

A Concept for Integrating AI-Based Support Systems into Clinical Practice

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Abstract. The integration of artificial intelligence (AI) algorithms into clinical practice holds immense potential to improve patient care, but widespread adoption still faces significant challenges, including interoperability issues. We propose a concept for the agile development of an IT platform to integrate AI-based applications into clinical workflows for a use case in ophthalmology.

Keywords. Artificial intelligence, Clinical Decision Support Systems, Interoperability, Ophthalmology, SMART on FHIR

1. Introduction

The amount of Artificial Intelligence (AI)-based Clinical Decision Support Systems (CDSS) in ophthalmic research is increasing, particularly in imaging diagnosis [1]. However, model-based applications are rarely used in clinical practice, partly due to the lack of interoperability with Clinical Information Systems (CIS) [2,3]. The aim of this work is to design a generic IT platform for the implementation of AI-based CDSS into clinical workflows intended to be used by hospital system administrators.

2. Methods

We opted for an agile methodology to derive a technological framework. In collaboration with interdisciplinary experts, we defined so-called expansion stages of AI integration, ranging from no AI to fully AI-based decision support. The agile development of CDSS and the underlying IT platform follows the requirements of the Medical Device Regulation (MDR), and has been extended to include data standardization and authorization activities. Based on the defined expansion stages of AI integration and leveraging on the SMART-on-FHIR specifications, we designed a technological concept for the generic IT platform.

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3. Results

We present expansion stages ranging from Minimum Viable to Final Product, a methodological concept for agile development of the CDSS and the underlying platform (doi: 10.5281/zenodo.11205902), as well as a technological concept for the IT platform to integrate the respective CDSS into clinical practice (Figure1).

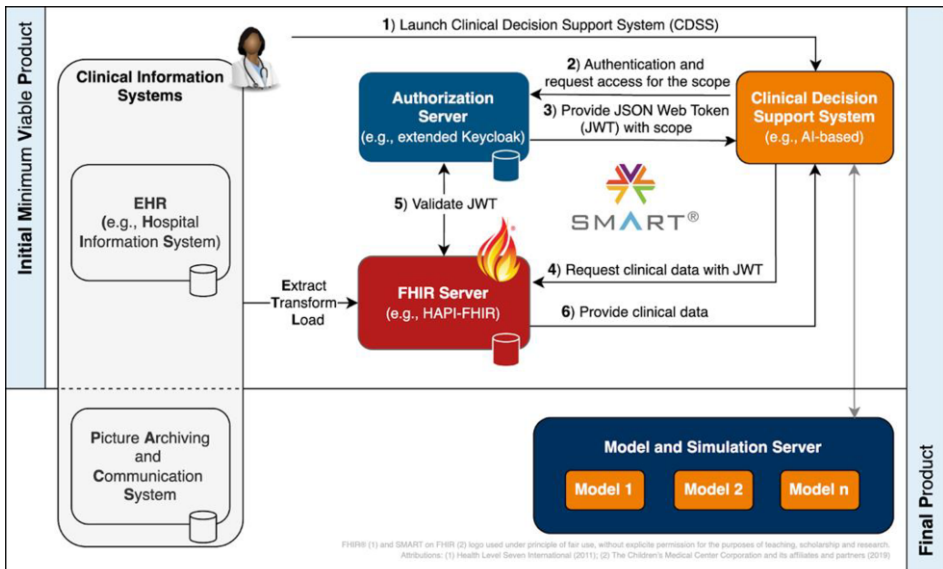


Figure 1. Technological concept for the Initial Minimum Viable to the Final Product.

4. Discussion and Conclusions

Our work focuses on a concept for the development of an IT platform for the integration of AI-based CDSS into clinical practice, which are based on interoperability standards and specifications, such as FHIR and SMART-on-FHIR. In this way, a CDSS developed and implemented according to our proposed concept could be launched from anywhere in the healthcare system and access data from any electronic patient record or other data repositories, provided that all software components use compatible FHIR specifications. Our proposed concept would be suitable for all specialties. Future work will include the development and integration of a machine learning based CDSS for predicting visual acuity in a clinical ophthalmology department.

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