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# NHS CFH – EHR content modelling

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# *Part 1: About NHS CFH*

# *NHS CFH background*

NHS Connecting for Health

**NHS Vision**

- To have a more modern, efficient, patient-led health service and to give patients more choice and control over their own health and care.

**About NHS CFH**

- In operation since 1 April 2005, an agency of the Department of Health
- *Purpose* - To support the NHS to deliver better, safer care to patients via new computer systems and services.
- *Responsible for* delivering the National Programme for IT - a multi-billion pound infrastructure to improve patient care by enabling clinicians and other NHS staff to increase their efficiency and effectiveness.
- A key aim is to give healthcare professionals access to patient information safely, securely and easily, whenever and wherever it is needed.

**Key products and services:**

- an NHS Care Records Service to improve the sharing of patients' records across the NHS with their consent
- Choose and Book hospital appointments for patients, by GPs and other primary care staff
- Electronic Transmission of Prescriptions
- IT infrastructure

# … as at 24 Sep.

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**Choose and Book**

- Over five million bookings have been made, as many as 20,000+ in a single day
- Over 85% of all GP practices have used Choose and Book to refer their patients to hospital.

**Electronic Prescription Service (EPS)**

- Over 38.5 million prescription messages have been issued (1.2 million issued in the last week)
- 3,799 GP systems and 4,086 pharmacy systems are actively operating EPS
- EPS is being used for 15.7% of daily prescription messages.

**GP2GP Transfer**

- Used for 18,932 medical record transfers to date
- 1,758 GP practice systems now have access to GP2GP

**PACS**

- 113 PACS from NHS Connecting for Health are now live across England.
- Over 362 million images have been stored
- 75% of trusts in the NHS in England are now using PACS technology
- PACS has been used for over 16 million patient studies
- We are currently deploying approximately four PACS a month.

# *NHS CFH Programmes for Information Technology*

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***Working with***

- **10 NHS Strategic Health Authorities**
- **3 Local Service Providers** (CSC, BT, Fujitsu)

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# *Part 2: NHS CFH Content Modelling*

# *Types of NHS data 'content' specifications*

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1. Application to application interface content
   - Data sharing - messages and documents (e.g. NHS Message Implementation Manual, HL7)
2. User interface content
   - Data capture (e.g. emerging regional models and NHS Common User Interface specification)
   - Data display (e.g. as above)
3. Content to support national abstractions / queries / policies
   - Data definition (e.g. NHS Data Dictionary)
   - Data submission (e.g. Commissioning Data Sets)
   - Data queries (e.g. resource groups)
4. ?Future
   - Content to support ad hoc queries / views of clinical data, e-Care Pathways or decision support (e.g. 'normal forms' of records data supporting machine reasoning)

# *Background to use of openEHR & ISO/CEN 13606*

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- Interest expressed by NHS vendors, informatics groups and clinicians wanting -
  - better or more explicit alignment across NHS data specifications
  - non-proprietary detailed data requirements definitions to feed into application designs
- Do once, re-use many
  - clinicians (data capture)
  - software developers (code, data)
  - NHS application purchasers (requirements)
  - NHS data specifications developers (avoid conflicts, save time, devote scarce resources to build shared specs.)
- Note: The 3 regions within the NHS National Programme for IT are ‘virtual’
  - neither patients nor clinicians want to see significant variability (e.g. in data constraints) between ‘Cerner-land’ and ‘iSoft-land’

- **Preliminary study** of feasibility of use (Oct.-Dec. 2006)
- **Pilot use** – clinical data capture requirements for Emergency and Maternity care (Feb.-May 2007) – report available soon

# *Summary of findings*

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- *open*EHR content models are **very accessible to clinicians**
  - The reference model is expressed in clinician-friendly terms (compositions, sections, entries, observations, instructions, actions, etc.)
  - The modelling technique encourages clinicians to think in terms of the user interface (model structures and constraints are clinician-driven) - 'clinicians are in the driver's seat'
- Could help NHS **business analysts share detailed data requirements (constraints)** across projects, prior to developing specific implementation models
- The modelling technique of designing 'global' archetypes alongside use-specific 'templates' makes the **re-use of structures very easy for modellers**
  - The technique supports rapid models development
  - Change alerts are cascaded through the repository
- **More work is needed** to explore how **complex SCT-binding** to archetypes and templates would be done
- **More work is needed** to explore the feasibility of **automatically transforming between *open*EHR and V3 models**

# Key recommendations

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- Use *open*EHR techniques for NHS data capture, display, messaging and dictionary content requirements (data constraints) definition
  - There should be no semantic conflict between data captured and data shared
  - Archetypes could be used to define national approaches to SNOMED CT use within the context of clinical record statements
- *open*EHR Templates are useful for defining data capture specifications
- Further work is needed to refine the design guidelines for archetypes and templates and extend the current modelling tools
- The archetypes as currently defined (for data capture) are not immediately useful as a basis for a logical record architecture (semantic linkages across archetypes are weak), but there is potential that should be further explored in either revising the archetypes to meet a wider architectural purpose or to use the formalism to define new models that relate to, but are not the same as, data capture models

# *The 13606/openEHR approach*

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Three layers of models:

- Reference Model
  - classes based on record structure (e.g. section, entry, etc.)
  - data types harmonisation work with HL7 is in progress (sponsored by NHS CFH)
  - current analysis underway to review compatibility of structural vocabularies and semantic interoperability with HL7 V3
- Archetypes
  - statement specifications
    - ‘maximal’, globally applicable (one archetype for blood pressure to support all use cases)
- Templates
  - use-case specific compositions and constraints
    - e.g. for data capture, for reports / analysis, for messaging, etc.

