Medexter Healthcare & ZK – Case Study

Medexter Healthcare

ZK is used in Medexter's software Momo (Monitoring of Microorganisms). Momo is a Microbiology Analytics and Clinical Tool for Reporting Pathogens and Antimicrobial Resistances. The software can play a significant role in avoiding the occurrence of epidemics inside a medical institution and helps medical personnel with prescribing adequate antibiotics while battling multi-drug resistant bacteria.

About Medexter

Medexter Healthcare is located in Vienna, Austria and develops and markets knowledge-based systems for clinical decision support (CDS). The highly innovative CDS solutions are based on specific requirements from everyday clinical practice. Moreover, the products are continuously developed further in close cooperation with medical professionals. The systems improve transparency, efficiency, and facilitate administrative tasks in the daily routine in a medical environment. The aim of these high-tech software solutions is to promote quality assurance and patient safety in diagnosis, therapy, prognosis, and patient management.

ZK x Clinical Decision Support

We currently use ZK in three of our software projects:

ArdenSuite Server – The ArdenSuite technology platform is a highly innovative and unique CDS solution: It has been developed for clinical contexts and is thus specifically tailored to meet the requirements needed to support doctors and medical staff in their daily work. Its CDS is patient-specific, as it is based on a person's latest data. The software based on this standardized syntax is applicable in every medical discipline. Initially without specific clinical content, it represents a highly flexible and versatile platform, waiting to be applied to medical tasks or to solve specific clinical problems, when endowed with proper clinical knowledge. The ArdenSuite's components comprise the ArdenSuite IDE for content development and testing, the ArdenSuite Server for content management and processing, and our ArdenSuite Connectors and Extensions for interfacing.

MONI (Monitoring of nosocomial infections) is a comprehensive Surveillance Tool for Identification, Monitoring, and Reporting of Healthcare-Associated Infections (HAIs) within the intensive care medicine. It is linked with the medical documentation systems of a healthcare institution and automatically imports electronic clinical and laboratory raw data to process it into surveillance information. MONI thereby allows to identify and monitor HAIs without the need for extra data entry by medical or surveillance staff. Due to the integration of fuzzy concepts, MONI also captures those incipient or borderline cases that are normally at a risk of not being recognized.

We recently developed a new feature for Momo. *OneClick* is a shortcut feature, implemented in clinical information systems within the hospital IT environment, and serves as an easy and quick way for the physician to access the Momo QuickScan application, which is described below.

The Project

Momo is a comprehensive microbiology analytics tool, to keep track of all pathogens and antimicrobial resistances in the hospital. Momo's QuickScan functionality gives immediate single patient overviews with all or all positive, approved results for one patient. It serves as a fast clinical tool for the attending physician and is always up-to-date. As microbiology analytics software, Momo provides all the information on pathogen occurrence, frequency distribution, and resistance situation in one place. 58 different parameters allow maximum flexibility for clinical, QM, and administrative queries. User-defined templates facilitate reporting and benchmarking.

The Challenge

Momo is a software that is used in clinical practice by physicians. It comprises a combination of features used individually or combined by physicians and medical personnel of different disciplines and with different purposes or problems in mind.

We rely heavily on our users' feedback and requests for needed features and extensions. As these users are mostly doctors and other medical personnel, issues are often complex and connected to the well-being of actual patients.

This implies that we must be able to implement new features exactly as needed and also customize the user interface to our users' liking. Our GUI components have to be clean and easy to grasp, and the system's performance has to be satisfying for use in clinical routine. Also, it has to be possible for us to make quick and effective adjustments.

With the implementation of Momo OneClick we strongly rely on a compact and clear representation of Microbiological data, since this new feature is used in daily clinical routine and the physicians need fast overview of the data.

Why ZK

We chose ZK as our framework, because while it leverages the strengths of AJAX, the developer usually does not have to deal with JavaScript but can concentrate on programing in Java. Furthermore, themes provided by ZK can easily be adapted to our own requirements, which leads to highly customizable user interfaces.

