



Pre Procurement Demo

DIPS EHR Craft

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ENABLING EFFICIENT HEALTHCARE

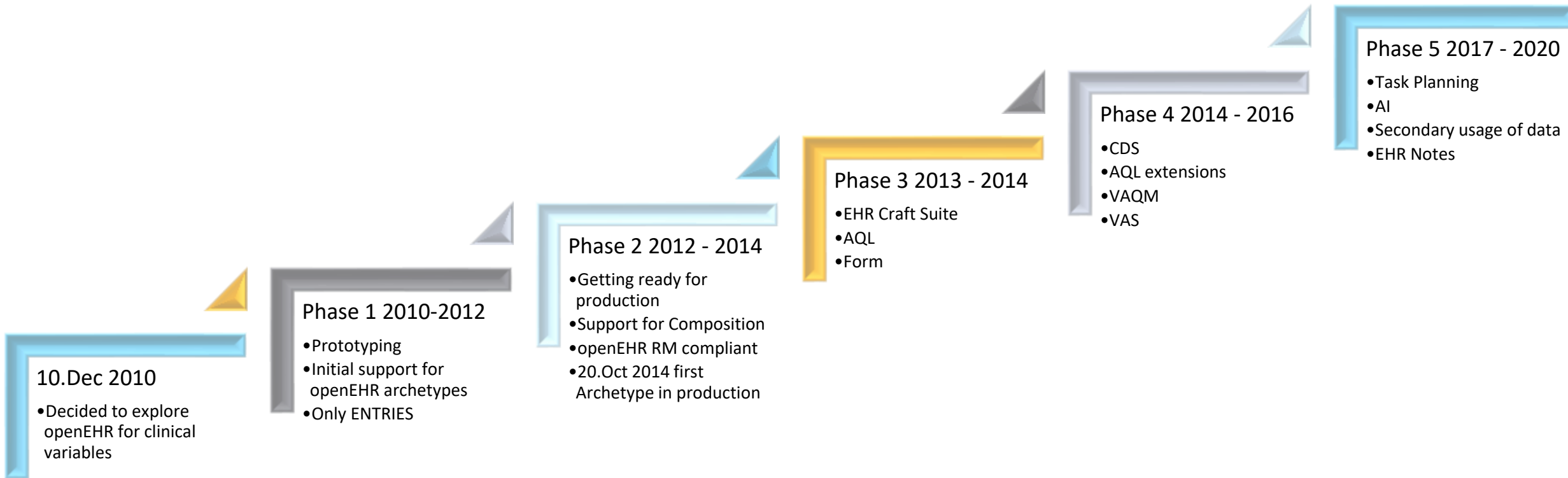


Agenda

openEHR in DIPS
Arena
(presentation)

openEHR Tools
in EHR Craft
(demonstration)

