Two hours

Please use a ruler for diagrams and tables

# UNIVERSITY OF MANCHESTER
# SCHOOL OF COMPUTER SCIENCE

Systems Governance

Date:     Monday 21st January 2019

Time:     09:45 - 11:45

**Please answer all THREE  Questions**

**Do NOT use one-word answers or use lists without an explanation of each element in the list**
**No marks will be awarded for reproducing answers to similar questions from previous years**

This is a CLOSED book examination

The use of electronic calculators is NOT permitted

**[PTO]**

1.     **RESPONSIBILITY AND ACQUISITION**

a) Explain – in your own words – the six elements of systems governance.

(6 marks)

b) According to the Soft Systems Methodology, what are the three types of people associated with a state of effective governance of an information system. How can they be mapped to those involved in the acquisition and deployment of an active system?

(3 marks)

The Callous and Bonzo Confectionery Company has a process control system that is used for making its famous, chocolate-coated liquorice toffees. The marketing department has determined that the company will sell more sweets if it puts a thicker layer of chocolate on them and want to alter the process control system to make it so. The operations department sees this as an opportunity to make savings by running all factories from a single operations control centre rather than have production managers at each location by upgrading the process controllers to be managed remotely.
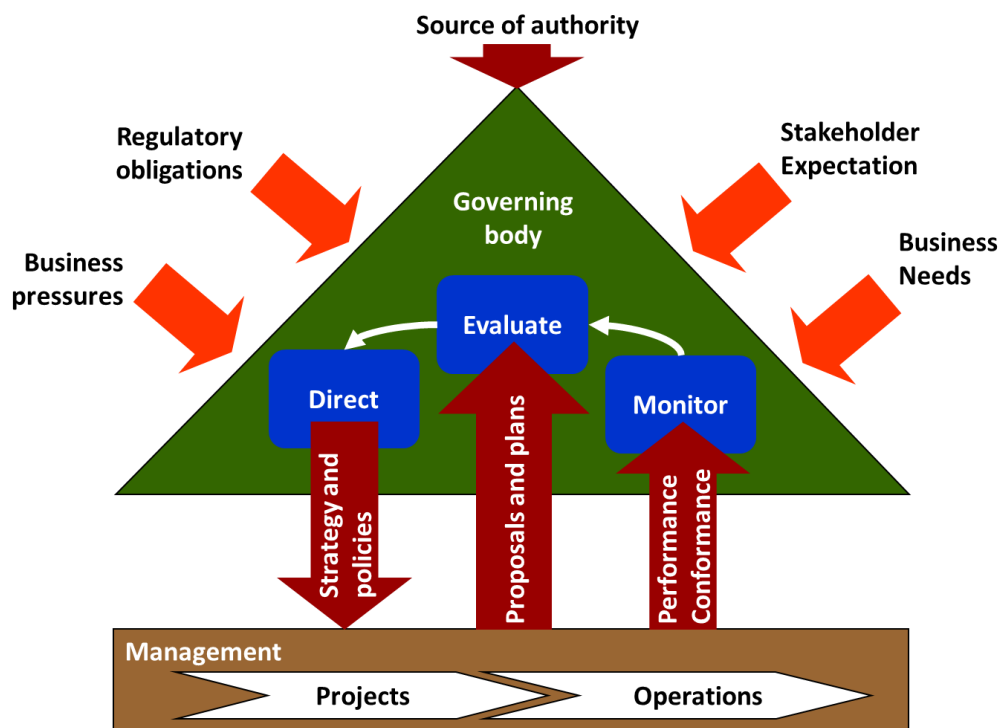


*ISO/IEC 38500:2015

Explain how the standard **process** for Systems Governance – as laid down by ISO/IEC 38500 – should be applied to upgrade the system. Who is involved with the respective parts of the process? Be specific to the likely stakeholders in the case study.
Use a well-labelled diagram with supporting commentary.

(4 marks)

c) One week after roll out across the company, one of the factories finds that the production line is putting on so much chocolate on the sweets that the conveyer belts are being transformed into one long slab of confectionery.

What course of action should the factory take?

(7 marks)

2.    **ARCHITECTURE/STRATEGY**

a)  Explain the role of the reference architecture in Systems Governance.

(2 marks)

