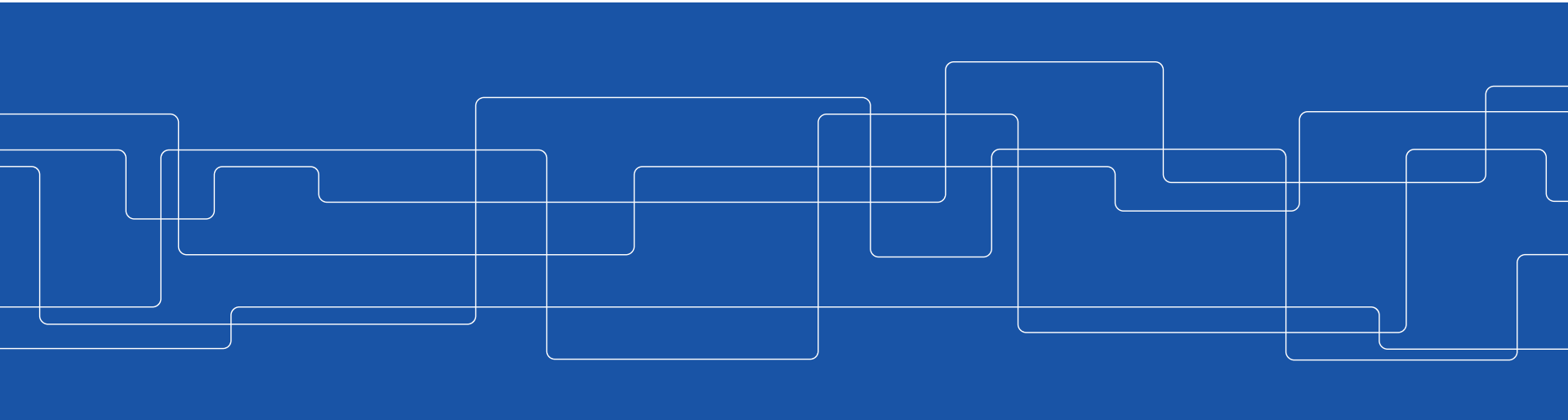




The System Engineering Assignment

Medical Informatics & Communication (HI2010)

Autumn 2021 - Martin Jacobsson





Learning objective

use common ICT requirements methods to

identify, reason, and analyse

the medical and care needs of ICT solutions

The Example ICT System

Laboratory Information System (LIS)





Laboratory Information System (LIS)

https://www.limswiki.org/index.php/Laboratory_information_system

https://en.wikipedia.org/wiki/Laboratory_information_management_system

LIS is a software system that records, manages, and stores data for clinical laboratories. A LIS has traditionally been most adept at **sending laboratory test orders to lab instruments, tracking those orders, and then recording the results, typically to a searchable database**. The standard LIS has supported the operations of public health institutions (like hospitals and clinics) and their associated labs by managing and reporting critical data concerning "the status of infection, immunology, and care and treatment status of patients"



Kundid/kombikakod

[illegible]

Kundnamn

Placera brickavtryck
innanför den
streckade linjen

Namn rem. läkare: _____

Urinsamling från kl: _____ till kl: _____ volym: _____ mL

Typ av läkemedel: _____ Senaste dos datum: _____ kl: _____ Provt sign: _____

Frågeställning/Kliniska uppgifter

AKUT



Hematologi

- ☐ B-Blodstatus
- ☐ B-Hemoglobin
- ☐ B-Leukocyter
- ☐ B-Trombocyter
- ☐ B-Celler, diff
- ☐ (B)Erc-Retikulocyter
- ☐ B-SR

Anemi

☐ S-Ferritin

2

Allmän kemi

- ☐ S-Natrium
- ☐ S-Kalium
- ☐ S-Klorid
- ☐ S-Albumin
- ☐ S-Kreatinin
- ☐ S-Cystatin C
- ☐ S-Urea
- ☐ S-Urat
- ☐ S-Calcium
- ☐ S-Magnesium

1

- ☐ S-CK
- ☐ S-25-OH-vitamin D
- ☐ S-CRP
- ☐ S-Albumin, CRP, α_1 -Antitrypsin
Orosomukoid, Haptoglobin
- ☐ S-IgG, IgA, IgM
- ☐ S-IgA
- ☐ S-PSA, totalt
- ☐ S-PSA kvot (fritt/totalt)
- ☐ S-PTH

1

Hormoner

Ange om tolkning önskas:

- ☐
- JA, frågeställning krävs

Pågående hormonbehandling:

- ☐ JA, typ av prep:

P-Piller: ☐ JA

1:a dag i sista mens

- ☐ S-FSH
- ☐ S-LH
- ☐ S-Prolactin
- ☐ S-Progestins

8

Markörer

- ☐ S-CEA (G-I, bröst)
- ☐ S-AFP (lever, testis, ovarier)
- ☐ S-CA 19-9 (G-I, pankreas)
- ☐ S-CA 125 (ovaries)
- ☐ S-CA 15-3 (bröst)

