Project no. 6524105

ATLAS

Artificial Intelligence Theoretical Foundations for Advanced Spatio-Temporal Modelling of Data and Processes

WP1: Coordination, Management, and

Dissemination

Deliverables D1.1.

Project Management Plan

Program for Development of Projects in the field of Artificial Intelligence

https://ai.ipb.ac.rs/

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Summary

The project plan outlines the management structure and procedures for successfully executing, monitoring and controlling the project by planning all phases and activities. It lists the project objectives, team members, milestones, and the effort and resources required for performing specific tasks. The plan covers risk management, budget structure, and the planned allocation of funds, including a detailed analysis of potential risks and strategies to mitigate them.

1. Planning Basis

Objectives

The ATLAS project aims to achieve the following objectives:

- provide theoretical foundations for advanced modelling of spatio-temporally-defined data and processes using artificial intelligence (AI), combined with the existing knowledge in the field of AI;
- build a pilot AI-based platform as a first tangible step toward addressing scientific research challenges;
- validate the developed methodological framework through global, long-term air pollution research.

Basis for management

The basis for project management is the specification of work packages which are an integral part of the contract.

Management structure

Project management is carried out according to a structure that includes:

1. Three subjects of management:
   1.1. Research includes tasks and activities intended to lead to the delivery of deliverables defined in work packages WP2, WP3, WP4, and WP5.
   1.2. Finance, administration, reporting, and coordination, which include tasks and activities that are intended to provide quality financial management and internal communication among project team members and SRO engaged in the project until the realization of work package WP1 in the administration and finance segment.
   1.3. Dissemination, which is distinguished due to the circumstances of project implementation conditioned by the pandemic, which have particularly hindered the dissemination of project results
2. A management structure for each subject of management:
   2.1. Initial identification of tasks and activities based on the project application. The tasks are defined in accordance with the work packages and the activities in accordance with the deliverables. The following elements have been identified: content, timeline, allocation of human resources including role assignment, and control points. Two types of control points have been defined: quarterly control points synchronized with periodic reports and operational control points (every two weeks or once a week).
   2.2. Monitoring of task and activity implementation. Monitoring is carried out through project team meetings scheduled according to control points. Meetings related to quarterly control points include discussion of the prepared quarterly report proposal and determination of the final report. Meetings related to operational control points include oral reporting on the progress of activities in carrying out tasks and a discussion where identified problems and proposals for their resolution are presented.

2.3. Corrective measures. Measures include activities undertaken to carry out the project in accordance with identified tasks and activities and monitoring results. Two types of corrective measures have been identified: long-term and short-term. Long-term measures are defined for a quarterly period, while short-term measures are defined for one month. They include a review of content, timeline, and allocation of human resources.

Project team

The project team comprises members from two scientific institutions – the University Singidunum and the Institute of Physics Belgrade. The team has diverse research capabilities and has been assembled to achieve maximum efficiency in executing the planned activities.

Table 1. Team members.

ID	Name and family name	SRO	Person-months/ Effective person-months	Skills
PI	Endre Pap	Singidunum University	24/12	AI and fuzzy systems
P1	Zora Konjović	Singidunum University	24/8	AI and software engineering
P2	Dimitrije Maletić	Institute of Physics Belgrade	24/7	AI and supercomputing
P3	Dušan Vudragović	Institute of Physics Belgrade	24/6	Machine learning, database, and supercomputing
P4	Andreja Stojić	Institute of Physics Belgrade	24/7	Machine learning and environmental science
P5	Đorđe Obradović	Singidunum University	24/7	Fuzzy systems, machine learning and programming
P6	Nemanja Stanišić	Singidunum University	24/4	AI and hierarchical modelling
P7	Mirjana Perišić	Institute of Physics Belgrade	18/3	Environmental physics
P8	Gordana Jovanović	Institute of Physics Belgrade	18/5	Environmental chemistry
P9	Svetlana Stanišić	Singidunum University	18/5	Environmental physical chemistry
P10	Marija Mitrović Dankulov	Institute of Physics Belgrade	12/2	Machine learning
P11	Ivan Radosavljević	Singidunum University	22/6	Machine learning and programming
P12	Mladen Vidović	Singidunum University	22/6	Machine learning and programming
P13	Aleksandra Mitrović	Singidunum University	22/6	Software engineering and programming
P14	Nebojša Nešić	Singidunum University	22/6	Computer graphics and programming
P15	Ana Vranić	Institute of Physics Belgrade	12/2	Programming

Milestones

The milestones will be implemented successively throughout the project duration, culminating in the main event that represents the completion of a series of activities.

