

# ELICITATION AND FORMALIZATION OF LOCAL ENERGY COMMUNITY STAKEHOLDER REQUIREMENTS IN AUSTRIA

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DI Oliver LANGTHALER, BSc, Fachhochschule Salzburg GmbH, [oliver.langthaler@fh-salzburg.ac.at](mailto:oliver.langthaler@fh-salzburg.ac.at)

**Dr. Jawad KAZMI**, AIT Austrian Institute of Technology GmbH, [jawad.kazmi@ait.ac.at](mailto:jawad.kazmi@ait.ac.at)

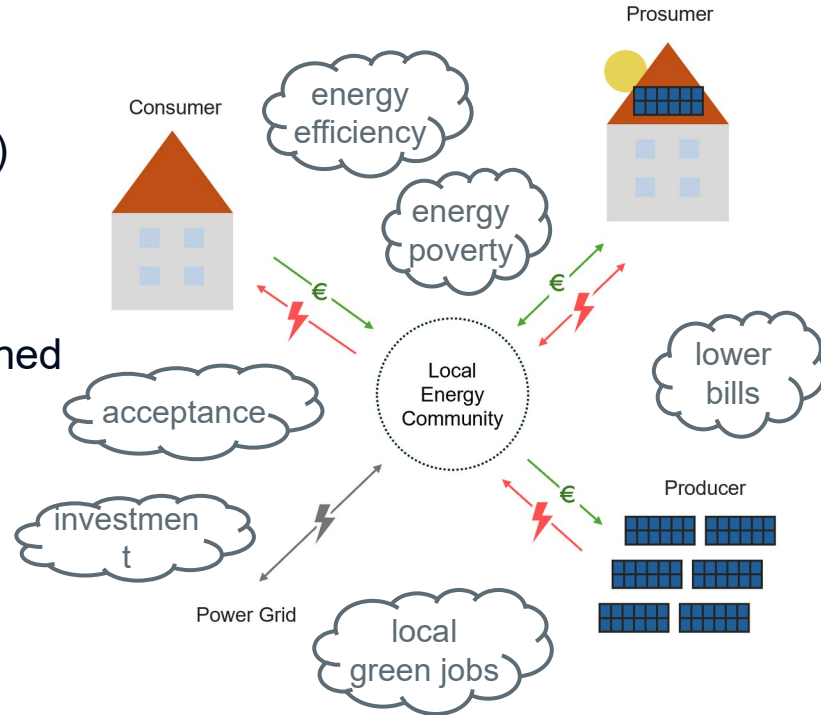
DI Stefan LINECKER, BSc, Salzburg Research Forschungsgesellschaft m.b.H., [stefan.linecker@salzburgresearch.at](mailto:stefan.linecker@salzburgresearch.at)

# OUTLINE

1. Introduction
2. Methodology
3. Stakeholder engagement workshops
4. Results
5. Conclusion and outlook

# LOCAL ENERGY COMMUNITIES

- Physically and virtually connected community (one or more buildings, several parties)
- (Typically) predominantly residential in nature
- Local energy production (Electricity and/or heat, community-owned)
- Renewable energy source(s)
- Usage of produced electricity/heat predominantly within the community
- Purpose: Benefit for its members
- Not (primarily) profit-oriented



*“collective and **citizen-driven** energy **actions** to support the **clean energy transition**”*

# PROJECT ECOSINT: (ENERGY COMMUNITY SYSTEM INTEGRATION)



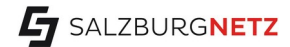
- 6. FFG call for energy research
- 03.2021-08.2024, 9 consortium partners, € 1,35 Mio.
- Holistic view on LECs
- Development of a unified IT system architecture
- Close involvement of stakeholders (e.g., via workshops)
- Increase potential for contribution to energy transition
- System-friendly, safe, secure integration into the overall energy system
- Leverage flexibilities for peak shaving, improve resilience
- Prevent increasing peaks, shifts in simultaneities



