



Report on Deliverable D10.4

Strategic Analysis of the Supported Topics 2021

Workpackage		10		
Task		10.4		
Date of delivery	Contractual	Month 44 (July 31 st , 2021)		
	Actual	Month 46 (September 1 st , 2021)		
Code name		D10.4	Version 1	Draft ☐ Final ☒
Type of deliverable		Report		
Dissemination level		Public		
Contact(s)		Florence Quist	florence.quist@frs-fnrs.be	
WP/Task leader		Florence Quist	florence.quist@frs-fnrs.be	
EC project officer		Salvatore Spinello		
Publishable abstract		The report presents the analysis of the outcome of the funded projects in the Call 2016 topics: • Lifelong Learning for Intelligent Systems (LLIS) • Visual Analytics for Decision Making under Uncertainty (VADMU) It also gives insight into the evolution of those topics.		
Keywords		Strategic analysis, supported topics, Call 2016		

Content Table

1. Overview of CHIST-ERA III Task Related to D10.4	3
2. Analysis and recommendation for the process	3
a. Scope of Deliverable 10.4	3
b. Analysis of the Topic <i>Lifelong Learning for Intelligent Systems (LLIS)</i>	3
i. Evolution of the Funded Projects	3
ii. Evolution of the Topic	4
c. Analysis of the Topic <i>Visual Analytics for Decision Making under Uncertainty (VADMU)</i> ..	5
i. Evolution of the Funded Projects	5
ii. Evolution of the topic	6
3. General comments	6

1. Overview of CHIST-ERA III Task Related to D10.4

The task (T10.2) related to the deliverable 10.4 covers the strategic analysis for the topics funded by CHIST-ERA calls. This task entails an analysis of the results obtained by on-going projects and aims at the definition of suitable criteria for the identification of emerging research communities and their maturity. In addition, an analysis of the needs and opportunities of research projects for specifically identified topics is conducted to determine their compatibility with possible future European programmes. Deliverables of this task, D10.4 and following, will be made available to the FET community and other fora.

2. Analysis and recommendation for the process

a. Scope of Deliverable 10.4

In order to allow for maturation of both funded projects and topic, deliverable 10.4 focuses on the topics of the Call 2016:

- Lifelong Learning for Intelligent Systems (LLIS)
- Visual Analytics for Decision Making under Uncertainty (VADMU)

Projects of the Call 2016 finished in 2021. During their lifetime, the corresponding research communities could form, exchange and present their vision of the future of their topics thanks to 2 editions of the CHIST-ERA yearly projects seminar¹.

This deliverable draws on the work performed in task 9.1 Project follow-up and monitoring (for projects from all calls except Call 2017) and in task 10.1 Project Seminar organisation.

b. Analysis of the Topic *Lifelong Learning for Intelligent Systems (LLIS)*

i. Evolution of the Funded Projects

The CHIST-ERA consortium funded three projects in the LLIS topic. The table below details the specific scope of each project.

Name	Project goals
ALLIES	<i>Autonomous Lifelong learning intelLigent Systems</i> Evaluation of Human Assisted Lifelong Learning Systems (HALLS) • Evaluation of the cost and benefit of human interaction across time • Derivation of existing metrics to evaluation HALLS • Creation of protocols, corpora to foster a research community • Implementation of an open platform for reproducible research evaluation Proof of concept on two modalities: • Machine translation • Speaker diarization
DELTA	<i>Dynamically Evolving Long-Term Autonomy</i> • Reinforcement learning: agent repeatedly interacts with environment • Maximization of long-term reward • Three key issues addressed – Planning, exploration and task decomposition

¹ Project Seminar 2020 had to be cancelled due to the health crisis

	- Application domain: microgrids - Gradual changes: seasonal variations - Abrupt changes: battery failure
LIHLITH	<i>Learning to Interact with Humans by Lifelong Interaction with Humans</i> Lifelong Learning applied to dialogue systems - User interaction and feedback provided to system to obtain additional supervision to improve the system - Reduction of the amount of annotated interactions - Lowering of the cost of deployment - Improvement of the quality on deployment across time

From the progress reports submitted by the participating teams and the review reports by the scientific experts appointed by CHIST-ERA, we can conclude that in general the projects progressed according to the initial plan and generated relevant results, as detailed in the table below:

Name	Major project outcomes
ALLIES	- Organization of open challenges (publicly available corpora, protocols, baselines) - Set up of an operational platform for reproducible evaluation of HALLS - Follow-up of the CHIST-ERA project with MSCA RISE ESPERANTO project
DELTA	- Development of novel algorithms that address three key issues of lifelong learning - Publicly available simulator based on data from a real microgrid - Development of an integrated system that implements the algorithms on the simulator
LIHLITH	- Improvement of results after deployment, especially in new domains - Development of an open evaluation method, four open benchmarks - Dissemination: 2 paper awards and 2 Google faculty research awards - Successful commercial exploitation → 5 follow-up projects/collaborations

ii. Evolution of the Topic

As part of the projects seminar's format, the projects in the same topic were invited each year to reflect on their progress and on the key challenges that still need to be tackled in their specific field. They produced presentations that are made public and available from the CHIST-ERA website (<http://www.chistera.eu/funded-topics>). The following challenges were identified during the 2021 project seminar:

- Transition from simulation to real-world applications
 - Scalability and responsiveness with an emphasis on performance increase, robustness and flexibility
 - Access to more data, potentially with more modalities – improvements beyond the state of the art
- Challenges of implementing AI systems
 - Ethics, privacy, discrimination, etc.
 - Trust, explainability, formal verification of actions
- Need for additional support for technology transfer
 - Industrial contacts – need to build networks of academic and commercial collaborators
 - Entrepreneur backing for potential start-ups

c. Analysis of the Topic *Visual Analytics for Decision Making under Uncertainty (VADMU)*

i. Evolution of the Funded Projects

The CHIST-ERA consortium funded two projects in the VADMU topic. The table below details the specific scope of each project.