# *Language analogy*

***(adapted from an Ocean Informatics presentation)***

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Reference model is like a grammar – i.e. the rules for constructing sentences

Terminology is the dictionary of words

Archetypes are the rules for constructing meaningful sentences (or term compositions)

- Without such rules, we can construct an infinite number of grammatically correct but clinically meaningless sentences e.g.
  - "fractured earlobe"
  - "suture of left eyelash"

Templates are the rules for assembling sentences to fit a business use (e.g. documents, forms or reports in a consistent that are fit-for-purpose)

# *Archetype Attributes*

***(adapted from an Ocean Informatics presentation)***

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- Include the **maximum and minimum values** that could possibly be sensible
- Determine the **allowed units**, with associated **numeric ranges** which are unit dependent
- Incorporate the set of terms from a **terminology** that could be used to populate a data point or define a **value set** (e.g. if SCT terms do not exist for these values)
- Establish whether a data point is **mandatory or optional**
- Quantify the number of times a data point or data set might be **repeated**

# *Template attributes*

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- Use case specific requirements
  - Aggregate archetypes
  - Impose additional constraints within the limits dictated by the archetypes
    - e.g. the neonatal and paediatric blood pressure cuff sizes are not sensible options in a maternal antenatal assessment
    - e.g. few clinicians are interested in recording the device used to measure body weight in every encounter

