

# EnInnov2024

18. Symposium Energieinnovation | 14.02.-16.02.2024

## SMART ENERGY SERVICES FOR ENERGY COMMUNITIES

### BUSINESS MODELS AND USER EXPERIENCE ANALYSIS FROM THE SERVE-U FIELD TRIAL

Karthik BHAT, Andrea WERNER, Ines MLINARIC, Martin EDER, Michael SCHMIDTHALER



Community based smart energy service through flexible optimization models and fully automated data exchange

# Project Serve -U

- Community based smart energy service solution
- Klima-und Energiefonds  
(through Energieforschungsprogramm 6. Ausschreibung)
- **Development and validation** of an Energy-use Optimization Platform (EOP) supporting Energy Communities through
  - energy flow visualization and effective communication
  - enabling EC members to optimally control the utilization of their renewable energy sources
  - accentuating flexibility and demand optimization, with minimal technical and financial effort.
- Website: <https://serve-u.at/>



Community based smart energy service through flexible optimization models and fully automated data exchange



# Serve-U Application

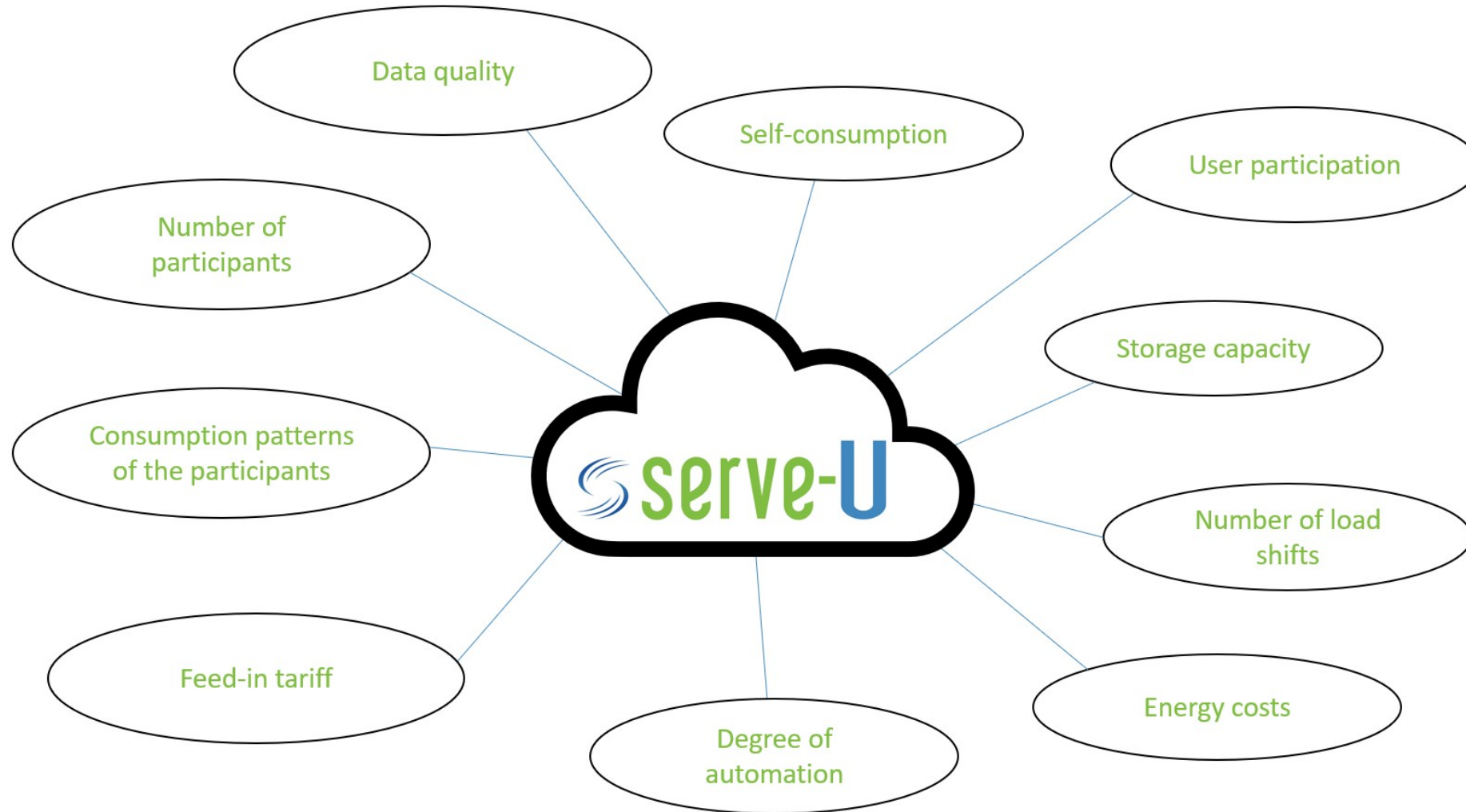
- **Front-end** for the Energy Optimization Platform (EOP)
- Influence existing energy practices with optimization
- User Interface for delivering valuable information from EOP
- Discrete design with contrasting colours and simple symbols for easy understanding
- **„Motivators“** – Recommendations to shift load
- User feedback on recommended action collected during functional validation