The openEHR journey in DIPS

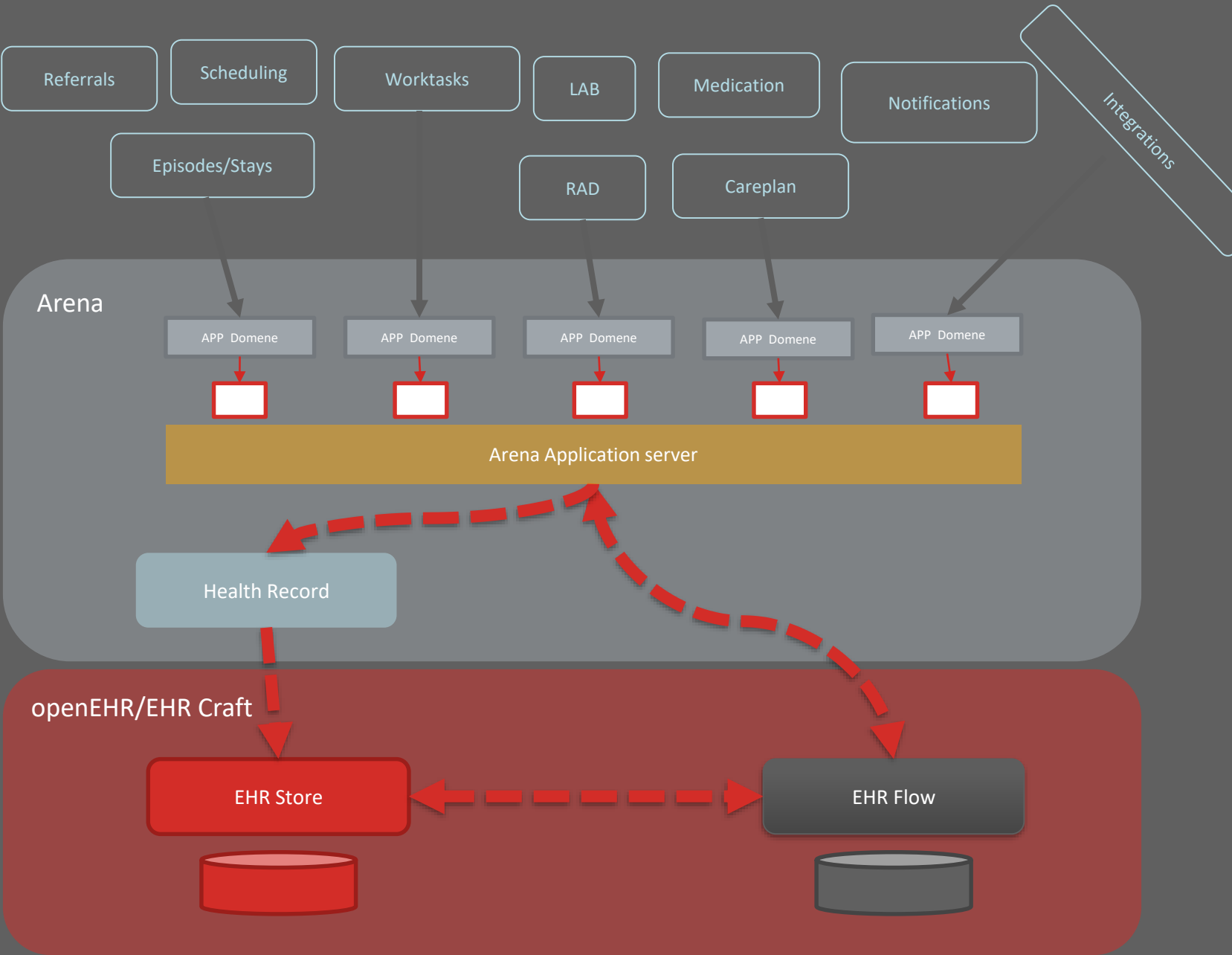


openEHR is a core part of our EMR, DIPS Arena.

It's an integrated part and is used to handle the structured clinical data from different modules.

EHR Craft is the suite of services and tools to support the development of openEHR based application and the core CDR and Taskplan services.

It is developed to cover the needs of the EMR.



openEHR Forms is used within DIPS Arena to build clinical apps.

We have separate teams which use the tools on a daily basis.

Examples shown are:

- Reporting to national cancer registry
- Advanced admission note for the acute care

Behandling for	
<input checked="" type="radio"/>	Primærsykdom - lokal/lokalavansert inkludert spredning til regionale lymfeknuter
<input type="radio"/>	Primærsykdom - avansert sykdom (fjernspredning)
<input type="radio"/>	Tilbakefall - lokal/lokalavansert sykdom inkludert spredning til regionale lymfeknuter
<input type="radio"/>	Tilbakefall - avansert sykdom (fjernspredning)

Lokalisasjon av primaertumor	
Lokalisasjon	
Colon (C18-C19)	
Spesifiser lokalisasjon Colon	
<input checked="" type="radio"/>	Cekum (C18.0)
<input type="radio"/>	Appendix (C18.1)
<input type="radio"/>	Ascendens (C18.2)
<input type="radio"/>	Høyre fleksur (C18.3)
<input type="radio"/>	Transversum (C18.4)
<input type="radio"/>	Venstre fleksur (C18.5)
<input type="radio"/>	Descendens (C18.6)
<input type="radio"/>	Sigmoideum, ≥ 20 cm (C18.7)
<input type="radio"/>	Tykkertarm, overlappende (C18.8)
<input type="radio"/>	Tykkertarm uspesifisert (C18.9)
<input type="radio"/>	Rectosigmoid ≥ 16 og < 20 cm (C19)

Kjemoterapi	
Hensikten med behandlingsplanen	
Adjuvant kjemoterapi	
ECOG funksjonsstatus	
2 - Sengeliggende < 50 % av dagtid	
Startdato for behandlingen(dd.mm.åååå)	
05. feb 2020	