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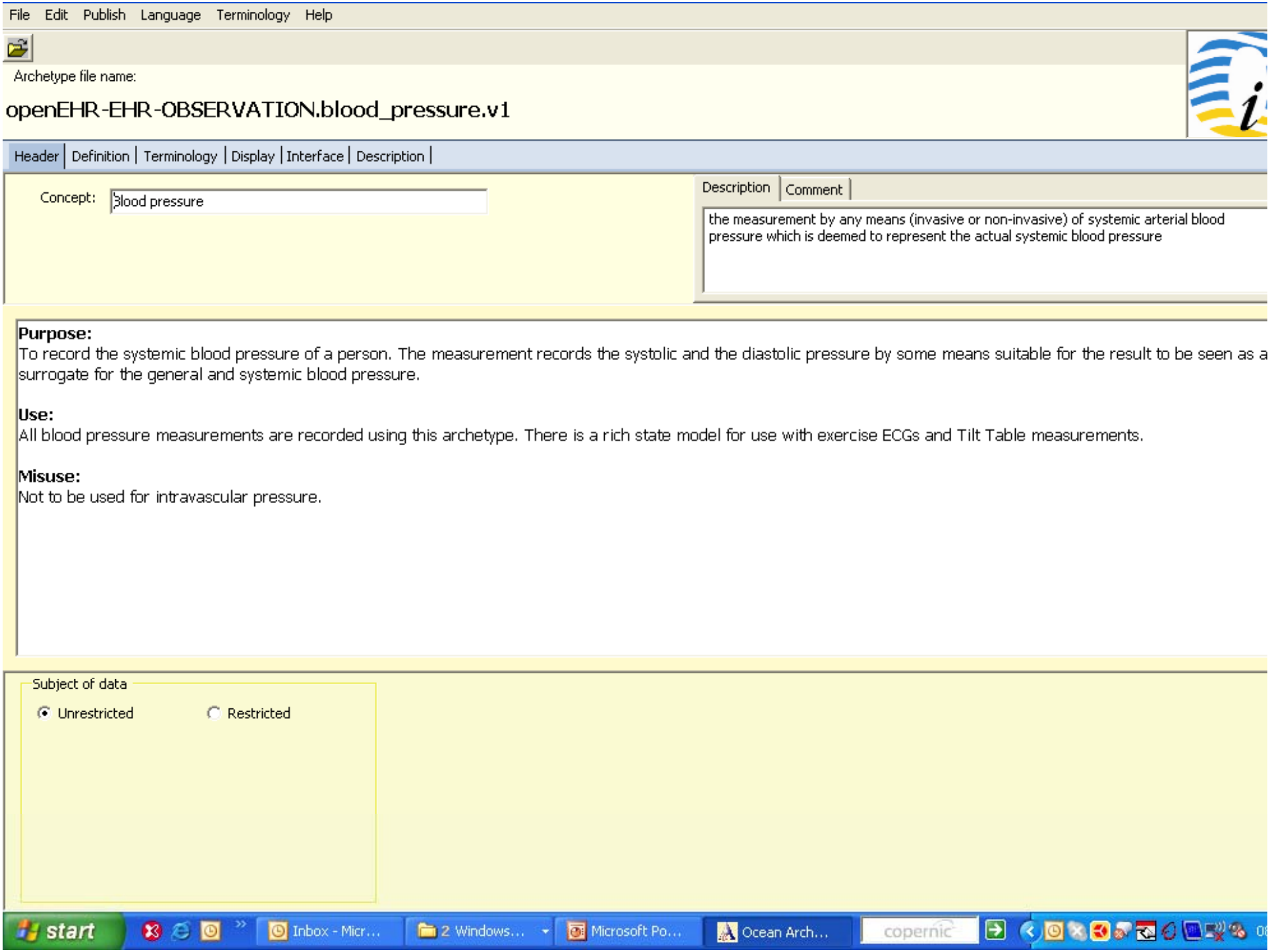
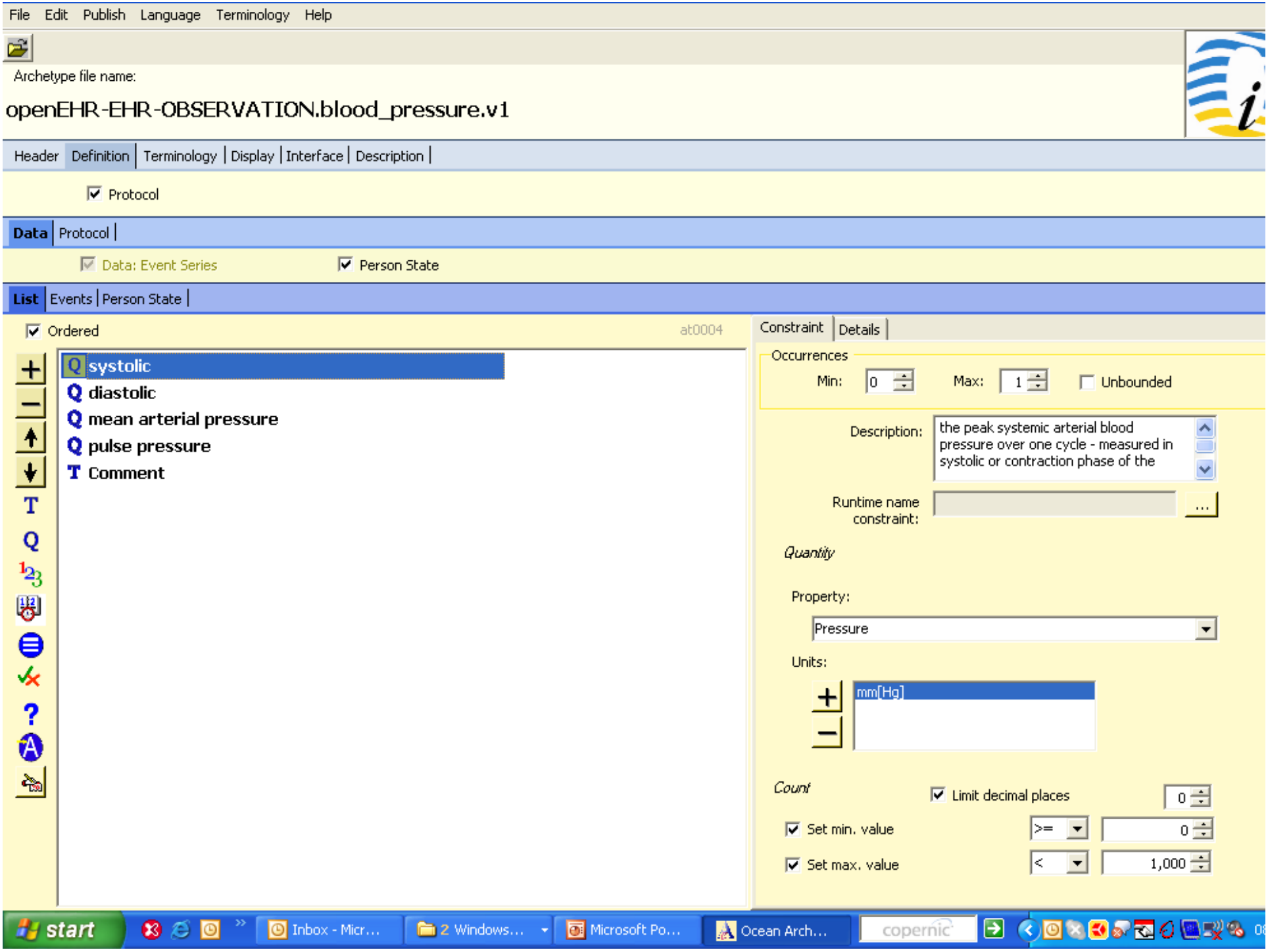