\*serve-U, FHOÖ

# Business model development

- Factors influencing economic efficiency



# Business models

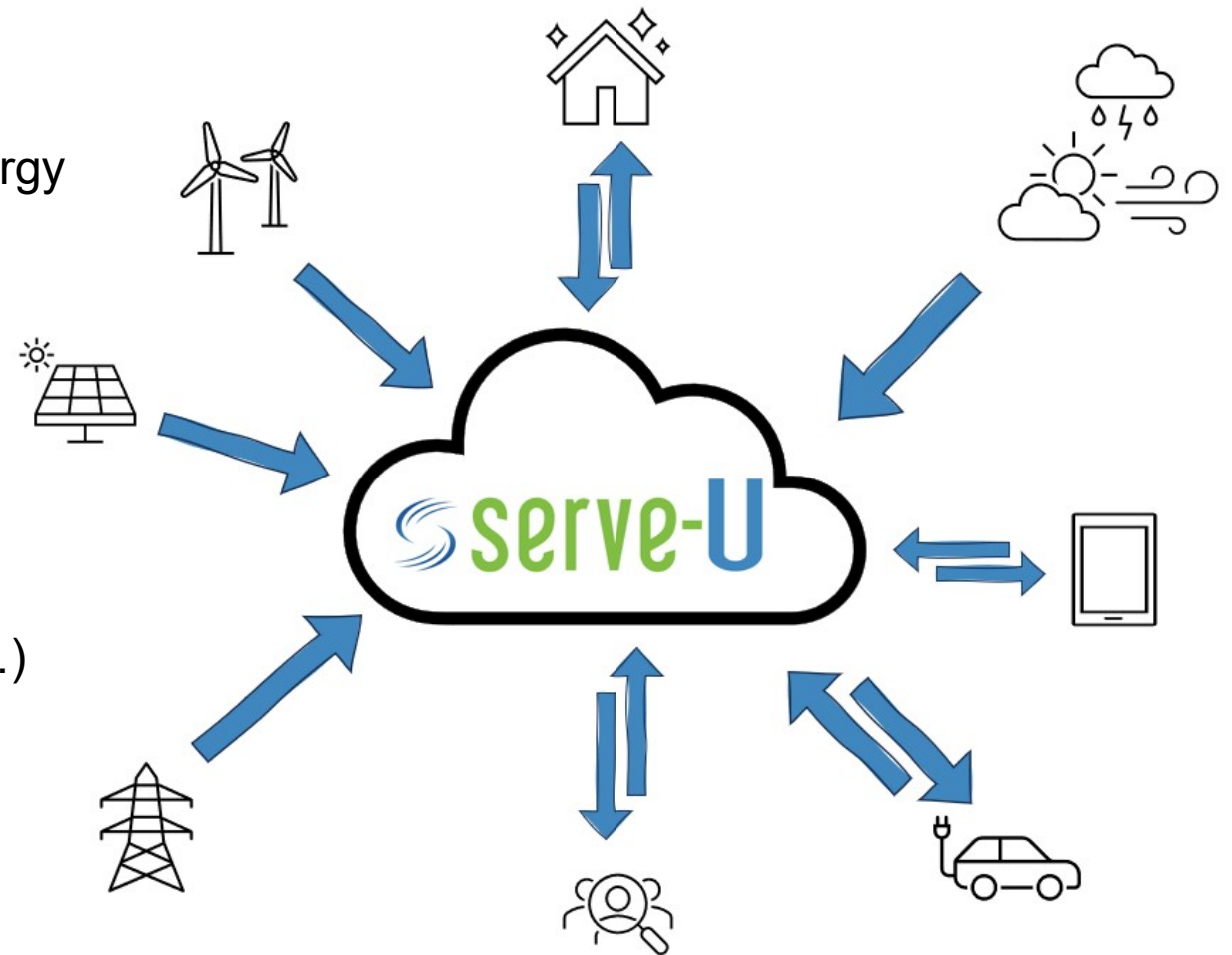
- **Energy community:**

- **Community**

- Collective generation and consumption of energy
    - Collective participation in the energy market
    - Increase energy efficiency
    - Knowledge transfer

- **Value creation**

- Diversification of generation technologies
    - Energy storage systems (e.g. V2G, Battery, ...)
    - Continuous growth of the community
    - Collective creation of value



# Business models

- **Energy Service Platform**

- **Information exchange**

- Visualisation of overall generation and consumption
    - Increase active participation through collaboration
    - Interaction possibilities for participants (e.g. forum,...)