Medikamenter	
Medikamenter	
<input type="checkbox"/>	Kapocitabin
<input type="checkbox"/>	5-FU
<input type="checkbox"/>	Kalsiumfolinat
<input type="checkbox"/>	Oksaliplatin
<input checked="" type="checkbox"/>	Irinotecan
<input type="checkbox"/>	VEGF-hemmer
<input type="checkbox"/>	EGFR-hemmer
<input checked="" type="checkbox"/>	Annet
Spesifiser medikament	
Et skikkelig sinna medikament	

Akuttmottak	
Start time	9. feb 2020 kl 18:33
Pulsoksymetri	
SpO ₂	89 %
På romluft	<input checked="" type="radio"/> Ja <input type="radio"/> Nei
+ Sett inn oksygenbehandling	
Puls/Hjertefrekvens	
Pulsfrekvens	90 /min
+ Sett inn puls detaljert	
Blodtrykk	
Systolisk	120 mm[Hg]
Diastolisk	80 mm[Hg]
Middelarteriestrykk	93 mm[Hg]
Kroppstemperatur	
Temperatur	38,0 Cel
Åndedrett	
Frekvens	20 /min
+ Sett inn detaljert åndedrett	
Glasgow Coma Scale	
Åpning av øynene (E)	Ved tiltale
Verbal respons (V)	Usammenhengende t...
Motorisk respons (M)	Avverger smerte
Smertescoring	
Smertescoring	0
Spesialisert beslutningsstøtte og prosessstøtte	
<input checked="" type="checkbox"/> SAP (samfunnservvert pneumoni)	
Forvirring	Nylig oppstått forvirring
<input type="checkbox"/> Hjerneslag (apopleksi)	

Utførte scoringer	
SIRS kriterier	0
qSOFA-Score	1
GCS-Score	10
CRB-65 score	2

NEWS avvik	
Oksygenmetning	91
Bevissthetsgrad	V, P eller U

Triage akuttmottak	
Triage	Orange
Tidspunkt triage	9. feb 2020 kl 23:33
Foreslått triage	Foreslått triage basert på vitale tegn er ORANGE

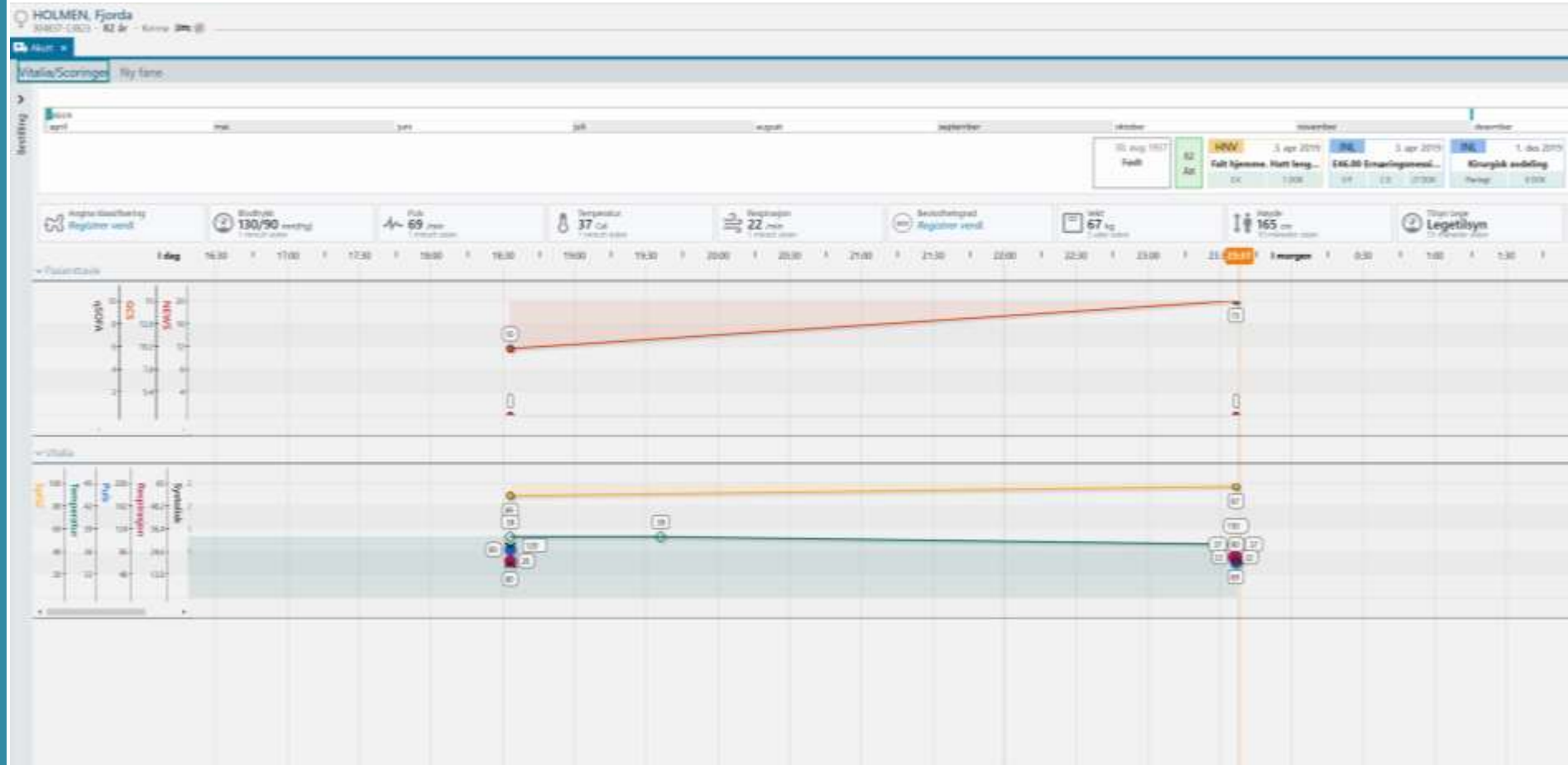
Scoringer/varslinger/koding	
CRB-65 foreslått respons	
CRB respons	Hvis SAP påvist: Lege bør vurdere sykehusinnleggelse
På grunn forhøyet	CRB-65 score
Anbefalt medisinsk tiltak	Empirisk antibiotika behandling

