

Empowering Students through Visual Analytics

A Dashboard Redesign for Modern Curricula

Graz University of Technology, Austria

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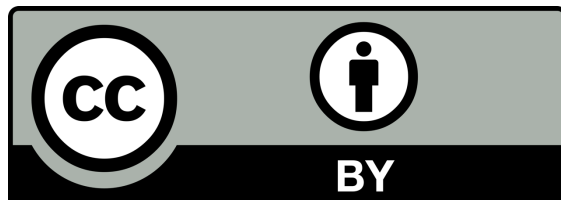
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Philipp Leitner, Peter-Philipp Pranter, Benedikt Brünner & Martin Ebner (2025) ed-tech.at

FLAAIT Group at Educational Technology Unit, TU Graz

- Future Learning, Analytics & AI for Teaching
- Presenter today
 - Benedikt Brünner
 - PhD Student
 - Educational Technologies
 - Synchronous
 - Asynchronous
 - Self-Regulated Learning



Introduction

- Studies on university level are **separated** in different **lectures**
- Student have to **self organize** at university
 - no fixed time-table
 - can select their courses
- Modern curricula according to European Credit Transfer and Accumulation System (**ECTS**)
 - **elective** subjects
 - **modules**
 - **sub-modules**

A Fragmented View of Ongoing Study Process

- Data was available
 - but **important information** scattered across **disconnected** campus management system **views**
- Students often only learned **at the time of graduation submission** whether **all requirements** were met
- No visual or structured overview of **academic progress**

Note 2	ANERKENNUNG 716.032 Entwurf und Analyse von Algorithmen 1.5 ECTS-Credits 09.12.2019 Dr.-Studium d.technischen Wissenschaften; Informatik
Note 2	ANERKENNUNG 706.052 AK Informationssysteme 5 ECTS-Credits 09.12.2019 Dr.-Studium d.technischen Wissenschaften; Informatik
Note 1	PRÜFUNG 930.002 Inventions, Patents, and Technology Exploitation 27.11.2019 Dr.-Studium d.technischen Wissenschaften; Informatik
Note 1	ANERKENNUNG 700.011 Wissenschaftliches Arbeiten 05.06.2019 Dr.-Studium d.technischen Wissenschaften; Informatik
Note 2	ANERKENNUNG 707.000 Web Science and Web Technology 3 ECTS-Credits 05.06.2019 Dr.-Studium d.technischen Wissenschaften; Informatik
Note E	ANERKENNUNG 372.008 MOOC zu „Start-Up Journey: Geschäftsmodell erstellen“ 05.06.2019 Dr.-Studium d.technischen Wissenschaften; Informatik

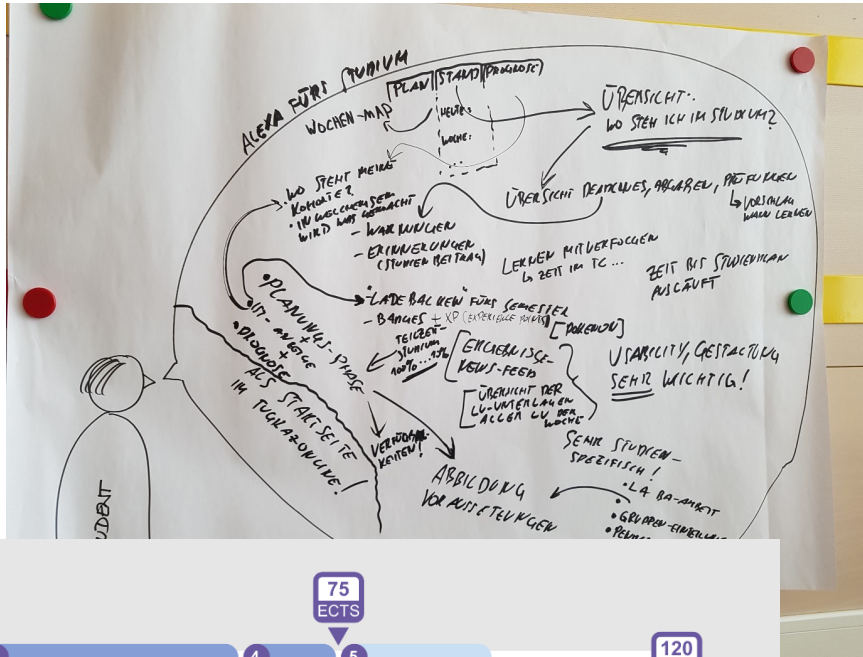
What Students Needed

Student demand: Data driven ...