- **Peer-to-peer**

- Energy exchange within the community
    - Energy exchange with other users of the energy service platform

- **Data**

- Gain of historical and current data
    - Implementation of weather forecasts
    - Implementation of price data

# Business models

- **Monetization:**

- **Subscription**

- Monetization through a periodic subscription fee (e.g. monthly, yearly)

- **Open source**

- Monetization through providing infrastructure

- **Licencing**

- Monetization through a yearly licencing fee

- **Whitelabel**

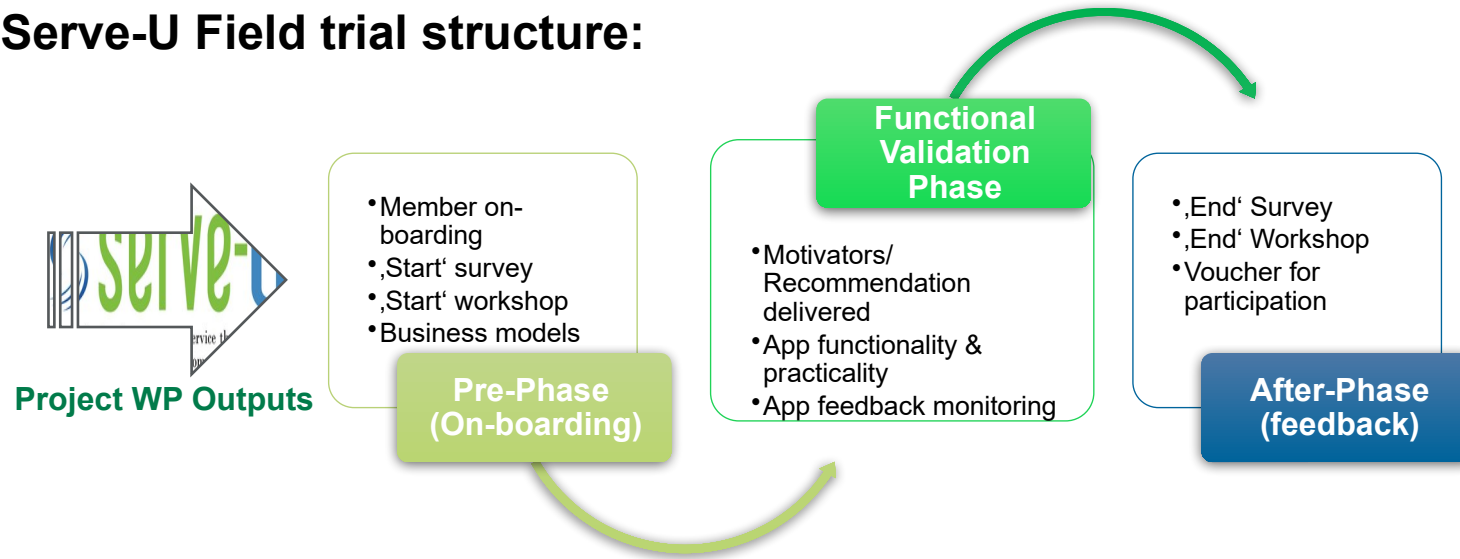
- Monetization through selling the knowledge and application to third parties

- **Data generation**

- Monetization through leveraging data from consumption and production patterns for third parties

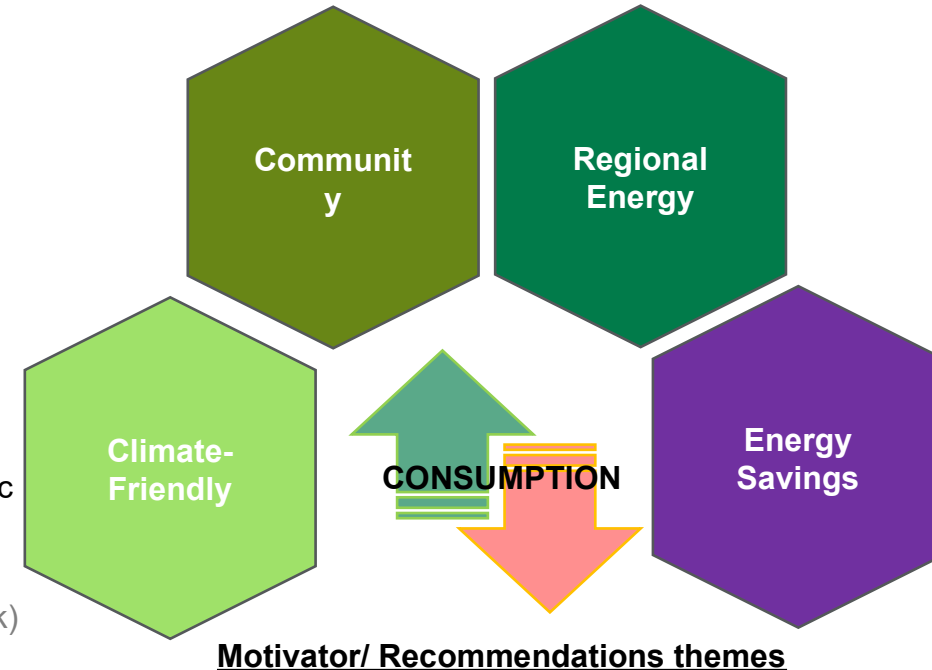
# Serve-U Field trial & Functional Validation