Behandlingsforslag	
CRB! Behandlingsforslag tar ikke hensyn til registrert allergi! For fullstendig oversikt over behandling av SAP fra antibiotikaveilederen trykk her!	
Empirisk behandlingsforslag SAP	Empirisk standardregime Benzylpenicillin iv 1,2 g x 4
Overgang til peroral behandling så snart klinisk tilstand tillater det:	
Fenoksymetylpencillin po 1 g x 4	
eller	
Amoksisillin po 500 mg x 3.	
Behandlingsvarighet 5-7 dager	

Store AQL queries defined as VAQM serves several purposes in DIPS Arena.

On the screen you see:

- Charts configured with 8 VAQM configurations
- Cards displaying key values for the ward, i.e. vital signs and encounter with doctor.



Widgets in Arena showing content from openEHR compositions.

This examples also shows the usage of DV_MULTIMEDIA for pathology images. The images is stored in the LAB system. The thumbnail and URI are stored in the composition.

The screenshot displays the openEHR Arena interface with four widgets highlighted by red boxes:

- Persistent composition:** A widget showing a list of compositions, including a 'Daglig notat' (Daily note) and a 'Daglig notat' (Daily note).
- Structured daily note:** A widget displaying a structured daily note with fields for 'Daglig notat' and 'Daglig notat'.
- Pathology report with DV_MULTIMEDIA:** A widget showing a pathology report with a thumbnail image and a 'Daglig notat' (Daily note).
- Admission note with CDS in Form:** A widget displaying an admission note with a 'Daglig notat' (Daily note) and a 'Daglig notat' (Daily note).

Patient lists are used to follow up populations, i.e. Ward list, Admission lists, Trajectories.

openEHR data is queried using VAQM to give status of the patient.