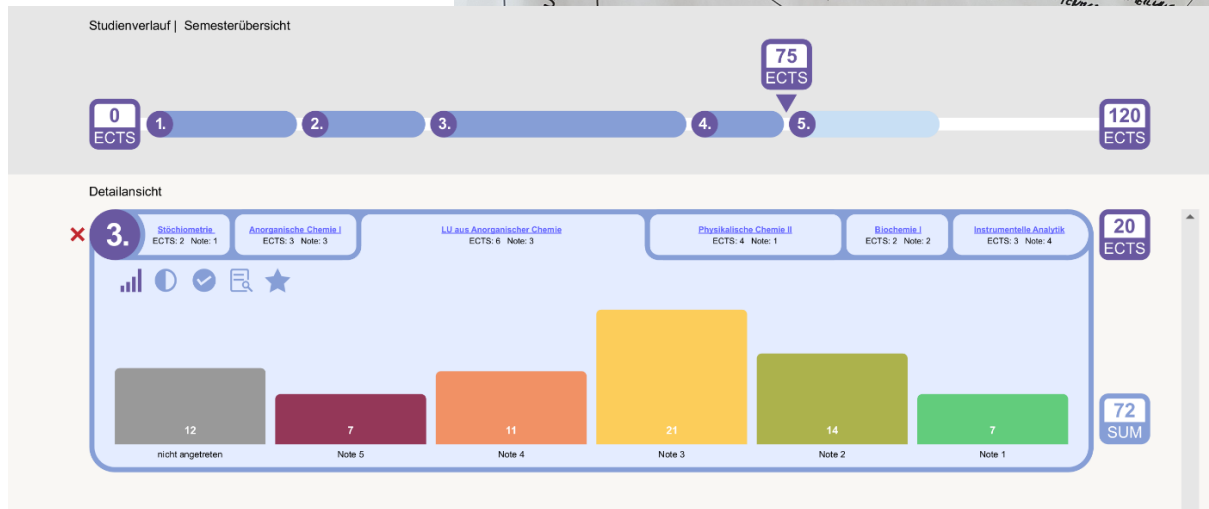
- ... academic orientation
- ... self-regulation
- ... transparency

*to solve practical **pain points** students experienced in **planning***

Built with Students

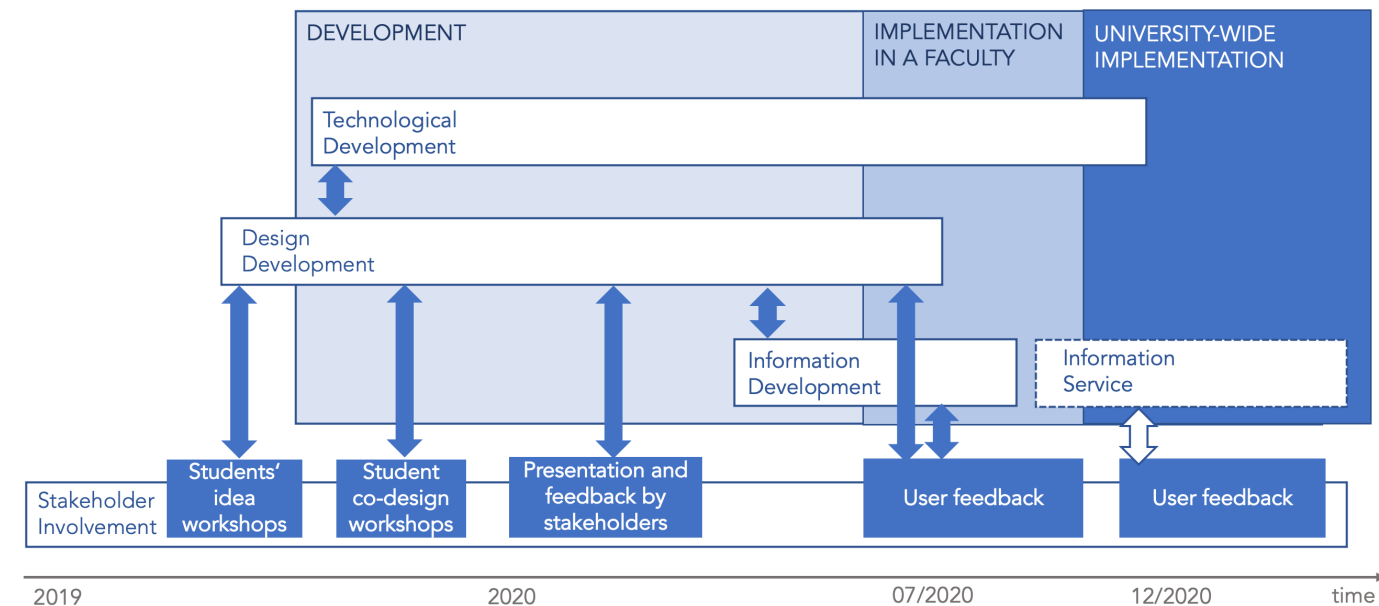


- Idea workshops and **co-design**
 - early 2019
- Students created
 - **paper prototypes**
 - gave structured **feedback**
- Strong focus on visual clarity, language, color, and usability
- **Collaborative development** ensured **trust** and relevance