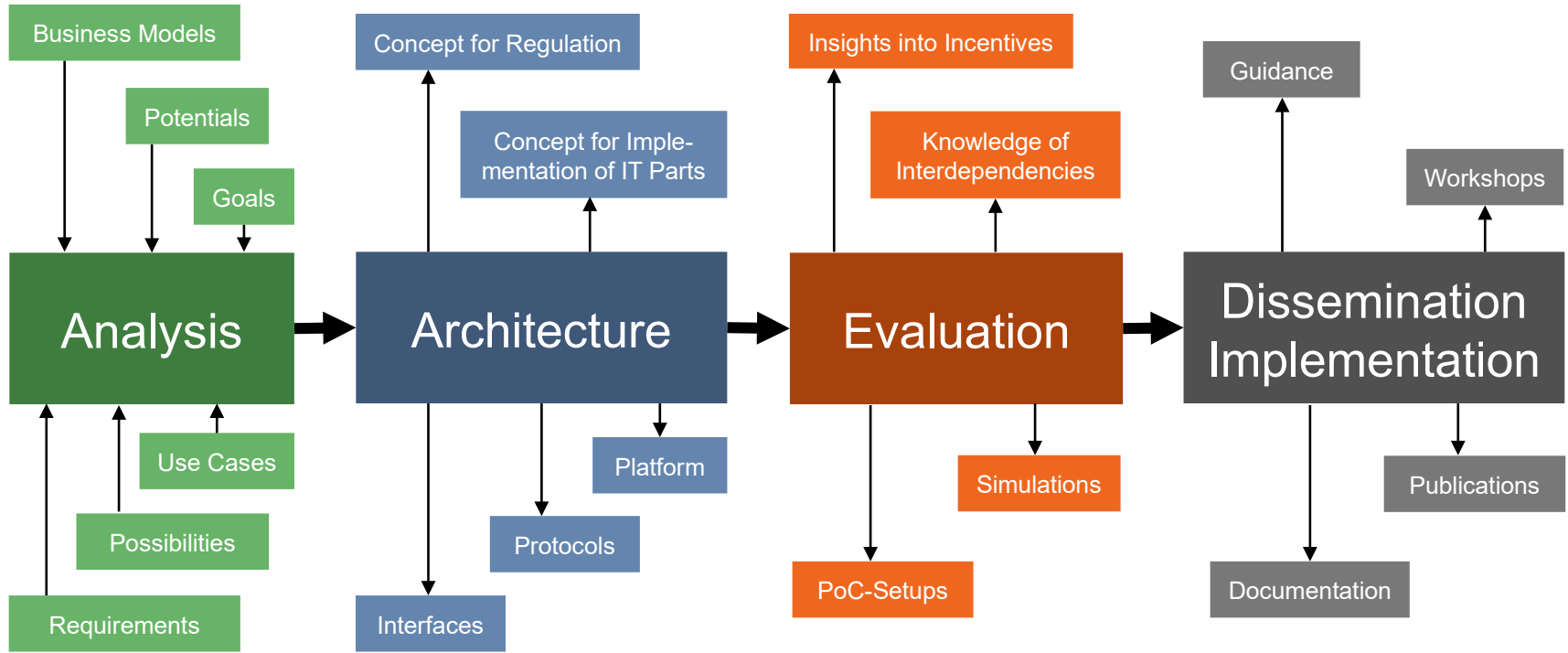
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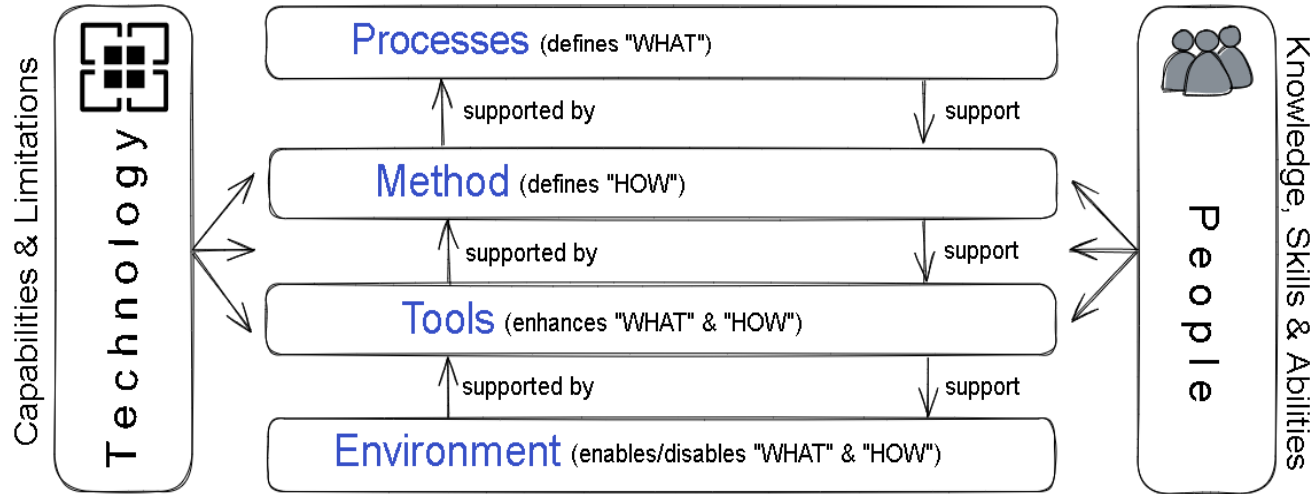
SIEMENS