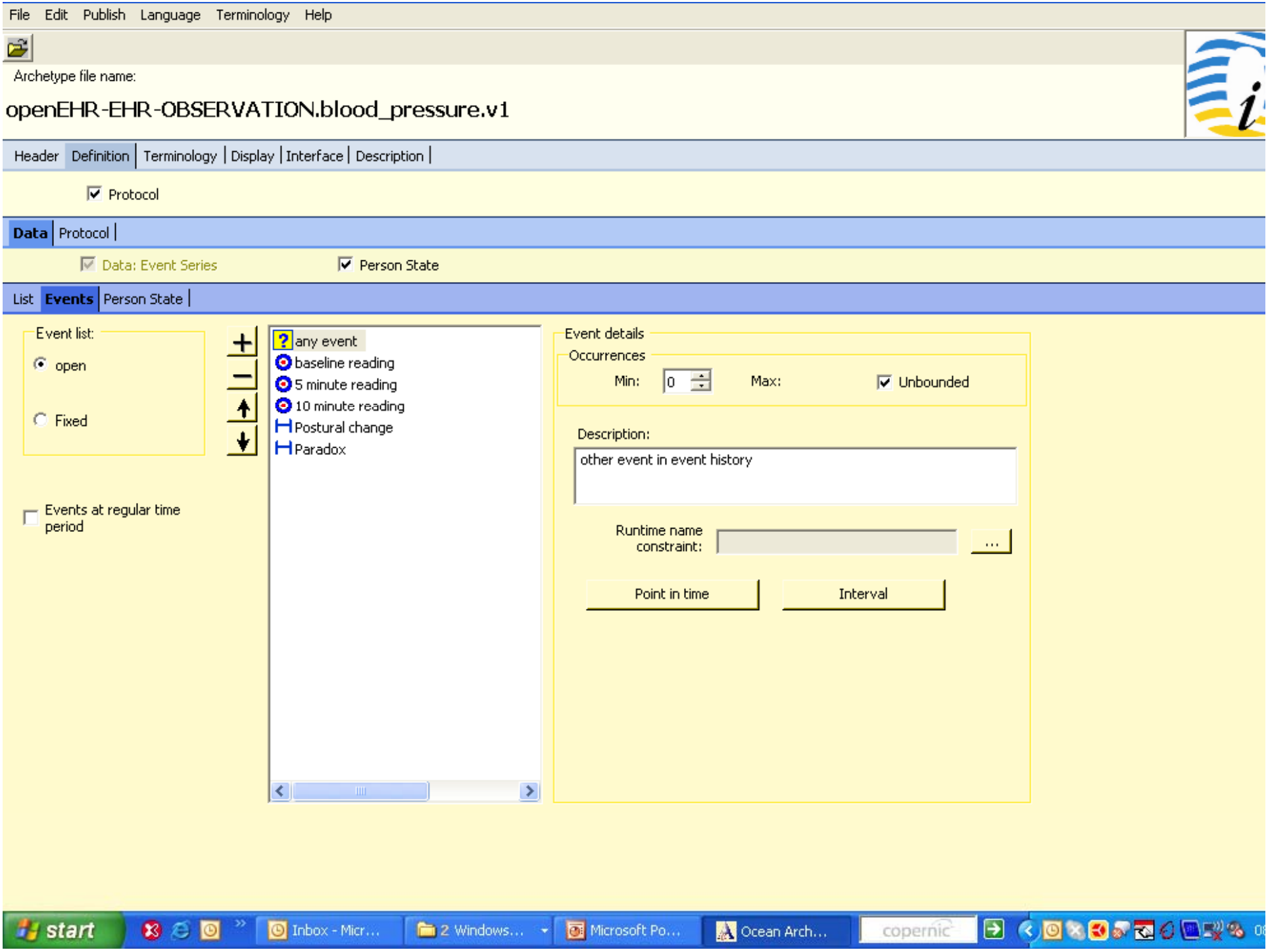
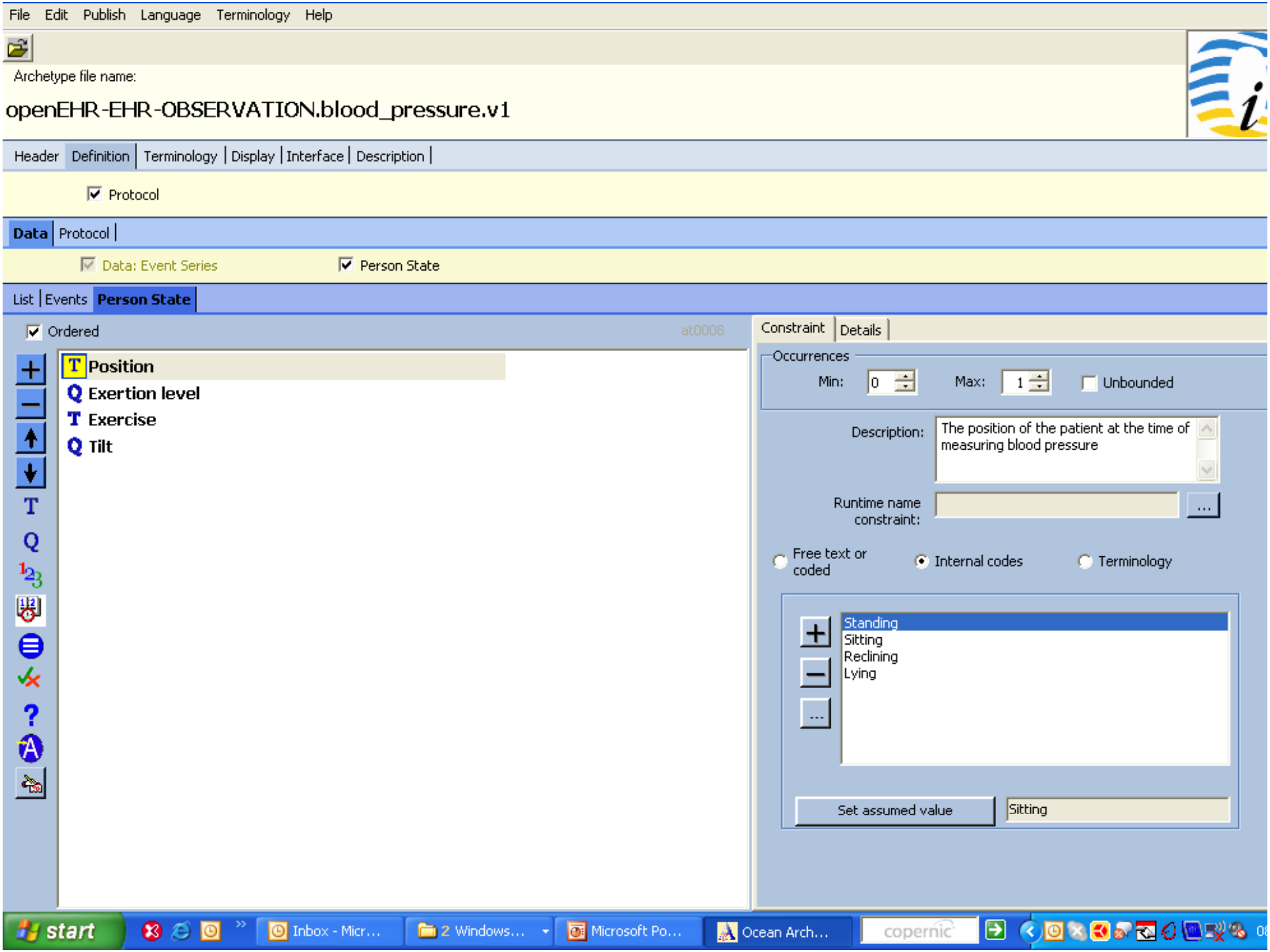
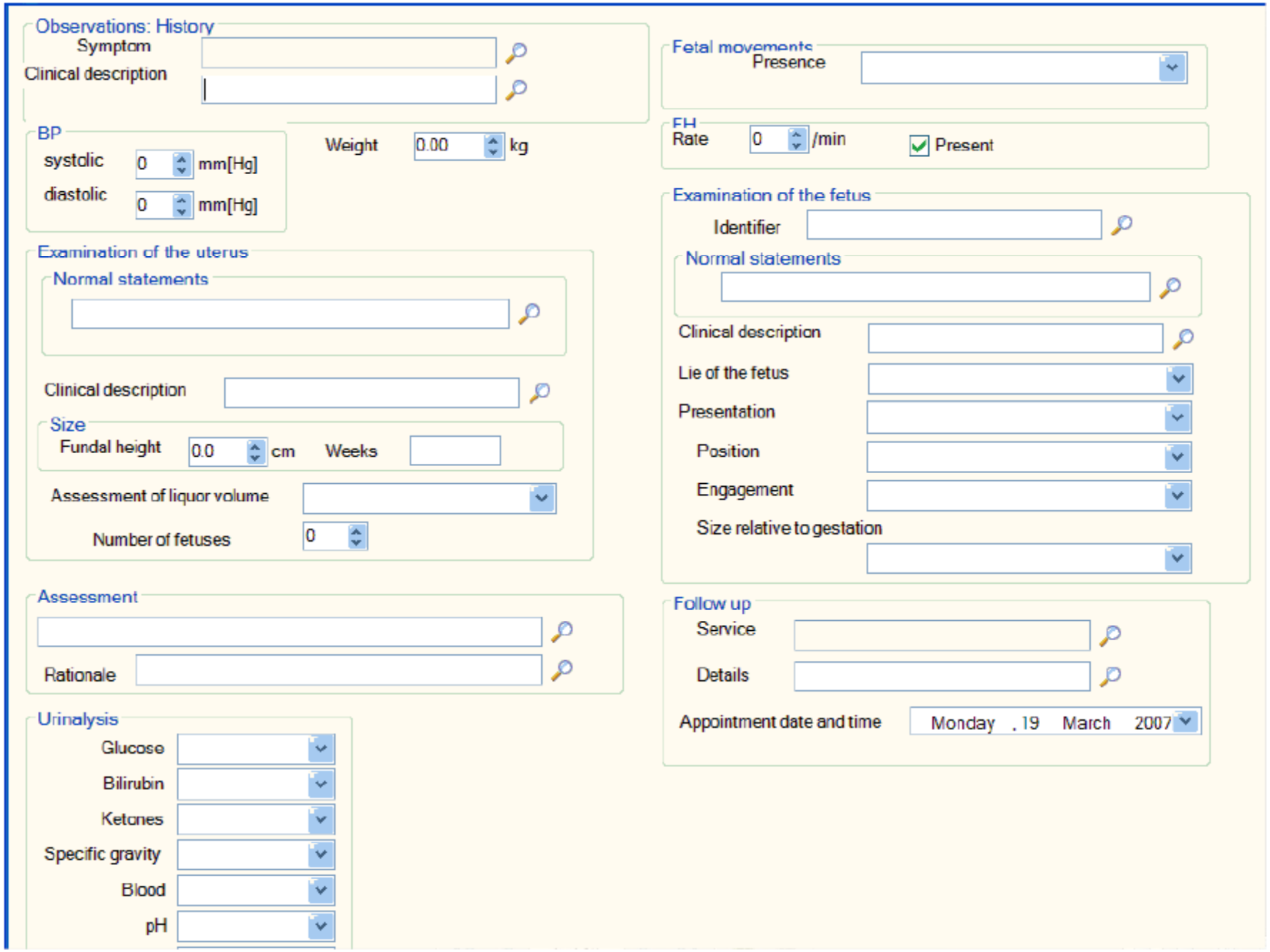
# Example archetype with template