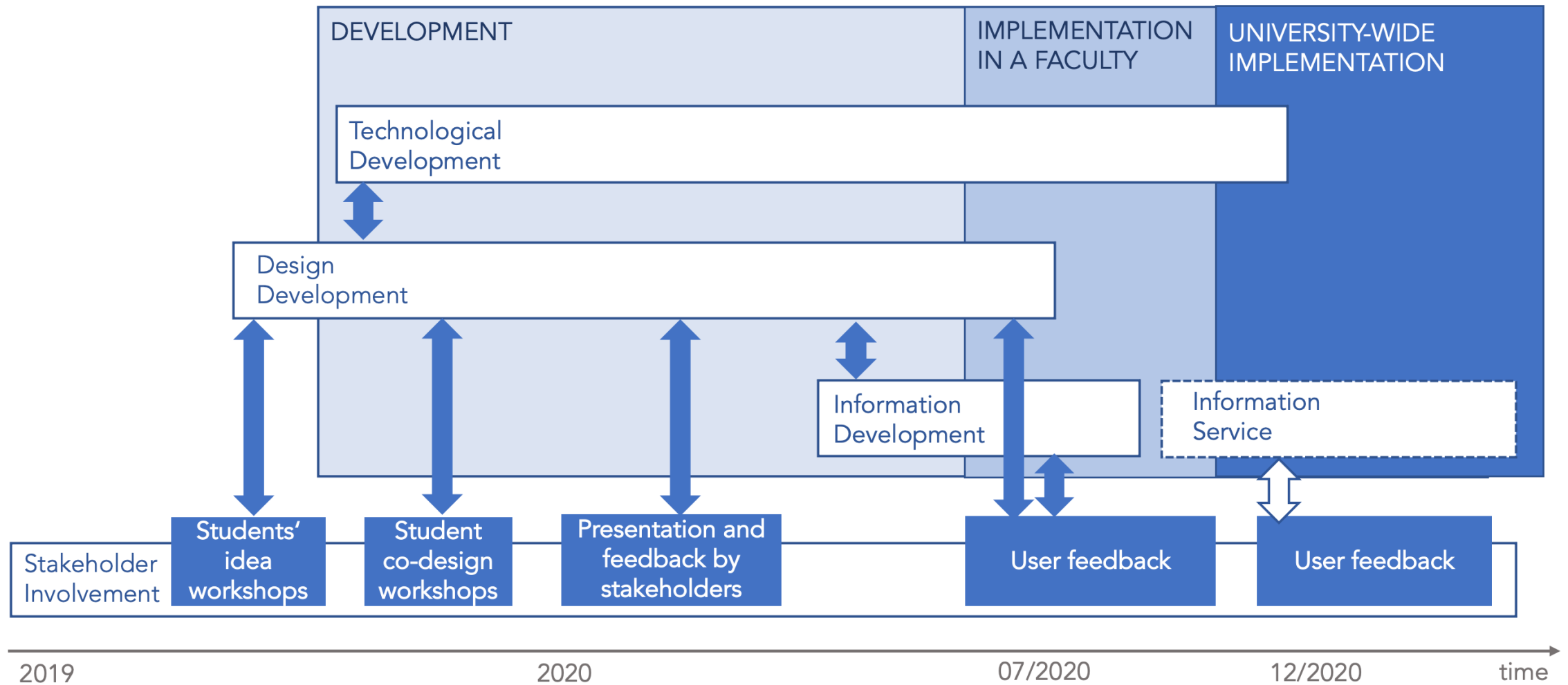


From Vision to Rollout

- Parallel development of **technology** and **design**
- Stakeholder engagement: **students, administration, legal**
- Pilot launch
 - June 2020 (CS + Biomed)
- Full rollout
 - Dec 2020 (all BA programs)