# ECOSINT: PROCESS FLOW

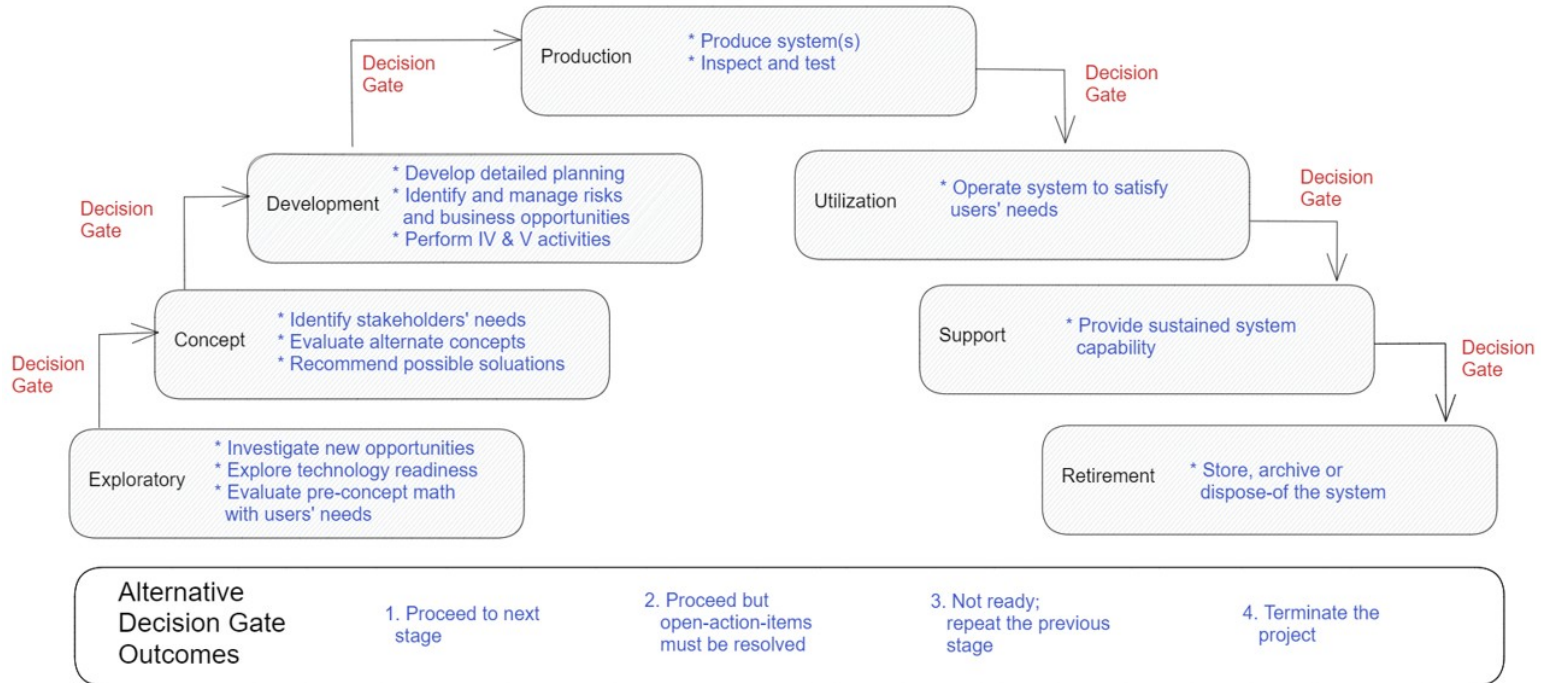


- Methodology  $\neq$  Process **OR** Method



