

LIHLITH:

**Learning to Interact with Humans by
Lifelong Interaction with Humans**

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<http://ixa2.si.ehu.eus/lihlith>

Scientific background

- Dialogue systems are changing the way we access information
- Major companies are investing heavily on gadgets
- But current commercial technology is brittle
 - > Agents follow predefined information flows coded with manual rules
 - > Limited vocabulary and understanding
 - > Works for narrow tasks, agents get confused easily
 - Turn on radio station, get traffic information, ...
 - > Once deployed, knowledge managers need to be on top, checking logs to detect weaknesses



Scientific background

- Alternative to manual rules
 - > Supervised machine learning
 - > Collect and annotate interactions
 - > Less costly than writing rules
- Quality is bound by the contents of the collected interactions
 - > Less control on errors (easy to fix with rules)
- Needs to collect interactions separately for each domain
 - > It is still costly to deploy in new domains

Scientific background

- LIHLITH will apply Lifelong Learning techniques to dialogue systems
 - > Improve the quality
 - > Lower the cost of deployment in new domains
- Lifelong Learning (Liu et al. 2016)
 - > Learn cumulative knowledge
 - > Monitor interactions
 - > Continuous learning



Source: <https://www.dnainfo.com>

Key challenges

- Key ideas of LIHLITH

- > Dialogue systems designed to get feedback from user
- > The system will learn from the feedback
 - Dialogue management
 - Domain knowledge
- > Focus on question-answering dialogue
 - Knowledge bases
 - Textual repositories



The screenshot shows the 'Seasoned Advice' website interface. At the top, there's a navigation bar with 'Questions', 'Tags', and 'Use'. Below the header, a question is displayed: 'Caffeine content of cold-brewed coffee: higher or lower than hot-brewed?'. The question has 41 votes, 20 answers, and 137k views. It is tagged with 'coffee', 'cold-brew', and 'caffeine'. The user 'crispy' asked the question 16 hours ago.

Key challenges

- Technologies:
 - > Lifelong Learning, Deep Learning
 - > Dialogue and Natural Language Understanding
 - > Question Answering from text and knowledge bases
- Three research areas
 - > RA1: Lifelong Learning for dialogue
 - > RA2: Lifelong Learning for knowledge induction and question answering
 - > RA3: Evaluation of dialogue

RA1: Lifelong Learning for dialogue

- **Autonomous reconfiguration of dialogue strategies** based on
 - > User feedback
 - > Online lifelong learning algorithms
- **Proactive capabilities** to
 - > Ask for new knowledge
 - > Use performance feedback

RA2: LL for knowledge induction and question answering

- **Use user feedback to improve knowledge induction and QA over time**
- **Knowledge induction**
 - > Based on low dimensional representations
 - > Capture propositional knowledge from background texts and knowledge bases
 - > Feedback to provide supervised signal
- **Question answering**
 - 1) Powered by semantic textual similarity (STS)
 - 2) Questions parsed into structured queries on KB

RA3: Evaluation of dialogue

- Release of all **experimental conditions to the public**
- Use **crowdsourcing platforms** in order to test the systems
 - > Online access to the dialogue systems, live users
 - > Performance throughout time
- Use semi-automatic techniques to produce **artificial large amounts of training data**
 - > Convert QA datasets in interactive question-answering dialogues based on crowdsourcing
 - > Using a novel technique where semi-automatic expansion is used to produce variations in the dialogues

Impact on science

- RA1: Lifelong Learning for dialogue
 - > Method to produce dialogue management that learns from previous dialogues
- RA2: Lifelong Learning for knowledge induction and QA
 - > Method to improve representations from dialogue feedback
 - > Method to improve QA/STS from dialogue feedback
- RA3: Evaluation of dialogue
 - > Benchmark for interactive system based on QA using crowdsourcing and an online API

