

# Open SOA Health Web Platform for Mobile Medical Apps

Connecting Securely Mobile Devices  
with Distributed Electronic Health Records and Medical Systems

Jörg-Uwe Meyer

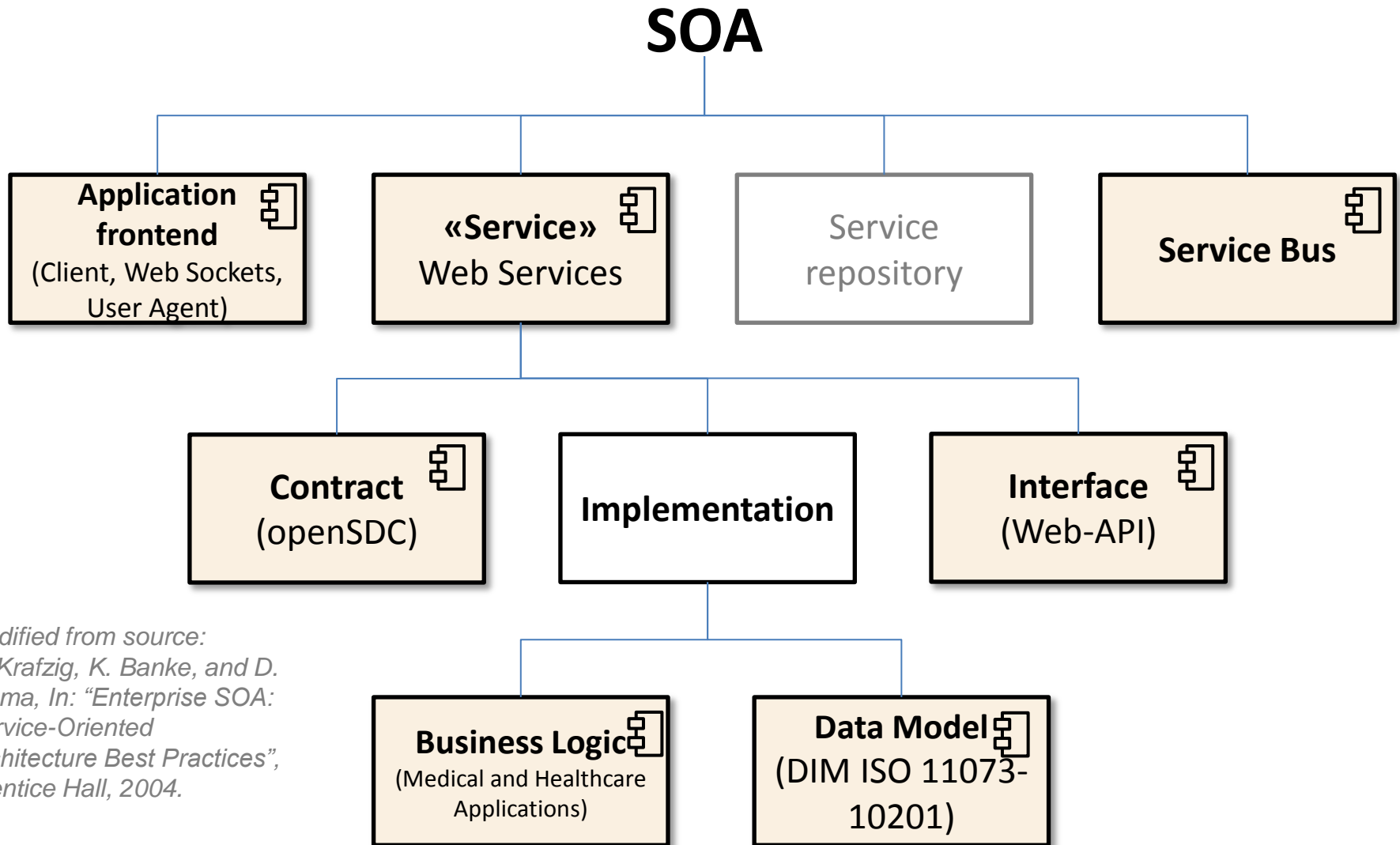
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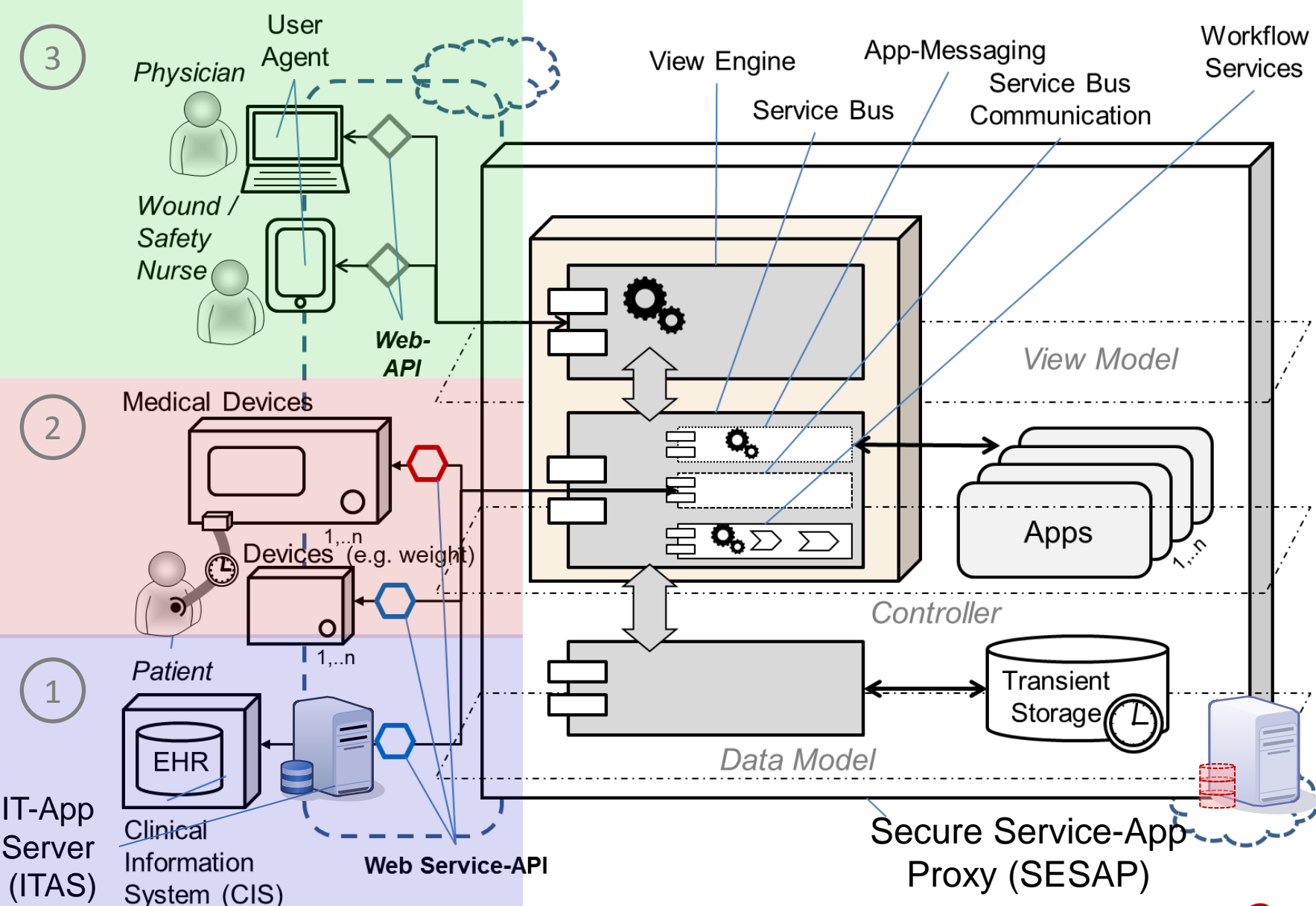
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# Elements of a Service-Oriented Architecture (SOA)



Modified from source:  
D. Krafzig, K. Banke, and D. Slama, In: "Enterprise SOA: Service-Oriented Architecture Best Practices", Prentice Hall, 2004.

