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

JUST CRUSHED 20 YEARS
HAPPY ANNIVERSARY openEHR !!!

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

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!

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HEALTH INTELLIGENCE

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

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
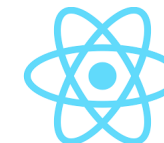
Cloud Computing and Infrastructure:
- Containerization: e.g. Kubernetes
- Infrastructure as Code: e.g. Ansible

Data Science and Machine Learning:
- Languages and Libraries: e.g. Python
- Data Processing: e.g. Apache Spark

DevOps and Continuous Integration/Deployment:
- Version Control: e.g. Git
- Continuous Integration: e.g. Jenkins

Content Management Systems (CMS):
- WordPress

open Source Stacks & who is behind

Either Foundations or companies that believe in a technology vision

- **Apache HTTP Server**

- **Android**

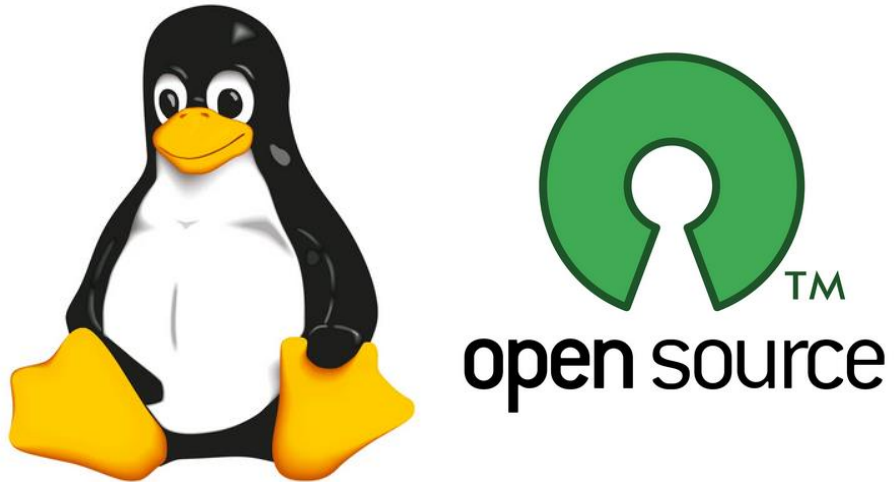- **React Native**
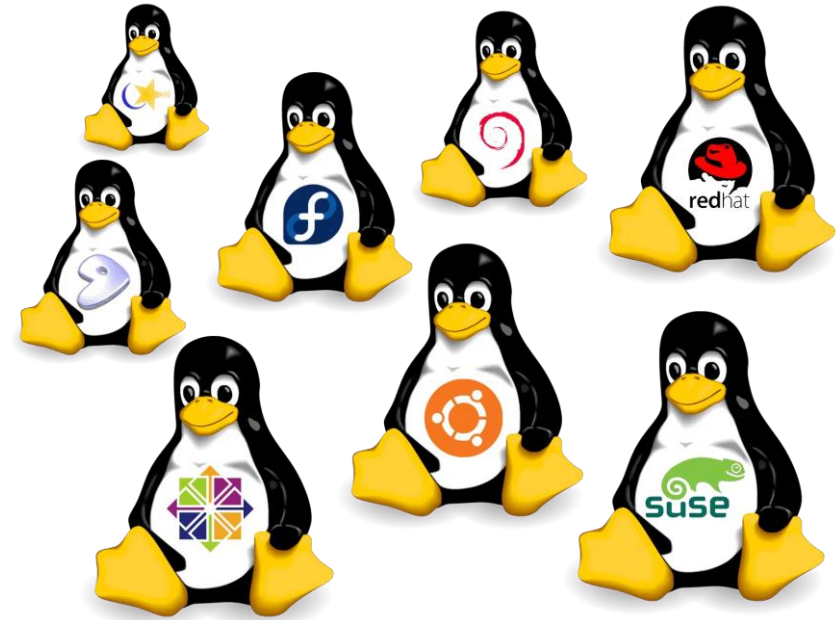
- **Kubernetes**