NEWS Medium/Høy												
Pasient med fødselsnummer	Smitte	NEWS	Trykksår	Ernæring	LMG	Tromboseris...	Korrespondansesp...	Ernæring risikograd	Ernæring	Fall	KAT	Ti
Carmex Conrad 001208-29038 - 111 år - Kvinne								Risiko	09.02.2020 23:55			
Dipsforum Jes Tre 280579-00727 - 49 år - Mann								Mangler scree...				
Hansen Helge Martin 254158-44738 - 62 år - Mann								Mangler scree...				
Meona Mona 064574-05236 - 45 år - Kvinne								Risiko	15.05.2019 23:45			
Jule Nissen 084419-55961 - 0 år - Mann								Mangler scree...				
Test2 Eline 204555-37844 - 64 år - Kvinne								Mangler scree...				
Gull Arne 011140-26553 - 79 år - Mann								Ufullstendig ris...	05.04.2019 11:27			
Plo5 Kal 020400-73720 - 19 år - Mann								Mangler scree...				
Dottno Finn 210164-00952 - 56 år - Mann								Mangler scree...				
Rock So 084169-43959 - 51 år - Mann					23.02.2019	Ja		Ufullstendig ris...	24.02.2019 21:54		Ja IND: True	
Operasjon Pasient 6 034330-26194 - 89 år - Mann								Ingen risiko	16.05.2019 10:25			
Hansen Hans 235100-85736 - 19 år - Mann								Mangler scree...				
Berg Isaak 250697-45752 - 22 år - Mann								Mangler scree...				
Datter Snill 154567-23672 - 52 år - Kvinne								Mangler scree...				
Test Anja 154277-21458 - 42 år - Kvinne								Mangler scree...				
Testpasient1 Diakon1 014190-14989 - 30 år - Mann								Mangler scree...				
Testfor2 Heidi 154167-15812 - 53 år - Kvinne					04.04.2017			Mangler scree...			Ja IND: True	
Demo8 Else 114731-38818 - 88 år - Kvinne								Mangler scree...				

EHR Craft – the openEHR platform

Agenda

The purpose is demonstration of the tools DIPS use to build forms based applications in DIPS Arena.

The technical details related to deploy, run and maintain the openEHR CDR (EHR Store) is not covered.

EHR Store

- Web Studio
- REST API
- Definitions
- Status

Form Designer

- Introduction to the UI
- Some basic form design

EHR Craft Studio

- Introduction to the tool
- Some basic Form Testing

Form Advanced

- Calculations
- Reuse of data
- Script

Test Manager

- How to test use-cases
- Used to populate the given patient data

AQL

- Some examples

EHR Flow

- Taskplan viewer

VAQM

- What is it?
- Some examples

pre-procurement-demo-dips

Traumatisk skada

Z042 Undersøkelse og observasjon etter arbeidsulykke

Datum / tid for skada

2020-01-23 11:34

Anatomisk plats

Vänster arm

[+ Add anatomisk plats](#)

Klinisk beskrivning

The patient held his hand in a door opening at work when a colleague accidentally slammed it.

[+ Add multimediaresurs](#)

NEWS

Time

08. feb 2020 18:03

Syremåttnad

> = 96

Syrgastillførsel

Nej

Andningsfrekvens

12-20

Hjärtfrekvens

51-90

Totalpoäng (NEWS)

0

Låg

Låg/medium

Medium

Hög

Låg

Start time

2020-02-08 18:03

Pulsoximetri

SpO₂

98

%

Mätplats

Enbart luft

☒ Yes ☐ No

Andning

Förekomst

Förekommer

Frekvens

19

— +

/min

Enbart luft

☒

Puls/Hjärtfrekvens

Frekvens

72

— +

/min

Regelbunden

☒ Regelbunden ☐ Oregelbunden

Kroppsställning

Sittande

Metod

Automatisk, icke-invasiv

Lokalisation

Finger

Coded text

End time

2020-02-08 18:18

AQL

Terminology service is not embedded in EHR Store.

The client is expected to lookup terminologies in separate services.

The MATCHES syntax is supported and to search branches in i.e. SNOMED-CT the code_string values has to be expanded.

Example to the right.

```
SELECT
  c/uid/value AS CID,
  e/data[at0001]/items[at0012]/value AS Anatomy
FROM
  COMPOSITION c
  CONTAINS EVALUATION e[openEHR-EHR-EVALUATION.problem_diagnosis.v1]
WHERE
  e/data[at0001]/items[at0012]/value/defining_code/terminology_id/value = 'SNOMED-CT'
  AND e/data[at0001]/items[at0012]/value/defining_code/code_string matches {'80768000', '6921000', '32153003', '62175007'}
LIMIT 10
```

Try it out

AQL – given example

The AQL given to the demonstration is really interesting. Was it intended?

This AQL structure and underlying data will give the permutation problem which DIPS has described here:

https://github.com/DIPSAS/openehr-conformance/blob/master/aql/case1.1-permutation_bp/index.adoc

We are currently doing a rewrite of EHR Store Core. As part of this rewrite we will add functions to expand the AQL syntax to support new ways to express such queries.