## Serve-U Field trial structure:



## Functional Validation:

- Users receive (individualized) notifications on DSM actions/ recommendations to shift their load (specific device)
- Day-ahead optimization - generates suggestions for household actions (e.g. "if you plan to use washing machine tomorrow, it would be best to use it between xx and yy o clock")
- Notification for user via app + feedback on intention to act on this suggestion
- IF YES: reminder push notification in the morning of said day for that action as well as notification asking, whether action was undertaken (Repeat various times per week, depending on preferences of household)
- Feedback on functioning of the app, etc. during validation phase through in-app option



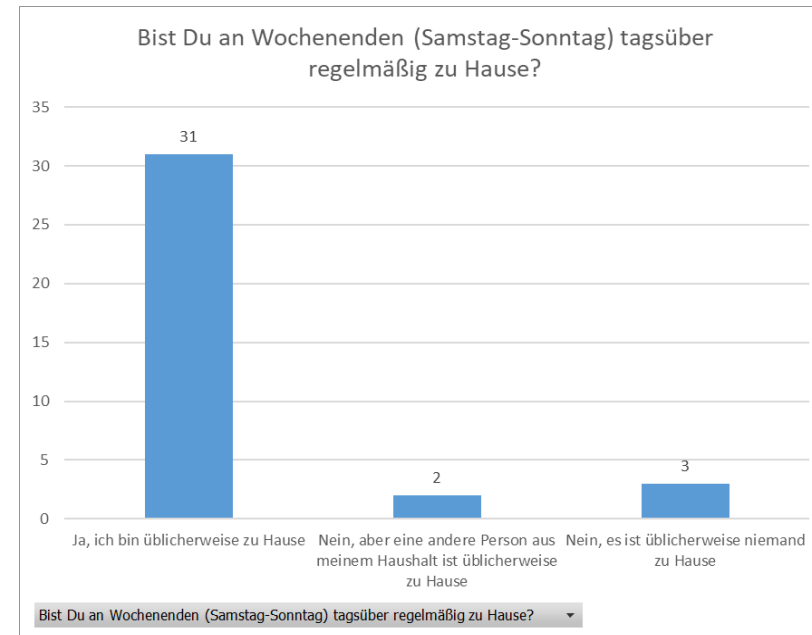
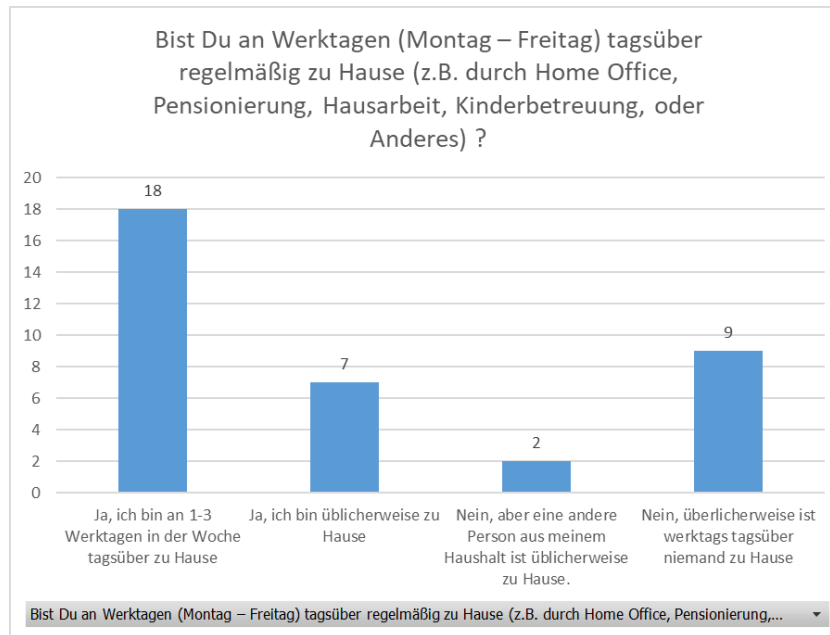
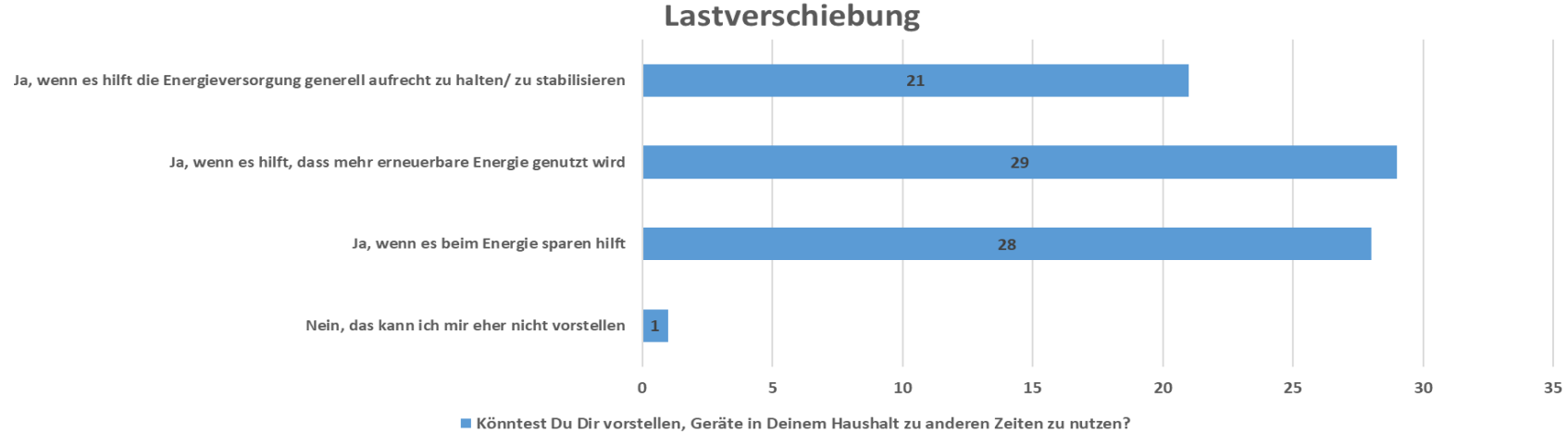