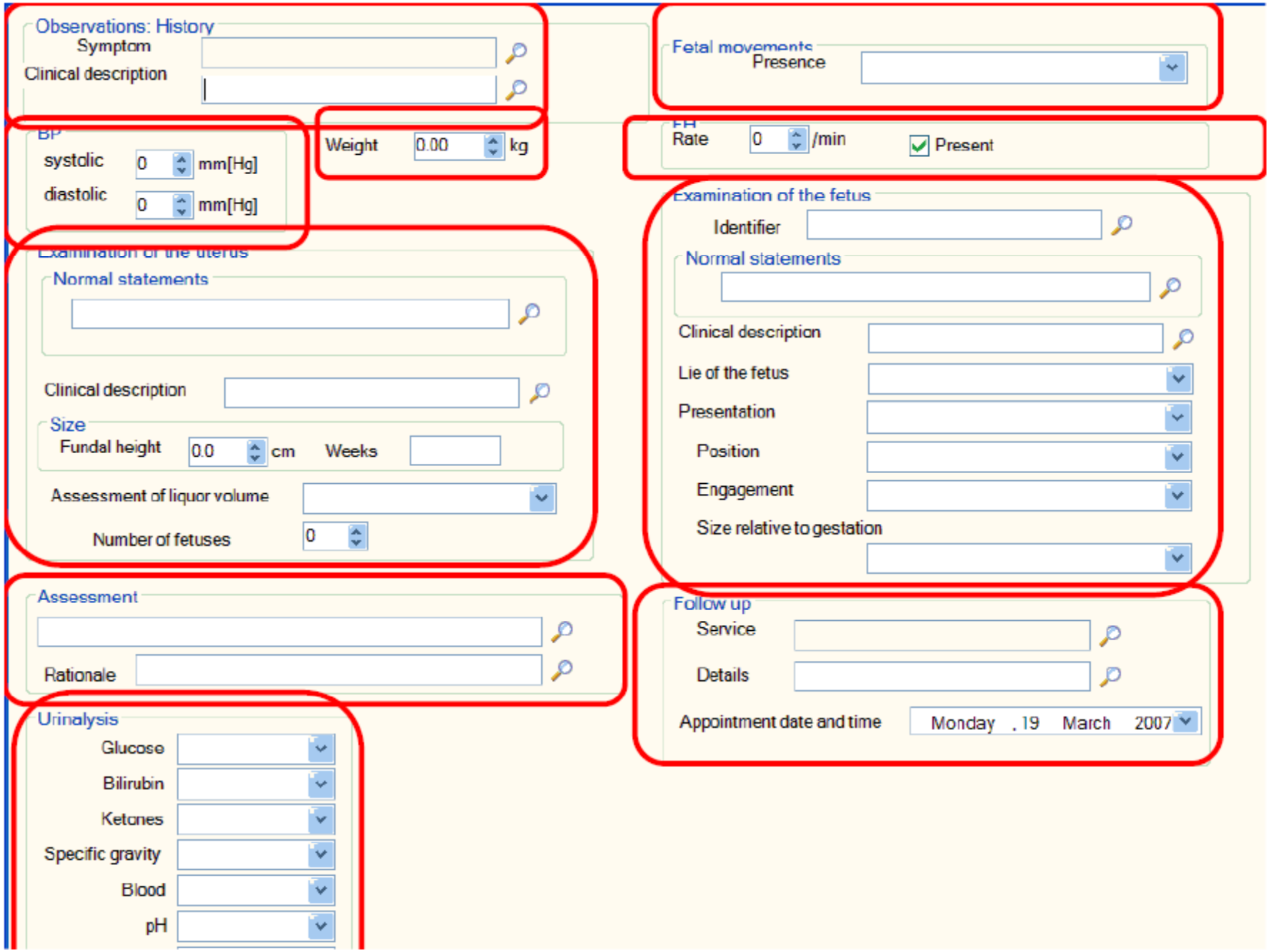

File Edit Publish Language Terminology Help
Archetype file name:
openEHR-EHR-OBSERVATION.blood_pressure.v1
Header | Definition | Terminology | Display | Interface | Description |
Concept: Blood pressure
Description | Comment |
the measurement by any means (invasive or non-invasive) of systemic arterial blood pressure which is deemed to represent the actual systemic blood pressure
Purpose:
To record the systemic blood pressure of a person. The measurement records the systolic and the diastolic pressure by some means suitable for the result to be seen as a surrogate for the general and systemic blood pressure.
Use:
All blood pressure measurements are recorded using this archetype. There is a rich state model for use with exercise ECGs and Tilt Table measurements.
Misuse:
Not to be used for intravascular pressure.
Subject of data
Unrestricted
Restricted
start
Inbox - Micr...
2 Windows...
Microsoft Po...
Ocean Arch...
copernic


File Edit Publish Language Terminology Help
Archetype file name:
openEHR-EHR-OBSERVATION.blood_pressure.v1
Header Definition Terminology Display Interface Description
Protocol
Data Protocol
Data: Event Series
Person State
List Events Person State
Ordered
at0004
systolic
diastolic
mean arterial pressure
pulse pressure
Comment
Constraint Details
Occurrences
Min: 0
Max: 1
Unbounded
Description:
the peak systemic arterial blood pressure over one cycle - measured in systolic or contraction phase of the
Runtime name constraint:
Quantity
Property:
Pressure
Units:
mm[Hg]
Count
Limit decimal places
0
Set min. value
>=
0
Set max. value
<
1,000
start
Inbox - Micr...
2 Windows...
Microsoft Po...
Ocean Arch...
copernic


File Edit Publish Language Terminology Help
Archetype file name:
openEHR-EHR-OBSERVATION.blood_pressure.v1
Header Definition Terminology Display Interface Description
Protocol
Data Protocol
Data: Event Series
Person State
List Events Person State
Event list:
open
Fixed
Events at regular time period
any event
baseline reading
5 minute reading
10 minute reading
Postural change
Paradox
Event details
Occurrences
Min: 0
Max:
Unbounded
Description:
other event in event history
Runtime name constraint:
...
Point in time
Interval
start
Inbox - Micr...
2 Windows...
Microsoft Po...
Ocean Arch...
copernic


