

and stakeholder engagement through the following activities.

- (I) **Write position papers and relevant conferences:** White papers will be produced showcasing the results receive feedback from stakeholders about implementations. Results will also be shown in relevant conferences where scientific, industry, NG and NGO entities meet.
- (II) **Website:** A website to reach the general public through social media (Instagram, Twitter, Facebook, LinkedIn, Video-channels), press releases/TV/radio and a public git ROBHOOT repository (ROBHOOT git repository), will be used for communicating results to all target audiences.
- (III) **Hackathons:** we will organize joined activities with on-going EU/International projects to attract multipliers and developers from the community who engage in data analytics. At the end of the project we will organize a workshop specifically on *Next-generation evolutionary-biology AI-inspired solutions for global sustainability challenges*.
- (IV) **Testnet:** ROBHOOT will launch a testnet to disseminate the results of discovery in federated networks. The launch will have invited NGOs and GO across disciplines and social, economical and technological sectors. The ROBHOOT Open Discovery Network will be launched as a Biodiversity and sustainability network. It will offer solutions for the sustainability of the Oceans and to integrate additional public databases and data collections into the open discovery network to facilitate NGOs, GOs and other organizations transparency and governance in ecosystem management.

3 Implementation

3.1 Research methodology and work plan, work packages and deliverables

The project consists of five work-packages (WP1-WP3: R&D, WP4: Dissemination and WP5: Management). WP1 deals with evolutionary semantic algorithms for data knowledge discovery, WP2 addresses eco-evolutionary diversification-inspired AI models to infer causal knowledge discovery with an implementation for the sustainability of the Oceans' sustainability case study, WP3 addresses evolutionary neural biology-inspired for knowledge discovery to provide cooperative forecasting in federated networks. WP3 also provides an empirical case implementation of cooperative forecasting for the sustainability of the Oceans. **Demonstrators:** The project will create three demonstrators of increasing complexity all containing full reproducibility, automation and visualization capabilities:

1. ROBHOOT v1.0 Software demonstrator with evolutionary semantic algorithms to decipher ontologies for the sustainability of the Oceans data knowledge discovery case study (MS1);
2. ROBHOOT v2.0 Software demonstrator with evolutionary diversification-inspired AI modeling for spatiotemporal causal pattern knowledge discovery (MS2);
3. ROBHOOT v3.0 Software demonstrator with evolutionary neural diversification-inspired modeling for discovery in federated networks (MS3).

The inference of causal mechanisms and the discovery of spatiotemporal patterns in federated networks is a generic problem found in e.g. many agents sharing resources, sustainability, eco-evolutionary networks, biodiversity maintenance, or social networks. Thus, the discovery computation of spatiotemporal patterns represents a ubiquitous computational problem in digital and natural ecosystems, where many evolving and heterogeneous agents and interactions share information to reach sustainability goals. In the demonstrators of ROBHOOT, we will consider different scenarios for each of the software implementations such that agents contain many evolving traits and interactions (MS1, MS2 and MS3). This allows, for example, finding patterns of trait and interaction changes to improve sustainability as a function of the observed empirical patterns in our Oceans' sustainability case study. In the course of the project, more complex context-dependent trait changes of agents and interactions together with different learning functions will be considered to explore how they affect sustainability properties in federated networks.

WP	Work package title	Lead No.	Lead Name	PMs	Start Month	End Month
1	Data knowledge discovery	2	CSIC	48	1	18
2	Causal knowledge discovery	4	TARTU	24	7	24
3	Discovery in federated networks	6	TU GRAZ	24	13	36
4	Dissemination	7	IEO	24	1	36
5	Management	1	EAWAG	31.2	1	36
			Total PMs	151.2		

Table 3.1b: Work package description