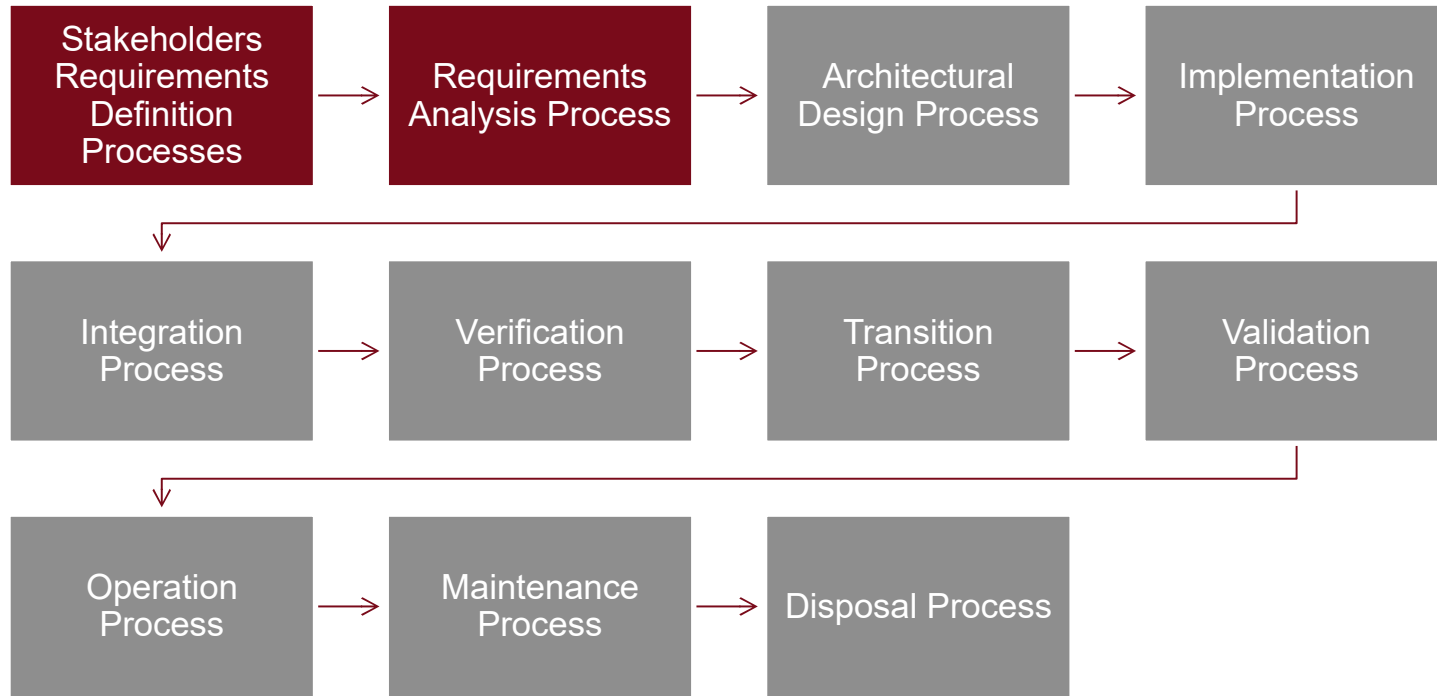
The PMTE Elements and effect of technology and people