Name	Project goals
IVAN	<i>Interactive and Visual Analysis of Networks</i> Creation of a visual analysis system for the exploration of dynamic or time-dependent networks using modern clustering methods
PROVIDEDH	<i>PROgressive Visual Decision-making for Digital Humanities</i> - Assess and track the degree of uncertainty of Digital Humanities research objects - Evaluate how they are affected by application of different computational models - Covey the evolution of uncertainty with interactive multimodal interfaces that progressively adapt to the moment of decision-making

Together, those projects address the following issue:

- Understanding the reliability, scope and accuracy of big data analysis systems
- Communicate these aspects to users in an intuitive manner
- Development of new analysis tools to support trusted an efficient decision making under uncertainty
- Explorations of ensembles and parameter spaces of algorithms
- Participatory design workshops to identify questions and capture the users' mental models
- Proposals to convey uncertainty in different application scenarios and measured how this affected collective and/or individual sensemaking

From the progress reports by the participating teams and the review reports by the scientific experts appointed by CHIST-ERA, we can conclude that projects progressed generally according to the initial plan and generated relevant results, as detailed in the table below:

Name	Major project outcomes
IVAN	- Organization of two full-day Creative Visualization Opportunities (CVO) Workshops to identify questions and capture the users' mental models - Development of novel algorithms based on graph Slepian's for network clustering - Comparison of multiple network clustering by integrating Prior Knowledge into clustering process - Development of novel techniques suitable for exploring networks and their clustering in the presence of uncertainties
PROVIDEDH	- Literature review on visualization for the digital humanities - Development of uncertainty taxonomy through different evaluation techniques carried out alongside experts - Active participation in VIS/DH conferences (DARIAH, IEEE VIS, DH conferences....) - Development of a collaborative platform that enables collective reasoning and sensemaking on a corpus with a focus on uncertainty management and representation - Application of visualization techniques aimed at depicting uncertainty in distinct DH tasks

ii. Evolution of the topic

As part of the projects seminar's format, the projects in the same topic were invited each year to reflect on their progress and on the key challenges that still need to be tackled in their specific field. They produced presentations that are made public and available from the CHIST-ERA website (<http://www.chistera.eu/funded-topics>). The following challenges were identified during the 2021 Projects Seminar:

- Fostering the transfer of exploration methodologies when data is uncertain between different application areas of visualization research
- Shortening the development cycle for visual decision-making tools
- Refining evaluation strategies for visual decision-making tools
 - Taking into account the degree of trust and confidence users have in the systems
 - Identifying common elements that make these tools useful in different application domains

3. General comments

Based on the scope of the supported topics and the progress and analysis of the funded projects about what still needs to be investigated, certain future calls from the Horizon Europe EIC Work Programme 2021-2022 are identified as being of interest to the CHIST-ERA Call 2016 research communities.

Topic	Relevant Horizon Europe Work programme: relevant topics of WP 2021-2022
	EIC funding schemes • EIC Transition open – for further valorisation of the projects research results EIC Transition funds innovation activities that go beyond the experimental proof of principle in laboratory. It supports both the maturation and validation of your novel technology in the lab and in relevant application environments (by making use of prototyping, formulation, models, user testing or other validation tests) as well as the development of a business case and business model towards the innovation's future commercialisation. • EIC Pathfinder open – for tackling the identified challenges of the research area EIC Pathfinder Open involves interdisciplinary research and development. By bringing diverse areas of research together, often with different perspectives, terminologies and methodologies, within individual projects and within a portfolio of projects, really new things can be generated and entirely new areas of research can be opened up. It is up to you to compose the team that you need, that you can learn from, and that you can move forward with.
LLIS	HORIZON-CL4-2021-HUMAN-01-01: Verifiable robustness, energy efficiency and transparency for Trustworthy AI: Scientific excellence boosting industrial competitiveness (AI, Data and Robotics Partnership) (RIA) Expected Outcome: • World-class transparent, explainable, accountable and trustworthy AI, based on smarter, safer, secure, resilient, accurate, robust, reliable and dependable solutions. • Improved AI solutions aiming to meet the industrial 253 requirements in terms of autonomy, accuracy, safety, repeatability, robustness, resilience, security, etc.

	• Greener AI. • Next level of AI-based solutions, exploiting the intelligence embedded in the edge-to cloud infrastructure 253 Including all industries from manufacturing to service, both public and private. • Advances in complex systems & socially aware AI HORIZON-CL4-2022-HUMAN-01-01: AI for human empowerment (AI, Data and Robotics Partnership) (RIA) Expected Outcome: • Truly mixed human-AI initiatives for human empowerment • Trustworthy hybrid decision-support systems
VADMU	HORIZON-CL4-2022-DATA-01-01: Methods for exploiting data and knowledge for extremely precise outcomes (analysis, prediction, decision support), reducing complexity and presenting insights in understandable way (RIA) Expected Outcome: Improving automated ways for extracting meaning and providing insights from data extremely fast and/or accurately in order to optimize decision making (ranging from crisis/emergency management to predictive maintenance) or action planning, as well as demonstrating how these improvements can have great positive impacts for society, people, economy, or the environment.