File Edit Publish Language Terminology Help
Archetype file name:
openEHR-EHR-OBSERVATION.blood_pressure.v1
Header Definition Terminology Display Interface Description
Protocol
Data Protocol
Data: Event Series
Person State
List Events Person State
Ordered
at0008
Position
Exertion level
Exercise
Tilt
Constraint Details
Occurrences
Min: 0
Max: 1
Unbounded
Description:
The position of the patient at the time of measuring blood pressure
Runtime name constraint:
Free text or coded
Internal codes
Terminology
Standing
Sitting
Reclining
Lying
Set assumed value
Sitting
start
Inbox - Micr...
2 Windows...
Microsoft Po...
Ocean Arch...
copernic


Observations: History
Symptom
Clinical description
BP
systolic
0
mm[Hg]
diastolic
0
mm[Hg]
Weight
0.00
kg
Examination of the uterus
Normal statements
Clinical description
Size
Fundal height
0.0
cm
Weeks
Assessment of liquor volume
Number of fetuses
0
Assessment
Rationale
Urinalysis
Glucose
Bilirubin
Ketones
Specific gravity
Blood
pH
Fetal movements
Presence
FH
Rate
0
/min
Present
Examination of the fetus
Identifier
Normal statements
Clinical description
Lie of the fetus
Presentation
Position
Engagement
Size relative to gestation
Follow up
Service
Details
Appointment date and time
Monday
19
March
2007


Observations: History
Symptom
Clinical description
Fetal movements
Presence
BP
systolic
0
mm[Hg]
diastolic
0
mm[Hg]
Weight
0.00
kg
FH
Rate
0
/min
Present
Examination of the uterus
Normal statements
Clinical description
Size
Fundal height
0.0
cm
Weeks
Assessment of liquor volume
Number of fetuses
0
Examination of the fetus
Identifier
Normal statements
Clinical description
Lie of the fetus
Presentation
Position
Engagement
Size relative to gestation
Assessment
Rationale
Follow up
Service
Details
Appointment date and time
Monday , 19 March 2007
Urinalysis
Glucose
Bilirubin
Ketones
Specific gravity
Blood
pH

# *Current draft models*

NHS Connecting for Health

- hundreds of archetypes were needed to support 30 data capture (Maternity and Emergency) templates developed for the North / West / East / Midlands of England
- a versioning and configuration management approach to NHS archetypes and templates has been developed
- an NHS repository has been established (in addition to sharing our work within the openEHR repository)
  - branches are available for projects, with a ‘trunk’ of best models for ongoing use and development

# *Draft models*

NHS Connecting for Health

- ‘production’ repository
  - HTML Templates - http://svn.openehr.org/knowledge/templates/dev-uk-nhs/gen/html/
  - HTML Archetypes mindmap index - http://svn.openehr.org/knowledge/TAGS/dev-uk-nhs/Lorenzo_3.5/pub/ContentRelease-1.0.1/archetypes/gen/html/en/ArchetypeMap.html.txt
- experimental / emerging ‘national’ repository
  - https://svn.connectingforhealth.nhs.uk/svn/public/

Plan to join repositories in Jan./Feb. 2008

- Emergency-AbdominalPain.v2draft.html
- Emergency-BackPain.v2draft.html
- Emergency-ChestPain.html
- Emergency-Collapse.v2draft.html
- Emergency-Discharge_Summary.html
- Emergency-Generic_Acute_Presentation.v2draft.html
- Emergency-HeadInjury-v2draft.html
- Emergency-Headache-v2draft.html
- Emergency-JointPain.v1draft.html
- Emergency-LimbPainOrBoneInjury.v1draft.html
- Emergency-PoisoningOrOverdose.v2draft.html
- Emergency-ShortnessOfBreath.v2draft.html
- ExamFetus-v2draft.html
- ExamUterus-v2draft.html
- GeneralInvestigations.html
- HeadAndNeck.html
- HeartRate.html
- MATERNITY-AnaestheticAssessment.html
- MATERNITY-AnaestheticInterventions.html
- MATERNITY-TerminationOfPregnancy.html
- MATERNITY-ThreatenedMiscarriage.html
- MATERNITY-UltrasoundScan.html
- MENTAL_HEALTH-Assessment.html
- MENTAL_HEALTH-Discharge.html
- MENTAL_HEALTH-ReferralInformation.html
- MEWS.html
- Maternity-AntenatalBooking.html
- Maternity-Antenatal_Past_History_screening.html
- Maternity-Antenatal_family_history_screening.html
- Maternity-Antenatal_handheld_record.html
- Maternity-Antenatal_medication_screening.html
- Maternity-Birth Plan.html
- Maternity-CS_operative_notes-v3draft.html
- Maternity-Diabetic_Antenatal_Assessment.html
- Maternity-Family_History.html
- Maternity-First_stage_labour_assessment.html
- Maternity-MaternalDeath.html

ENCOUNTER

- [+/-] Emergency template [0..*]
  - [+/-] History [0..1]
  - [+/-] Examination [0..1]
  - [+/-] Investigations [0..1]
    - [+/-] General investigations [0..*]
    - [+/-] Other investigations [0..1]
      - [+/-] O Cardiac Enzymes [0..*]
      - [+/-] O Lipid studies [0..*]
      - [+/-] O Liver function tests [0..*]
  - [+/-] Evaluations [0..1]
    - [+/-] E Diagnosis [0..*]
    - [+/-] E Problem or issue [0..*]
  - [+/-] Clinical Management Plan and Actions [0..1]
    - [+/-] I Medication order [0..*]

[+/-] History [0..1]

[+/-] Examination [0..1]

[+/-] Vital signs [0..*]

[+/-] Respirations [0..*]

Rate [0..1] 0 /min

Rhythm [0..1] regular

Character [0..1] Gasping

- Gasping
- Grunting
- Kussmaul
- Snoring
- Inspiratory stridor
- Paradoxical breathing

Depth [0..1] Sha

[+/-] Oximetry [0..*]