# METHODOLOGY: LIFECYCLE DEVELOPMENT MODELS

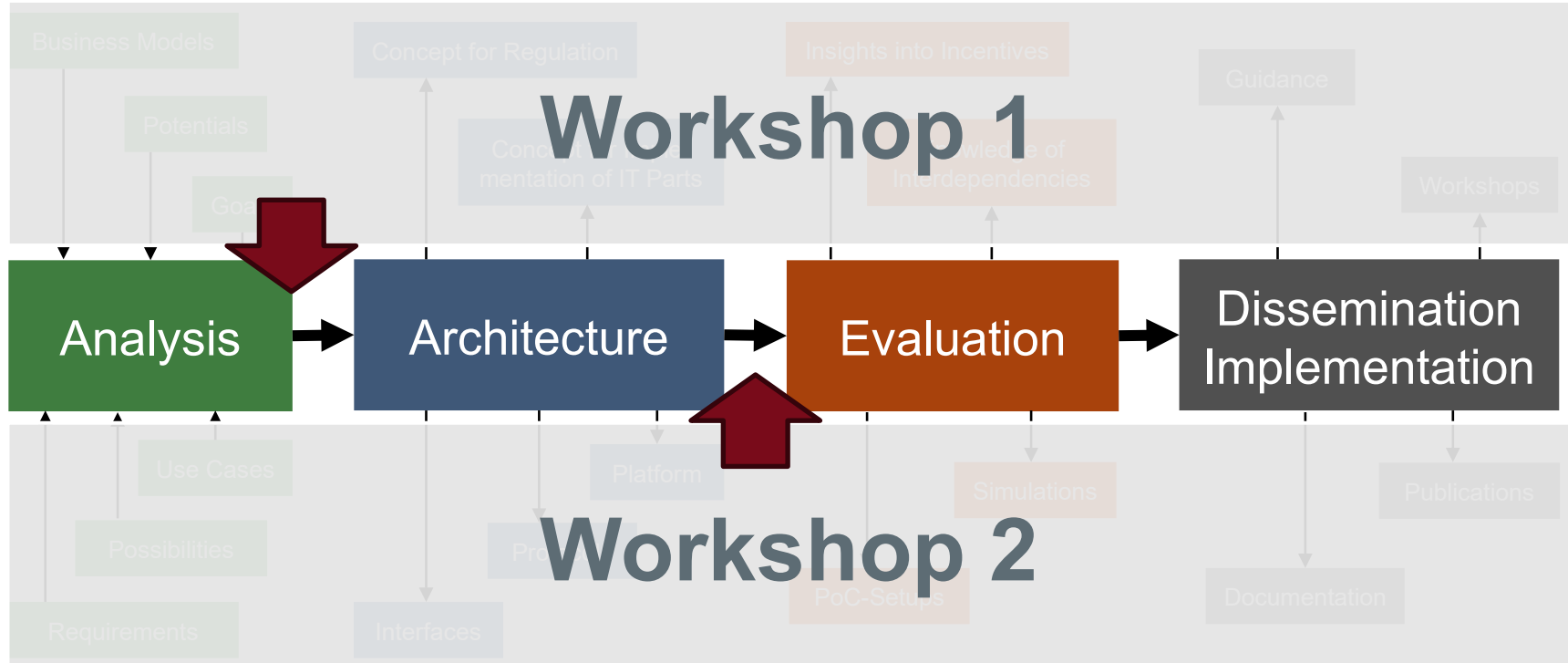


SEBoK Vee Model rendering ISO/IEC/IEEE 15288 lifecycle process

# ISO/IEC/IEEE 15288:2023 TECHNICAL PROCESSES

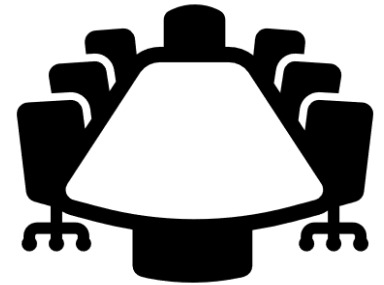






# STAKEHOLDER-WORKSHOP 1

- Held on September 29<sup>th</sup>, 2021
- Goal: collect internal and external requirements regarding LECs
- 4 hours, ~**50** participants, representative mix of stakeholders from all domains
- 2 breakout sessions, 3 groups corresponding to interest groups
- Presentation and discussion of group results
- Constructive discourse
- Clear tendency towards convergence and inclination to cooperate
- 2nd workshop announced



# GROUP 1 "LEC-OPERATORS & MEMBERS" TOPICS (MUNICIPALITIES / OPERATORS / SERVICE PROVIDERS / MEMBERS)

## Administration, Quality, Dissemination, etc.

- **Avoidance of bureaucracy** (e.g., need to form associations), LEC operation as a service
- **Possibility for citizen participation** (to promote acceptance and awareness)
- **Diversification of expansion of renewable energy production**, not just PV
- **Cost savings** (must not be cancelled out by administrative expenses)
- **Maximization of expansion goals** utilization of available areas
- **Avoidance of limiting factors for expansion** (e.g., circumvent grid restrictions via storage)
- **Digitalization** counteract increasing transparency of energy consumption
- **Simple messages** in public communication to ensure mass appeal and leverage existing goodwill



# GROUP 2 "LEC PARTNERS" TOPICS (DSO / ENERGY-/SOLUTION-/HARDWARE-PROVIDERS)

## Technical, Performance, Operation, Quality, etc.



- **Interoperability** (hardware / software / communication, required for mass adoption)
- **Harmonization of tariffs** (e.g., for joint usage of storage for peak shaving and by energy provider)
- **Sustainable grid operation** (e.g., procurement of storage replacement after end of service life)
- **Adherence to costs-by-cause principle** (cost transparency, avoid exploitation by solving self-induced problems)
- **Billing data** (15m SM values only for billing, live data for real-time control within LECs)
- **Replacement value calculation** (consensus on how to handle missing values)
- **Multiple use of measurement data** (e.g., usage of SM customer interface -> cost savings)
- **Low-threshold participation** (e.g., support from service providers, One-stop-shop, offers from cooperatives)
- **„How to“ Energy Community** (e.g., model contracts)
- **Unified system architecture** (required for mass adoption and economic viability)