Table 2. Milestones.

Milestone ID	Milestone name	Means of verification
M1.1	Workshops, open forums, and meetings on the ATLAS activities	Workshops and open meetings on the ATLAS activities and ongoing results will be held at SROs and will gather a wide range of stakeholders (scientists, the general public, and relevant policymakers).
M1.2	Final report	Submission and acceptance of all deliverables.
M2.1	Computing cluster online	Computing cluster connected to existing infrastructure.
M4.1.	Functional verification of the software components	Operational (functional) software libraries for space, processes and decision-making modelling.
M5.1	Launch of the ATLAS platform	The ATLAS platform is online and operational.

Activities

The main activities, which will be undertaken to deliver a substantial portion of the overall ATLAS project, include 1) raw database implementation, 2) integrated ML and explainable modelling, 3) advanced database and 4) web platform development. Each of the mentioned activities can be observed through work tasks which are shown in the table below.

Table 3. Activities and tasks.

Activity	Description	Tasks
Raw data base implementation	The database will include: (1) pollution data from the United States Environmental Protection Agency (US EPA), the European Environmental Agency (EEA) and the UK Automatic Urban and Rural Network (AURN), (2) meteorological data from the National Oceanic and Atmospheric Administration (NOAA), and (3) meteorological fields implemented in the Air Resources Laboratory's Global Data Assimilation System (GDAS1).	1. Collect all available geo-referenced 1-hour air pollution and meteorological data from 2008 to 2018 that cover Europe and the USA. 2. Calculate and interpolate meteorological surface data based on GDAS1 meteorological fields. 3. Process, combine, optimize, validate, document, and submit the datasets to a repository as highly dimensional, structured database.

Integrated ML and explainable modelling	New AI methods will be based on soft computing, a fusion of research in evolutionary algorithms and genetic programming, neural science and neural net systems, fuzzy set theory, and fuzzy systems. The specificity of fuzzy systems is bridging the gap between the flexibility of human reasoning and the precision and clarity of mathematical or computerized representations. Also, understanding the processes being modelled, and providing accurate explanation and interpretation of each model's prediction will be achieved by using XAI Shapley Additive exPlanations (SHAP) and the statistical analysis of SHAP values.	1. Spatio-temporal data methods development 2. Air pollution modelling 3. Decision making modelling
Advanced data base	In environmental science, advanced database development and management is necessary to support huge data volumes, and diverse and versatile data types, models, and formats. Data management of the ATLAS platform should be built in a way to support effective and efficient management for key/value pairs, documents, and graphs in addition to the classic relational model.	
Web platform development	The ATLAS platform will allow easy-to-use access to raw data and data transformations, air pollution models creation and execution, rich visualization and reporting tools for both development and operation and furthermore assistance to participatory multi-criteria decision-making.	1. Core package specification and implementation 2. Web-based GUI implementation with extended GIS capabilities and data visualization. 3. Knowledge base/semantic net specification and implementation 4. Implementation of tools/services for distributed (agent-based) stream analytics as support to experiment execution 5. Implementation of tools/services for participatory multi-criteria decision making

Effort

An estimation of the time needed to complete each of the above-mentioned tasks was made based on the required efforts. Furthermore, Table 4 displays which team members are involved in executing the tasks.

Table 4. The effort required to complete each task.

