

A⁺CHIS - ADAPTIVE AND INTERACTIVE CHIS

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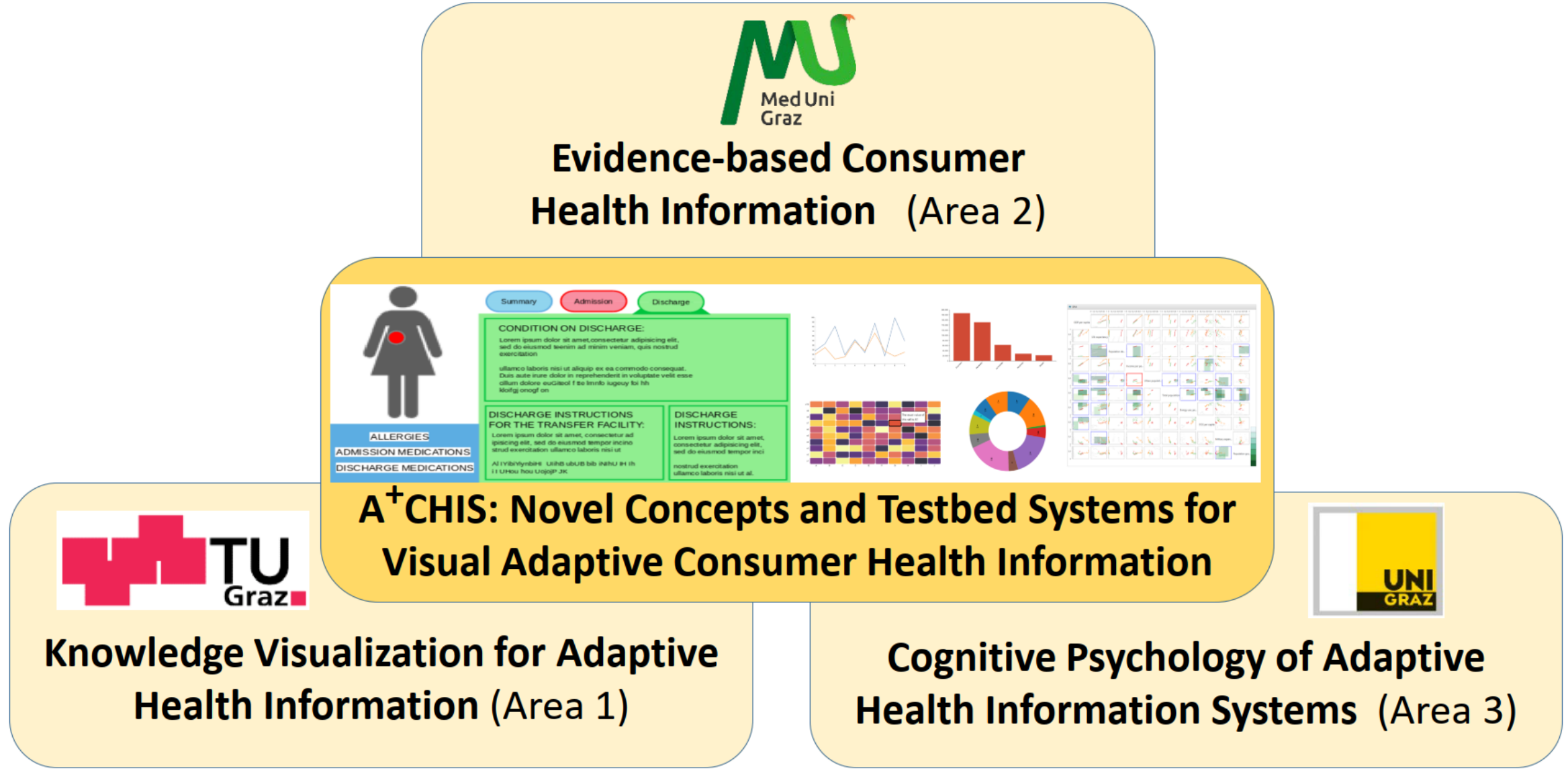
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INTRODUCTION

FWF Research Group on Human-Centered Interactive Adaptive Visual Approaches in High-Quality Health Information



Areas of research

Our main research question and objective in this project is: How can evidence-based medical knowledge, cognitive-psychological mechanisms, and novel interactive data visualizations be combined to form adaptive and interactive consumer health information systems that take account of individual health information needs, and increase health literacy by providing a reliable source of medical knowledge?