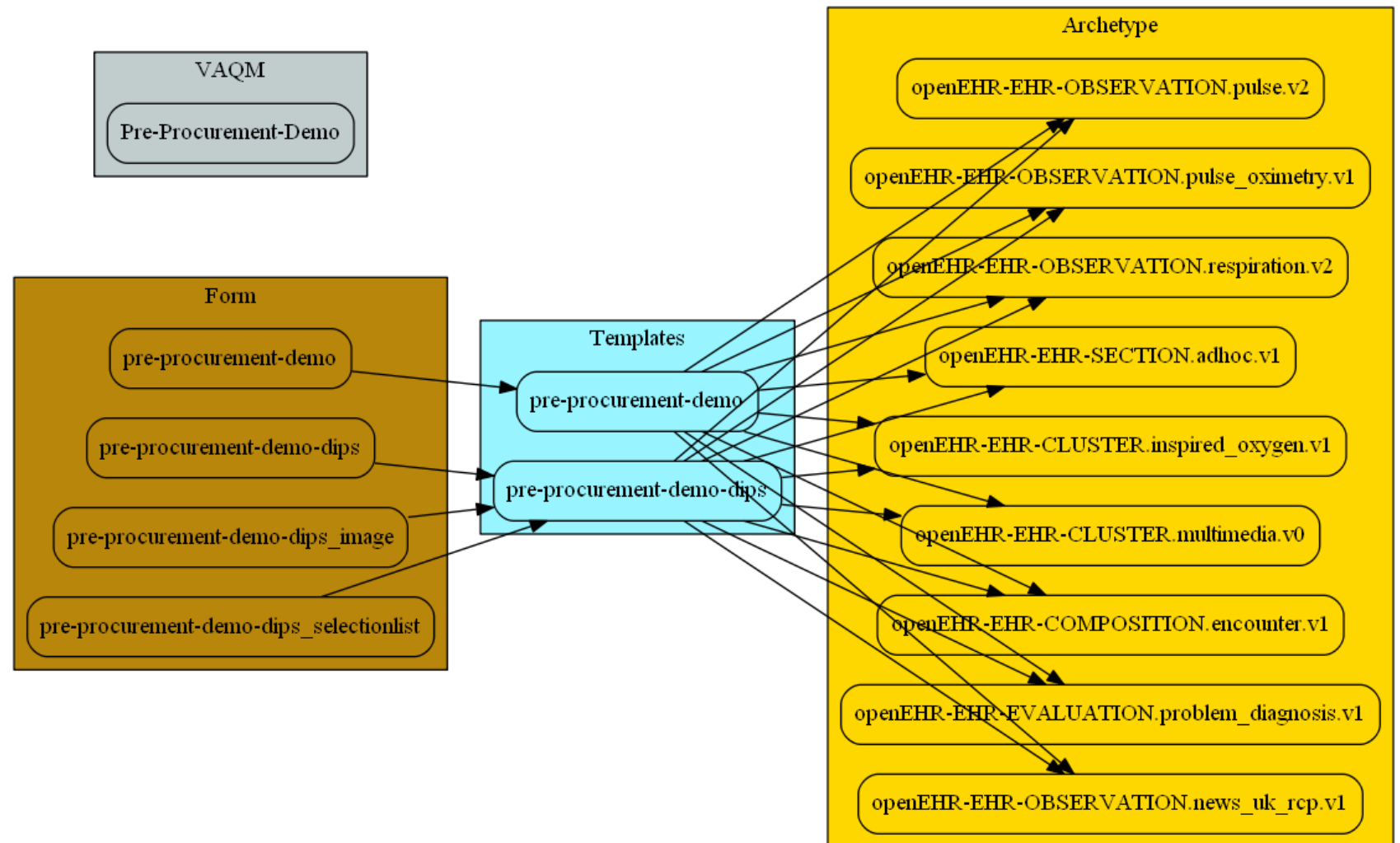
```
select
  probl/data[at0001]/items[at0002]/value/value as diag,
  probl/data[at0001]/items[at0009]/value as descr,
  probl/data[at0001]/items[at0012]/value/value as loc,
  pulse/data[at0002]/events[at0003]/data[at0001]/items[at0004]/value/magnitud
e as puls,
  e/ehr_id/value
from EHR e
contains COMPOSITION a
contains (
  EVALUATION probl[openEHR-EHR-EVALUATION.problem_diagnosis.v1] or
  OBSERVATION pulse[openEHR-EHR-OBSERVATION.pulse.v2])
where pulse/data[at0002]/events[at0003]/data[at0001]/items[at0004]/value/mag
nitude > 80
offset 0 limit 100
```

Try it

Package Manager

To manage resources with dependencies we have developed package manager. It's based on Nuget packages and the tool generated a dependency map.

