CODECO's Validation and Experimentation Challenges

Field	Details
1. **Name of Challenge**	CODECO Resilience strategies evaluation
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 — CODECO NetMA, in particular the monitoring aspects. **Description** The main goal of this challenge is to assess the proposed CODECO strategies for resilience against i) CODECO without resilience; ii) vanilla K8s scheduler. SMART Goals: • Analyze node selection consistency under varying conditions. • Assess trade-offs between resilience and application QoS/impact in the overall infrastructure. • Identify benefits of CODECO across different environments. **Main steps (Months: Mx)** *1 – Setup of the controlled experimental enviroment M1* • 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 metrics to CODECO's PDLC-CA. • Set adequate load generators (e.g., Apache JMeter, etc) and network load generators **2 - Design Experimental Scenarios M1** Consider realistic datasets or realistic configurations: • Measure baseline node resilience for different proposed metrics (and others). • 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 M2-M3** — Consider the proposed resilience aware metrics (node faikure, link failure, etc) and assess the impact of the probing in this process — **Performance evaluation parameters should consider at least**: — *Baseline*: K8s, CODECO without resilience profile — Node selection stability — Migration frequency impact — Overall energy consumption — Response time (when re-scheduling) — Others: CPU, memory usage, etc. **4 – Explain results – M3** — 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 –M3** — Explain where CODECO brings advantages, and where are gaps — Propose improvements

	Report will be provided by CODECO
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.