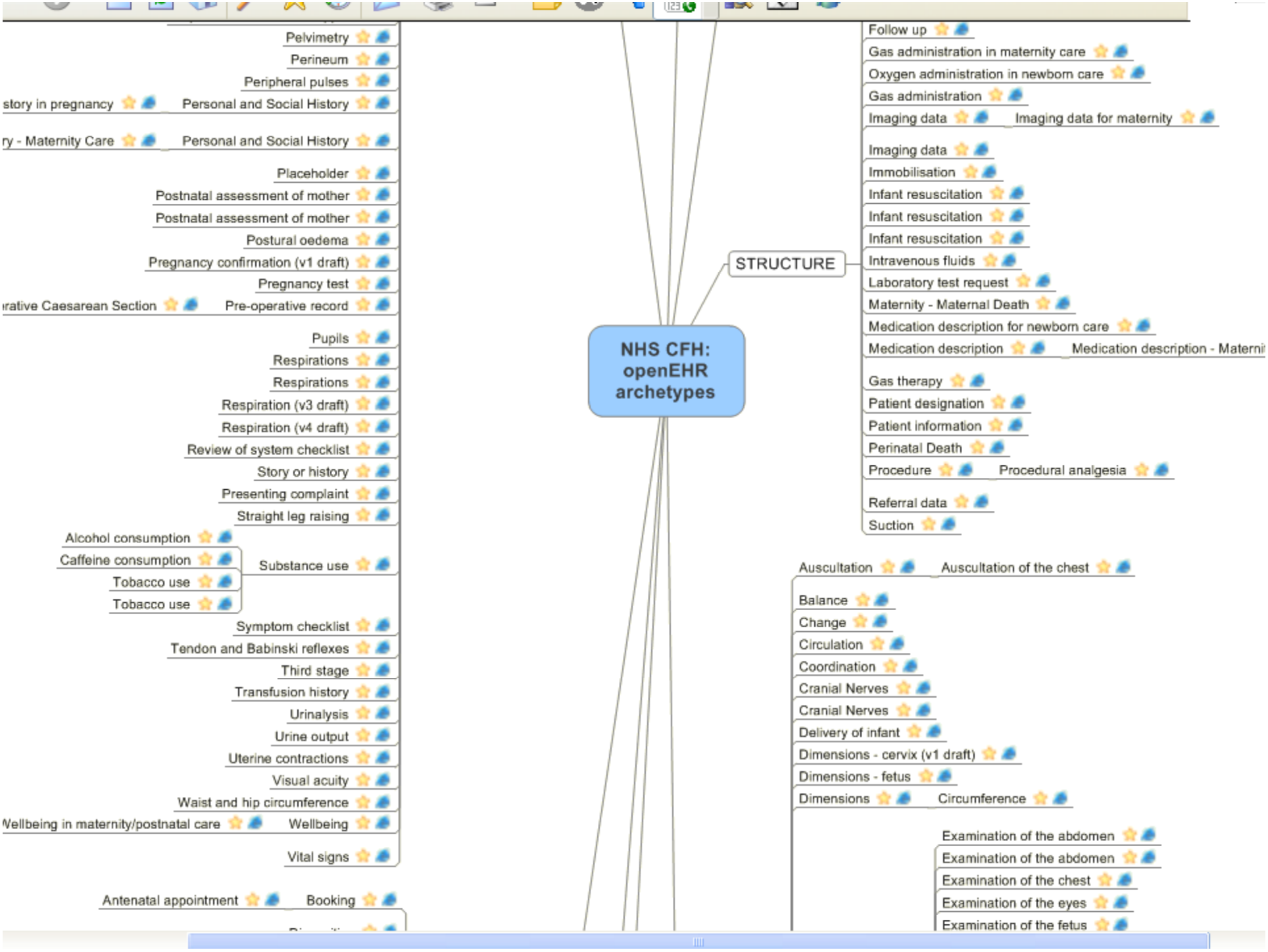
Oxygen Saturation [0..1] 0 %

FiO2 [0..1] 21 %

Site [0..1]

[+/-] Heart rate [0..*]

Rate [0..1] 0 /min


NHS CFH: openEHR archetypes
STRUCTURE
Follow up
Gas administration in maternity care
Oxygen administration in newborn care
Gas administration
Imaging data
Imaging data for maternity
Imaging data
Immobilisation
Infant resuscitation
Infant resuscitation
Infant resuscitation
Intravenous fluids
Laboratory test request
Maternity - Maternal Death
Medication description for newborn care
Medication description
Medication description - Maternit
Gas therapy
Patient designation
Patient information
Perinatal Death
Procedure
Procedural analgesia
Referral data
Suction
Auscultation
Auscultation of the chest
Balance
Change
Circulation
Coordination
Cranial Nerves
Cranial Nerves
Delivery of infant
Dimensions - cervix (v1 draft)
Dimensions - fetus
Dimensions
Circumference
Examination of the abdomen
Examination of the abdomen
Examination of the chest
Examination of the eyes
Examination of the fetus
Pelvimetry
Perineum
Peripheral pulses
story in pregnancy
Personal and Social History
ry - Maternity Care
Personal and Social History
Placeholder
Postnatal assessment of mother
Postnatal assessment of mother
Postural oedema
Pregnancy confirmation (v1 draft)
Pregnancy test
rative Caesarean Section
Pre-operative record
Pupils
Respirations
Respirations
Respiration (v3 draft)
Respiration (v4 draft)
Review of system checklist
Story or history
Presenting complaint
Straight leg raising
Alcohol consumption
Caffeine consumption
Substance use
Tobacco use
Tobacco use
Symptom checklist
Tendon and Babinski reflexes
Third stage
Transfusion history
Urinalysis
Urine output
Uterine contractions
Visual acuity
Waist and hip circumference
Wellbeing in maternity/postnatal care
Wellbeing
Vital signs
Antenatal appointment
Booking

| | | | | | | |
|---|---|---|---|---|---|---|
| Rate | The rate of the heart as beats per minute | *Quantity* | optional<br>0..1 | *Property* FREQUENCY<br>*Units*:<br>/min, >= 0 - Limit decimal places = 0 | | |
| Rhythm | The rhythm of the heart beat | *Coded text* | optional<br>0..1 | Regular<br>Irregular<br>Irregularly irregular | | |
| Description | The description of the rate and rythm | *Text* | optional<br>0..1 | *Free or coded text* | | |
| Present | The pulse rate is present (implied true if rate > 0) | *Boolean* | optional<br>0..1 | True, False | | |

***Normal statements***, Normal statements about the heart rate. ***Cluster*** (0..1) optional

| Concept | Description | Type | Cardinality | Values | Terminology (SNOMED-CT) | Comment |
|---|---|---|---|---|---|---|
| T Normal statements | The heart rate is abnormal | *Coded text* | optional<br>0..1 | Normal sinus rhythm<br>Normal rate and rhythm<br>Normal | | |

## ate: *LIST*

| ncept | Description | Type | Cardinality | Values | Terminology (SNOMED-CT) | Comment |
|---|---|---|---|---|---|---|
| Position | The position of the patient when the heart rate was measured | *Coded text* | optional<br>0..1 | Lying<br>Sitting<br>Reclining<br>Standing | | |

