Reusable and cascade economy at the Environmental Campus Birkenfeld of Trier University of Applied Sciences

IntakeDAV for Mensa-to-go reusable tableware and digital platform for furniture exchange

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Prof. Dr. Georg Rock, Hochschule Trier, Hauptcampus Informatik

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Key figures

1. **Cross-site project**: Department of Computer Science (Campus Trier), Department of Environmental Economics/Law (Environmental Campus Birkenfeld) und Campus Company GmbH (Mensa Birkenfeld)
2. **Staff**: 2 research assistants
3. **Duration**: 18. months (01.09.2021 – 28.02.2023)
4. **Funded** by the Ministry for Climate Protection, Environment, Energy and Mobility Rhineland-Palatinate

RheinlandPfalz
MINISTERIUM FÜR KLIMASCHUTZ, UMWELT, ENERGIE UND MOBILITÄT

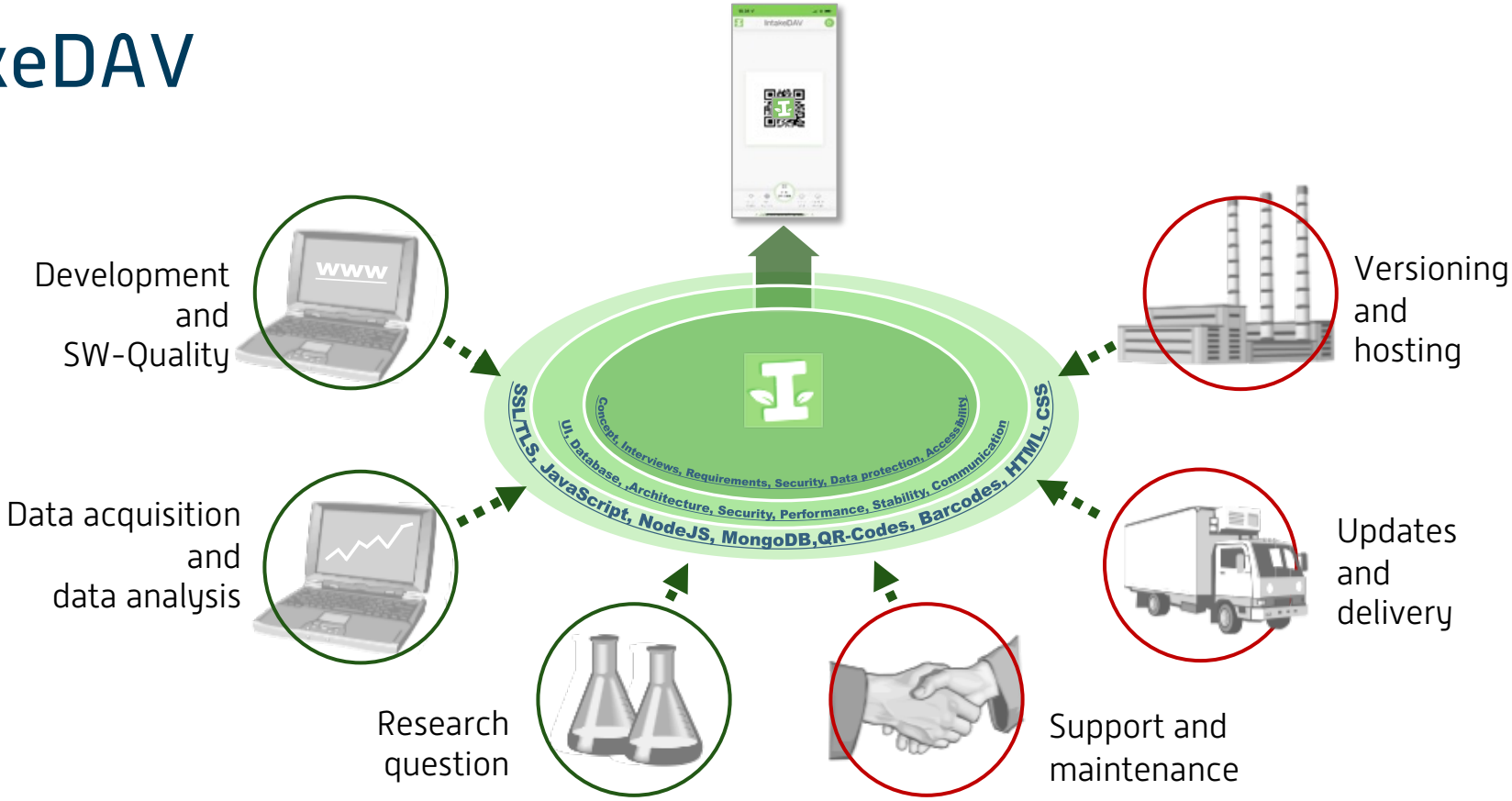
Introduction

1. Establishment of a canteen-to-go reusable packaging for food (and beverages) whose cyclicity is controlled and analyzed via the IntakeDAV web application and
2. Establishment of a physical furniture exchange and a multi-cascade usage concept for the student dormitories at the Environmental-Campus Birkenfeld and combination with a digital platform (hybrid approach).