From Vision to Rollout



Initial Success

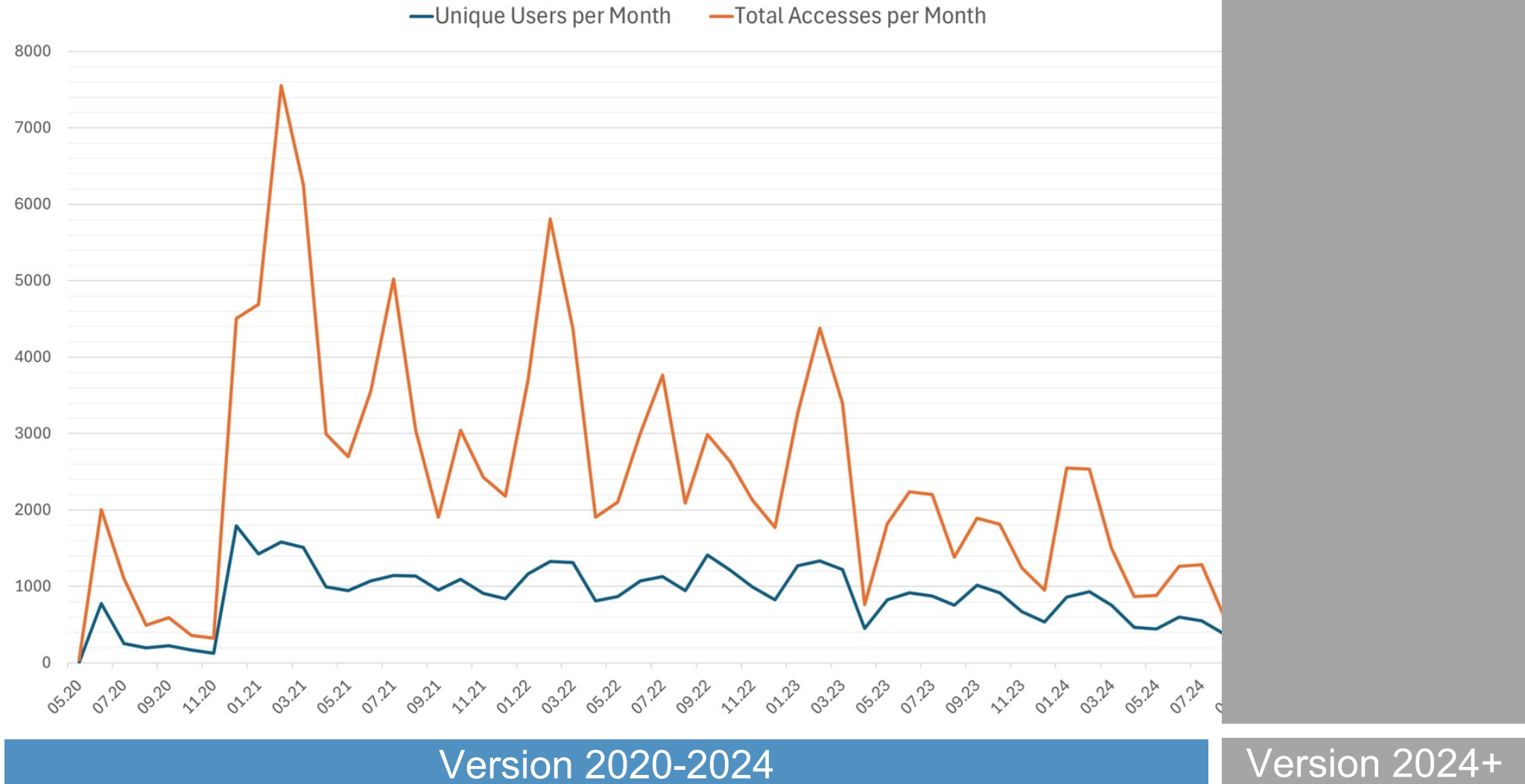
- University-wide expansion
 - Over 90% of student feedback was positive
 - Dashboard seen as
 - motivational
 - clear
 - practical

but

Systemic Breakdown (2022-2024)

- New study programs use different modeling logic
- Legacy curricula were deprecated, causing incompatibilities
- Dashboard failed to represent updated data
 - **modules** missing
 - incorrect **mappings**
 - **new programs** unsupported
- Students **began losing trust** due to inaccurate or outdated information