# Survey Statistics

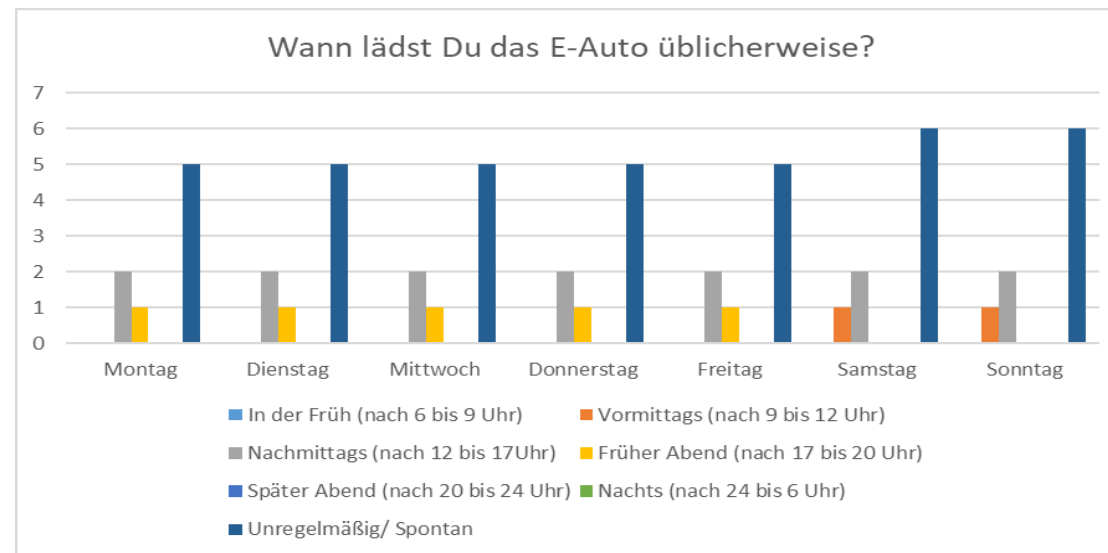
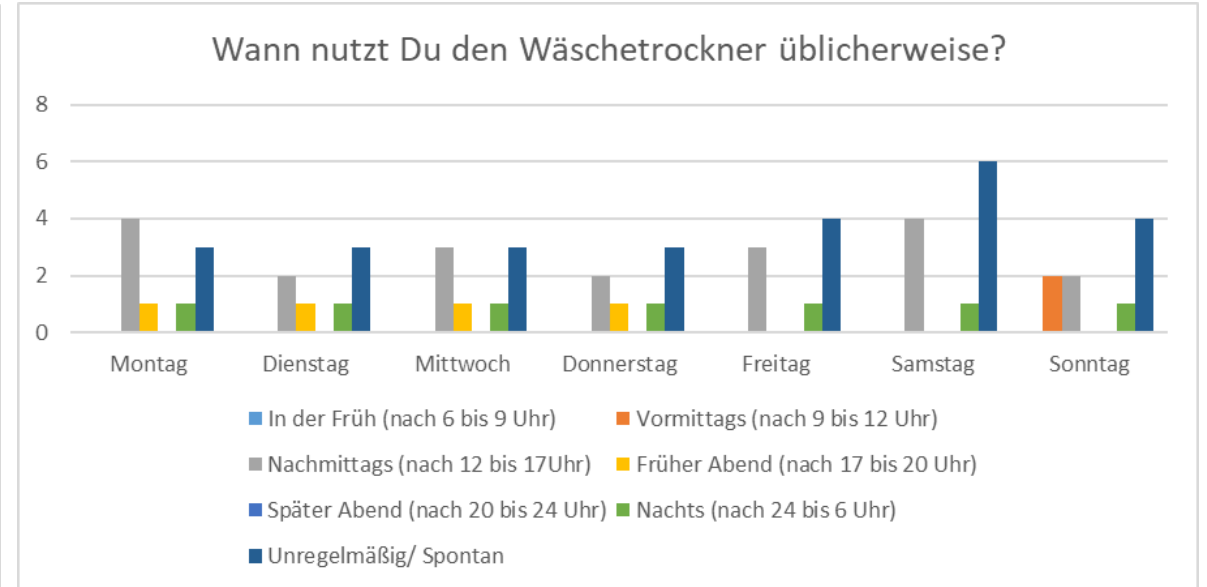