## nts: HISTORY

# *Potential benefits of terming content models*

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- Provides detailed and consistent implementation guidance on term usage within the context of specific clinical statements
- Should be possible to join up with SCT subsets
  - Benefits from being ‘driven’ and used by current system design requirements
  - Benefits from being a technique that supports both re-use and extension
- Should be possible to share a single set of archetypes to support requirements across NHS CFH programmes (e.g. Common User Interface, Data Dictionary, messaging)

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# *Some experimental work…*

**Vaccine ADR (Adverse reaction (constrained))**
**Description:** An undesirable or unwanted consequence of a preventative, diagnostic, or therapeutic procedure or regimen or other agent. This definition includes acquired hypersensitivity caused by exposure to a particular antigen (allergen) resulting in a marked increase in reactivity to that antigen upon subsequent exposure (i.e. an allergy).
Purpose:
Use:
Misuse:

Data tree : TREE

Reaction category : CLUSTER [1..1]

| | |
|---|---|
| Details of the type of adverse reaction. | **Comment:** 246090004\|Associated finding\| = openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding.v1draft.adl |

ELEMENT slot [1..1] choice of:

**Vaccines adverse or allergic reaction category**
**Description:** Set of SNOMED-CT coded terms used to specify categories of adverse and allergic reactions to vaccines.
Purpose:
Use:
Misuse:

DV_CODED_TEXT

*Value set constraint:*

VaccinesAdverseReactionCategory ::= 62014003|Adverse reaction to drug| OR 416093006|Allergic reaction to drug| OR 241937000|Drug-induced anaphylaxis| OR 241947002|Drug-induced anaphylactoid reaction|

Reference to any associated symptom.
Adverse effect

**Adverse reaction manifestation (Generic finding (constrained))**
**Description:** A structure for representing a generalised clinical finding without any assertion of causation.
Purpose:
Use:
Misuse:

Event Series : EVENT [1..1]

Any event : ITEM_TREE [1..1]

Tree : TREE

Finding type : CLUSTER [1..1]

| Details of the type of finding. | **Comment:**<br>246090004\|Associated finding\| = SLOT[1] |
|---|---|

ELEMENT slot [1..1] choice of:

**Vaccine adverse reaction manifestation**
**Description:** Set of SNOMED-CT coded terms used to specify types of clinical manifestation of an adverse reaction to a vaccine.
Purpose:
Use:
Misuse:

DV_CODED_TEXT

*Value set constraint:*
VaccineAdverseReactionManifestation ::= (308893005|Pyrexia postprocedure|) OR (422587007|Nausea|) OR (422400008|Vomiting|) OR (12532009|Malaise|) OR (95891005|Influenza-like illness|) OR (56018004|Wheezing|) OR (102601005|Perioral numbness|) OR (267038008|Oedema|) OR (4386001|Bronchospasm|) OR (397709008|Patient died|)

- ..
- openEHR-EHR-ELEMENT.code_set-LPfIT_immunisation_outcome.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-body_site-immunisation_injection.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-body_site.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-causative_agent-adverse_reaction-vaccines.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-causative_agent-adverse_reaction.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-causative_agent.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-course.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-degree_of_immunisation_completion.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_actual_medicinal_product.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_actual_medicinal_product_pack.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_medicinal_product_or_moiety.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_medicinal_product_pack.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_virtual_medicinal_product.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_virtual_medicinal_product_pack.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-dm_and_d_virtual_therapeutic_moiety.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding-adverse_reaction_category-drugs.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding-adverse_reaction_category-vaccines.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding-adverse_reaction_category.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding-injection_site_disorder.v1draft.htm
- openEHR-EHR-ELEMENT.code_set-SNOMED_subset-finding-vaccine_adverse_reaction_manifestation.v1draft.htm
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# *Upcoming clinical data work*

NHS Connecting for Health

- Content proposal for a shared vaccinations summary record for London – including both HL7 message / CDA profiling and *open*EHR models
- A pilot use of *open*EHR modelling for London Emergency care (starting with the models developed for the NHS North, Midlands, East Programme for IT, NHS NMEPfIT)
  - review and potentially integrate with US CDC 'DEEDS' content
- A Diabetes (shared care) national content project, likely joint with the NHS CFH e-Care Pathways programme
- Ongoing work for the NHS NMEPfIT (Mental Health, ENT scheduled surgery, discharge summaries, clinic letters)
- Possible other collaborations with regional Programmes (e.g. Peri-operative reports)

# *Implementation-driven content modelling*

NHS Connecting for Health

1. NHS NMEPfIT
   - Emergency, Maternity assessments
   - Discharge Summary (generic + ENT/ED/Maternity-specific)
   - Clinic Letters (generic)
   - Out of Hours – initial assessment, triage, intervention
   - ENT – Acquired Hearing Loss (initial assessment, standard referrals, audiogram, surgical assessments)
   - Diabetes assessment
   - Musculoskeletal / Physiotherapy generic assessment
   - Mental Health Common Assessment Framework (+ referral, assessment, evaluation and discharge drafts available)
   - Theatres – pre- / intra- / post-assessments
2. NHS LPfIT
   - Vaccinations Summary Record
   - Emergency
   - Mental Health
3. NHS SPfIT
   - informal talks last summer about peri-operative assessments

# *Current technical initiatives*

NHS Connecting for Health

1. Identify issues and propose resolutions for technical conflict between 13606 and V3 approaches to defining clinical record 'content' (passing recommendations to standards bodies as needed)
   - Investigate whether a bi-directional automated transform could be developed between *open*EHR and HL7 specifications
2. Investigate whether a single aligned infrastructure between these standards + SCT concept/context models + NHS DD meta-model could function as a 'logical record architecture' for the NHS
3. Enhance *open*EHR / 13606 archetype and *open*EHR template design rules and tools, e.g. to introduce
   - More consistency in archetype design
   - Semantic links between and within archetypes
   - Improvements in presentation formats for human review
4. Guidelines for binding SNOMED CT to archetypes and templates, potentially supporting both data capture and display constraints
5. Revise / refactor NHS *open*EHR archetypes and templates developed to date in line with new protocols

# *Possible future work*

***(through the NHS CFH EHR Content Technical Advisory Group)***

NHS Connecting for Health

1. What is a Content Model? (What are the associated artefacts?)
2. Principles / criteria and use cases for which aspects of EHR Content should be (nationally) standardised (structured)
    - Principles and use cases for what (within the above scope) should be **encoded** and why
4. Define a logical content architecture
5. Protocols for content specification business analysis
6. Protocols for testing content specifications for fitness of purpose
7. National requirements & strategic recommendation for SCT subset management & implementation guidance (joint with the NHS Terminology Steering Group)

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# *Thanks for your attention*

- Any questions?

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# *For more information*

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