

HEALTH INTELLIGENCE

The importance of open source software for the breakthrough of openEHR as leading technology



Betamax vs. VHS – a format warfare in the late 1970s

A lesson that we should learn from



Betamax video tape

SONY

- Better price/value ratio
- Earlier in the market (1975)
- Higher resolution, better colors
- Goal: Being the industry standard



VHS video tape

JVC

- Longer recording time (120 min. vs. 60 min)
- Market entry 1976 (early follower)
- Downward compatible

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Why did VHS win the battle over the ,right' format?

5 Principles

Principle number 1:

The first player in the market does not always win!

Principle number 2:

The needs of the customers are decisive!

Principle number 3:

Customers do not want one-offs, but functioning systems!

Principle number 4:

Nobody makes it on their own!

Principle number 5:

Giving up does not necessarily mean failure. A change of perspective helps!



https://www.medienrettung.de/blog/videosysteme/

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Behind every successful adopted technology is at least one open source stack

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Technologies and related open Source Stacks

Web Development:		
Web Servers:	e.g. Apache HTTP Server	
 Programming Languages: 	e.g. JavaScript	
Databases:	e.g. PostgreSQL	
Mobile Development:		
Operating Systems:	e.g. Android	
Frameworks:	e.g. React Native	
Cloud Computing and Infrastructure:		
Containerization:	e.g. Kubernetes	
Infrastructure as Code:	e.g. Ansible	
Data Science and Machine Learning:		
Languages and Libraries:	e.g. Python	
Data Processing:	e.g. Apache Spark	
DevOps and Continuous Integration/Deploy	ment:	
Version Control:	e.g. Git	
Continuous Integration:	e.g. Jenkins	
Content Management Systems (CMS):		
WordPress		

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Behind every open source stack is a main supporter and driver

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open Source Stacks & who is behind

Either Foundations or companies that believe in a technology vision

- Apache HTTP Server
- Android
- React Native
- Kubernetes
- Python
- WordPress



Google









Linux

Open Source the starting point for successful markets

Open Source Distribution



By 2023, the global Linux operating system market is expected to exceed \$7 billion.

Commercial Distributions



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https://meterpreter.org/the-linux-system-market-will-be-worth-more-than-7-billion/?utm_content=cmp-true



EHRbase - open source backend for electronic health records



EHRbase removes barriers for vendors, hospitals, national programs and others to adapt open standards and thereby fosters the establishment of semantic interoperability

Project Background

- HiGHmed is a consortium of 9 German university hospitals, funded by the Federal Ministry of Science and Education (40mio €, 2018 2022)
 - Data infrastructure to enhance data-driven research and care provision
 - Based on an open platform architecture, using openEHR, IHE XDS and FHIR
- HiGHmed aimes to provide its platform components under open source licenses
- vitagroup joined HiGHmed as industry partner
- Since January 2019: joint development of EHRbase with Hannover Medical School, vitagroup and ADOC Software

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Hannover Medical School







EHRbase Overview

- Modern architecture and technologies
- Open Source Apache 2 License
- Only depends on open source components
 - Java 11 (OpenJDK)
 - Spring Boot
 - PostgreSQL
 - J00Q
 - Maven
- Designed for daily operations in transactional systems
 - Clinical application systems
 - Hospital information systems
 - regional/national health platforms







EHRbase – openEHR services

- Implements the current version of the openEHR Reference Model
 - Support of JSON and XML
- Archetype Definition Language Version 1.4
- Performs openEHR object transactional CRUD operation with validation
- Official openEHR REST API support
 - Create EHRs and manage EHR Status
 - Create, Update, Delete openEHR compositions
 - Upload, list, retrieve Templates
 - Directories
 - Execute Archetype Query Language
 - Stored Queries (with parameters)



openEHR – Software Development Kit

- The Software Development Kit helps to efficiently implement new clinical application systems
- Generates software code (Java classes) from openEHR Templates
- Allows to automatically transform data from java object to openEHR database format and back
- Encapsulates the openEHR REST API
 - EHR
 - Template
 - Composition
 - Querying
 - Directory
- Facilitates the use of the Archetype Query Language

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Differentiation EHRbase and HIP CDR

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Vendor Independence

Open-Source-Software

forms the core of the HIP CDR. True vendor neutrality must be based on open-source components that provide maximum freedom of choice in the future.



The **HIP CDR** combines the advantages of open-source with the convenient extensions of a commercial distribution like **security** and **performance** for operation, **scalability**, **usability** and **additional plug-ins** and **features** on top of **guaranteed Service Levels**



Data-centric, open information architecture

How is the data connected to the HIP CDR?



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Let's stay in touch

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