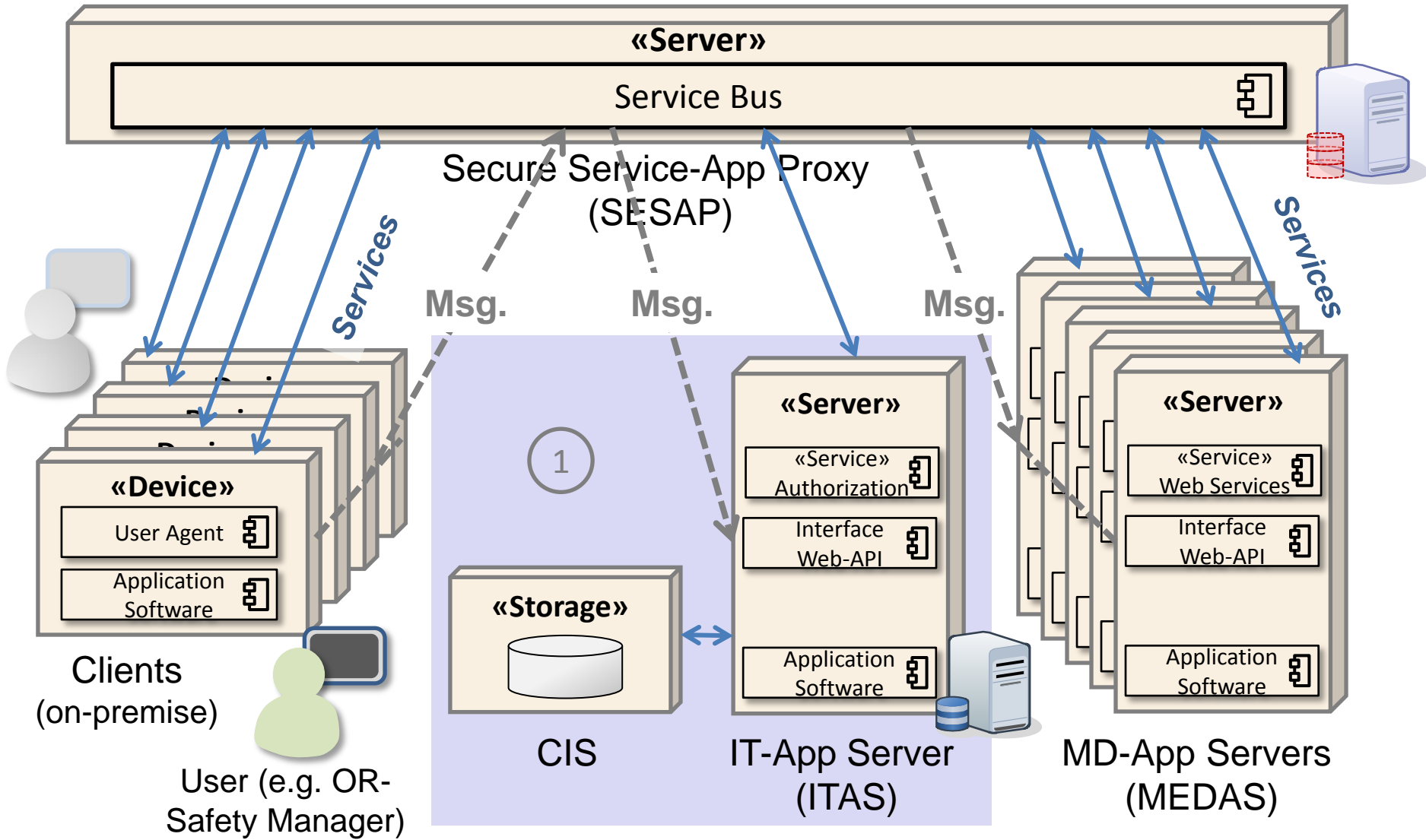
# Components of the Open SOA Health Web Platform for Medical Apps



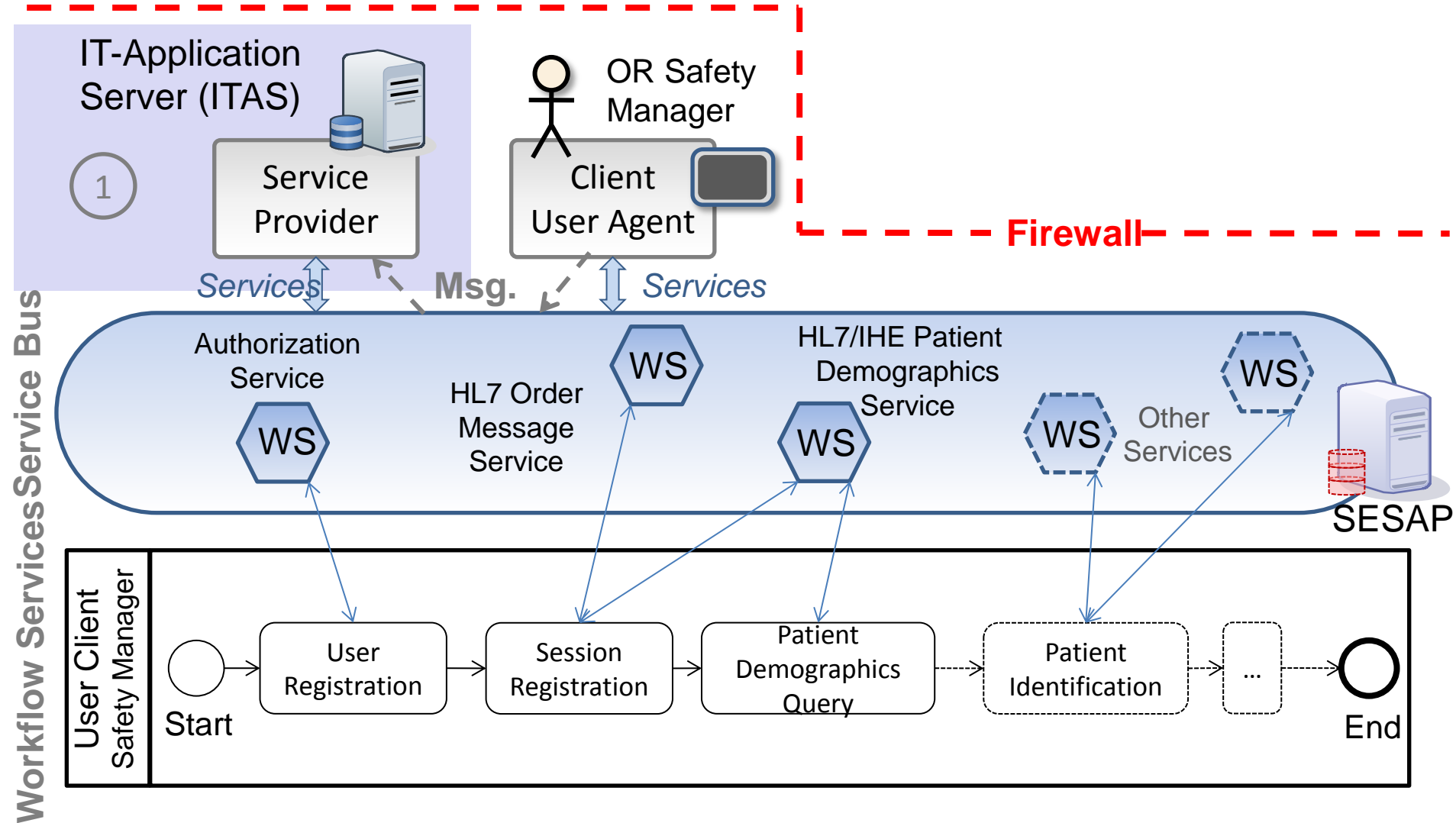
# On-premise SOA Deployment of open Health Platform