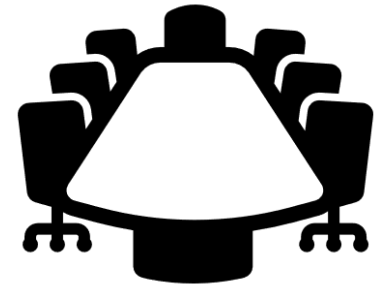
## GROUP 3 "FRAMEWORK PROVIDERS" TOPICS (RESEARCH INSTITUTES / SOCIOLOGISTS / ECONOMISTS / REGULATORS)

### Technical, Administrative, Replication, etc.

- **Infrastructure** for LEC operation and grid friendliness, consideration of season-specific parameters
- **Use cases, business case(s)**
- **Robustness**, avoidance of negative effects on the grid
- **Data exchange** standardized and reliable
- **Data for simulation** (e.g., investigating interaction between LECs)
- **Prioritizing utility over profit**
- **Slow (simple) start**, gather experience and best practice examples
- **New forms of tariffs** and/or tariff structures
- **Tools** to gauge potentials and for operation

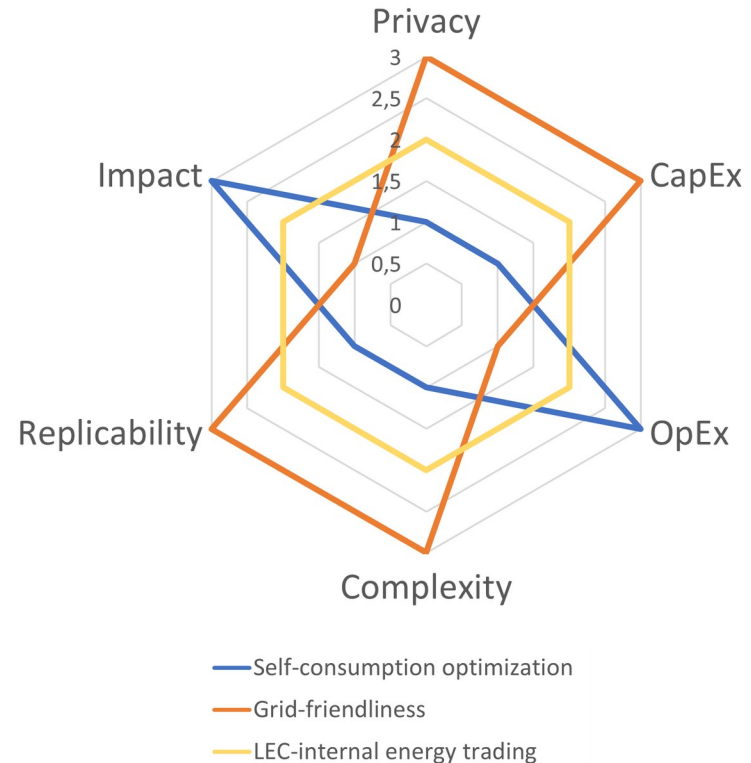


- Held on March 3<sup>rd</sup>, 2023
- Hybrid event at 12th Symposium on Communications for Energy Systems (ComForEn)
- Goal: collect feedback on developed architecture, define focus for remainder of project
- 2,5 hours, ~25 participants
- predominantly research institutions, regulators, service/solution/hardware providers
- 2 breakout sessions, grouped corresponding to interest groups
- Presentation and discussion of group results
  
- Architecture appropriate for communicated requirements
- Minor oversights and need for clarification of some details identified
- Focus for remainder of project:
  - Flexibility (esp. EV charging)
  - Data spaces
  - Communication infrastructure/architecture (esp. for live metering)