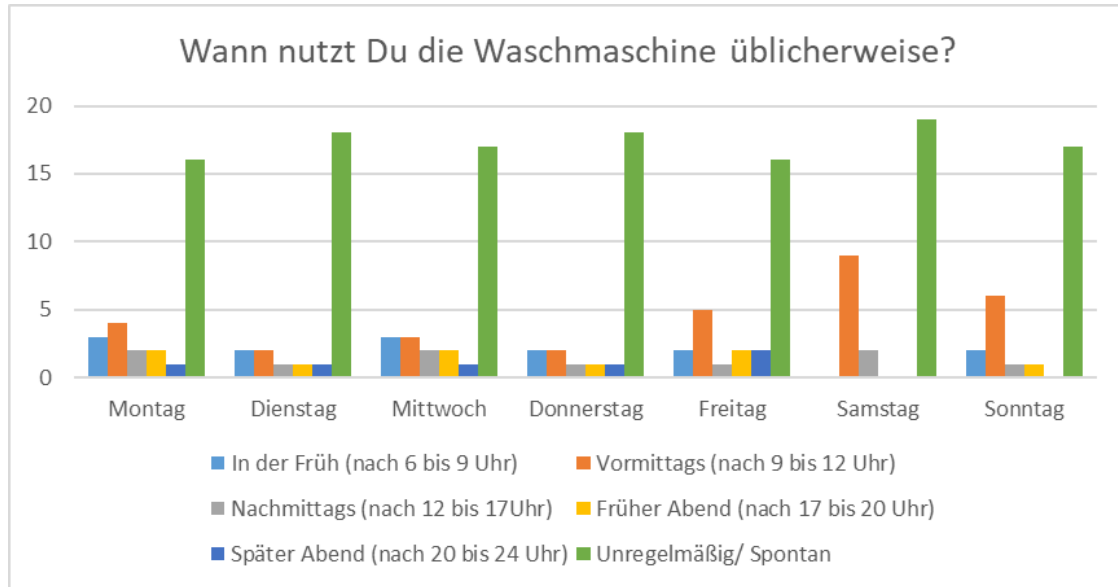
## Verteilung Teilnehmer\*innen nach Geschlecht, Alter, Wohngebiet, Haushaltgröße