b)  RAMPARTS - ReAl-time Mobile monitoring of Patient symptoms, Access to Records, Treatment, and Storage – is an information system that processes and stores medical information about individuals and supports medical practitioners in their decision making and administration of treatment.
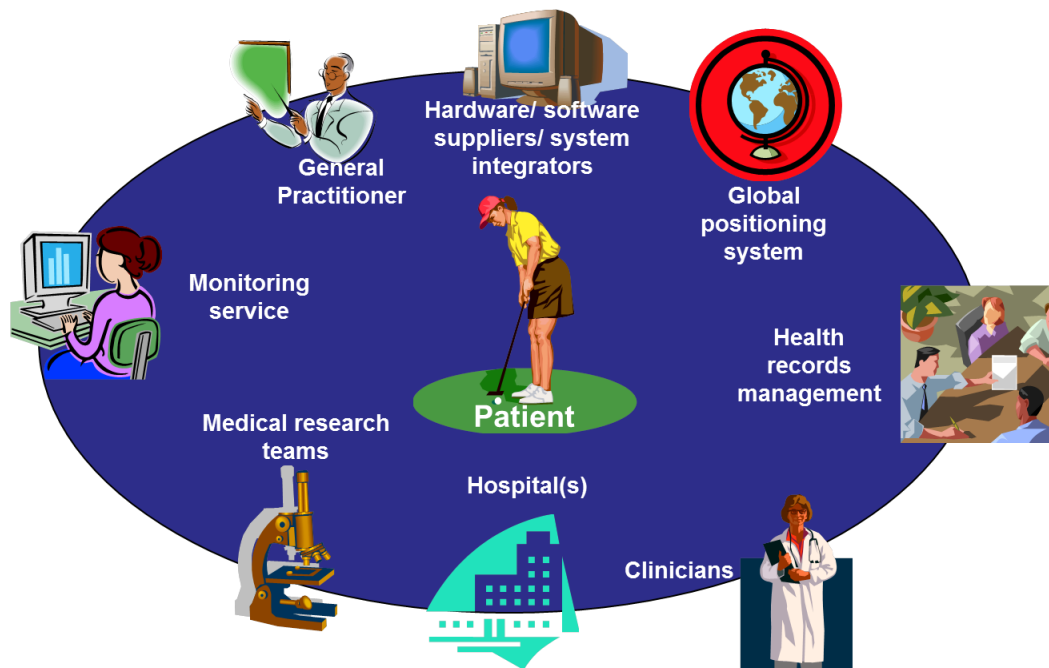


The *basic* requirements from RAMPARTS are:

- Collect real-time data about a patient's health from one or more medical devices carried by the patient.

- Transmit that data to healthcare professionals who may:

    o  Administer medication or other treatment through one or more devices carried by the patient.

    o  Contact the patient with instructions, for example, to take medicine or attend a clinic.

- Create Electronic Health Records (an electronic version of the medical record of the care and treatment the patient receives; it's kept up to date and looked after by the health care provider).

- Update Personal Health Records (information about the patient's health that the patient – or nominee - keeps up to date).

- Aggregate data and make it available for medical research.

Technologies available include:

- Mobile medical devices
- Global positioning systems
- Applications
- Short Message Service (SMS),
  e-Mail, Instant messaging (IM), etc.

- Smartphones
- The mobile data network
- The Internet

i) Suggest a typical data set that is required to ensure the uninterrupted supply of information to medical devices carried by the patient. Divide this dataset into business impact levels to show the risks to it. Consider, in particular, the importance of protecting patient-identifiable data. Use a business impact table to present the categories of your solution.

(6 marks )

ii) Design the information security architecture that will support the confidentiality, integrity, and availability of the information handled during the process of supplying the information or instructions for treatment. At what points will non-repudiation be important? Use a well-labelled block diagram. How will your architecture be resilient to attack?

(12 marks)

3. **HUMAN BEHAVIOUR**

a) Explain how a system must account for human behaviour in its design throughout its life cycle from conception to decommissioning. How can human-machine symbiosis help? What is the appropriate role of training and education?

(2 marks)

b) Explain how the responsibilities in the Evaluate-Direct-Monitor process apply to the consideration of human behaviour affecting an information system.

(3 marks)

c) Redfriars school has 300 pupils and 50 staff including administrative staff, building maintenance staff, a school nurse, and (of course) teachers. Some of the teachers also provide careers advice and social counselling to the pupils. The school is managed by a panel comprising 3 governors (including a parent governor), a bursar (managing the accounts) and the headmaster.

Information needs to be kept on each pupil including attendance records, special needs including dietary requirements, parent or guardian contact details, marks from school work and examinations, and membership of extra-curricular clubs, behavioural and disciplinary records, and financial records about the payment of school dinners and school trips.

Over the years, the information system has been built up piecemeal and comprises half a dozen PCs networked across the school with a central server in the head teacher's office. A benefactor from their local computer dealer, the Universe of IT Emporium (UNITE), has offered to replace – at UNITE's expense – the current kit with a new school server and wireless router, wireless network laptops for each teacher, workstations for each pupil and administrative staff, and database programming expertise to create a new school management information system. Pupils will be allowed to bring their own devices for use on the school network which will be administered by UNITE.

   i) Make a list of use and misuse cases that must be considered to ensure that the upgraded system will deploy good security practices which protect the information about the stakeholders in the system and enable the effective running of the school. Be clear what data is likely to be handled in each.

(4 marks)

   ii) Extract a table of information handled by Redfriars from the use/misuse cases that you have just listed. Show the privileges that should be allocated to the actors and customers involved with the network (as described in the introduction). Show who will have access to what – and when if appropriate – and how that access will be controlled.

(5 marks)

iii) One of the teachers at Redfriars has discovered examination questions posted on a website. It is particularly alarming because this exam has not been sat yet so this is stolen material. What course of action should be taken and by whom?

(6 marks)

**END OF EXAMINATION**