Project Introduction

IntakeDAV: **Sustainability** through **digitalization**

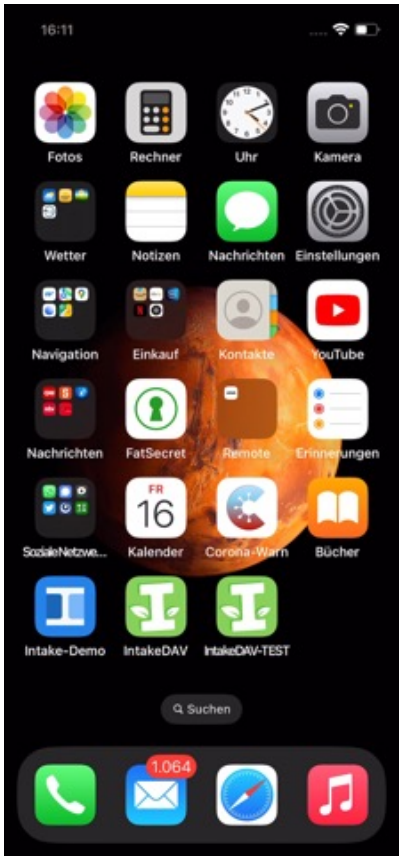
IntakeDAV


Development
and
SW-Quality
Versioning
and
hosting
Data acquisition
and
data analysis
Updates
and
delivery
Research
question
Support and
maintenance
SSL/TLS, JavaScript, NodeJS, MongoDB,QR-Codes, Barcodes, HTML, CSS
Concept, Interviews, Requirements, Security, Data protection, Accessibility
UI, Database, ,Architecture, Security, Performance, Stability, Communication

IntakeDAV

App features

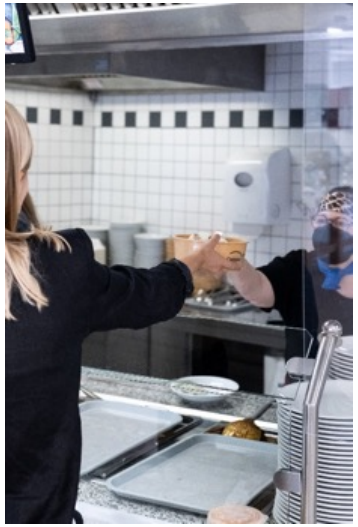
- Web app
- No installation necessary
- Platform independent
- Hosted at Trier University of applied sciences
- …