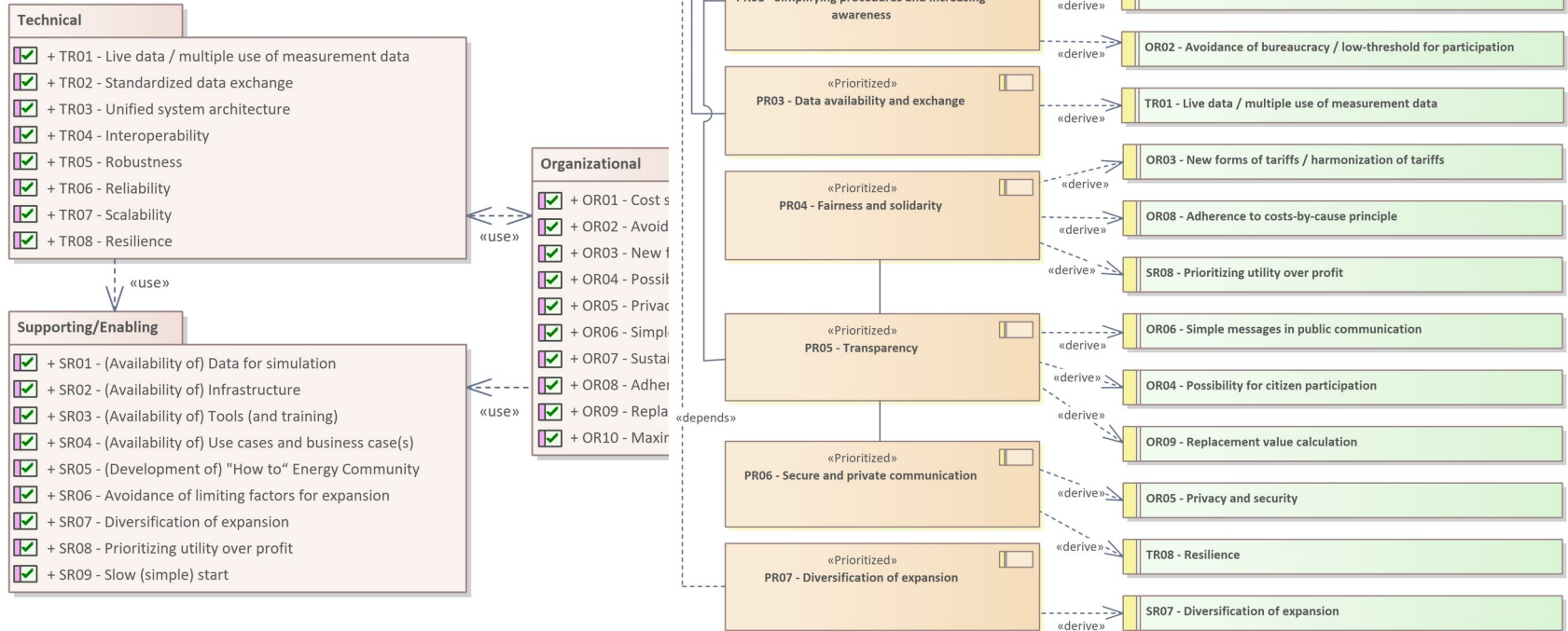


# RESULTS: SUMMARY

- 27 formalized requirements
- 8 summarized and prioritized requirements
- 3 main business use cases:
  - **self-consumption optimization**
  - **grid friendliness**
  - **LEC-internal energy trading**
- conceptual model & reference architecture



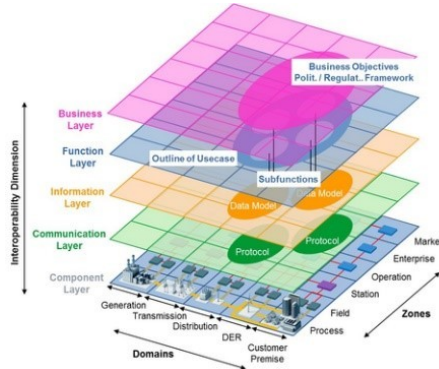
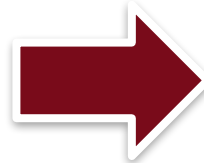
# RESULTS: FORMULATED & PRIORITIZED REQUIREMENTS