				Startfragebogen		Abschlussfragebogen	
Teilnehmer*innen				36		15	
<b>Männlich</b>				<b>34</b>		<b>15</b>	
Weiblich				2		0	
Start-befragung Haushaltsgröße		Abschluss-befragung Haushaltsgröße		Age	No.s	Age	No.s
1 Person	2	1 Person	2	20-29	2	20-29	1
2 Personen	17	2 Personen	8	30-39	8	30-39	1
3 Personen	11	3 Personen	4	40-49	5	40-49	3
4 Personen	6	4 Personen	1	<b>50-59</b>	<b>13</b>	<b>50-59</b>	<b>7</b>
				60-69	6	60-69	3
				70-79	2	70-79	0
				Ich wohne eher..		Ich wohne eher..	
				<b>Ländlich</b>	<b>24</b>	<b>Ländlich</b>	<b>10</b>
				Städtisch/ Urban	12	Städtisch/ Urban	5

# Start Survey/ On-boarding

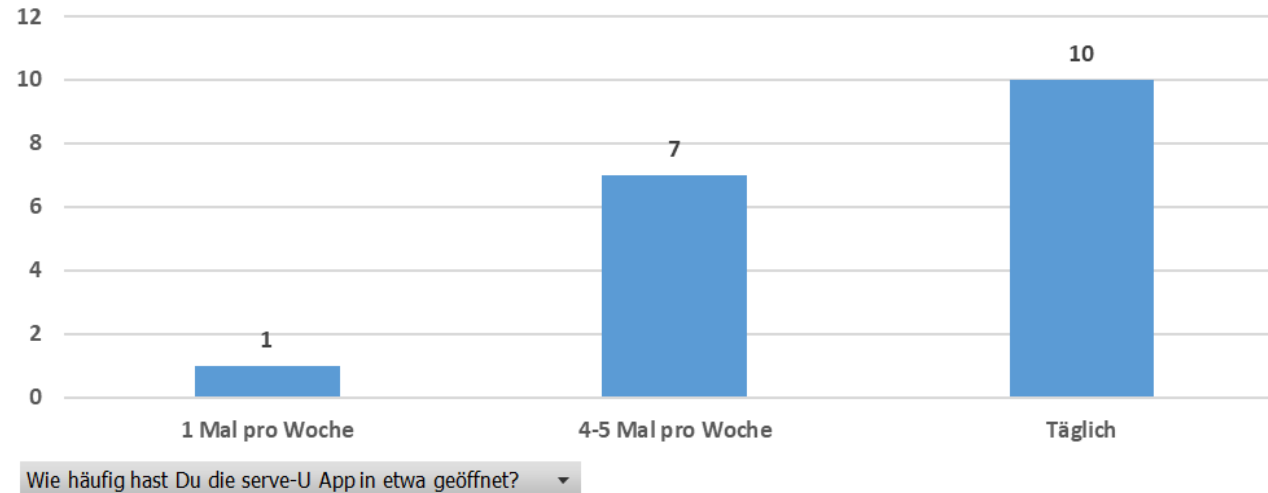


# Start Survey/ On-boarding

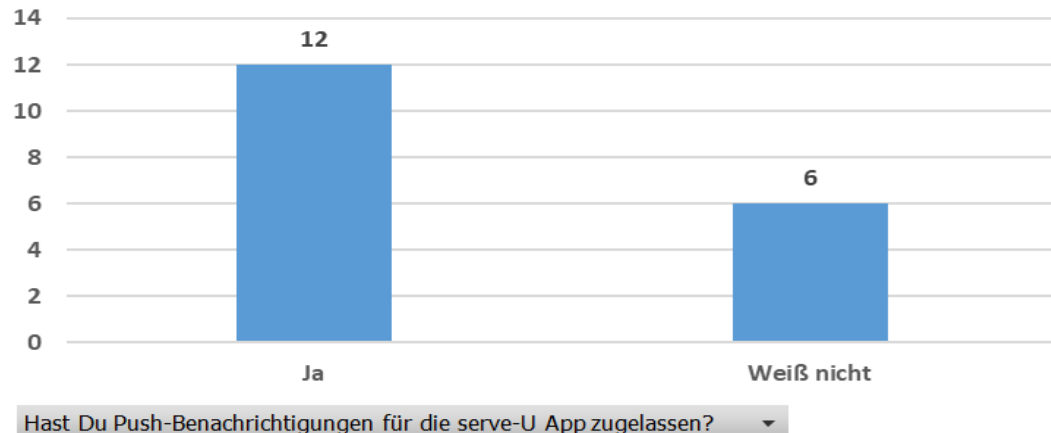


# End Survey/ App usage feedback

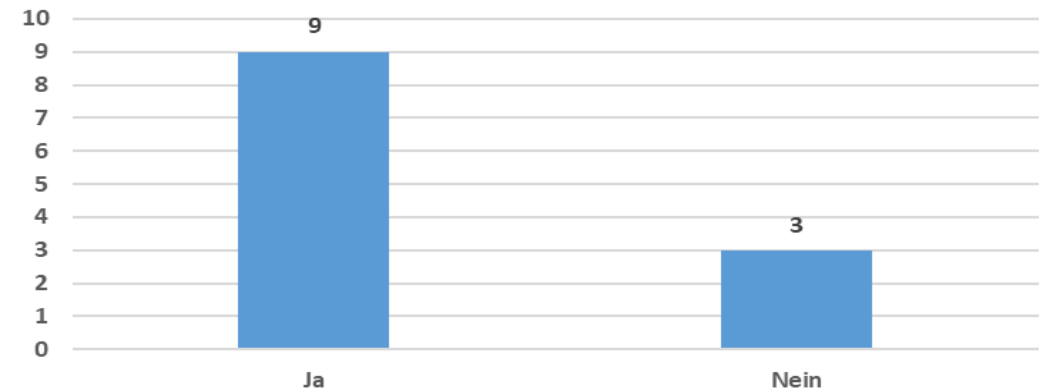
Wie häufig hast Du die serve-U App in etwa geöffnet?