Usage 2020-2024



Redesign Strategy Architecture & Technical Overhaul

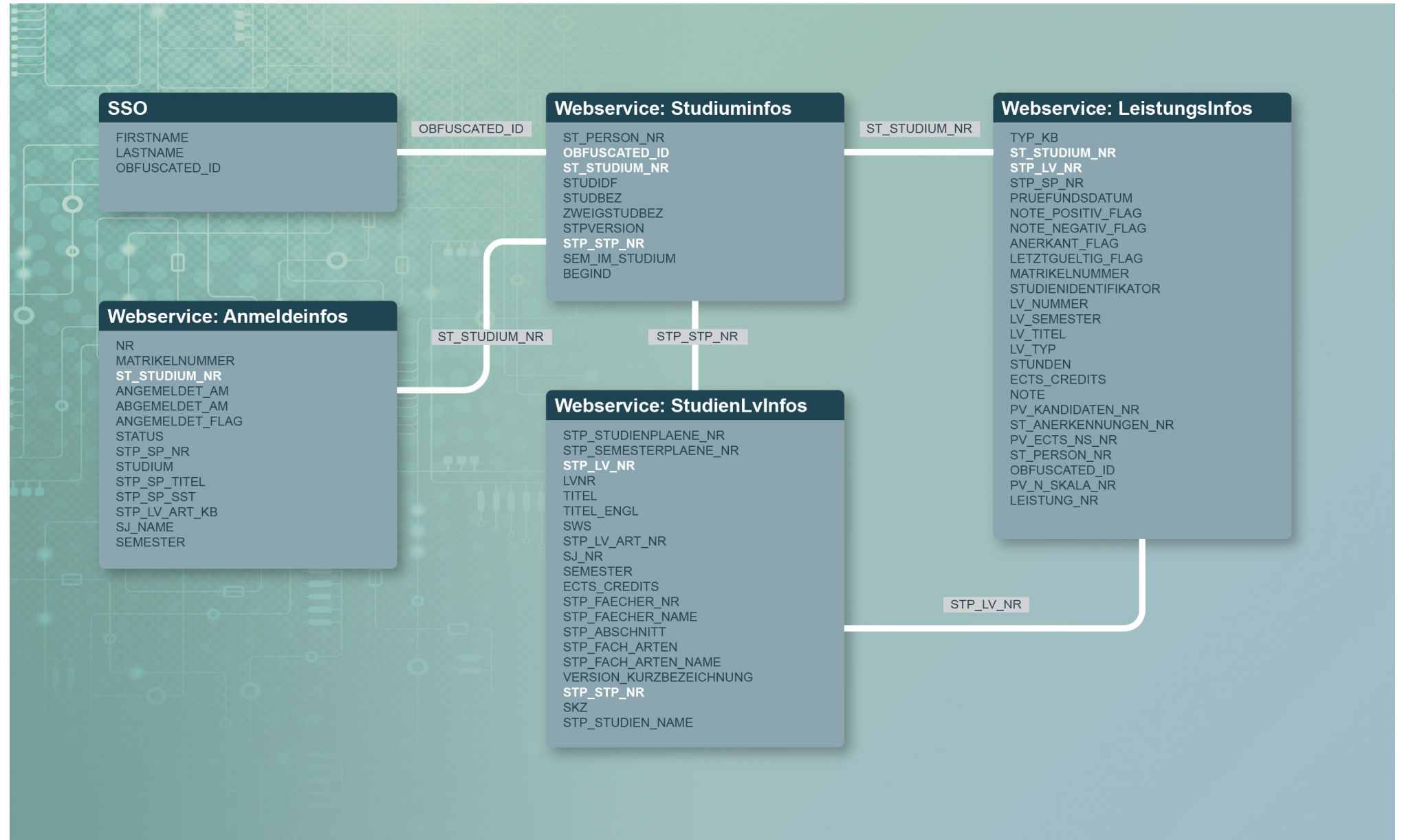
Project Goal

- Rebuild the dashboard to be
 - **modular**
 - **scalable**
 - **curriculum-adaptive**

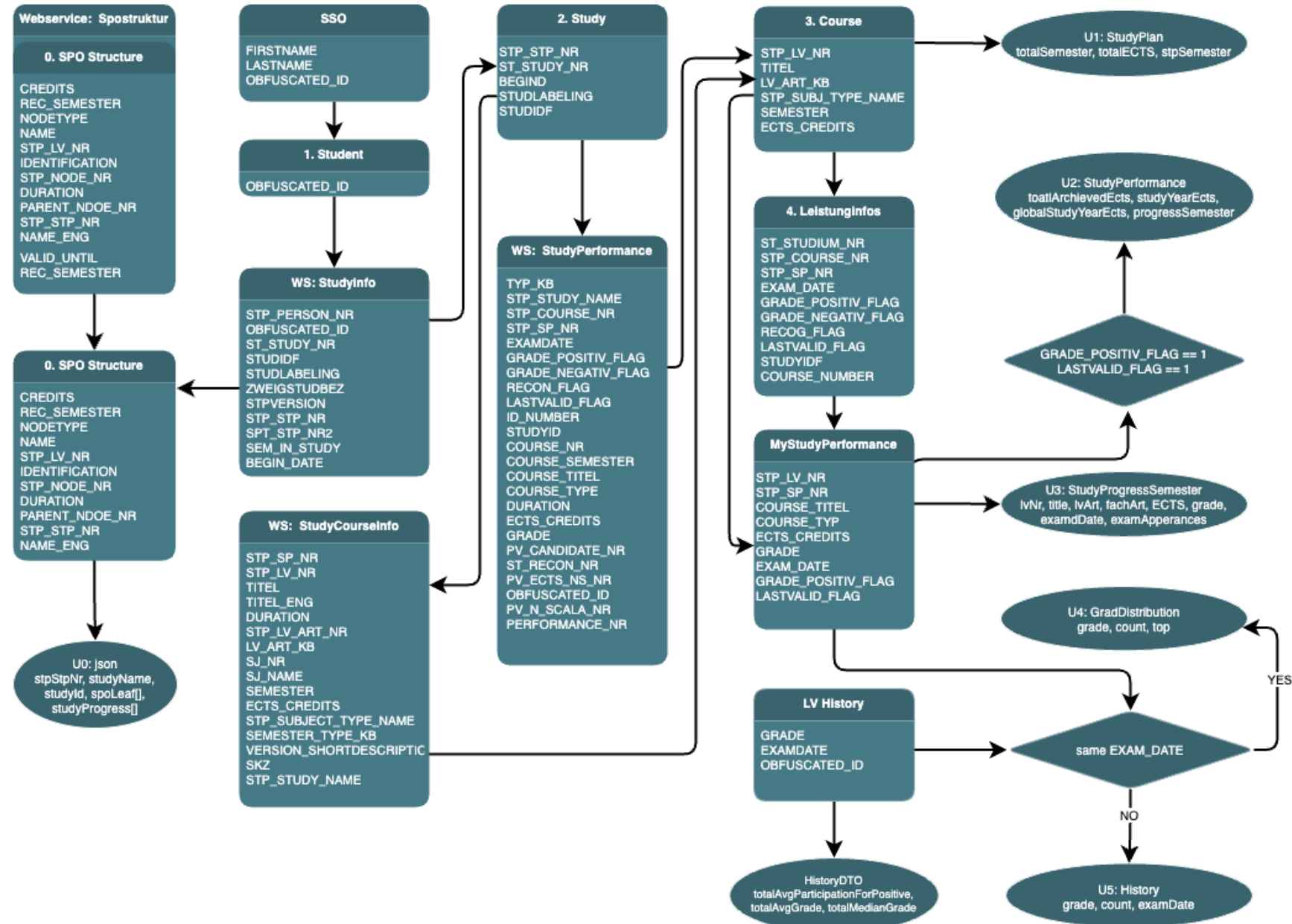
Implemented Features I

- Service-oriented architecture
 - web services **dynamically pull** up-to-date **data**
- Modular curriculum parsing
 - automatic recognition and display of
 - **programs**
 - **modules**
 - **submodules**