We consider the flexibility and easiness of developing customized components a particular benefit. ZK components already provide great functionalities, but for medical contexts and purposes, we were forced to create some components ourselves. We, for example, created components in order to provide users with a tool to create customized queries and select items from a thesaurus containing pathogens.
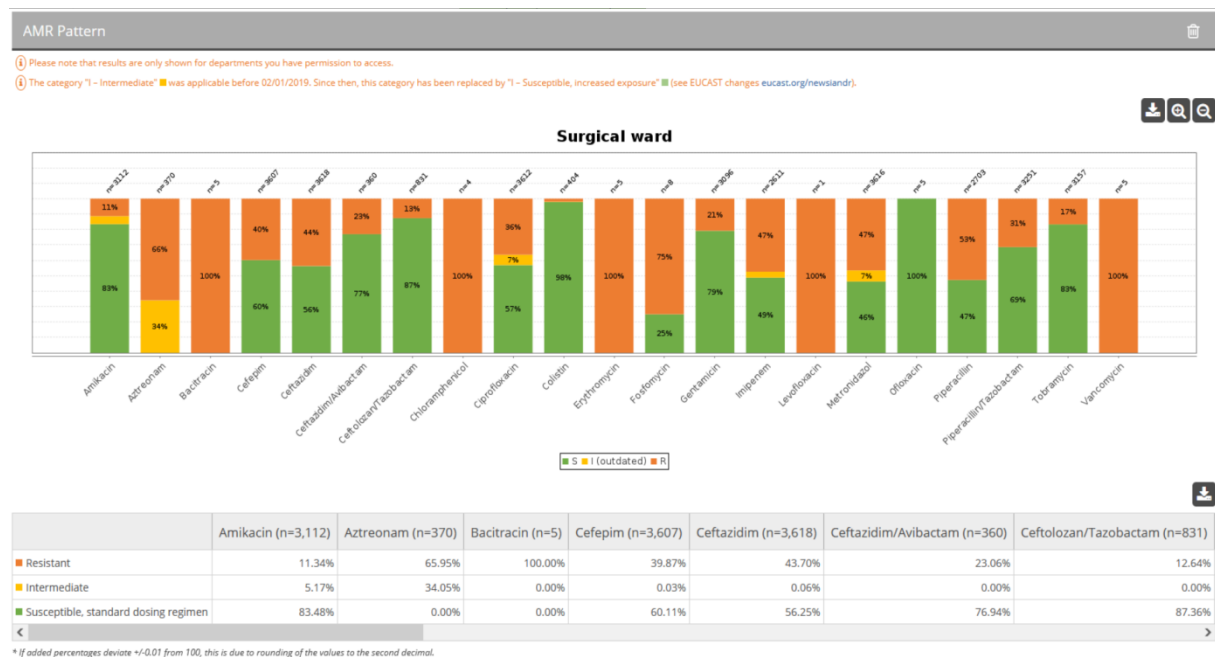
Why ZK Charts

The strength of ZK Charts lies in its great customizability. Offering countless design commands in Java and enabling the implementation of JavaScript Code to directly modify the underlying Highcharts settings, ZK Charts allows our developers to handle complex design requirements.

Embedded into a ZK-based application, the graphical components created by ZK Charts became an essential feature in Momo as they do not only facilitate clear presentation of medical data, but also provide an interactive experience for the user. For instance, the connection of a chart and a table can be achieved to enable the user to actively select the data plotted in the graph from a table.

Moreover, ZK's support team responds very quickly, always provides helpful advice, and informs about the resolution of bugs within ZK.
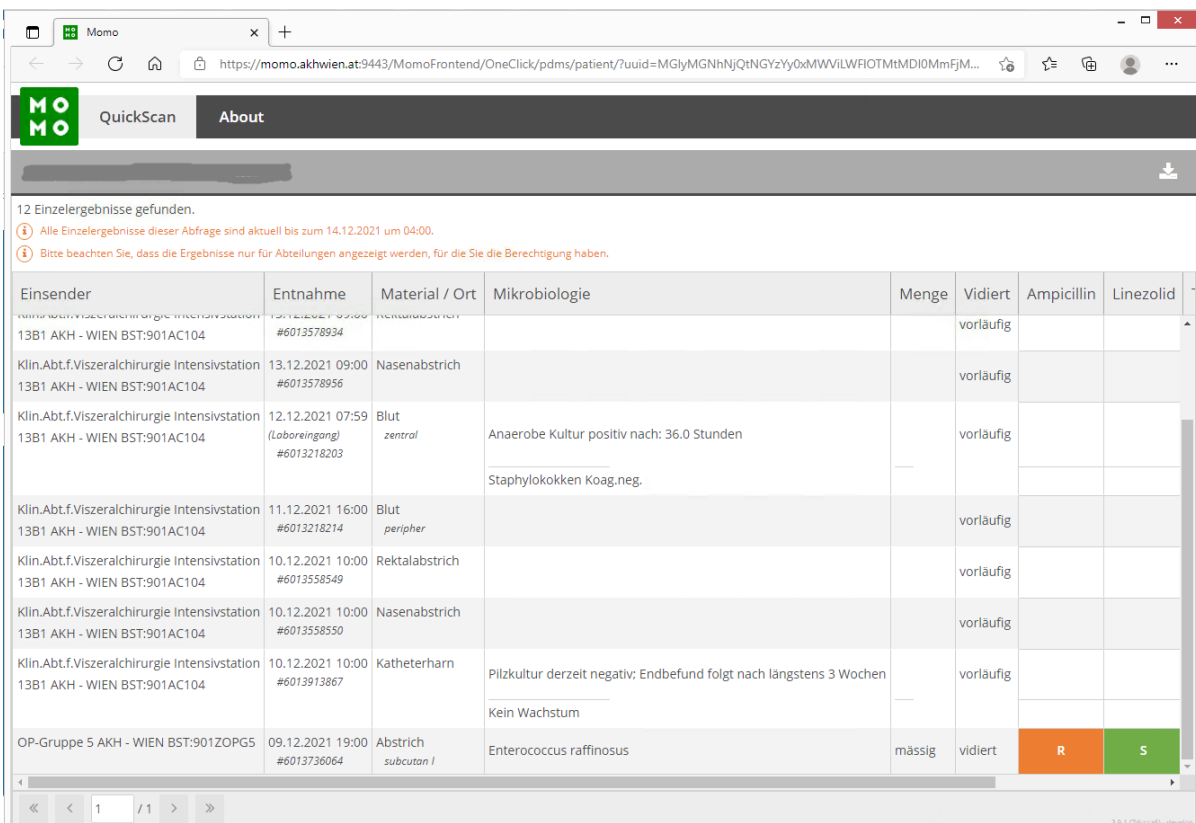
The Result

