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Fraunhofer-Institut für Angewandte Informationstechnik FIT

„Cloud Computing vs. Edge Computing“ [CvsE]

Technologies, development and application areas in the energy industry

Future Energy Lab

dena Deutsche Energie-Agentur

Cloud Computing vs. Edge Computing
Objectives

- Under the Umbreall of the dena Future Energy Lab

- Potentials and risks of Cloud Computing (CC) and Edge Computing (EC) application in the power system

- Identifying the readiness of CC and EC technologies
  - Regulatory Framework
  - Standards of the Energy Industry

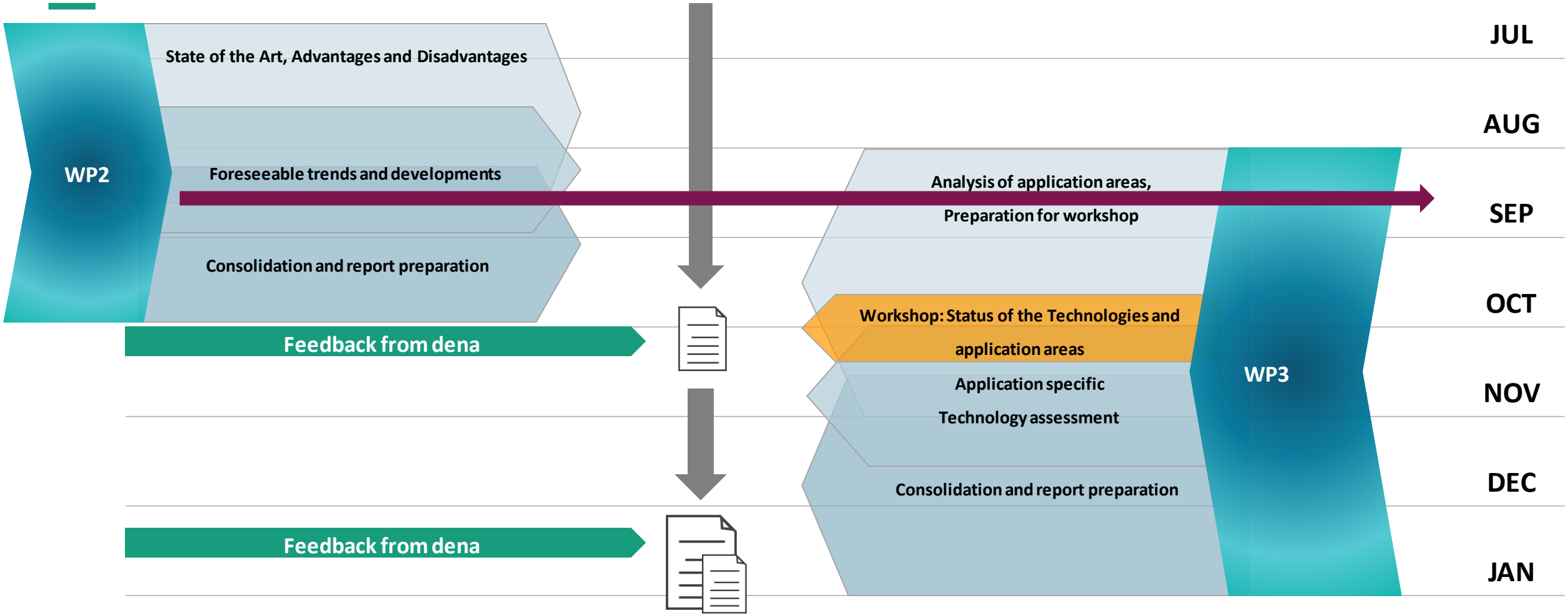
- **Innovation report that serves as guideline for**
  - Policy makers
  - Stakeholders : Business, politics as well energy system professionals

Project duration: 10.07.2023 – 31.01.2024

WP1	Project Management Planning
WP2	State of the Art Cloud-Computing vs. Edge Computing
WP3	Applications and impacts of cloud computing and edge computing in the power system
WP4	Dissemination and communication

Cloud Computing vs. Edge Computing

Timeline



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WP 2	State of the Art, Advantages and disadvantages	Foreseeable Trends and Developments

Focus	▪ Technical state of development
	▪ Advantages and disadvantages
	  ▪ **Economic**: time to market, vendor lock-in, costs/risks
	  ▪ **Ecological**: energy efficiency
	  ▪ **Technical**: scalability, flexibility, redundancy, bandwidth, downtime, security, privacy
		▪ Increasing penetration of cloud and edge computing
		▪ Hybrid solutions with cloud and edge computing
		▪ Increasing portability of services through
		▪ Standardisation (e.g. Gaia-X)
		▪ Green cloud approaches for further improved energy efficiency

Sources	▪ Literature review: Publicly available sources, work from our previous projects(edgeFLEX) and dena projects, drafts from committees and working groups (e.g. Gaia-X, EU Data Spaces Support Centre)	

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WP 3	Analysis of Application Areas	Workshop: State of the Art and Application Areas	Application-specific technology assessment
Focus	▪ Advanced metering infrastructure (AMI) ▪ Demand Side Response (DSR) ▪ Local Energy Communities and Markets ▪ Electromobility ▪ Operation of active energy distribution networks	▪ Half-day Expert Workshop ▪ Defining and concretizing application areas ▪ Contextualisation of the research results	▪ (Technical) requirements ▪ Contribution to security of supply (resilience, reliability, security concepts / advantages), interoperability, new business models ▪ Acceptance and social compatibility ▪ Cost efficiency ▪ Ecological relevance: integration of RES, energy demand ▪ (Regulatory) hurdles
Sources	▪ Literature review: Publicly available sources, work from our previous projects (edgeFLEX) and dena projects, drafts from committees and working groups (e.g. Gaia-X, EU Data Spaces Support Centre)		▪ Research, Results from WP2, Results of the Workshop

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Goal of the workshop

In the workshop, findings from the research (state of the art, development, applications) will be discussed with experts / stakeholders of the energy sector.

Questions to be addressed as a matter of priority:

- **What access do actors in the energy sector already have to cloud/edge technologies today?**
  - Data centres, edge-enabled end devices?
  - Self-operated / as a service?
- **What challenges does the energy sector face?**
  - Distribution grid operation, RES integration, grid transparency, black start capability, Cybersecurity
  - Consumer protection / user activation, dynamic tariffs
- **What solutions does the use of edge/cloud technologies offer in this regard?**
  - Status analyses, energy management, demand-side management

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Approach for the workshop

Zentrale Fragen

- **What access do actors in the energy sector already have to cloud/edge technologies today?**
  - In discussions on possible implementation paths/scenarios, participants will be asked about the current status "in practice" as a starting point for recommendations for action in the final innovation report.
- **What challenges does the energy sector face?**
  - Identified challenges of the energy sector will be compared with the experiences of the participants and supplemented if necessary. In the further course, these will be evaluated according to their urgency
- **What solutions does the use of edge/cloud technologies offer in this regard?**

Contact:

Charukeshi Joglekar

Charukeshi.mayuresh.joglekar@fit.fraunhofer.de