SPO



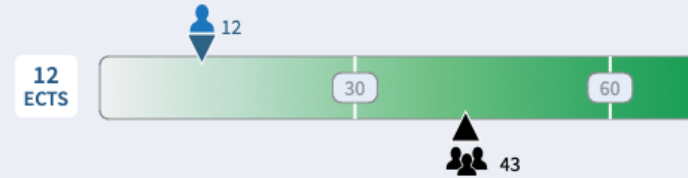
SPO 2.0



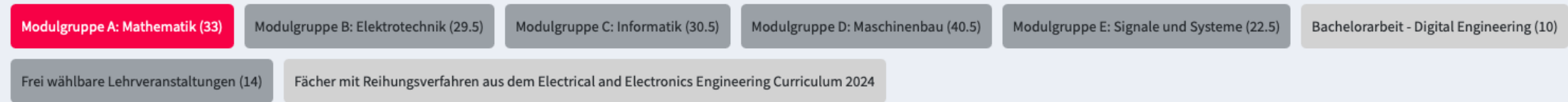
Implemented Features II

- Integrated analytics
 - **combines personal** records
 - grades
 - credits
 - with **historical cohort** statistics
 - medians
 - grade distribution
 - exam attempts

Studienjahr ECTS



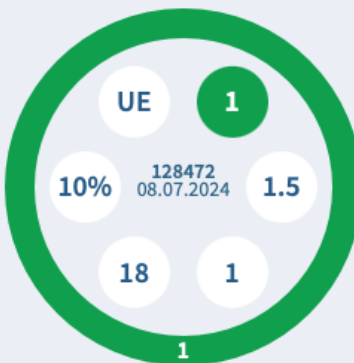
Modulübersicht (180 ECTS)



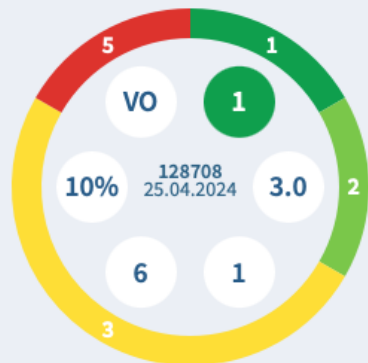
Ihr Studienverlauf



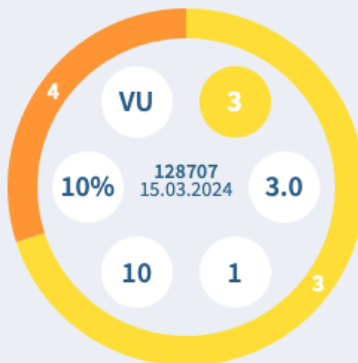
Numerische Simulation für Digital E...



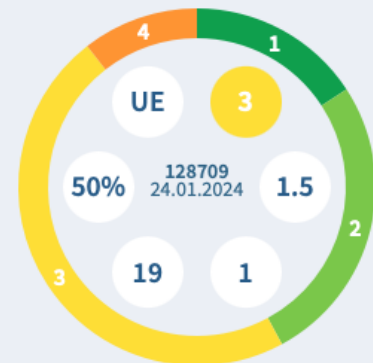
Numerische Methoden für Digital Eng...



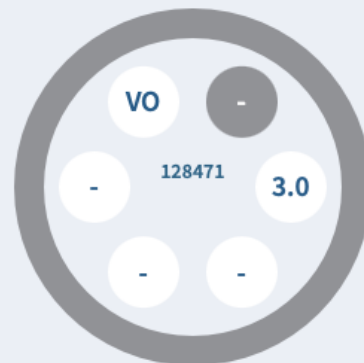
Mathematische Modelle für Digital E...



