo realism. Bonus: implement a virtual flight of a flock of birds near the balloon in order to make the user experience even more immersive. The application must offer the user the choice between both sites for flying. The app must be in Bulgarian, Serbian and English. In order to make the flight simulator as realistic as possible, controlling units must have pressure sensors that will be connected to central controlling unit via IOT, as well as the heat source which would simulate heating while the burner is in use. Central control unit must communicate with the virtual reality headset using wireless internet. The role of the central control unit is to deliver signals from the sensor to the headset that will control the application installed inside the headset, as well as the signals from the application to the basket (burner) Based on the given signals, the app will provide the user with the insight into the environment and the balloon movement through the air. The app must present flying realistically and enable the controlling of the balloon via realistic touch of the controlling units of the burner with the hands of the user or the balloon pilot. If the users do not respect flying rules, the app must present balloon falling. The app must enable the user to control the balloon as realistically as possible. Physics involved in balloon flying must be as realistic as possible. The app must follow user’s movements in real time, in order to make the simulator experience as immersive as possible. While using the controlling units of the simulator, the app must present the flame, including the sound. Make Digital Twin of the GPS system for balloon navigation. The system measures the speed of wind, flight height and balloon temperature, which, if exceeded, brings about the bursting of the envelope.

The contractor must also comply with the latest Communication and Visibility Requirements for EU-funded external action.

**System Overview**

* Splash screen: IPA branding.
* GUI screen: location and language selection.
* MR mode: the user sees the digital twin of the gondola and their surroundings.
* VR mode (flight): flight simulation with realistic physics.
* After the flight: return to MR mode and hand over the headset to the next user.

**Functional Requirements**

General Requirements

* GUI for selecting location (Belogradchik or Oblačinsko Lake) and language (Serbian, Bulgarian, English).
* One active VR headset, a second in reserve.
* Gondola alignment via QR code (or manually via controllers, optional).
* Maximum simulation duration: 10 minutes.

Environments

* Realistic 3D models of the take-off locations created via UAV capture.
* Time-of-day and weather variations.
* Optional: a flock of birds for added immersion, a second balloon, drones.

Balloon Simulation

* Digital twin of the gondola in VR.
* Interaction with physical controls.
* Vertical movement depends on the amount of hot air.
* Burner increases temperature.
* Virtual rope to vent hot air and reduce altitude.
* Wind affects heading and speed.
* Balloon rupture if temperature exceeds the limit.

Controls and Sensors

* Pressure sensors on the real gondola.
* The CCU collects signals and wirelessly transmits them to the VR headset(s).
* VR feedback signals: flame, sound, thermal effect.

VR Navigation Instruments

* Altitude (m).
* Vertical speed (m/s).
* Balloon temperature (°C).
* Wind speed and direction.

Immersion and Safety in VR

* Visual flame and burner sound.
* Realistic balloon physics.
* Simulation of balloon crash under critical conditions.
* End of flight: landing, 10-minute timeout, or balloon rupture.

**Non-Functional Requirements**

* Performance: ≥ 72 FPS, latency ≤ 50 ms.
* Usability: simple GUI with three languages.
* Reliability: operation sustained even with signal latency.
* Safety: virtual flame, IoT standards.
* Hardware: one active headset, one in reserve; charging via external batteries.

**Constraints**

* Maximum flight duration: 10 minutes.
* Only two locations (Belogradchik and Oblačinsko Lake).
* No controllers/joysticks.

## Project management

### Responsible body

Public Library of Merosina, Republic of Serbia

### Management structure

The responsible person for implementation of the tasks related to this contract for the Contracting authority are:

* Miloš Milošević, Legal Representative
* Nina Milošević, Project manager

### Facilities to be provided by the contracting authority and/or other parties

N/A

# LOGISTICS AND TIMING

## Location

Merosina (Serbia) and Vidin (Bulgaria)

## Start date & period of implementation of tasks

The intended start date is 28.11.2025. and the period of implementation of the contract will be 9 months from this date. Please see Articles 19.1 and 19.2 of the special conditions for the actual start date and period of implementation.