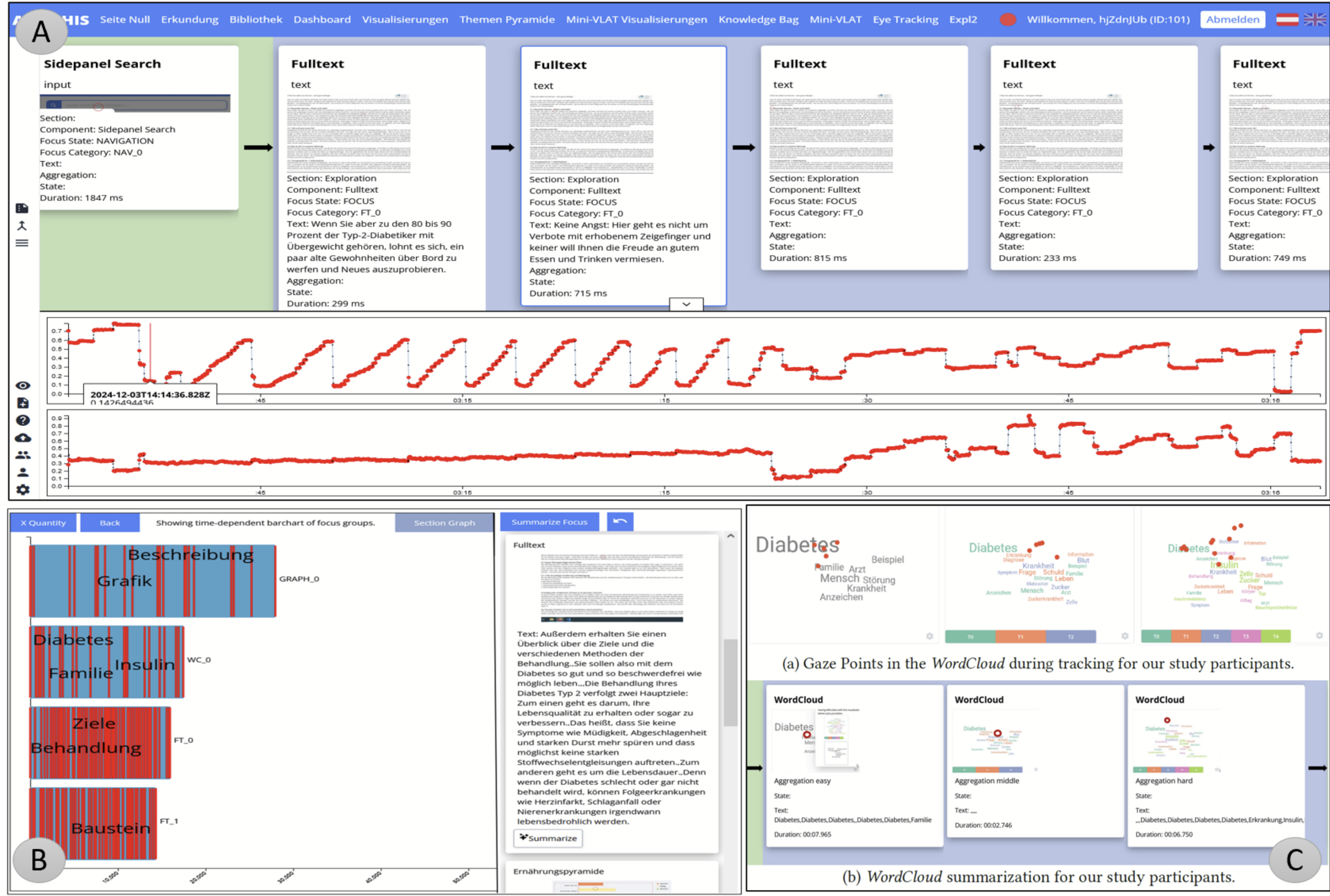
Based on an analysis of existing CHIS, cognitive foundations, and visualizations of medical and consumer data, we research innovative concepts for advanced interactive, adaptive, personalized and visual CHIS (A⁺CHIS). We contribute to evidence-based medical information processing, user adaption, interactive visual information displays, and cognitive psychology.