## Behind the Firewall

- Firewall - - - - -



# Communication ITAS $\leftrightarrow$ User Agent $\leftrightarrow$ SESAP



Workflow Services Service Bus

1

**Firewall**

SESAP

Workflow Services Safety Manager

Start

User Registration

Session Registration

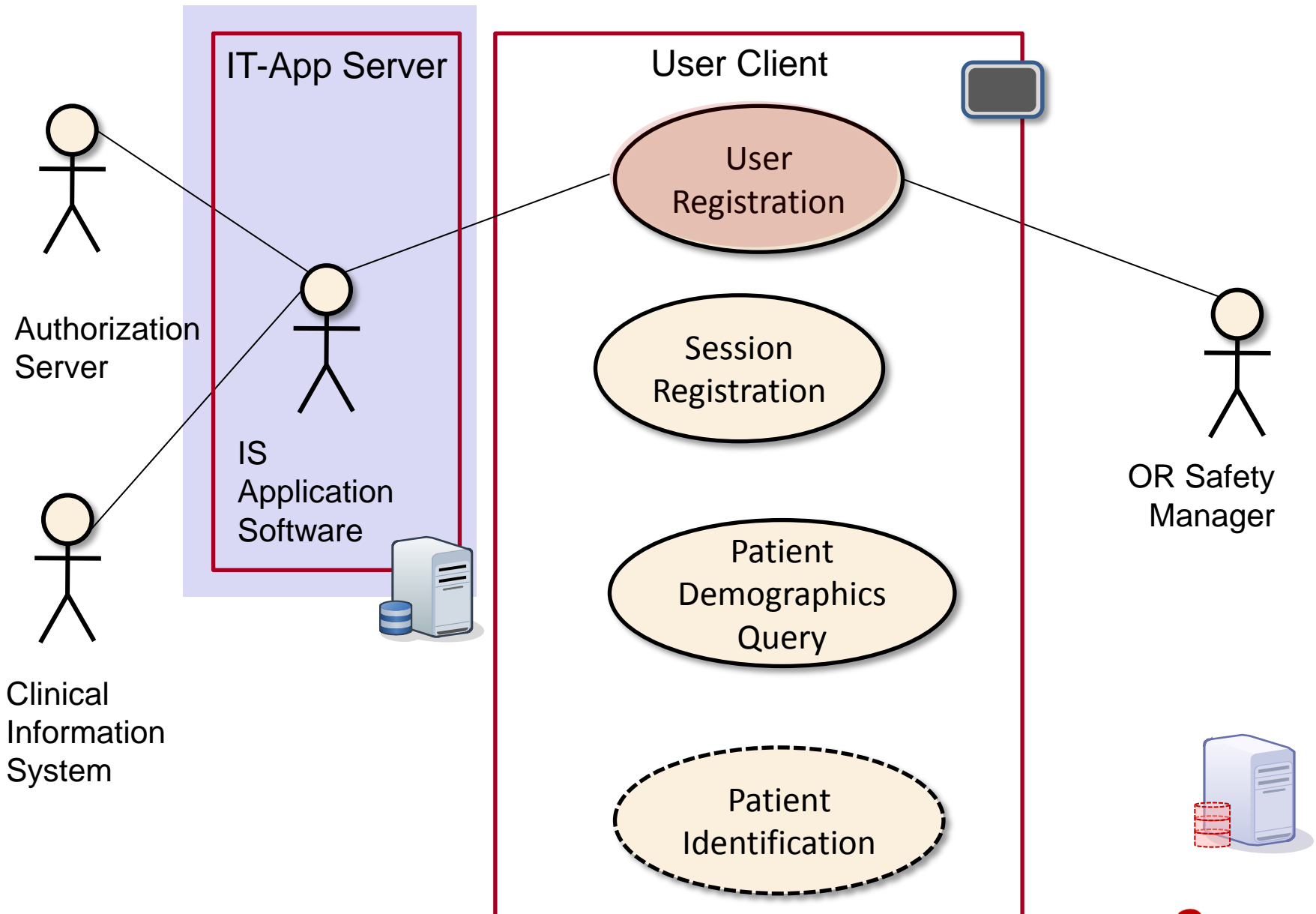
Patient Demographics Query

Patient Identification

...

End

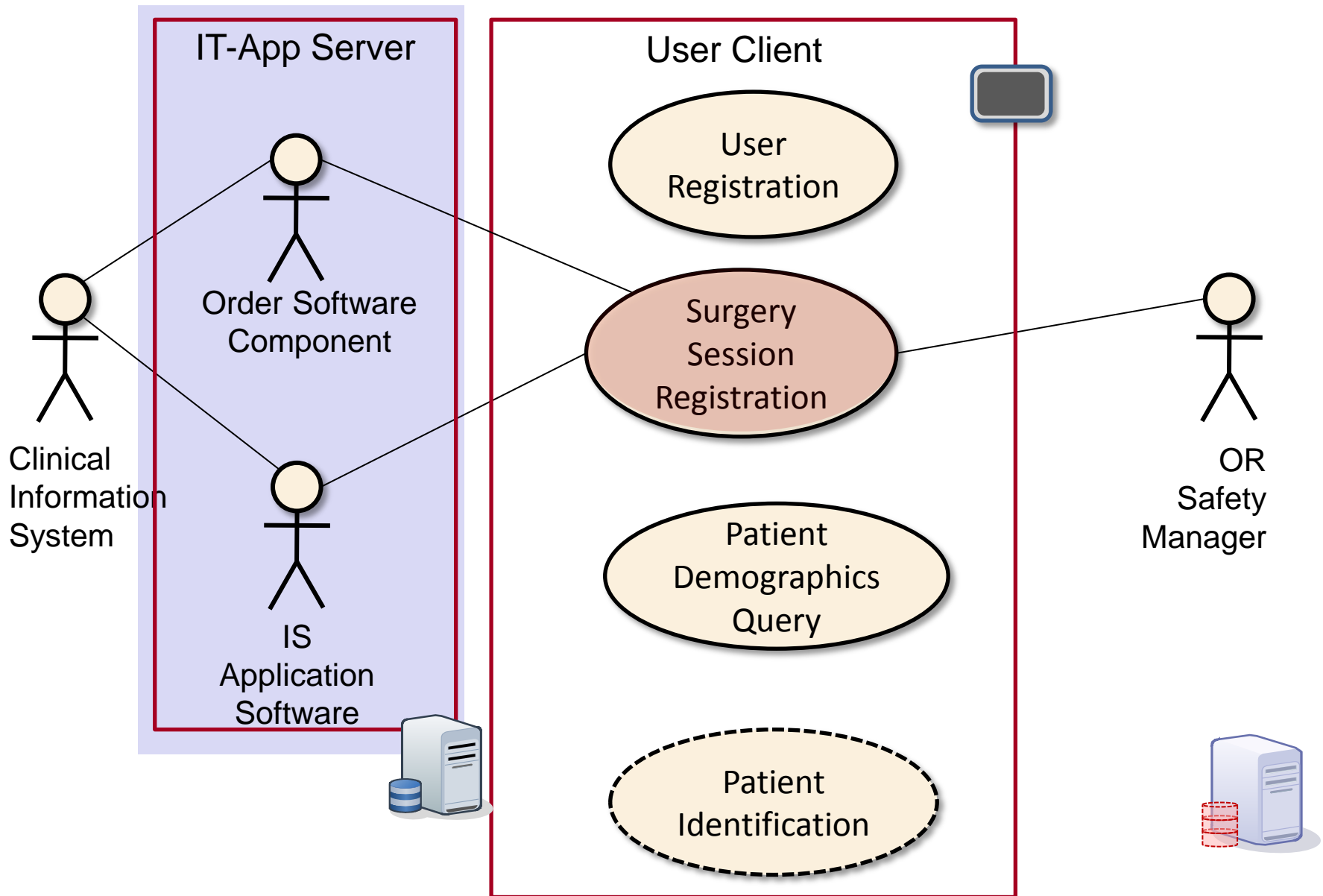
# Operation Room Use Case "User Registration"