It handles versions also for not versioned resources like Templates.



Form Dependencies

Form Designer has a visual editor to define dependencies between elements.

Screenshot shows an overview and one example.

> Regelbunden	Equals	Oregelbunden
	Not equals	Oregelbunden
> Totalpoäng (NEWS)	<=	4
	>	4
	>	6
> Enbart luft	Is	True
	Is not	True
> Enbart luft	Is	True
	Is not	True

Field dependency

Field **Totalpoäng (NEWS)**

Condition **<=** **4**

Action **Set** **Klinisk riskkategori** **Låg**

Condition **>** **4**

Action **Set** **Klinisk riskkategori** **Medium**

Condition **>** **6**

Action **Set** **Klinisk riskkategori** **Hög**

Form Dependencies

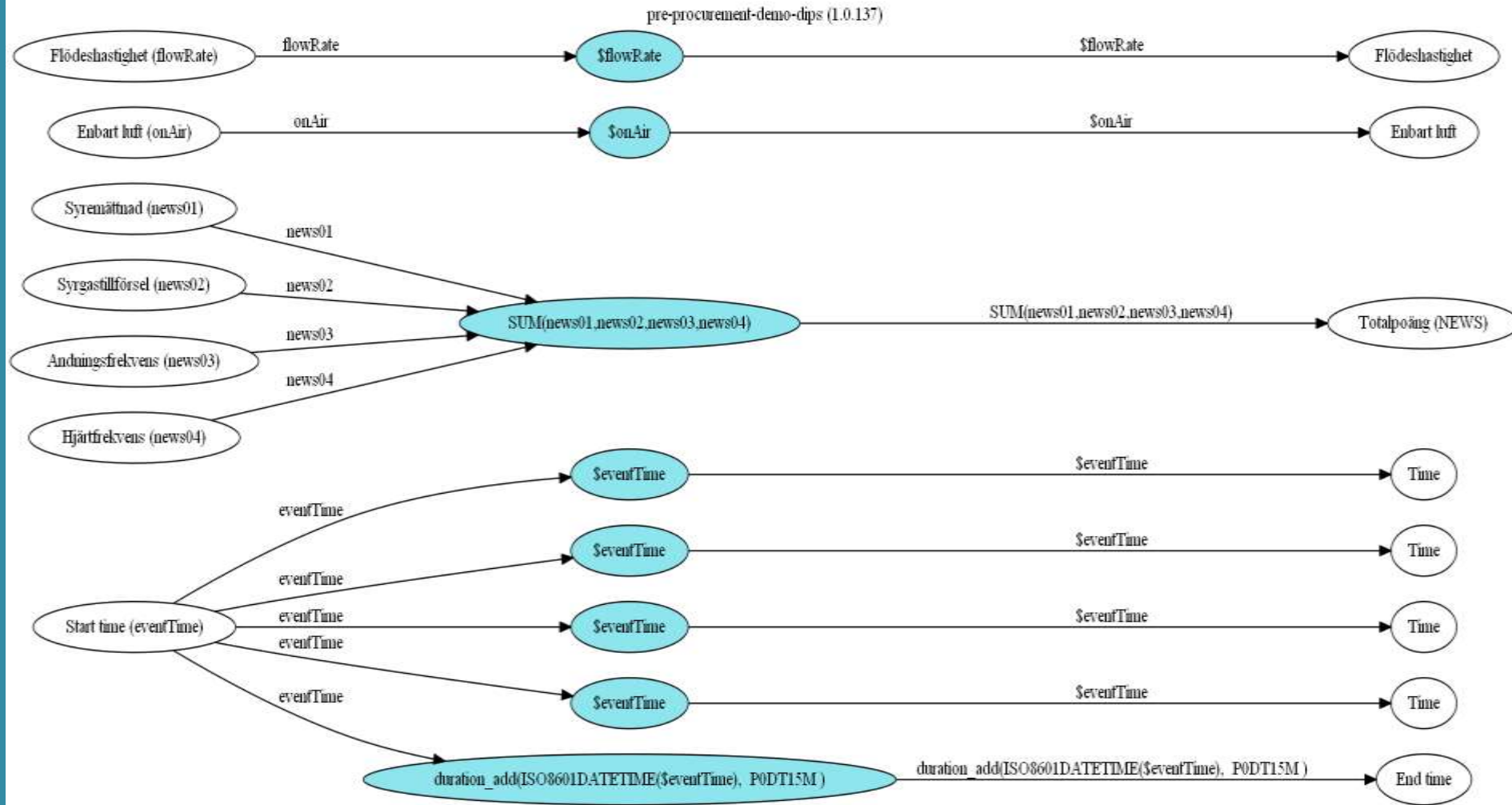
Sometimes the visual dependency editor is not enough. Forms support JavaScript for more advance usage.