- **Python**

- **WordPress**

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Linux

Open Source the starting point for successful markets
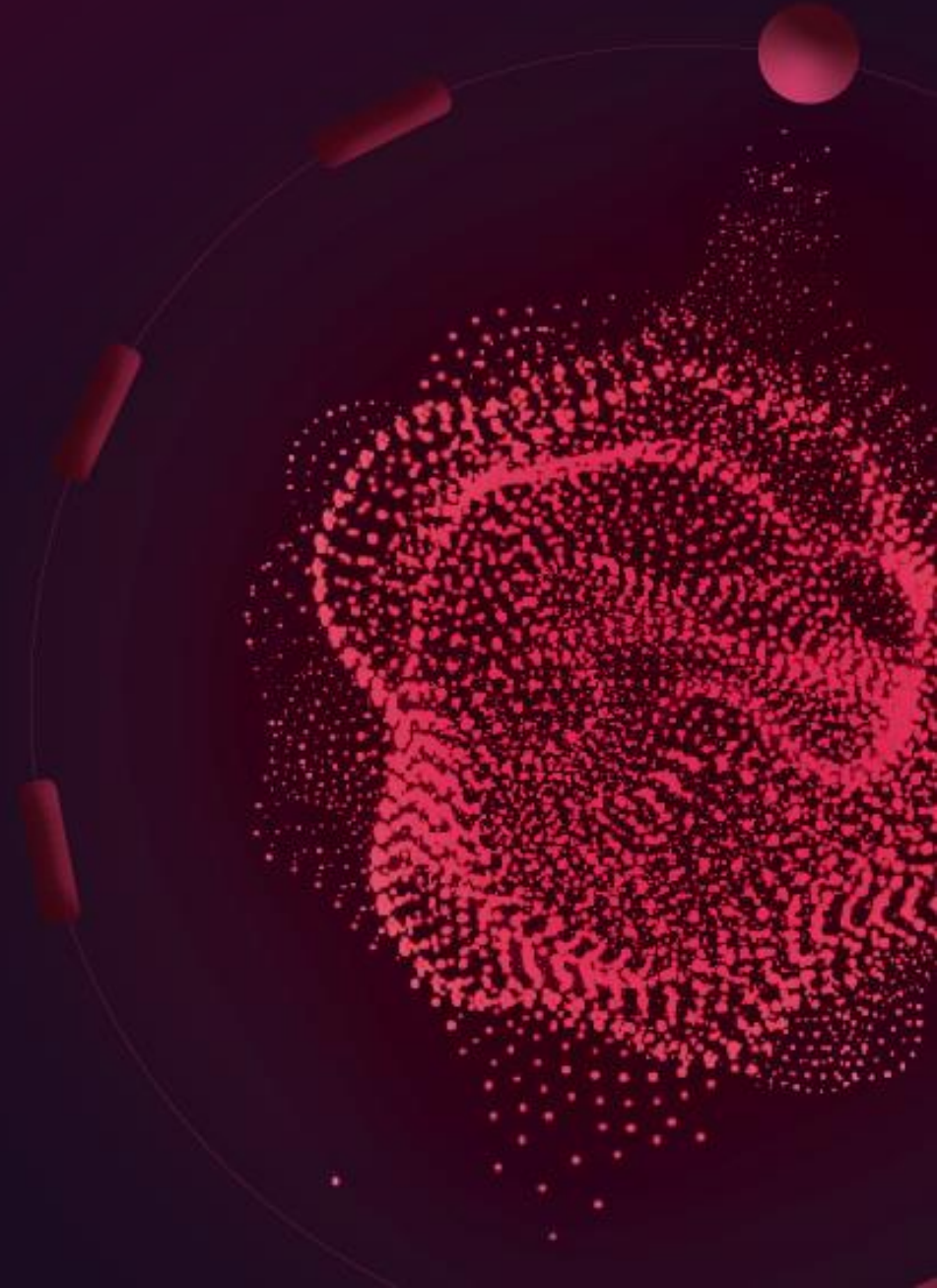
Open Source Distribution

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

Commercial Distributions

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EHRbase - open source backend for electronic health records

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 aims 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

EHRbase Overview

- Modern architecture and technologies

- Open Source Apache 2 License

- Only depends on open source components

  - Java 11 (OpenJDK)

  - Spring Boot

  - PostgreSQL

  - JOOQ

  - 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

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

Differentiation EHRbase and HIP CDR

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**

openEHR

HL7 FHIR

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HIP CDR
CLINICAL DATA REPOSITORY

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Data-centric, open information architecture