# OAUTH2 Activity Sequences of “User Registration”

UC User Registration		
	Activity Sequences	IHE-ITI or HL7 Reference
1	OR_Safety_Manager initiates through User_Client login page of IS_Application_Software_Component	
2	IS_Application_Software_Component redirects User_Client to Authorization_Server	ITI-71 Get Authorization Token
3	User_Client sends credentials to Authorization_Server's login page	ITI-71 Get Authorization Token
4	<b>Authorization_Server returns single-use authorization code to User_Client</b> and Authorization_Server redirects User_Client back to the IS_Application_Software_Component	ITI-71 Get Authorization Token
5	IS_Application_Software_Component passes the User_Client's <u>single use authorization code</u> and its own IS_Application_Software_Component's <b>ID and secret to the Authorization_Server</b>	ITI-71 Get Authorization Token
6	<b>Authorization_Server returns access token</b> to IS_Application_Software_Component	ITI-71 Get Authorization Token
7	IS_Application_Software_Component <b>uses access token to request OR_Safety_Manager user info</b> from Authorization_Server	ITI-71 Get Authorization Token
8	Authorization_Server returns OR_Safety_Manager user info to IS_Application_Software_Component	ITI-72 Incorporate Authorization Token
9	IS_Application_Software_Component confirms appropriate OR Safety Manager's user identification to OR_Safety_Manager	ITI-72 Incorporate Authorization Token
10	OR_Safety_Manager continues tasks presented by the User_Client	

# Operation Room Use Case "Session Registration"





# Workflow Services according to WHO Safety Surgical Checklist

## Surgical Safety Checklist



World Health  
Organization

Patient Safety

A World Alliance for Safer Health Care

### Before induction of anaesthesia

(with at least nurse and anaesthetist)

**Has the patient confirmed his/her identity, site, procedure, and consent?**

Yes

**Is the site marked?**

Yes

Not applicable

**Is the anaesthesia machine and medication check complete?**

Yes

**Is the pulse oximeter on the patient and functioning?**

Yes

**Does the patient have a:**

**Known allergy?**

No

Yes

**Difficult airway or aspiration risk?**

No

Yes, and equipment/assistance available

**Risk of >500ml blood loss (7ml/kg in children)?**

No

Yes, and two IVs/central access and fluids planned

### Before skin incision

(with nurse, anaesthetist and surgeon)

**Confirm all team members have introduced themselves by name and role.**

**Confirm the patient's name, procedure, and where the incision will be made.**

**Has antibiotic prophylaxis been given within the last 60 minutes?**

Yes

Not applicable

**Anticipated Critical Events**

**To Surgeon:**

What are the critical or non-routine steps?

How long will the case take?

What is the anticipated blood loss?

**To Anaesthetist:**

Are there any patient-specific concerns?

**To Nursing Team:**

Has sterility (including indicator results) been confirmed?

Are there equipment issues or any concerns?

**Is essential imaging displayed?**

Yes

Not applicable

### Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

**Nurse Verbally Confirms:**

The name of the procedure

Completion of instrument, sponge and needle counts

Specimen labelling (read specimen labels aloud, including patient name)

Whether there are any equipment problems to be addressed

**To Surgeon, Anaesthetist and Nurse:**

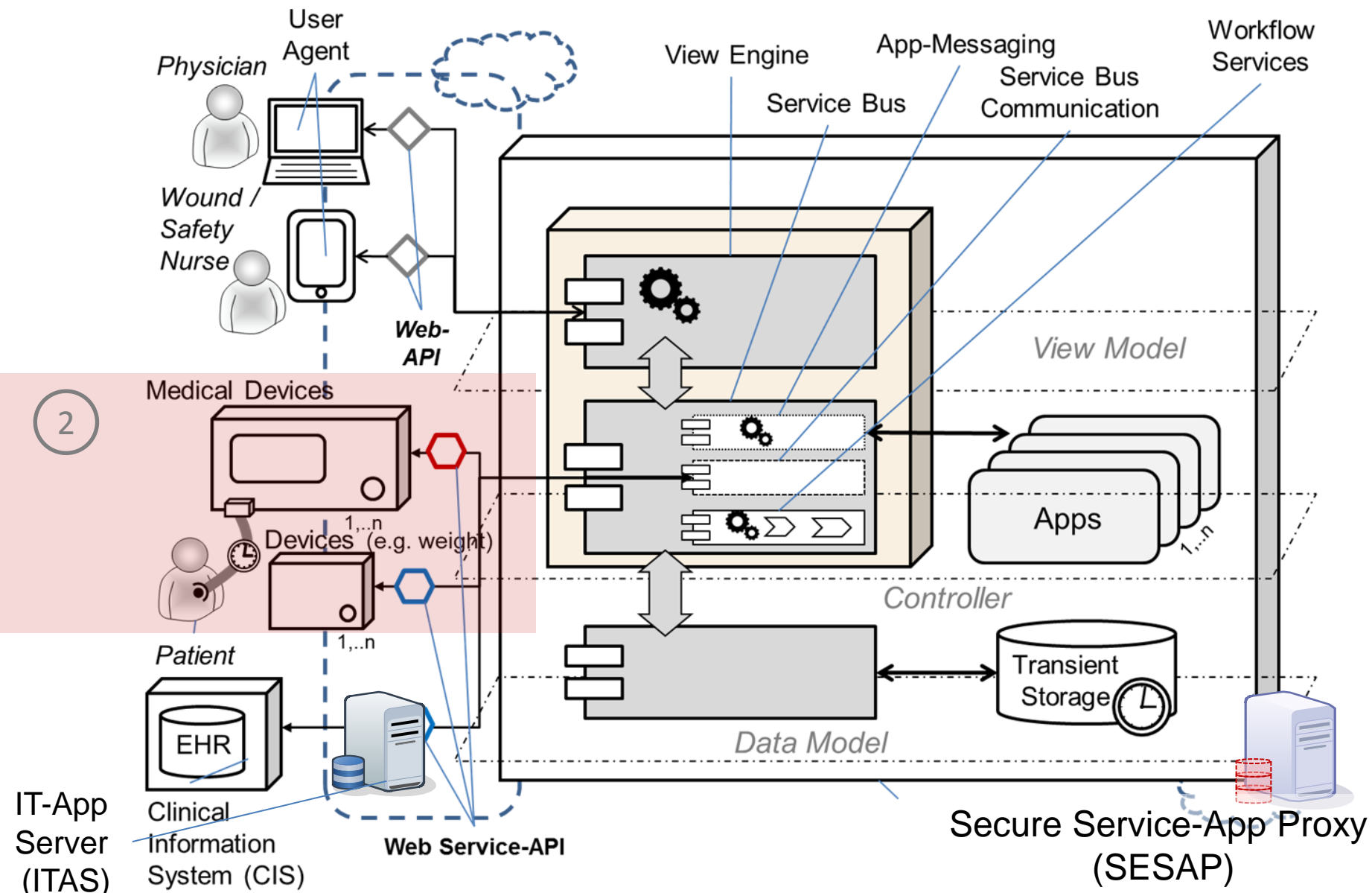
What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