Impact on society

- Support the development of objective benchmarks and evaluation strategies for lifelong learning
- Build momentum and enable reproducibility beyond the project consortia
- Make intelligent systems more usable
- Reduce the cost of data management and limit or remove the need for users to provide data to developers
- Enhance the value-chain of actors and create new market opportunities
 - > Transfer to industrial dialogue system

LIHLITH consortium

<i>Country</i>	<i>Institution</i>	<i>PI</i>	<i>Co-Investigators</i>
Spain	UPV/EHU	Eneko Agirre	Arantxa Otegi, Basilio Sierra, German Rigau
France	LIMSI	Sophie Rosset	Patrick Paroubek, Anne-Laure Ligozat, Anne Vilnat
Spain	UNED	Anselmo Peñas	Álvaro Rodrigo
Switzerland	ZHAW	Mark Cieliebak	Jan Deriu
France	Synapse	Camille Pradel	Baptiste Chardon, Patrick Séguéla, Damien Siléo, Sophie Muller

LIHLITH
kick-off,
San
Sebastian

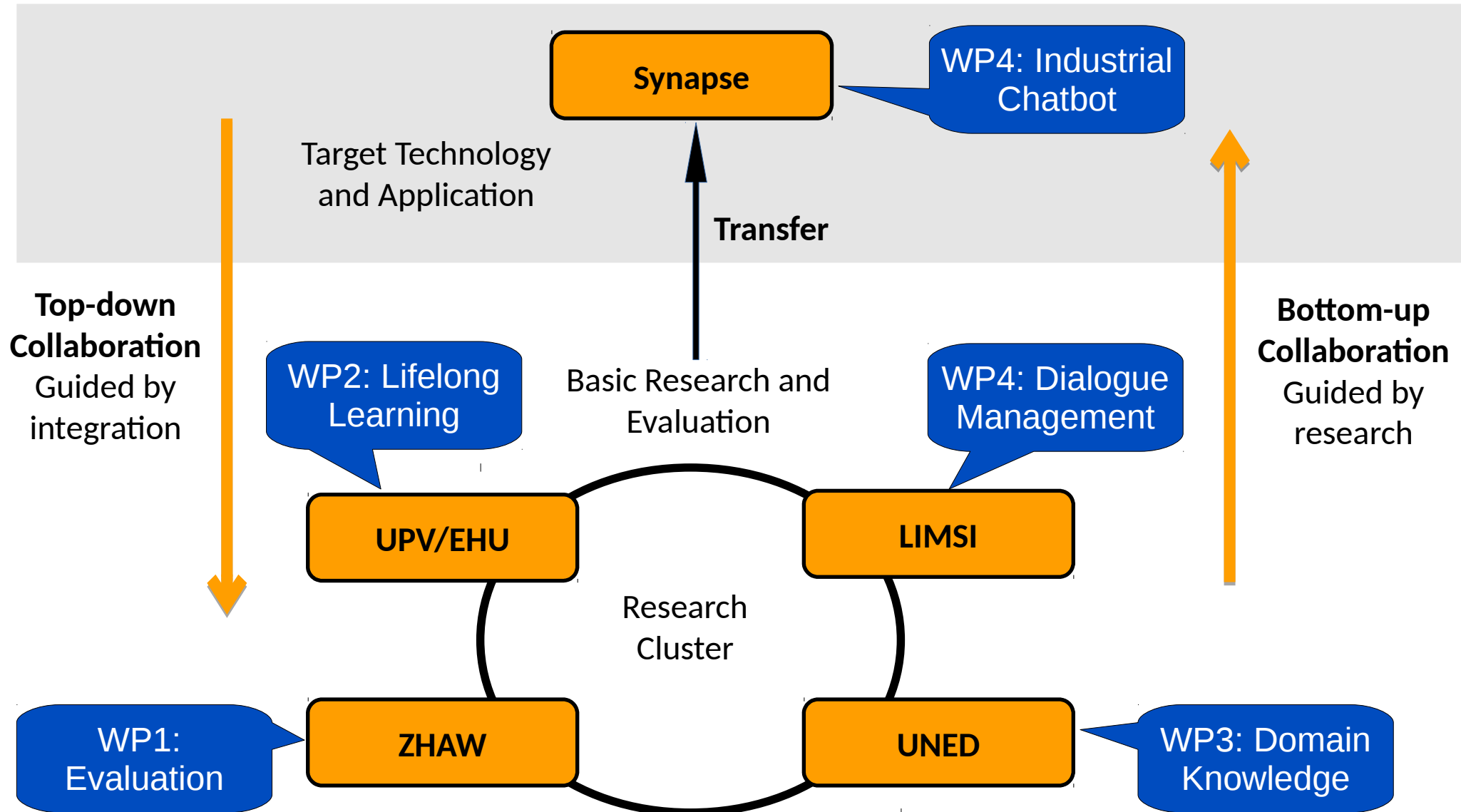


LIHLITH consortium

Combination of several, highly-specialised types of expertise:

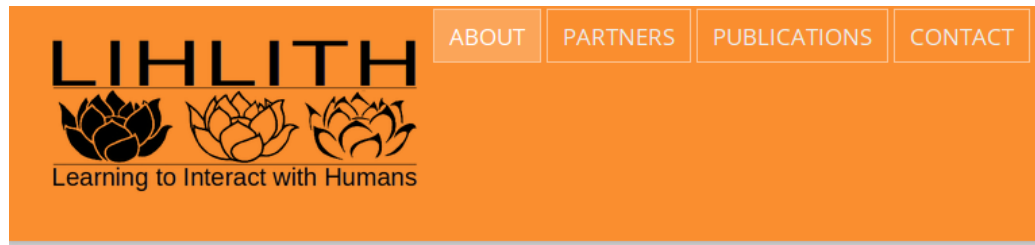
- Academia and **industry**
- Natural language processing (all)
- Human-machine dialogue (LIMSI, ZHAW, **SYNAPSE**)
- Question answering (UNED, **SYNAPSE**)
- Textual inference and similarity (UPV/EHU, UNED)