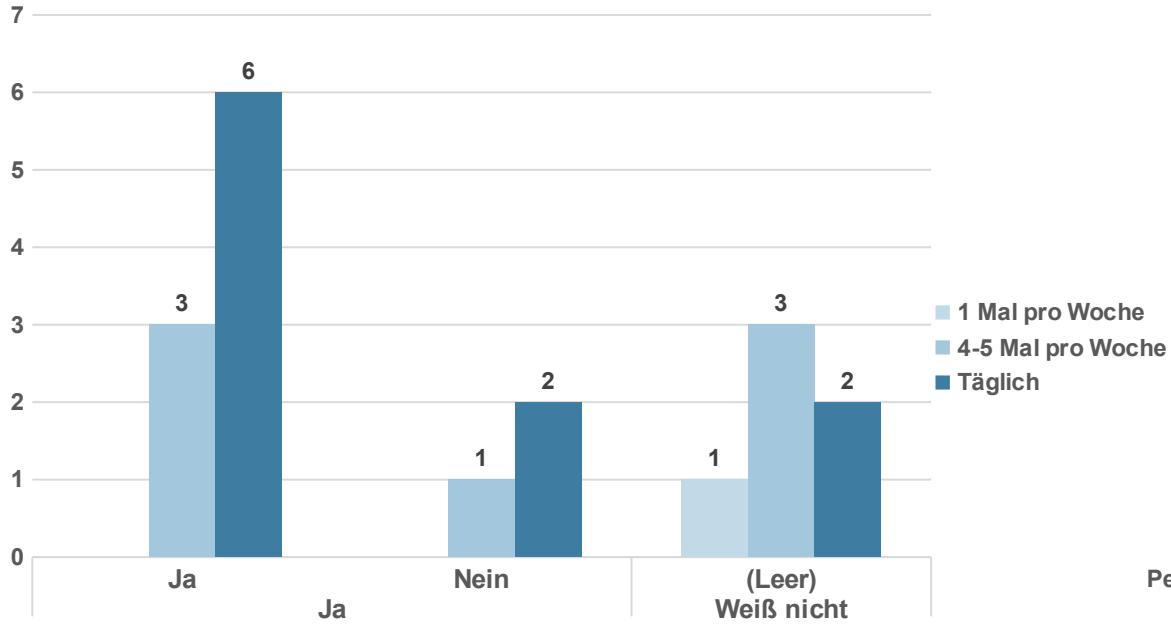
Hast Du Push-Benachrichtigungen für die serve-U App zugelassen?



Wenn ja, haben die Push-Benachrichtigungen Dich motiviert, die App zu öffnen und auf Aktionen zu reagieren?

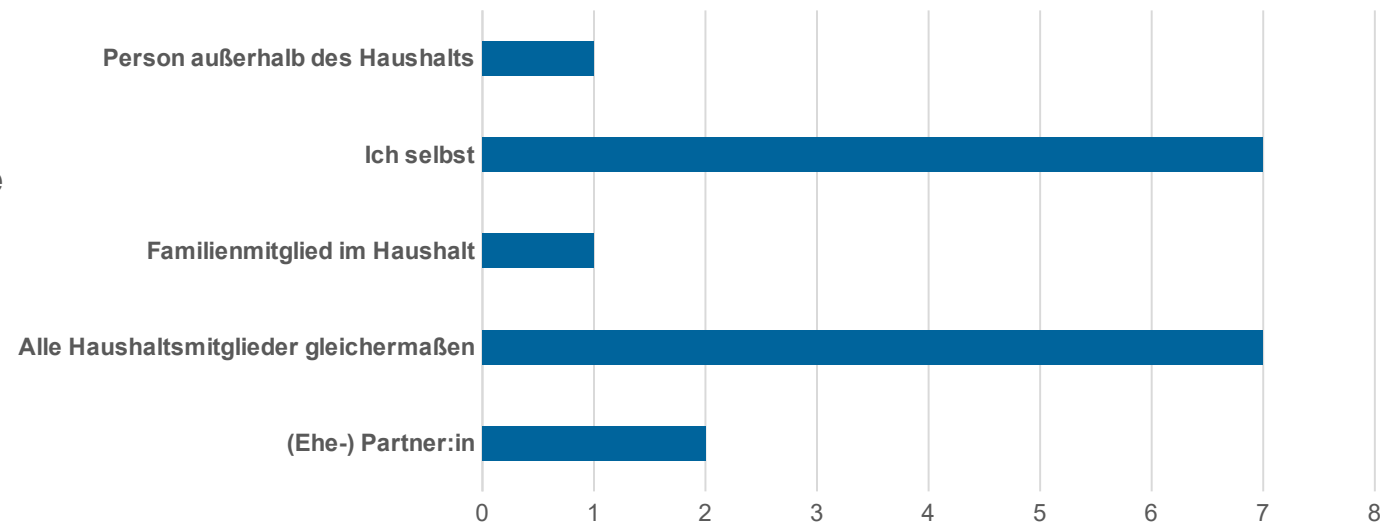


# End Survey/ App usage feedback



Serve-U App Statistics with push notifications active

Wer im Haushalt hauptsächlich mit den Tätigkeiten betraut?  
[Bedienung von Haushaltsgeräten (Waschmaschine, Geschirrspüler, Herd usw.)]



# Conclusions

## • Business model development

- High scalability enables positive economies of scale and fixed cost reductions with increasing user numbers, enhancing quality
- The networking of consumers in buildings or entire settlements holds significant future potential to improve autonomy levels and automate load shifting
- The platform is suitable to offer economic benefits to other stakeholders, such as valuable forecast data for grid operators

## • Surveys & Workshops

- Participant motivation – high during onboarding
- Socio-demographical findings – country, family, middle-aged, male, medium-high income group (3000-4000 €)
- Gender-gap in energy technology projects remains
  - Only male participants showed up at both workshops, and even more so, those participants were highly interested early adopters who enjoyed sharing insights with other participants
- Non-responses in 'End Survey'
  - various insights and reasons for not taking active part anymore or potential changes or conflicts in household responsibilities might have remained hidden.