© WHO, 2009

# Medical Device Network Communication with Web Service APIs

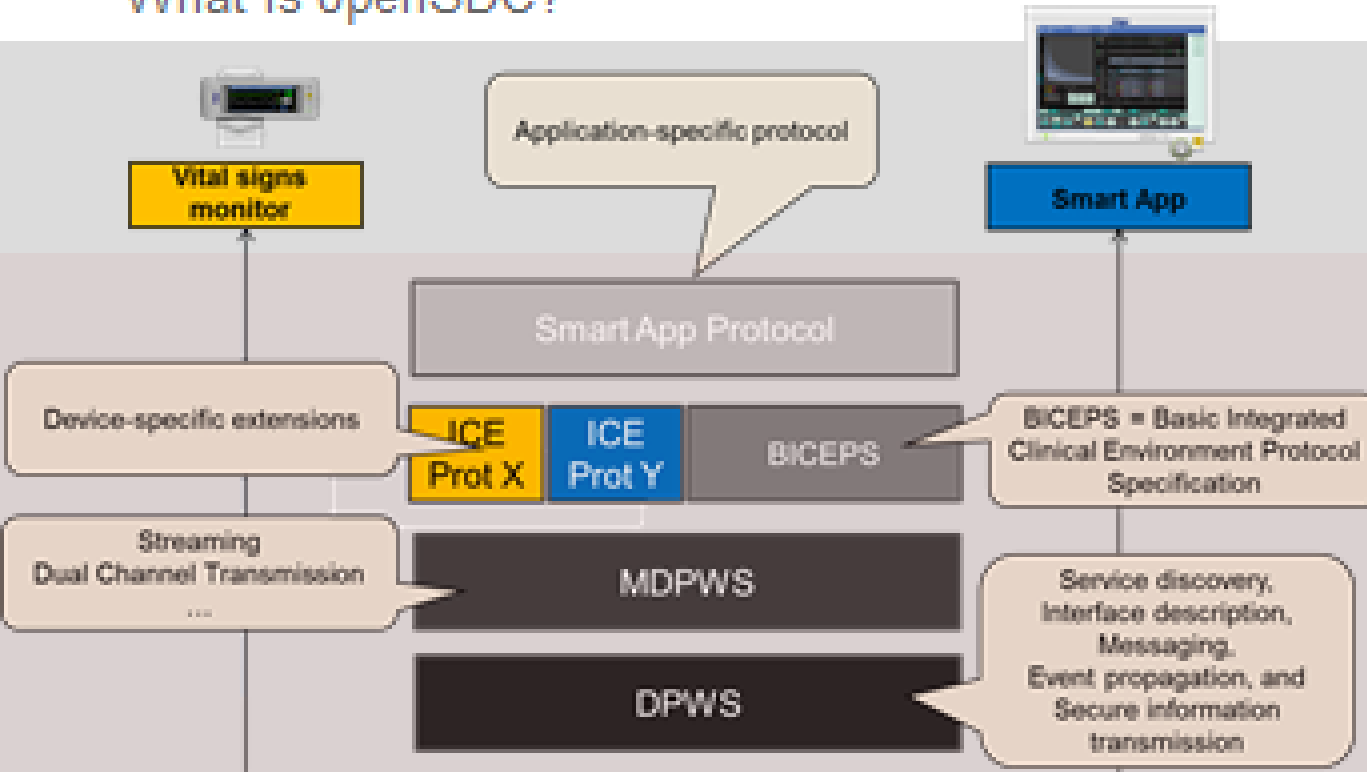


# Open System & Device Connectivity



openSDC update  
What is openSDC?

<http://sourceforge.net/projects/opensdc/>



Extensible openSDC protocol stack for clinical workplace service-oriented medical device architectures

- BICEPS (Message & Service Model)
- MDPWS & DPWS (Transport)

