CODECO's Validation and Experimentation Challenges

Field	Details
1. Name of Challenge	CODECO Energy-awareness strategies
2. Partners	FOR (Contact person is Rute C. Sofia at sofia@fortiss.org)
3. Submission Specifications	**Requirements**: – Full CODECO framework OR – CODAG, PDLC-CA and the CODECO scheduler, SWM **Description** The main goal of this challenge is to assess the proposed CODECO strategies for energy-awareness against i) vanilla K8s scheduler; ii) KEIDS or similar approaches. SMART Goals: • Analyze node selection consistency under varying conditions. • Assess trade-offs between energy savings and task latency or QoS. • Identify benefits of network-aware scheduling (e.g., reduced link energy). **Main steps:** *1 – Setup of the controlled experimental enviroment* • Deploy CODECO on a real or emulated IoT–Edge–Cloud testbed (min of 10 worker nodes, single cluster) – CODEF is suggested as well. • If possible, Include heterogeneous hardware (ARM, x86) and varied network topologies.

	- Ensure Prometheus/Kepler is configured to expose energy metrics to CODECO's PDLC-CA. - Set adequate load generators (e.g., Apache Jmeter, etc) and network load generators **2 – Design Experimental Scenarios** Consider realistic datasets or realistic configurations: - Measure baseline node energy. - Uniform load: Test equal pod distribution across nodes. - Heterogeneous load: Vary node preloads to test dynamic adaptability. - Varying request rates: Low, medium, high (e.g., 10, 50, 100 rps). - If possible, consider intermittent connectivity or mobile environments **3 – Heuristics comparison** — Consider the proposed energy-awareness metrics (node energy, link energy) — Consider energy increase, from the before and post deployment stages. — **Performance evaluation parameters should consider at least**: — *Baseline*: K8s, CODECO without energy-awareness, and others, such as KEIDS — Node selection stability — Migration frequency impact — Overall energy consumption — Response time (when re-scheduing) — Others: CPU, memory usage, etc. **4 – Explain results** — Provide results — Upload raw results for multiple runs — Provide an adequate documentation — Validate if CODECO prevents deployment in „hot nodes" as previously validated. **5 – Propose improvements** — Explain where CODECO brings advantages, and where are gaps — Propose improvements
4. Plataforms to be used	Local cluster with at least 10 nodes and/or CODEF

	Applicants are expected to follow up with the listed contact persons in order to obtain the necessary material and then upload their submission via a Zip File.