14

Proteiner


- ☐ S-Proteinfractioner
(elektrofores, S-Albumin, CRP,
a1-Antitrypsin, Orosomukoid, Haptoglobin,
IgG, IgA, IgM. V g ange frågeställning)

1

+ 6

Anvisningar

Laboratoriet använder ett skanningsystem för att tolka informationen på remissen. För att detta skall fungera optimalt är det viktigt att följa nästföljande anvisningarna:

- Texta tydligt i rutorna för avsändare, patient-identitet, provtagningstid och inte skrivare eller sjuksköterska avläsare.
- Oönskade analyser markerades så här  OBS! Använd ej röd pennan.
- Görda markeringar får ej raderas, var vänlig tag en ny remiss.
- Om remissen skall vika, viks på perforeringen.

Patientförebereelser

Undvik fet mat och alkohol dagen före provtagningen och avslåt från rökning de närmaste timmarna före provtagningen, patient bör vara tillstånd 15 minuter före provtagningen.

Fasting

De analyser som vill tas fastande är på remissen markerade med I för analysresultatet ut en IS-Tripglycerider.

Glukos skall tas fastande när diagnosen diabetes skall ställas.

Prostaglandin, intarut så snart min skall så 8-12 timmar före provtagning.

Urin, vätska och det utan socker och gräddmedel är tillåtet.

Vid provtagningen

- Fingmarka nagen på älskekudde(r)ens vävar provtagningsrörens proppfärg.
- Märk provrör med den exakt som motsvarar beställningen, samma namn och/eller nummer i analyslutan som på röret/etten.

OBS! Sätt etiketten rakt, från kroken och nedåt.

- Om provrör redan har en pappersetikett, sätt älskekudde(r)ens vävar nedan på sitt innehåll till provröret syns.
- Vävar inmatat analysmaterial eller analys kräver ett fullt provtagningsrör.

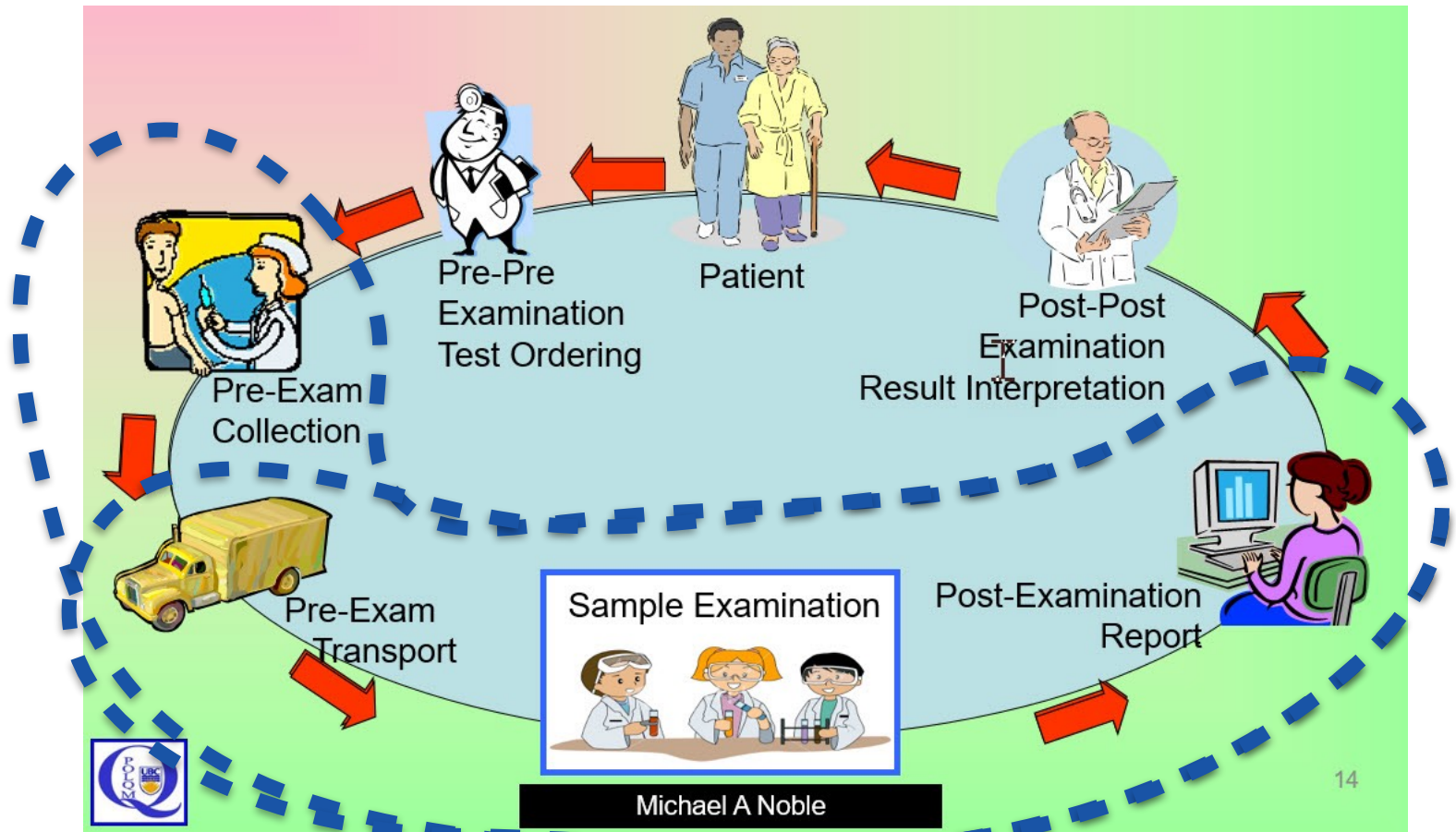
OBS! Rörna måste fyllas helt tills vakuum upphör.