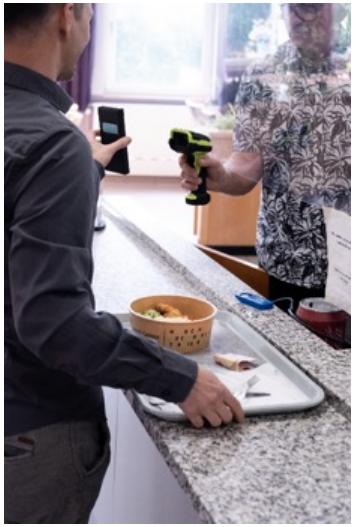


intakedav.hochschule-trier.de

IntakeDAV

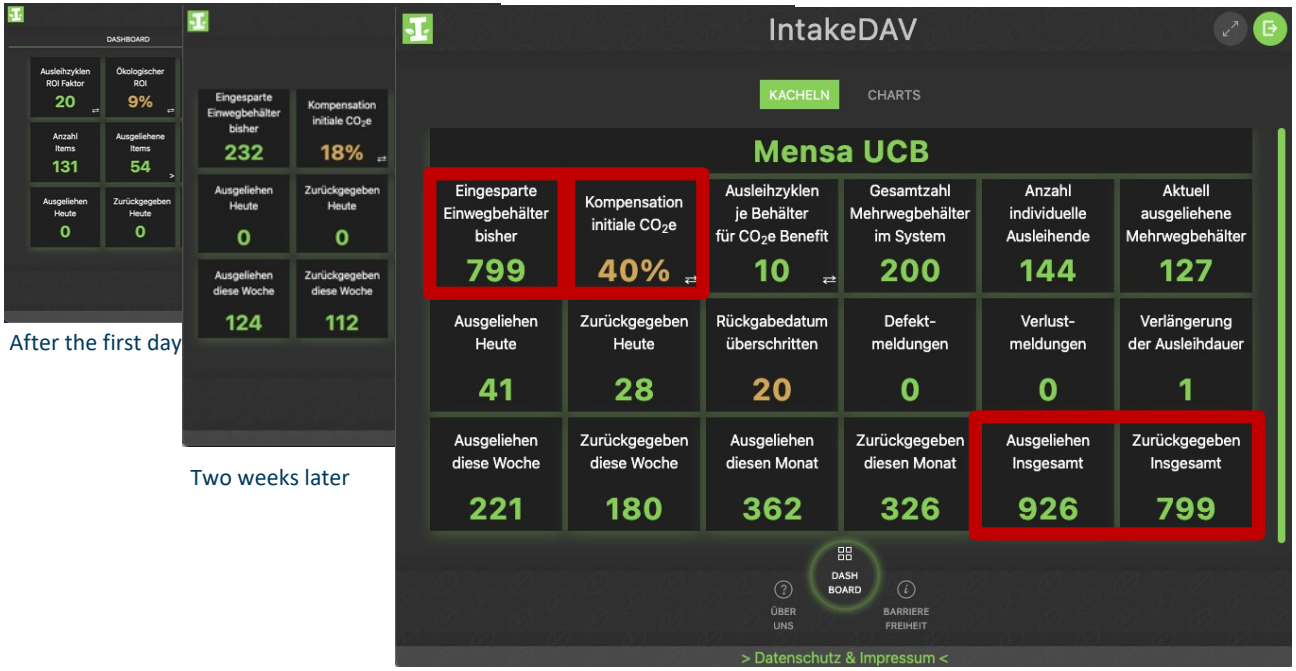
Routes (Endpoints): Checkout, Kitchen, Backoffice, **Dashboard**





IntakeDAV

Dashboard: Real-time „product lifecycle“ metrics



After the first day

Two weeks later

Six weeks later at 13th October 2022

IntakeDAV: Objectives

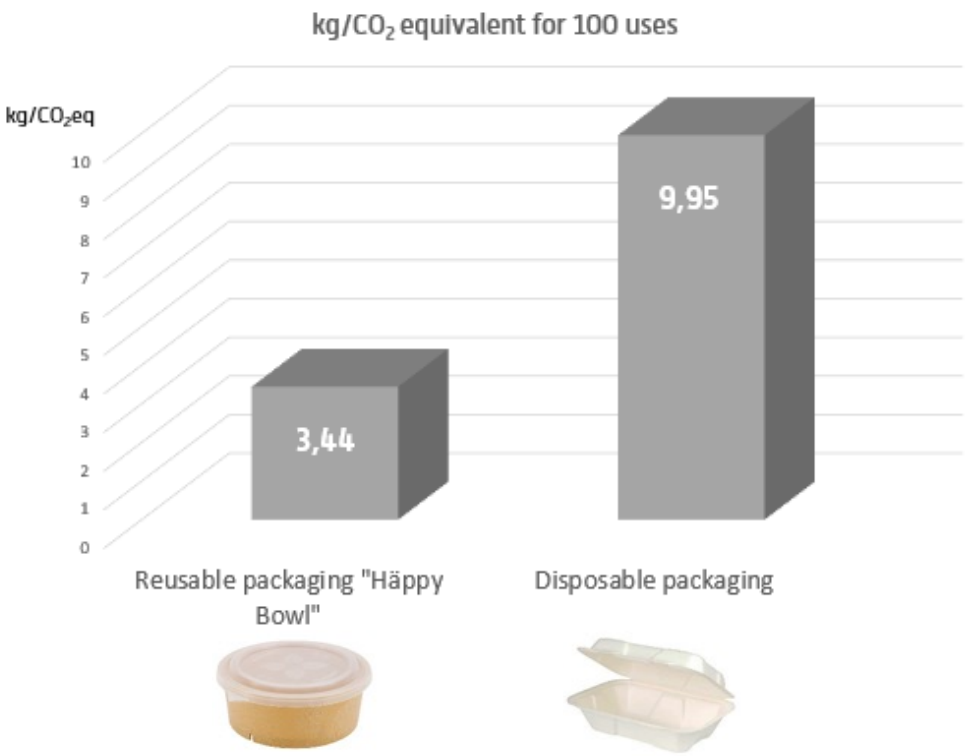
- Sustainability through digitalization
  - Why do we need digitalization here?
    - Business Intelligence vs. "**Ecology Intelligence**"
      - „**Data Mining** with focus on ecological correlations to improve overall system **sustainability** (circularity, optimal equipment, system load, …)"
    - **Dialog** with consumers
      - **Feedback** in both directions
      - **Transparency** regarding ecological consumption decisions
    - **Basis** for the possibility of an objective **proof of sustainability**