Screenshot shows how to add a listener on an form elements “OnChanged” event.

```
api.addListener(Resp_PRESENT, "OnChanged", function (id, value, parent) {  
    console.log("Resp present: " + value);  
  
    if (value) {  
        var present = value;  
  
        if (present && present.DefiningCode && present.DefiningCode.CodeString) {  
            var atcode = present.DefiningCode.CodeString;  
  
            switch (atcode) {  
                case "at0063":  
                    // Is present  
                    newsController.updateRespirationPresent(true);  
                    break;  
  
                case "at0064":  
                    // Is not present  
                    newsController.updateRespirationPresent(false);  
                    newsController.updateRespiration(getRespirationAsValue(api));  
                    break;  
  
                default:  
                    newsController.updateRespirationPresent(false);  
                    newsController.updateRespiration(getRespirationAsValue(api));  
                    break;  
            }  
        }  
    } else {  
        console.log("|- RESP PRESENT is not set");  
    }  
});
```

Form Dependencies

EHR Craft Studio has an embedded visualizer. Its purpose is to make the flow in the form easier to read.



EHR Flow

openEHR Taskplan engine. Targeting release candidate Q4 2020.

DIPS involved in specification work and has provided some TP examples to illustrate the use-cases for Taskplanning.

Screenshot is from one of the examples: HIP Outpatient Clinic

The screenshot displays the openEHR Taskplan engine interface. On the left, a 'Work Plan Visual Model' for 'Hip_Outpatient_Clinic' is shown. It contains five task plans: SELF#1, PHYS#1, LAB#1, RAD#1, and OUT#1. Each task plan is represented by a sequence of colored boxes (green for DO, blue for ATTEND, yellow for REPORT, and grey for PAY) connected by arrows, indicating the flow of the task. On the right, the 'Build Query' interface is visible. It includes a 'Query' tab, a 'WorkPlan' dropdown, and sections for 'Metadata', 'Tags', 'WorkPlan Filters', 'Archetype Id', and 'Execution State'. The 'Execution State' section has checkboxes for 'Materialized', 'Activated' (checked), and 'Terminated'. Below this, the 'Stored Queries' section shows a table of queries.

Name	Execution State	Id	Archetype Id
Hip_Outpatient_Clinic	Activated	de1b6863-979f-4f29-83c0-4a36bb0cbd6d	openehr-EHR-WORK_PLAN.sample.v'
Hip_Outpatient_Clinic	Activated	48ed122a-29d9-4a38-b1b0-4ec93751a659	openehr-EHR-WORK_PLAN.sample.v'
Hip_Outpatient_Clinic	Activated	531f6658-a863-4f62-88e2-e22e0cab31aa	openehr-EHR-WORK_PLAN.sample.v'
Hip_Outpatient_Clinic	Activated	80b49e14-5bdf-4e17-9004-5dcae4ea4334	openehr-EHR-WORK_PLAN.sample.v'

At the bottom of the 'Stored Queries' section, there is a 'Store Query' button.

<https://github.com/openEHR/TP-examples>



EHR Craft Suite

The vision:

enable efficient healthcare by making structured data accessible.

The solution:

EHR Craft Suite as a platform with services and tools.

A suite which **give developers tools**, components and services to **develop** functionality **fast, consistent and standardized**.

Based on an open standard for reuse of clinical content.

EHR Craft Suite

Overview of the functional components.

- EHR Store is the openEHR CDR
- Form Designer is used to design forms
- EHR Craft Studio is an “IDE” like tool for openEHR assets