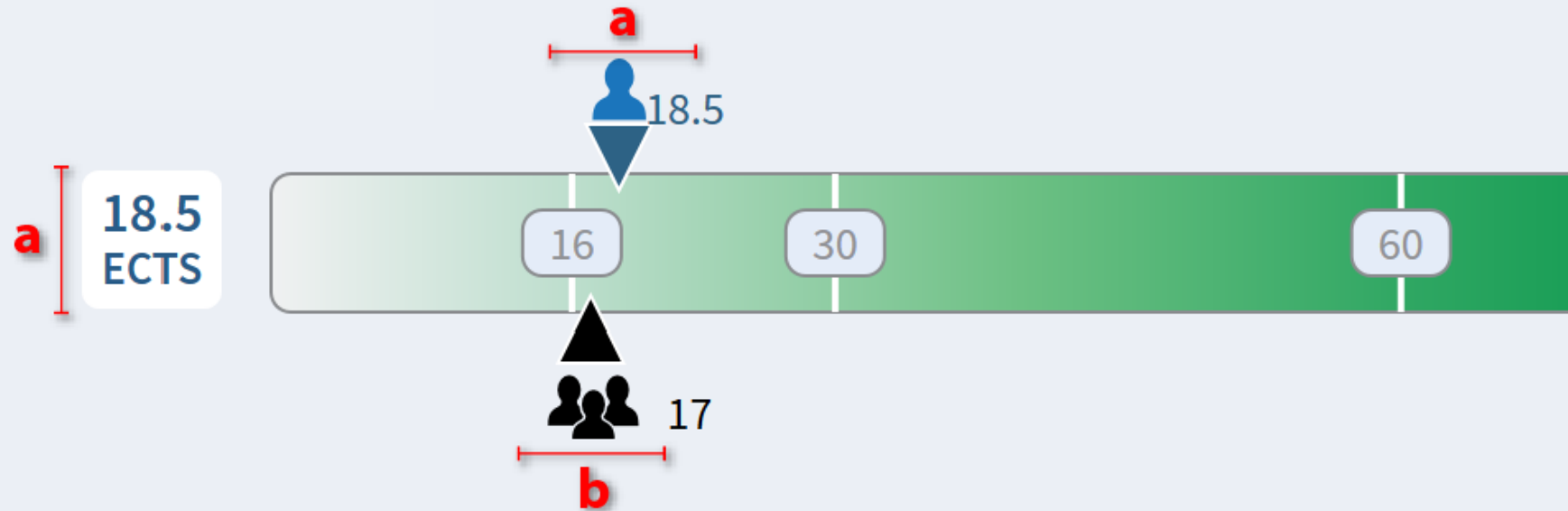
Numerische Methoden für Digital Eng...



Numerische Simulation für Digital E...

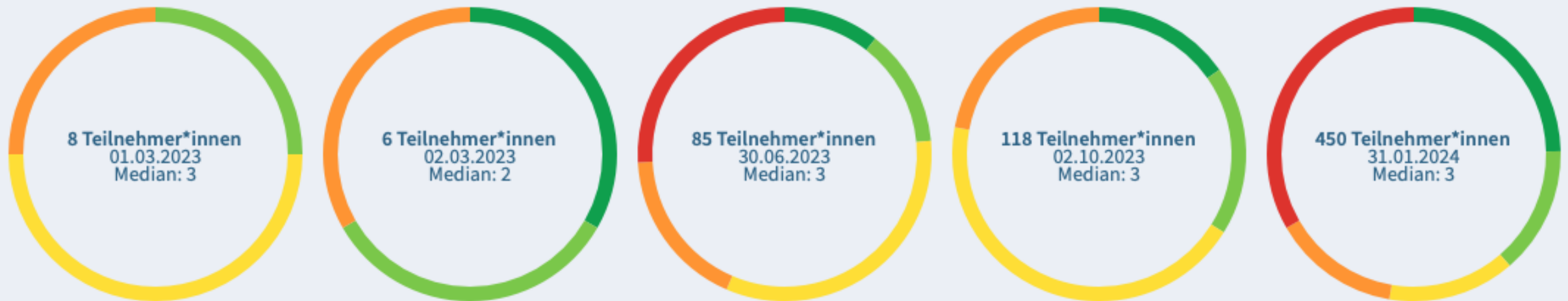


Study Year



- Students see their earned ECTS on a visual progress scale
- Key thresholds: 16 ECTS (exam activity & family allowance), 30 ECTS (semester goal), 60 ECTS (year goal)
- Individual progress (a) is shown alongside cohort average (b)
- Enhances reflection and orientation in the academic year

Performance History



User-Centered Design

User-Centered Design

- Continuous student involvement
 - co-design workshops
 - surveys
 - comment fields
- Feedback influenced both visual language
 - color logic
 - chart types
 - layout decisions
 - Example: Donut charts
 - initially unfamiliar
 - later well-accepted after proper labeling and testing

Stakeholders included

- Students, Student Union
 - interface usability
 - use-cases to support planning
- Curriculum Deans
 - evaluation needs
 - accreditation
- Teaching Staff & Works Council
 - ensuring no surveillance
 - privacy protection
- Vice Rector for Academic Affairs
 - institutional oversight