# REQUIREMENTS

## Staff

### Key experts

Key experts are defined and they must submit CVs and signed statements of exclusivity and availability.

All experts who have a crucial role in implementing the contract are referred to as key experts. The profiles of the key experts for this contract are as follows:

**Key expert 1: Team Leader / Senior XR-VR Developer**

**Qualifications and skills**

Minimum:

* University degree in Computer Science, Electronic Engineering, Multimedia, Geoinformatics or a related field or equivalent relevant professional experience.
* English language sufficient for day-to-day coordination and report writing (reports are in English).

Preferred

* Proven hands-on use of at least one real-time 3D/VR engine (e.g., Unity or Unreal) and a 3D content tool (e.g., Blender/Autodesk), with understanding of real-time rendering and optimisation.
* MSc/PhD in a relevant field.
* Knowledge of Serbian and/or Bulgarian for smoother coordination (the app UI is in BG/SR/EN).

**General professional experience**

Minimum:

* More than 5 years in developing interactive 3D/VR applications or similar multimedia solutions.

Preferred

* More than 10 years in 3D/VR simulations/multimedia.
* Demonstrated team leadership and knowledge transfer (workshops, mentoring, documentation).

**Specific professional experience**

**Minimum**

* Participation in more than 3 projects that delivered VR/XR applications.
* Implementing realistic physics/interactions in VR (e.g., vertical movement, wind influence, thermal effects), with attention to performance and low latency, as required for the simulator.
* At least one project involving integration of external sensors/IoT with a VR app (e.g., pressure sensors, central control unit, two-way signalling between app and physical controls).

**Prefered**

* On-site deployment/commissioning of VR solutions, including staff training and operation planning (two headsets: one active, one reserve).

### Other experts, support staff & backstopping

CVs for experts other than the key experts should not be submitted in the tender but the tenderer will have to demonstrate in their offer that they have access to experts with the required profiles. The contractor shall select and hire other experts as required according to the needs. The selection procedures used by the contractor to select these other experts shall be transparent, and shall be based on pre-defined criteria, including professional qualifications, language skills and work experience.

The costs for backstopping and support staff, as needed, are considered to be included in the tenderer's financial offer.

## Office accommodation

Office accommodation for each expert working on the contract is to be provided by the contractor.

## Facilities to be provided by the contractor

The contractor shall ensure that experts are adequately supported and equipped. In particular it must ensure that there is sufficient administrative, secretarial and interpreting provision to enable experts to concentrate on their primary responsibilities. It must also transfer funds as necessary to support their work under the contract and to ensure that its employees are paid regularly and in a timely fashion.

## Equipment

**No** equipment is to be purchased on behalf of the contracting authority / partner country as part of this service contract or transferred to the contracting authority / partner country at the end of this contract. Any equipment related to this contract which is to be acquired by the partner country must be purchased by means of a separate supply tender procedure.

# REPORTS

## Reporting requirements

The contractor will submit the following reports in English in one original:

* **Interim Report** The contractor will prepare interim reports on the implementation of the tasks, at the 1st and 6th month of contract service implementation. The report shall contain a detailed description of the implemented services for the reported period. The interim reports must be provided along with the corresponding invoice. The interim report should be approved by the Contracting authority.
* **Draft final report** of maximum 20 pages (main text, excluding annexes). This report shall be submitted no later than one month before the end of the period of implementation of tasks.
* **Final report** with the same specifications as the draft final report, incorporating any comments received from the parties on the draft report. The deadline for sending the final report is 10 days after receipt of comments on the draft final report. The report shall contain a sufficiently detailed description of the different options to support an informed decision on service performed. The detailed analyses underpinning the recommendations will be presented in annexes to the main report. The final report must be provided along with the corresponding invoice.

## Submission and approval of reports

The report referred to above must be submitted to the project manager identified in the contract. The project manager is responsible for approving the reports.

# MONITORING AND EVALUATION

## Definition of indicators

The indicator of the successful implementation of the contract is “Services provided in timely, quality and quantity manor, as required in these Terms of Reference”

## Special requirements

N/A