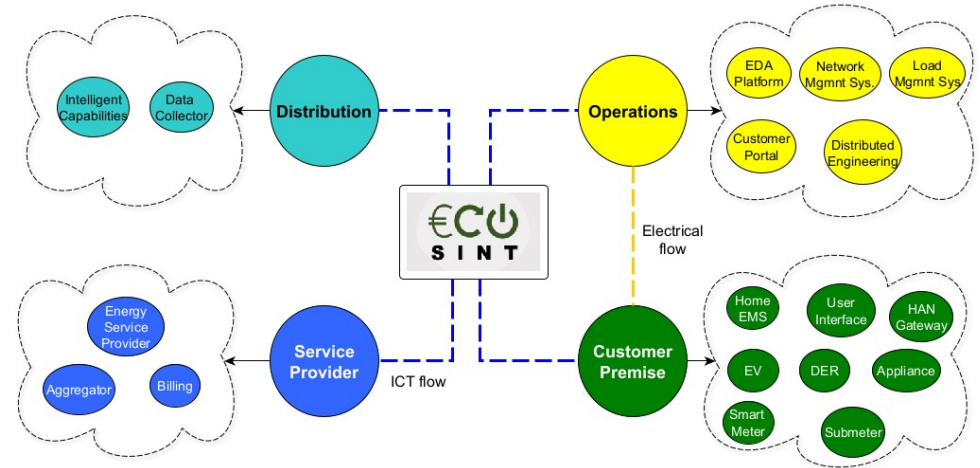


# RESULTS: CONCEPTUAL MODEL

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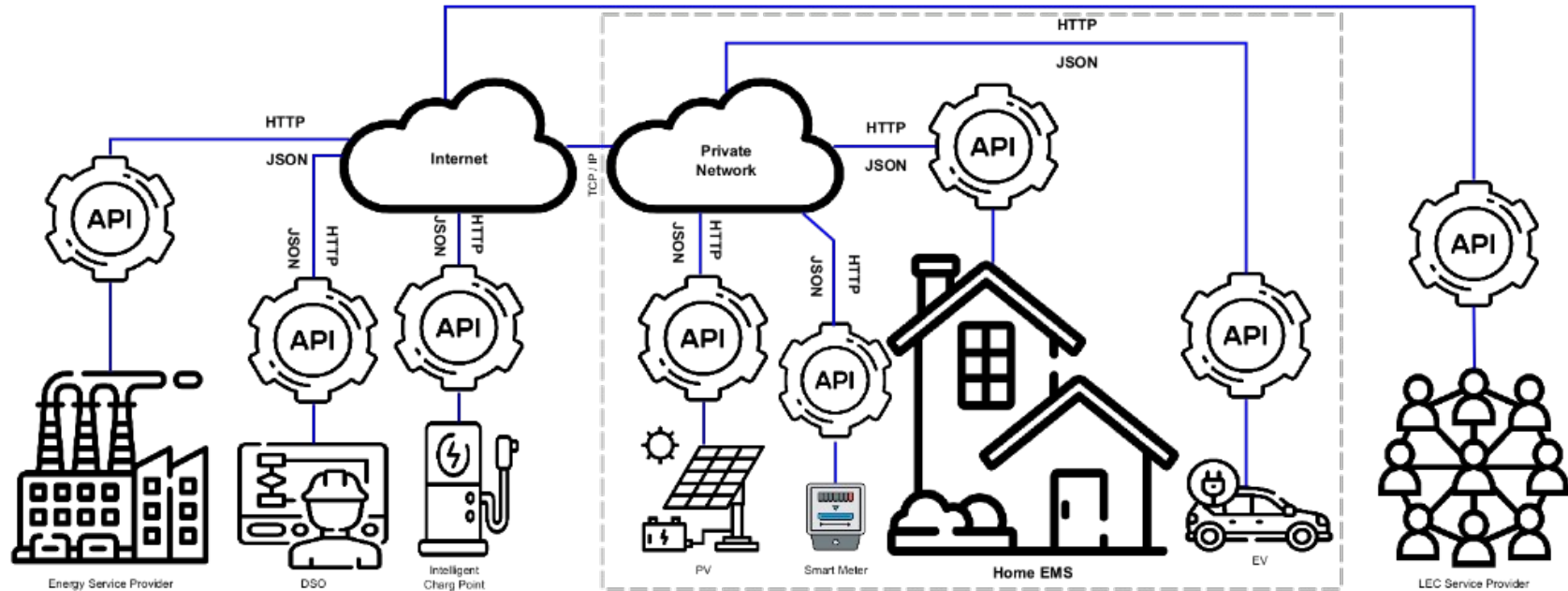


SGAM



Eibl, G., Kazmi, J., Langthaler, O. *et al.* Towards interoperable local energy communities in Austria. *Elektrotech. Inftech.* **140**, 432–440 (2023). <https://doi.org/10.1007/s00502-023-01150-4>

# RESULTS: REFERENCE ARCHITECTURE



Eibl, G., Kazmi, J., Langthaler, O. *et al.* Towards interoperable local energy communities in Austria. *Elektrotech. Inftech.* **140**, 432–440 (2023). <https://doi.org/10.1007/s00502-023-01150-4>

- adherence to standards → interoperability, reusability, portability, etc.
- stakeholder inclusion → co-creating is the way forward
- LECs are a rapidly evolving topic seeing rapid adoption → ongoing process, refinement may be necessary
- technology just one aspect → additional legislation necessary to leverage full potential

## Outlook

- develop formal CIM and PIM, reference PSM (*structure, semantics, and notations*)
- elaboration with scenario-based implementation approach
- elaborate on high level use cases and stakeholder groups

THANK YOU!