- Alla rör skall vävas minst 10 gånger omedelbart efter provtagningen.

Proppfärg	Innehåll
Lila	EDTA
Gul	Utan tillsats men med gel
Ljusgrön	Li-heparin med gel
Röd	Utan tillsats
Ljusblå	Na-citrat
Rosa	Na-Fluorid/EDTA-Na2 och Citrat/Citronsyrabuffert

Var vänlig se Analysföreläggningen
www.atrias.se/medlag

[illegible]



Michael A Noble



The Task (1)

Test

- stakeholder analysis
- user stories
- requirement list

Done in pairs.

Write a short report



The Task (2)

Stakeholder analysis

- Identify some stakeholders (minimum 5)
- Make use of the primary, secondary, tertiary classification

User stories

- For one or more stakeholders
- Create one epic user story, and 2-3 (sub)stories
- Follow the template

Requirements List

- From one user story, explicitly create 2-3 requirements

Social Technical Aspects

- Read Coiera (2004) and analyse the LIS system.

E. Coiera, "Four rules for the reinvention of health care", British Medical Journal, 238 (2004). P 1197-1199



The Task (3)

Write down this in a report and upload in Canvas before the deadline.

We expect the report to contain:

- a short (incomplete) list of stakeholders, with a short description and why they are stakeholders.
- A few User Stories according to the template. They should be structured so that it is clear which parent a Substory or User Story belongs.
- A requirement list with detailed requirements.
- A paragraph of text about whether all requirements are SMART.
- Half a page of text about the social technical aspects about an LIS based on the discussion from Coiera (2004).

E. Coiera, "Four rules for the reinvention of health care", British Medical Journal, 238 (2004). P 1197-1199

Important Slides when Writing the Report



Stakeholders

Patient

Physician/GP

Medical specialist

Radiologist

Lab

Nurse

Pharmacist

First responder

Billing

Insurer

Researcher, Quality assurance

Potential Stakeholder:

Dentist

Optician

Social worker

Ergonomist

School/work nurse

Home care worker



Stakeholder Structure - Medical Robots

Primary Stakeholders

- Direct Robot Users (e.g., patients)
- Clinicians (e.g., nurse lifting a patient)
- Care Givers (e.g., friend using robot in patients home)

Secondary Stakeholders

- Robot makers
- Environmental Service Workers (e.g., cleaning robots)
- Health Administrators (e.g., cost effective analysis)

Tertiary Stakeholders

- Policy makers
- Insurers
- Advocacy groups

Laurel Riek, "Healthcare Robotics", Communications of the ACM, Volume 60 Issue 11, November 2017, Pages 68-78.



Requirement List

Functional Requirements

Performance Requirements

Template:

3.2.1.16 Functional requirement 1.16

Title: Mobile application - Search by specific dish

Description: A user must be able to select a specific dish in a given list as input. The result is displayed in a map view by default.

Rational: In order for a user to search by specific dish.

Dependency: Functional requirement 1.7

Requirements Analysis - S.M.A.R.T.

SMART

- Specific
- Measurable
- Achievable
- Relevant
- Time-bound / Testable

Assume the product is finished. Can we then test if it fulfils all requirements? Yes/no?

Are the requirements written in this way?

Creating a User Story

User stories have a specific format:

“As a **[persona]**,
I want to **[do something]**
so that I can **[realize a reward]**”

A blue starburst graphic with multiple points, containing the text 'Stressing the why' in white.

Stressing the
why

Who is the user?

Why do they want to do this?
What is the benefit/reward?

<https://www.alexandercowan.com/best-agile-user-story/>

Discussion Points

Coiera:

1. Technical systems have social consequences
2. Social systems have technical consequences
3. We don't design technology, we design socio-technical systems
4. To design socio-technical systems, we must understand how people and technologies interact

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC411109/>

E. Coiera, "Four rules for the reinvention of health care", British Medical Journal, 238 (2004). P 1197-1199