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A User-Centric Adaption Model for Document Visualizations with Different Levels of Detail within a Consumer Health Information System. An adaptive LoD model personalizes health text visualizations to a user's visualization literacy and auto-adjusts via interaction signals (dwell time, clicks), recommending suitable views for different literacy levels.



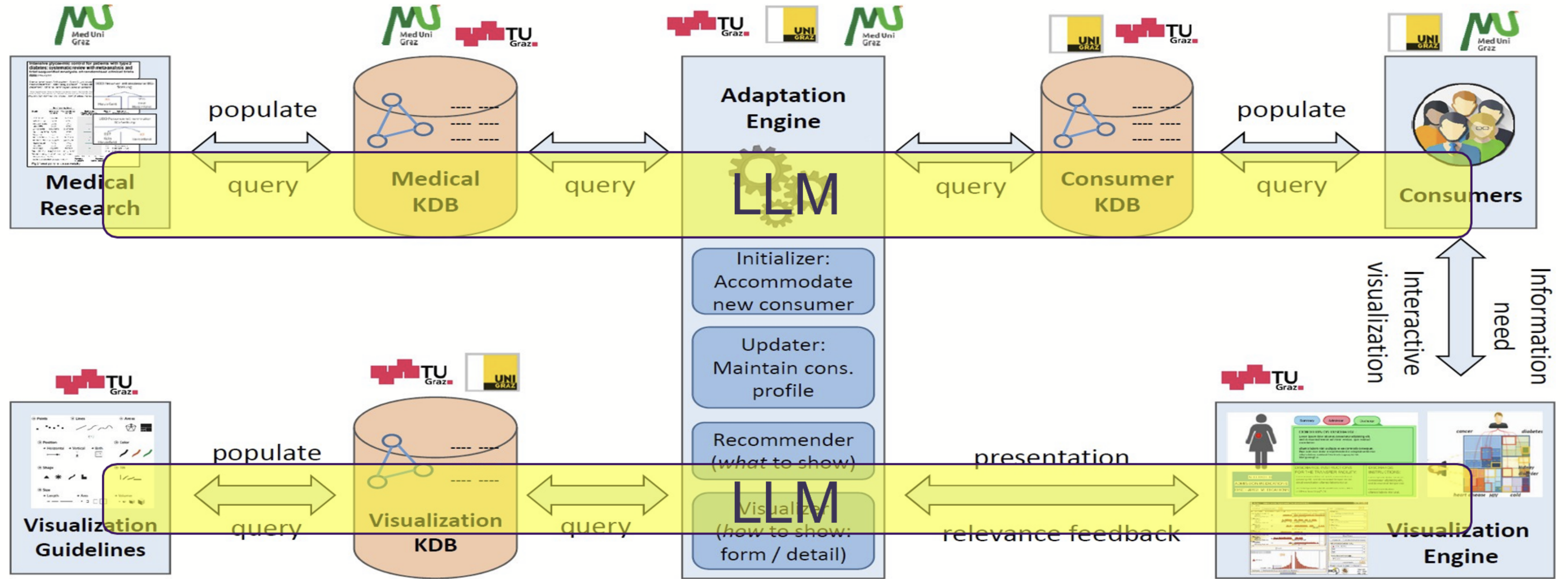
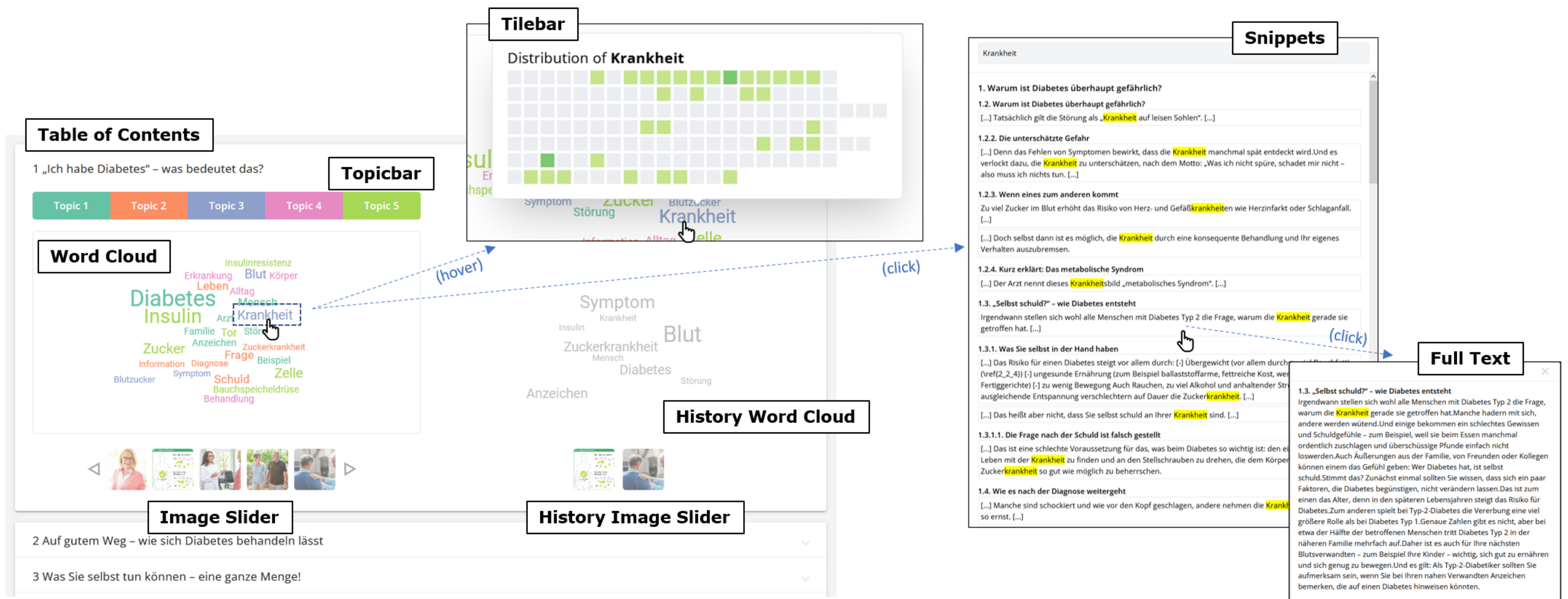
We integrate eye tracking into a CHIS—using fixation timelines, attention maps, and a gaze-based recommender—to enable explainable, attention-aware adaptation, while addressing challenges like noisy gaze data, interest vs. confusion, and LLM-based summarization.