S. Schlichting, "openSDC Update", Joint meeting of IEEE EMBS 11073 & HL7 Health Care Devices (DEV) WG, 2014/05/27.

# MT2IT Client of openSDC Web-API

Dräger

BICEPS  
... and Web Services

**'Java API converted to .NET CIL using IKVM'**

**'MT2IT openSDC ASP.NET Client'**

## Web Services

## BICEPS Services

*SOAP Request-Response*

*SOAP-over-UDP*

*SOAP Req-Resp  
+ TLS + Authentication*

*WS-Eventing*

GET

SET/ACTION

Waveform

PHI

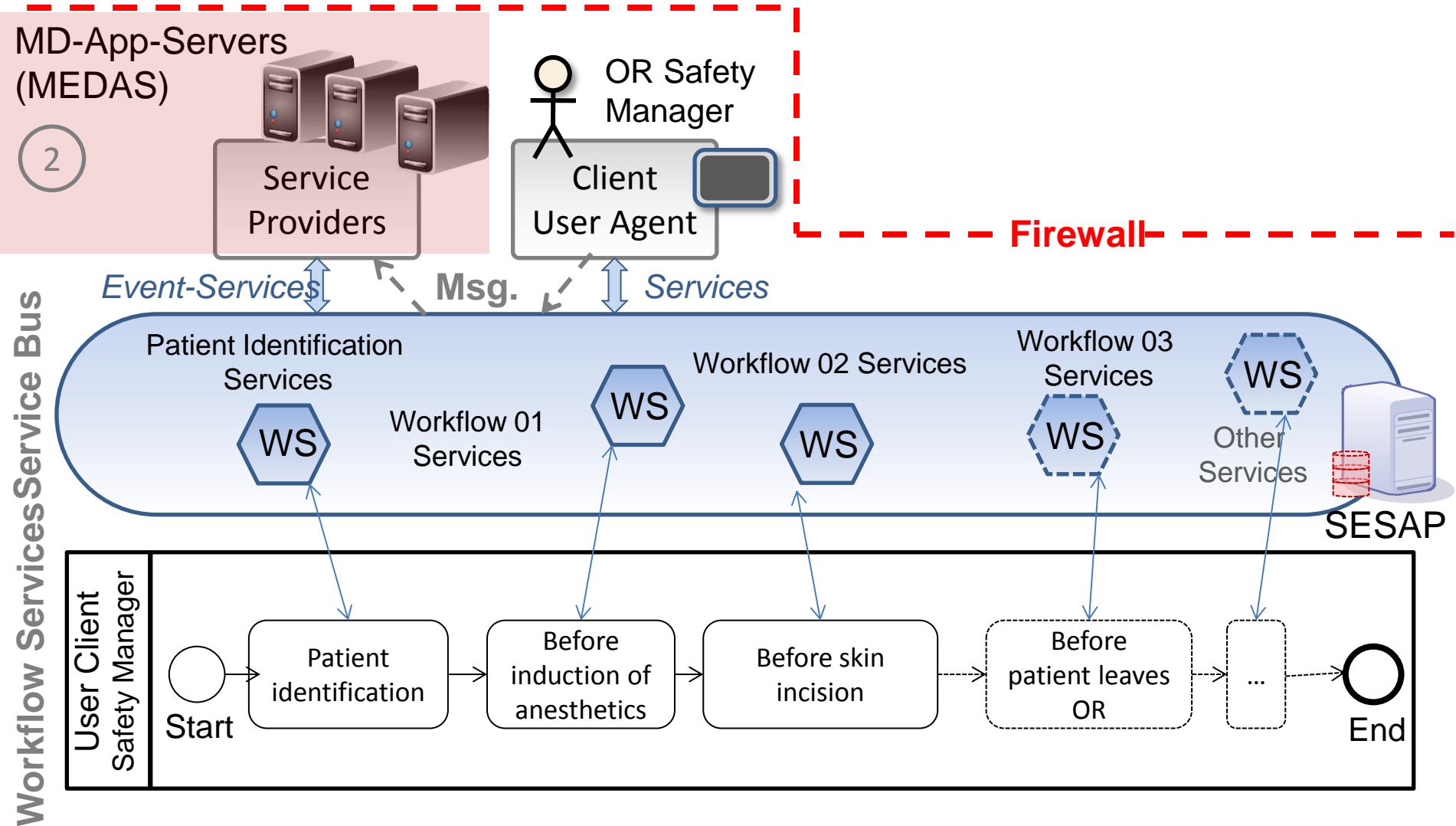
EVENT REPORT

BICEPS Services

27 | OR.NET Workshop - BICEPS

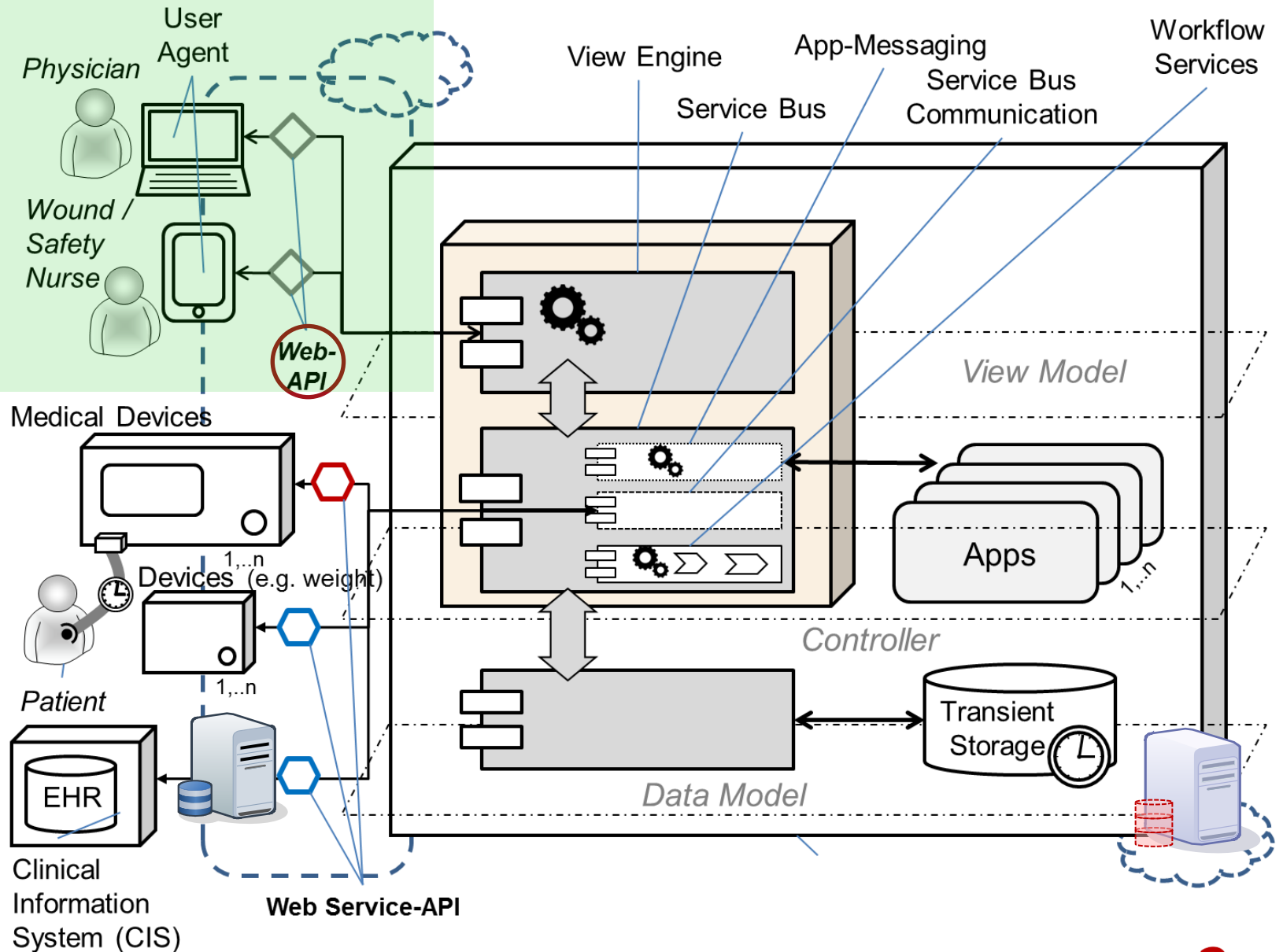
S. Schlichting, "openSDC Update", Joint meeting of IEEE EMBS 11073 & HL7 Health Care Devices (DEV) WG, 2014/05/27.

# Communication MEDAS $\leftrightarrow$ User Agent $\leftrightarrow$ SESAP



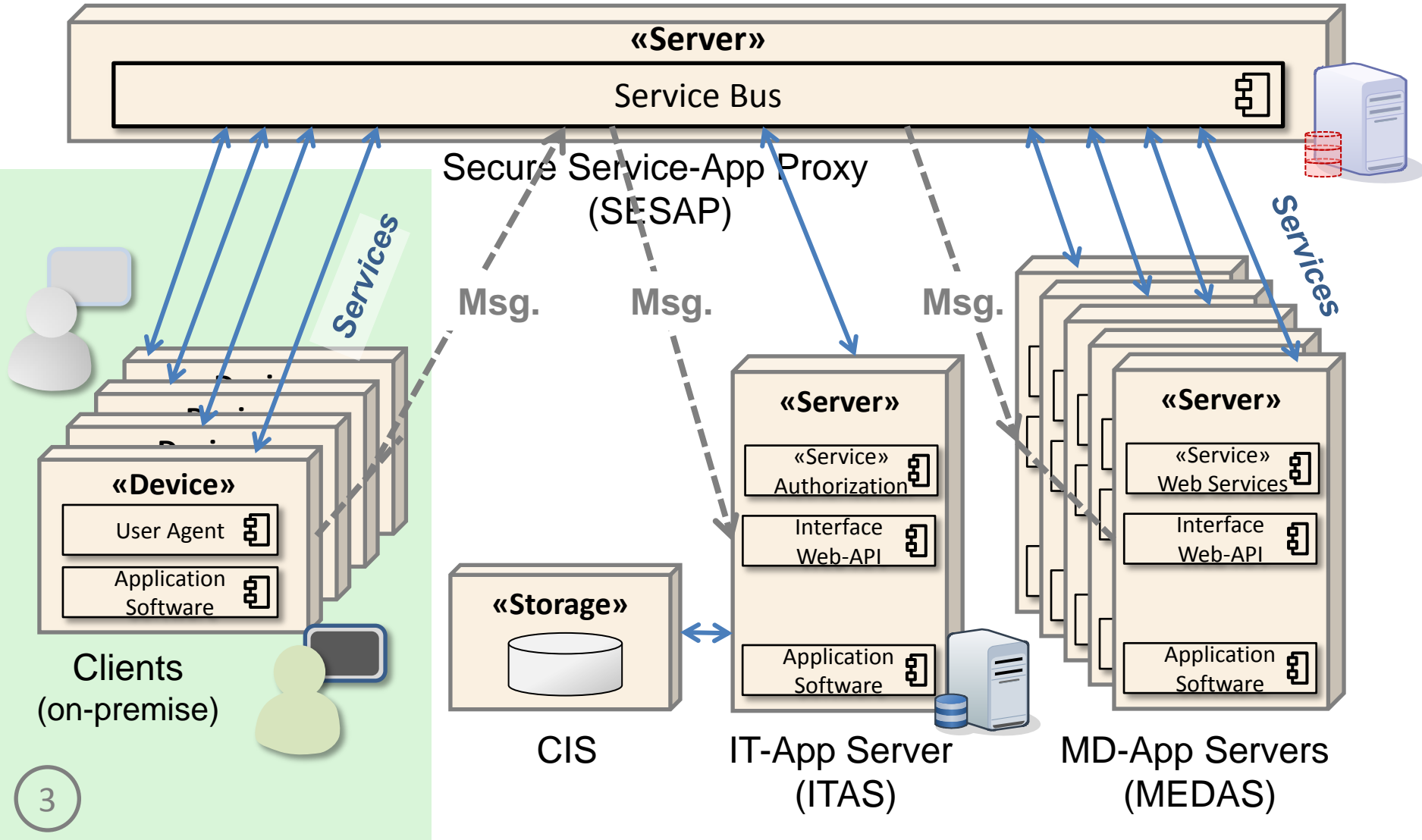
# Web-APIs Communication between User Front-End Client Application und Proxy (Server) Back-End Application