IntakeDAV: Objectives

- Sustainability of the overall „reusable-to-go“ system
  - **Digitalization itself** must be **sustainable** and **resource-saving** and at the same time remain **attractive** and **secure** for users (e. g. reduced data transfer vs. waiting times)
- **Use** of IntakeDAV at the **main campus Trier** (→ Studierendenwerk)

Expectations of the deployment were exceeded!

CO_2 savings due to reusability



- The CO_2 savings due to the reusable packaging amount to **6.51 kg/CO_2eq** compared to disposable packaging made of bagasse for **100 uses**.
- Life cycle phases considered: Raw materials/pre-chain, production, use and end-of-life with incineration.

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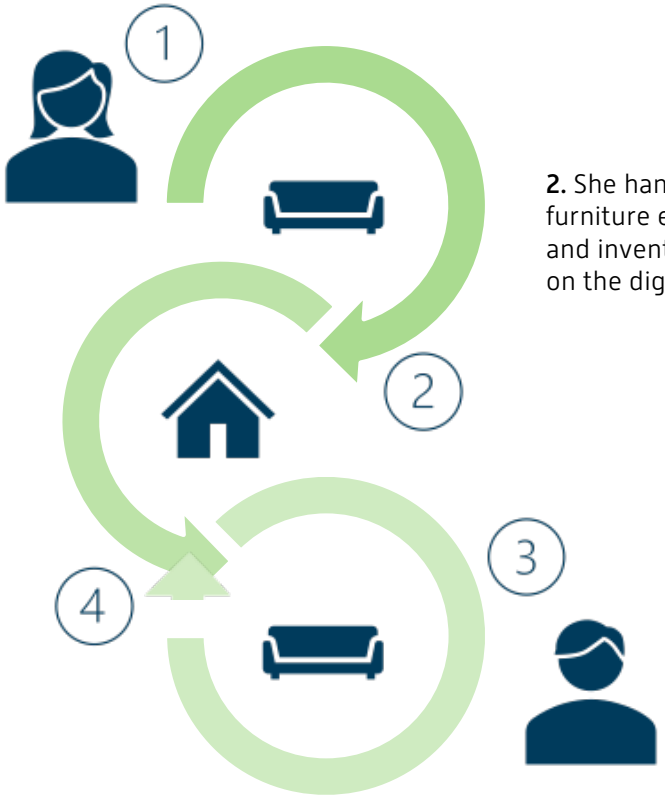
Furniture exchange: initial situation

Dormitory	Room total	Room furnished	Room unfurnished	Change of residence p.a.
Campus Company GmbH	359	125	234	WS 132 SS 70
Schneider Bau GmbH	140	36	104	40 - 45
	499	**161**	**338**	**242 - 247**

Furniture exchange: Opening on 13.05.2022

v.l.n.r. Christoph Frick (Campus Company GmbH), Sandy Winter (Campus Company GmbH), Prof. Dr. Susanne Hartard, Klara Theobald, Emily Barth

Furniture exchange: Example



1. A student has finished her studies and will move out of the dormitory. However, she does not want to take her old couch with her, although it is still in good condition.

2. She hands in the couch at the furniture exchange. There it is stored and inventoried, after which it appears on the digital platform.