How is the data connected to the HIP CDR?
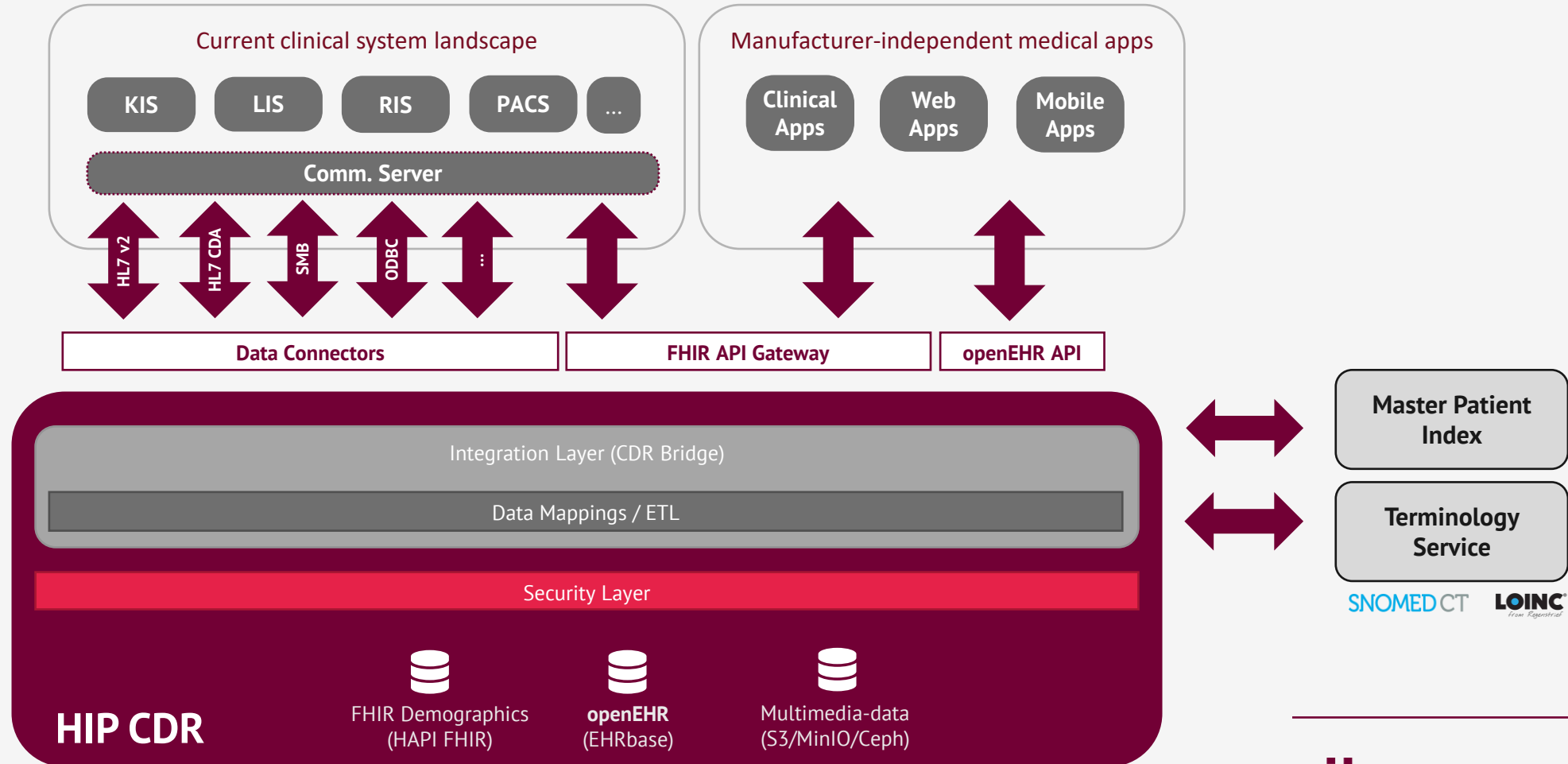
Let's stay in touch

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HEALTH INTELLIGENCE

Stefan Schraps

VP Partner Business & Community Management

mail   stefan.schraps@vitagroup.ag

vitagroup AG

Gottlieb-Daimler-Straße 8
68165 Mannheim

Telefon   +49 (0) 621 121 849-0
E-Mail   info@vitagroup.ag
Web   www.vitagroup.ag