3



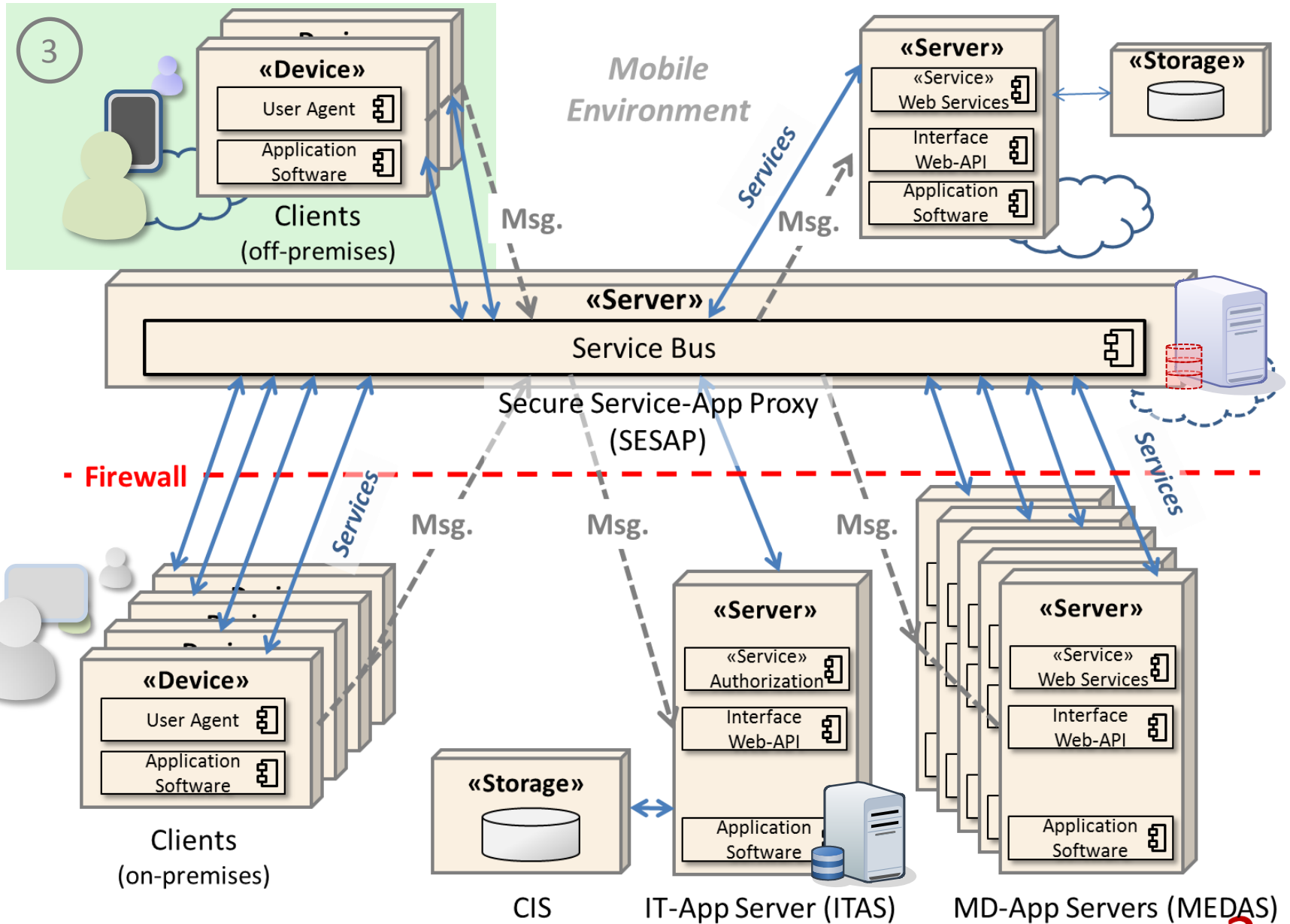
# On-premise Deployment Behind the Firewall

- Firewall - - - - -



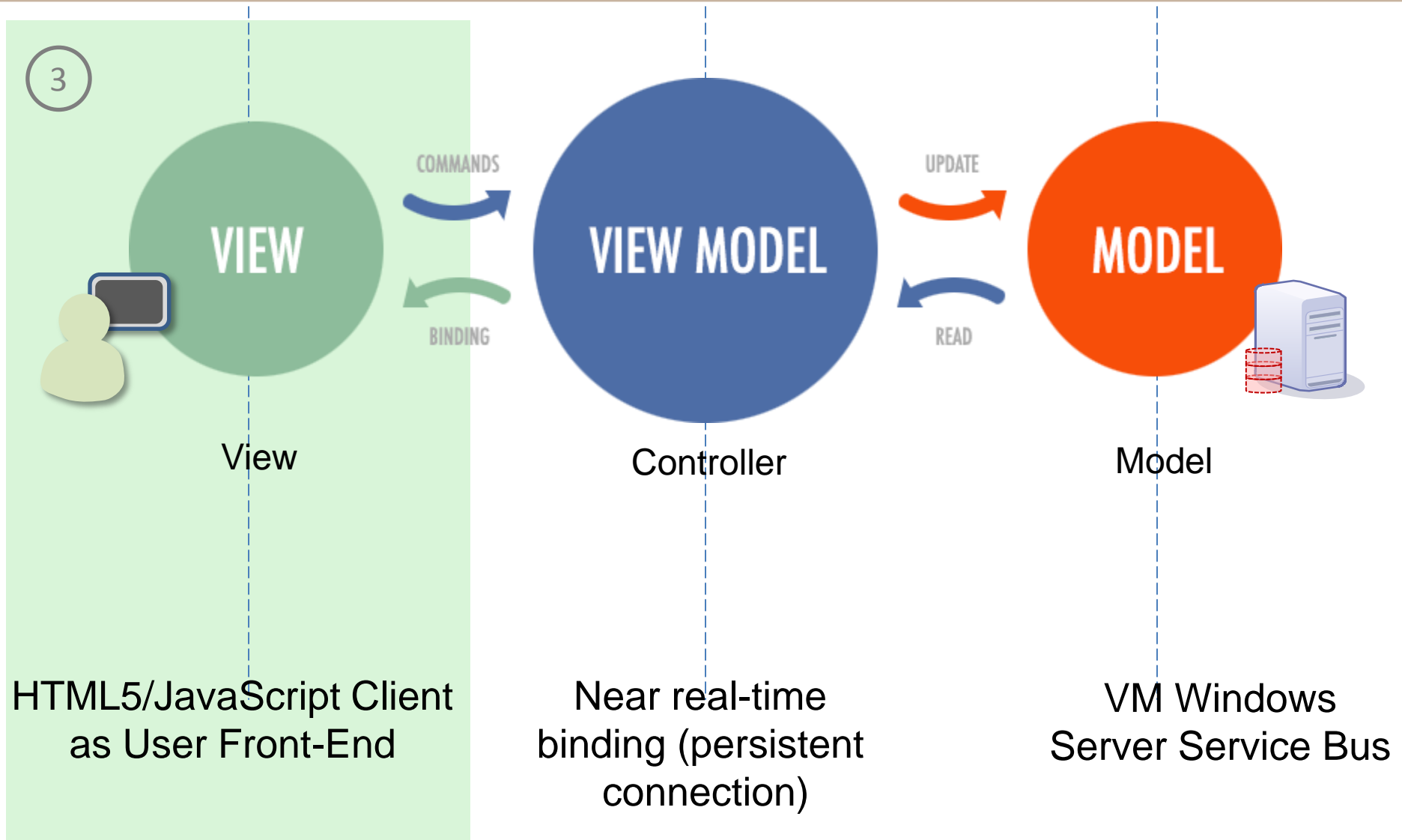
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# The Open SOA Health Web Platform for Mobile Medical Apps