Acceptance

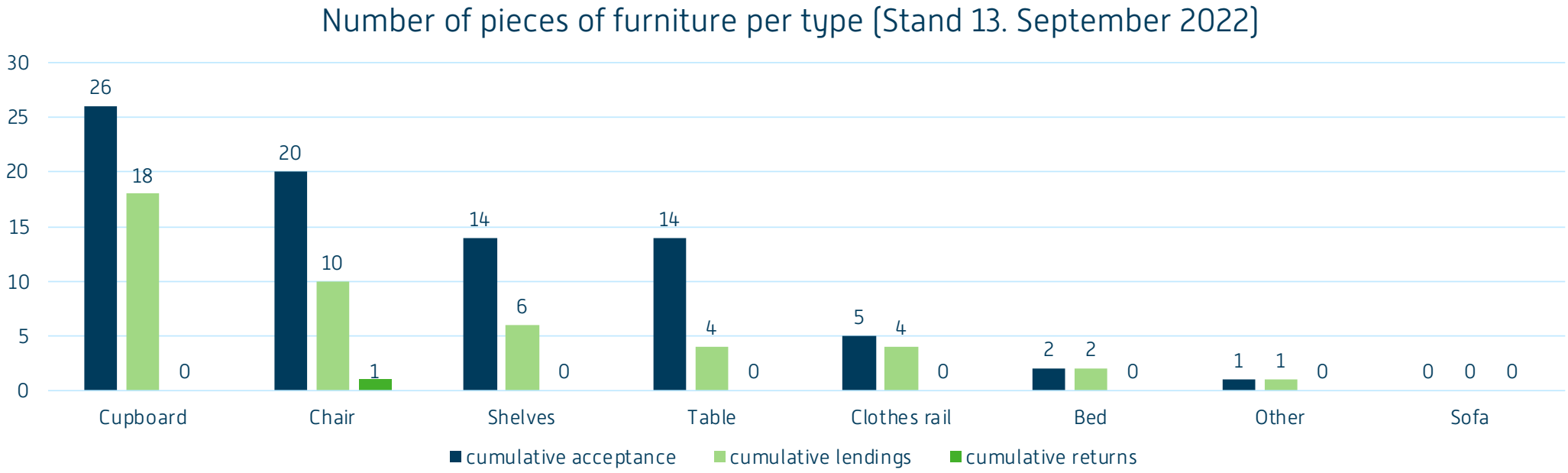
3. A new student moves to the environmental campus and is looking for a couch for his new room. He browses the digital platform and comes across the couch. He can now reserve it in advance or come by during opening hours and borrow the couch for free. The duration is unlimited.

Lending

Return

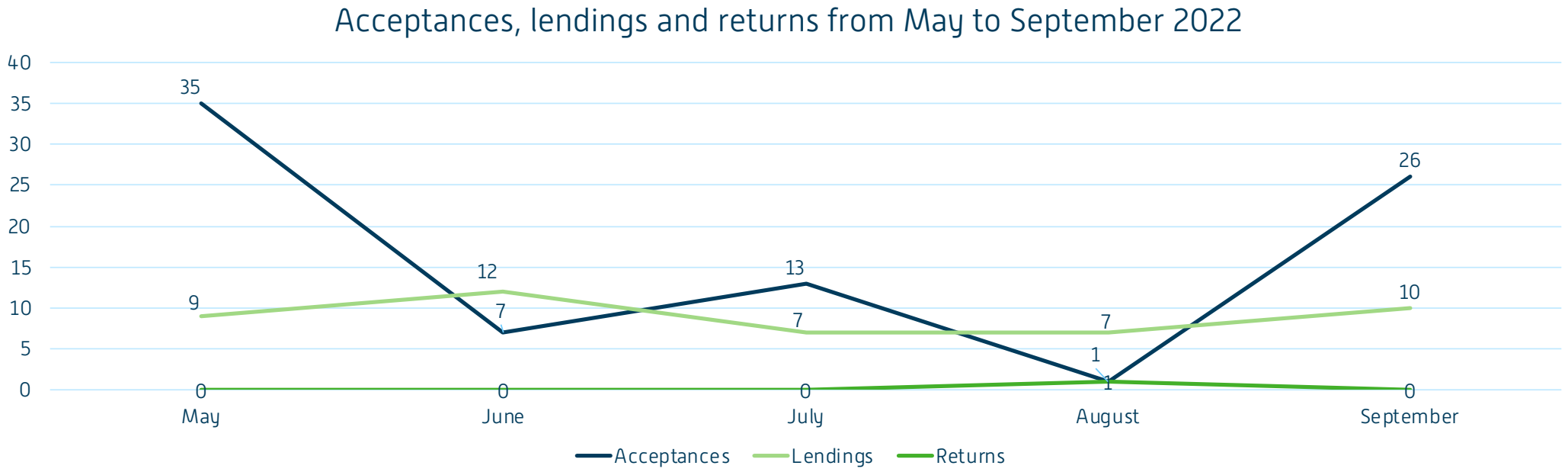
4. If this student moves out again at the end of his studies, he must return the couch so that other students have the opportunity to borrow it again.

Furniture exchange: cumulative inventory



Furniture exchange: history

Cumulative acceptances	82
Cumulative lendings	45
Cumulative returns	1



Furniture exchange: CO_2 savings to date

Assumption: Disposed furniture is burned in waste-to-energy plant

Furniture in the furniture exchange	ca. 900 kg
CO_2 emissions per t of waste in waste-to-energy plant	0,9 t
Share of fossil emissions	55%
CO_2 savings to date	**ca. 445,5 kg**