- Machine learning and deep learning (UPV/EHU, LIMSI)
- Knowledge induction from text (UPV/EHU, UNED)
- Evaluation (LIMSI, ZHAW, UNED)

LIHLITH consortium



Results

- Dissemination



<http://ixa2.si.ehu.eus/lihlith>

LIHLITH project

Learning to Interact with Humans by Lifelong Interaction with Humans

The LIHLITH project is a **fundamental pilot research** new lifelong learning framework for the interaction in specific domains.

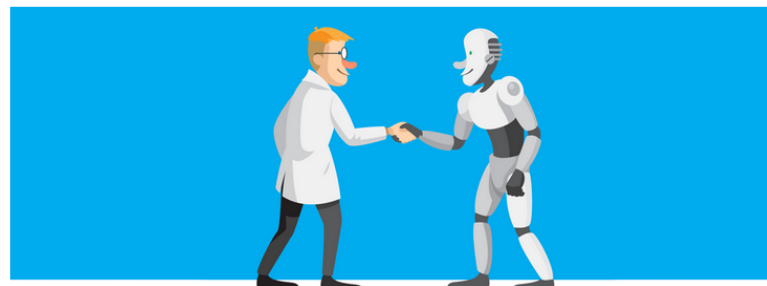
A Lifelong Learning system learns different tasks sequentially, solving future related tasks based on past experience. **computer dialogue**, where each dialogue experience allows the system to better interact, based on the success (or failure) of previous interactions. The dialogue will be designed to produce a reward, whether the interaction was successful or not. The reward is used to learn the next task.

Synapse

BESOINS SOLUTIONS PRESTATIONS À PROPOS BLOG CONTACT

LIHLITH, le projet R&D qui apprend aux robots à apprendre!

R&D | 14-02-2018



Sustainability and Valorisation

- Open source and web services
- Publicly available datasets and evaluation protocols
- Reproducibility
- Industrial partner, Synapse, is developing core technology for future demonstrators to its customers

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