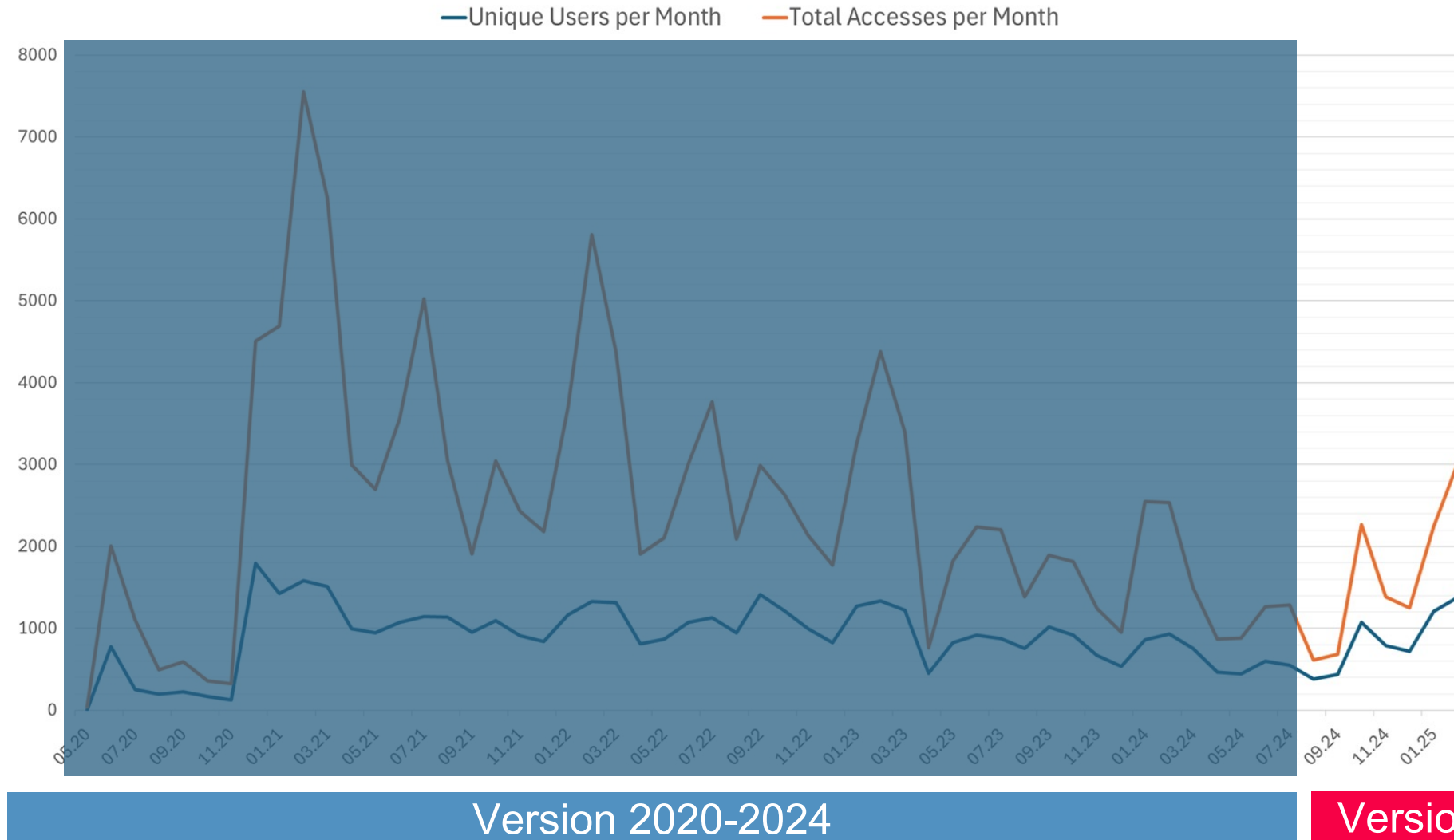
Data Protection Ethos

- No access for staff or teachers
- Based only on data students already have access to
 - ethical and trust-preserving

Adoption & Engagement Metrics

- Monthly **unique** users
 - 800 - 1300 (2021 - 2023)
- Post-relaunch peak (2024)
 - 1,377 users
 - 3,000+ accesses/month
- **Dashboard** became a **routine** part of **semester planning** and exam preparation
 - Regular use = **dashboard** is not just informative, but **empowering**
 - Engagement aligns with **key academic cycles**

Usage Statistics



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Lessons Learned

Lesson	Recommendation
Use only existing student-visible data	Reduce complexity & increase trust
Architectural flexibility is crucial	Build modular , service-based systems
Co-design drives success	Involve students from the beginning
Minimalist, clear visuals work best	Use consistent , intuitive UI elements
Feedback should be continuous	Combine surveys, comments, analytics
Innovation requires explanation	Test visualizations (e.g. donut charts) with users
Protect student autonomy	Avoid expanding access to personal data

Outlook: What's Next? I

- LMS Integration
 - merge campus data (grades)
with LMS behavior (content views, activity patterns)
 - goal
 - holistic student analytics platform

Outlook: What's Next? II

- Conversational Chatbot (AI)
 - Currently under development (Master's thesis)
 - Purpose
 - Guide students in reflecting on progress, understanding data, planning
 - Vision
 - Transform dashboard into an interactive academic coach

Outlook: What's Next? III

- Transferability & Cross-Institutional Use
 - High potential for adaptation at other universities
 - Common campus infrastructures can reuse architecture & design logic
 - Challenges
 - data model heterogeneity
 - multilingual systems
 - governance

Conclusion

- *The TU Graz study progress dashboard evolved from a simple visualization tool to a flexible, data-driven, student-centered platform*
- It supports
 - **transparency** and orientation
 - better **planning** and **self-regulation**
 - ethical analytics with preserved **autonomy**
- The dashboard is no longer just about visualizing what happened
 - it becomes a **compass** for **future learning decisions**

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