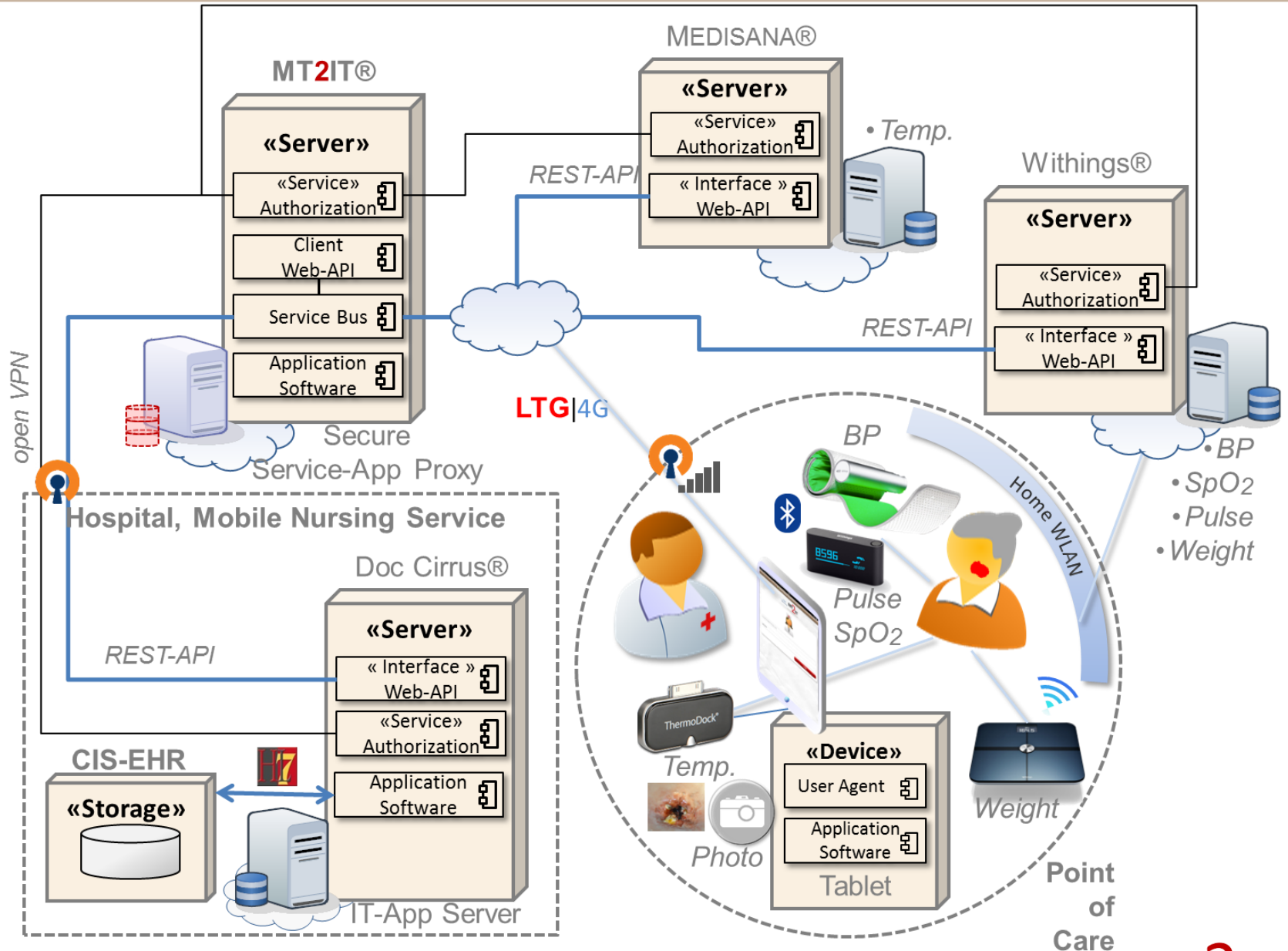




# Model View Controller (MVVM) as HMI Front-End



# e.g. Mobile Wound Management App on Open Health Platform



# Medical Device and Medical Software Standards

# IT and Web Standards



# IHE: e.g. Patient Demographics Query for Mobile

[http://wiki.ihe.net/index.php?title=Patient\\_Demographics\\_Query\\_for\\_Mobile\\_\(PDQm\)](http://wiki.ihe.net/index.php?title=Patient_Demographics_Query_for_Mobile_(PDQm))



Integrating the Healthcare Enterprise

# IHE

## IHE IT Infrastructure Technical Framework Supplement

### Patient Demographics Query for Mobile (PDQm)

Date: August 28, 2014  
Author: IHE ITI Technical Committee  
Email: [iti@ihe.net](mailto:iti@ihe.net)

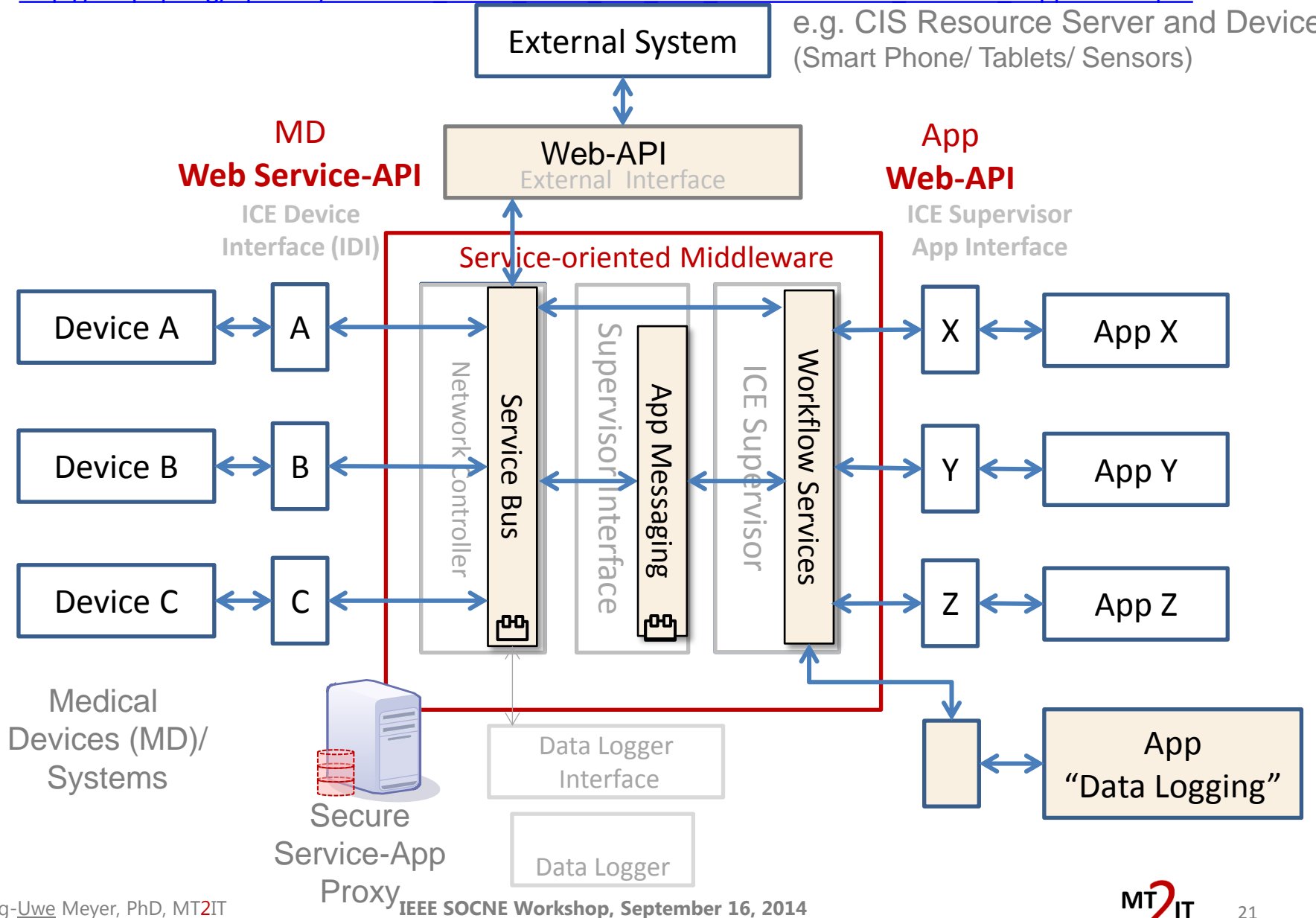


**BENEFITS UNLOCKED FOR:**

- Mobile healthcare providers (e.g. hospital staff making rounds)
- Medical devices that can become "smarter" with real-time patient data

# “Interoperable Medical Device Interface Safety - the AAMI/UL 2800 Family of Standards” Technical Brief for FDA, MDICC, and the AAMI HITI Committee

[http://mdpnp.org/uploads/MDISWG\\_Cover\\_letter\\_and\\_FDA\\_Pre-Submission\\_I120162\\_Supplement.pdf](http://mdpnp.org/uploads/MDISWG_Cover_letter_and_FDA_Pre-Submission_I120162_Supplement.pdf)



# Thank you for your attention!

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