Task	Team Members	Effort
1. Collect all available geo-referenced 1-hour air pollution and meteorological data from 2008 to 2018 that cover Europe and the USA.	P2, P3, P4, P7, P8, P10, P11, P15	*3 months*
2. Calculate and interpolate meteorological surface data based on GDAS1 meteorological fields.	P2, P3, P4, P11	*2 months*
3. Process, combine, optimize, validate, document, and submit the datasets to a repository as a highly dimensional, structured database.	P2, P3, P4, P11, P12, P15	*3 months*
4. Spatio-temporal data methods development	PI, P1, P2, P4, P5, P6, P10	*6 months*
5. Air pollution modelling	PI, P1, P4, P5, P6, P7, P8	*8 months*
6. Decision-making modelling	PI, P1, P4, P5	*2 months*
7. Core package specification and implementation	P1, P4, P5, P11, P12	*3 months*
8. Web-based GUI implementation with extended GIS capabilities and data visualization.	P1, P4, P5, P11, P12, P13, P14	*2 months*
9. Knowledge base/semantic net specification and implementation	P1, P5, P11, P12	*3 months*
10. Implementation of tools/services for distributed (agent-based) stream analytics as support to experiment execution	P1, P5, P11, P12, P13, P14	*2 months*
11. Implementation of tools/services for participatory multi-criteria decision making	P1, P5, P11, P12, P13, P14	*1 month*

Resources

Appropriate resources are required to complete each identified task. Table 5 contains the resources available to the SROs US and IPB to complete the identified tasks and the resources planned to be procured with funds from the ATLAS project budget.

Table 5. Resources required to complete each task.

Task	Resource
1. Collect all available geo-referenced 1-hour air pollution and meteorological data from 2008 to 2018 that cover Europe and the USA.	Personal computers at US and IPB
2. Calculate and interpolate meteorological surface data based on GDAS1 meteorological fields.	PARADOX infrastructure
3. Process, combine, optimize, validate, document, and submit the datasets to a repository as highly dimensional, structured database.	Personal computers at US and IPB and PARADOX infrastructure
4. Spatio-temporal data methods development	Personal computers at US and IPB
5. Air pollution modelling	Personal computers at US and IPB
6. Decision making modelling	Personal computers at US and IPB and PARADOX infrastructure
7. Core package specification and implementation	Personal computers at US and IPB
8. Web-based GUI implementation with extended GIS capabilities and data visualization.	Personal computers at US and IPB and PARADOX infrastructure
9. Knowledge base/semantic net specification and implementation	Personal computers at US and IPB

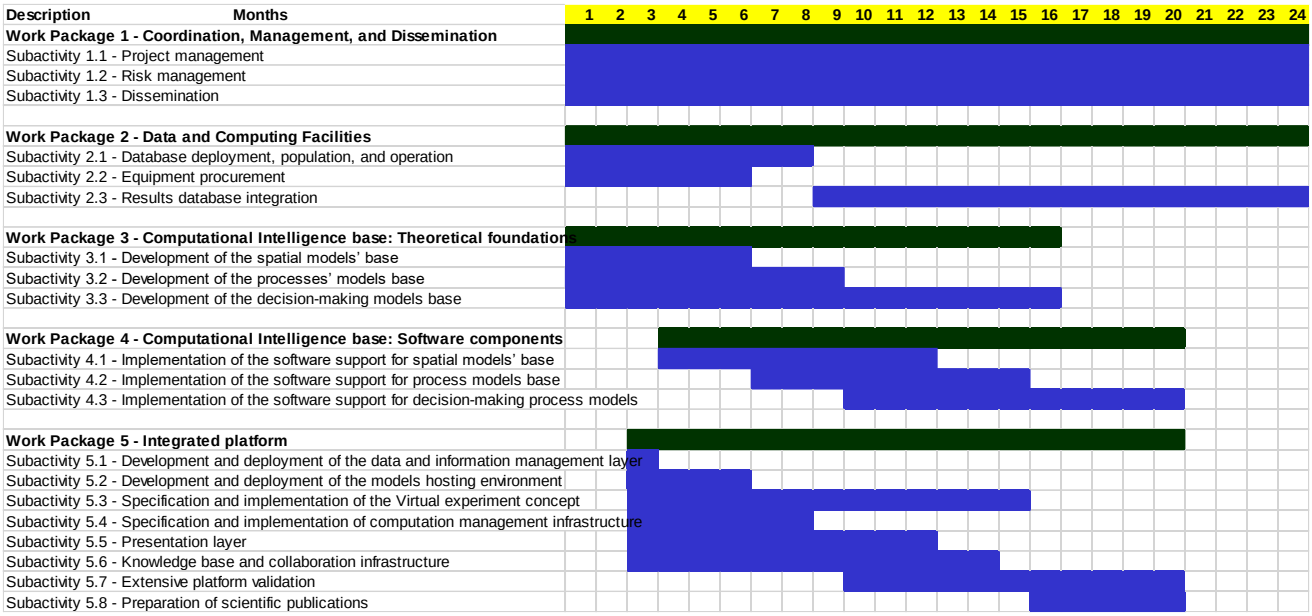
10. Implementation of tools/services for distributed (agent-based) stream analytics as support to experiment execution	Personal computers at US and IPB and PARADOX infrastructure
11. Implementation of tools/services for participatory multi-criteria decision making	Personal computers at US and IPB and PARADOX infrastructure