An important feature of Momo is the antimicrobial resistance (AMR) query. Clinicians select a pathogen based on a FlexScan or QuickScan query and Momo graphically displays the relevant AMR situation for this pathogen. With the ZK Charts, the AMR chart has unprecedented resolution and design. Moreover, results of insignificant sample size are depicted with a lower opacity to emphasize relevant information.

	Amikacin (n=3,112)	Aztreonam (n=370)	Bacitracin (n=5)	Cefepim (n=3,607)	Ceftazidim (n=3,618)	Ceftazidim/Avibactam (n=360)	Ceftolozan/Tazobactam (n=831)
Resistant	11.34%	65.95%	100.00%	39.87%	43.70%	23.06%	12.64%
Intermediate	5.17%	34.05%	0.00%	0.03%	0.06%	0.00%	0.00%
Susceptible, standard dosing regimen	83.48%	0.00%	0.00%	60.11%	56.25%	76.94%	87.36%

* If added percentages deviate +/-0.01 from 100, this is due to rounding of the values to the second decimal.

Futhermore, we implemented a dashboard with ZK charts to gather and visualize performance data of Momo. This feature is needed to comply with the current legal status of the European Union (IVDD/98/79/EC).
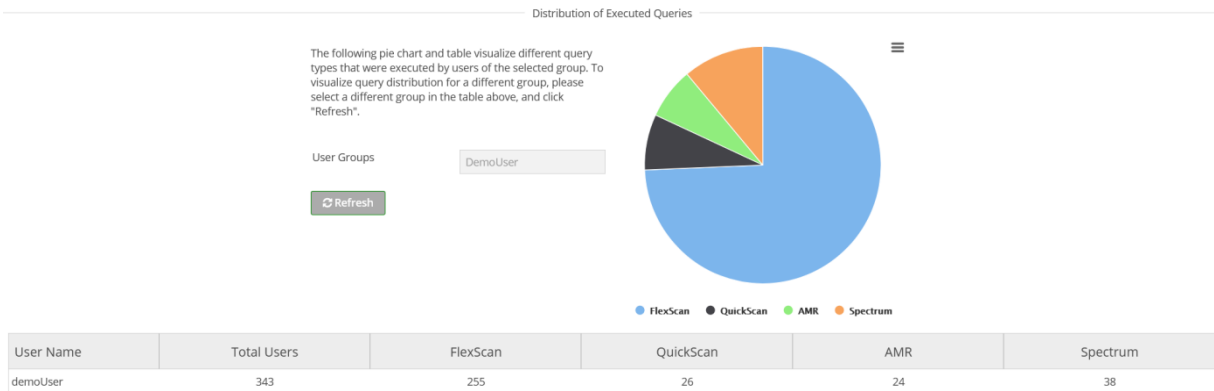
Our newest feature Momo OneClick (described previously) relies on the comprised and clear representation of the microbiological laboratory results. As shown below, Momo's OneClick functionality gives the immediate possibility to access Momo's QuickScan in a password-less authentication procedure to get patient overviews with all results for a single-patient or department.

Future

We are using ZK Charts for additional graphical components within Momo. One feature would be a comparison of two or more AMR charts. Enhance the dashboard to collect and display additional

performance and surveillance data for our technical documentation and Quality Management System (QMS).