ACKNOWLEDGMENTS

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A⁺CHIS - SYSTEM



COGNITIVE SCIENCE SECTION, UNIVERSITY OF GRAZ

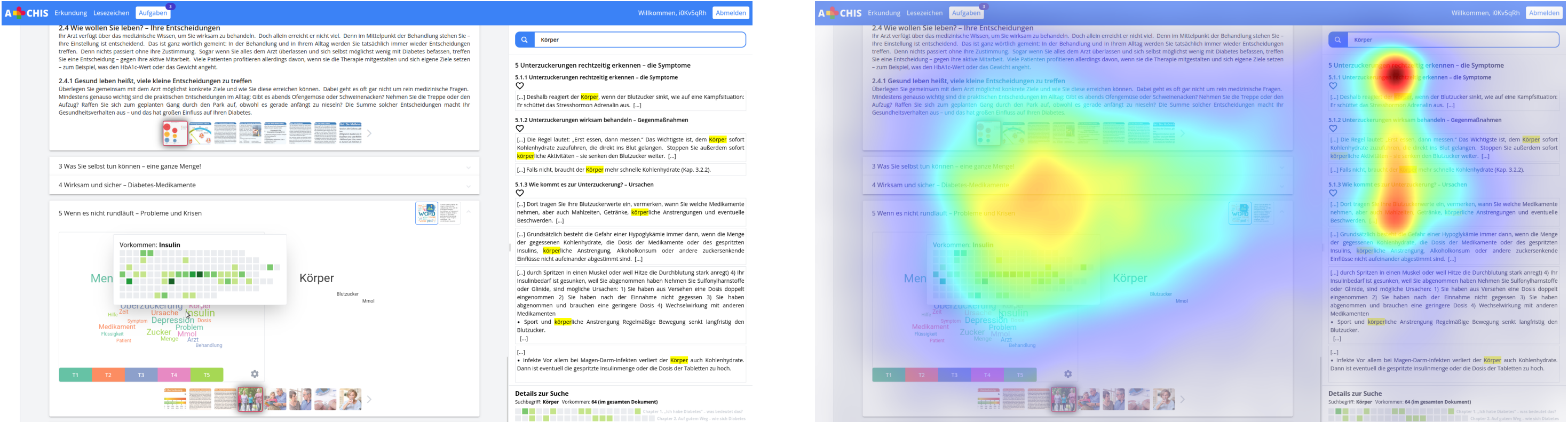
Our area focuses on the Cognitive Psychology of Adaptive Health Information Systems. This involves cognitive aspects involved when seeking and processing health information as well as system evaluation studies.

NON-INVASIVE ASSESSMENT OF COGNITIVE LOAD¹

Main RQ: Can user interaction data be used to predict users experienced cognitive load?

Method

Participants (N = 271) received a link to the A⁺CHIS prototype and could access the prototype online using a computer and a mouse. Each participant completed a total of three tasks (Example: How long after administration does normal insulin reach its peak effect?). The answers to the task could be found within the prototype and participants were instructed to find it. After each task participants answered a cognitive load questionnaire (Krieglstein et al., 2023, doi.org/10.1007/s10648-023-09738-0), which differentiates between intrinsic cognitive load (ICL), extraneous (ECL) and general cognitive load (CL). During the interaction with the prototype mouse movements, clicks, keyboard strokes, etc. were tracked.



Mouse tracking data for Task 3. Prototype (left) and interaction heatmap for Task 3 (right).

Planned Analysis

Data Preprocessing: We derived a total of 16 predictors from the raw interaction data files. Planned Analysis: Multilevel Model with tasks clustered in participants.

CL	0.135***	-0.003	0.169***	-0.021	-0.002	0.145***	0.157***	-0.059	0.119**	0.134***	0.067	0.118**	0.131***	0.223***	0.196***	0.231***
ICL	0.093*	-0.009	0.095*	-0.03	0.009	0.075*	0.084*	-0.049	0.056	0.066	0.065	0.065	0.078*	0.136***	0.132***	0.141***
ECL	0.146***	0.003	0.2***	-0.01	-0.012	0.177***	0.189***	-0.057	0.15***	0.166***	0.058	0.141***	0.152***	0.255***	0.213***	0.264***

Preliminary Correlations of Behavioral Indicators with the Cognitive Load Measures

¹ Michael Bedek, Stephan Lengauer, Sarah von Götz, Wilfried Grassegger, Marie-Therese Hoesch, Dietrich Albert