2. Project Plan

Timetable

The project Gant-chart is provided in Table 6.

Table 6. The project Gant-chart.



Assumptions

Assuming the project duration, the approved funding will be available upon request, the resources identified will be available upon request, and the project will not change in scope.

Constraints

Identified planning constraints can be summarized as follows:

1. The project team must deliver the software with no requirement for additional hardware.
2. Staff must complete the project within normal working hours.
3. The project must operate within the funding and resource allocations approved.

3. Budget, Risks, and Change Management

Project Budget

The budget of the ATLAS project is presented in Table 7 in accordance with the categories outlined in the Science Fund concur, along with a column for current costs to monitor the relationship between actual and planned consumption.

Table 7. ATLAS project budget.

Budget category	Costs in EUR
Personnel	134,146.43
Travel	700.00
Conferences and publications	3,520.00
Equipment	32,000.00
Consumables	704.25
Services and subcontracting	0
Dissemination	8,459.32
Other costs	470.00
SROs overhead	20,000.00
Total	200,000.00

Risk Log

Table 8 describes potential risks that could hinder the smooth implementation of the project and their corresponding proposed mitigation measures. The risk management process will be repeated at regular intervals throughout the project to monitor and control risk factors. While it may not be possible to foresee all contingencies, continuous monitoring will capture events that may threaten the success of the project or the quality of its results. Regular meetings will be organized to report new risks or those that have been resolved and to evaluate and update the corresponding contingency plans.

Table 8. Risk management.

Risk assessment	Description of the risk	Risk mitigation measures to be undertaken by members of the Project team or SRO	Risk level
Methodology risk	Description of the risk	1. Bad-performing Computational Intelligence methods. 2. The uncertainties in air pollution modelling.	High
	Actions to be undertaken	1. Improvement or even elimination of non-adequate methods. 2. Problematic data will be excluded from further analyses by preprocessing and verification of the raw data.	
Work packages, deliverables and milestones	Description of the risk	1. Malfunction of the high-performance computer. 2. Difficulties in delivery of platform or other milestones and deliverables.	Medium
	Actions to be undertaken	1. The tasks will be realized with a smaller number of computing processors. 2. Team members have significant experience in technical web development and will ensure that the technical specifications are clearly drafted and understood. The platform will be launched in phases. Flexibility has been built into the timing of the delivery ensuring minimum impact of potential delays.	
Members of the project team and SROs	Description of the risk	Difficulties in coordination among and within WPs, and tasks delivery.	Low
	Actions to be undertaken	The WP coordinators have strong relevant experience of managing diverse consortia and ties with the participants. They will bring best practices regarding coordination	

		among WPs and raise awareness of data sharing, data democracy and access.	
Procurement	Description of the risk	The planned equipment is not available on the market or has not been delivered on time.	Low
	Actions to be undertaken	IPB has experience in sourcing this type of equipment and reliable market estimate.	
Budgetary issues	Description of the risk	Delay in receiving budget funds.	Medium
	Actions to be undertaken	The first payment will be used for ordering the necessary equipment to prevent that delay hugely affect the realization of the project activities.	
Other risks	Description of the risk	Difficulty measuring concrete impacts during and beyond the project's lifetime/Fail to reach the expected dissemination and impact.	Medium
	Actions to be undertaken	The project’s commitment to building sustainable solutions and to measuring the impact of its activities will be pursued through a combination of the dedicated WPs and an appropriate methodology within and beyond the project’s lifetime.	