SFWR ENG 3RA3 Summary

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Math objects made using MathType; graphs made using Winplot.

Please join GitHub and contribute to this document. There is a guide on how to do this on my GitHub.

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Lecture 1

And so it begins…

Lecture 2 – Types of Statements

Descriptive Statement: facts about the system, such as natural laws and physical constraints

Prescriptive Statement: desired behavioural properties of a system; can be negotiated
Types of prescriptive statements:

- **System Requirement** (SYSREQ): when the software interacts with the other system components, i.e. environment
    - vocabulary understandable by all parties
    - Types of SYSREQ:
        - Domain Property (DOM): affecting environmental phenomena, such as physics
        - Assumptions (ASM):
- **Software Requirement** (SOFREQ): relationship between a set of input variables, *I*, and *O*, the set of output variables
    - vocabulary understandable by software developers

Lecture 5

Defining Requirements

Types of projects:

- Rabbit:
    - Agile
    - Short life
- Horse:
    - Fast, strong, dependable
    - Most common in corporate
    - Medium longevity
- Elephant:
    - Solid, strong, long life

Artifact-driven: basing the requirements on data collection, questionnaires, etc.

- You can often collect too much data
- Only keep what you need to know
- *prune* the document space, so you only keep the useful data.

Scenario: similar to *storyboards*…

Positive Scenario: behaviour system should cover

- **Normal Scenario**: everything proceeds as expected
- **Abnormal Scenario**: a desired exception

Negative Scenario: behaviour system should exclude

Knowledge Acquisition

Stakeholders: important to identify when determining who to customize the project towards

- Who is responsible for funding/using/managing the project?
- Caution: interactions with them must be done carefully

Domain expertise: what does the domain know / qualifications? Domain is who the project is directed towards

Lecture 6

Stakeholders-driven Elicitation Techniques: methods of knowledge acquisition

- Interviews
  - Single interview for multiple stakeholders: faster, but less involving
  - Steps:
    - Select stakeholders
    - Background study
    - Predesign sequence of questions, focused on concerns of present stakeholder(s)
    - Begin by asking easy questions
    - Keep focus during interview
    - Ask 'why'-questions
    - Record answers and reactions
    - Write report from transcripts
    - Confirm report with stakeholders interviewed
  - Types:
    - **Structured**: predetermined set of questions
    - **Unstructured**: free discussion of current system
    - Optimal: start with *structure*, then do *unstructured*

Lecture 6

Observation:

- people behave differently when observed
- slow & expensive

Group sessions: more than 4 people

Inconsistencies: conflicting views or incorrect

e.g.

Boundary Condition: the sample of instances where conditions conflict
Divergence: when two viewpoints have boundary conditions; they must be clarified

Entity Relationship (ER) Diagram

Entity: class of concept instances
Attribute 1 … Attribute *n*: intrinsic feature of an entity (regardless of other entities)

|

| relationshipName
|

Entity 2

arity: range of entities that contribute to the relationship

e.g.)

participant
Name Address e-mail

arity↓ |
1..* | invitedTo
| Invitation
0..* | invites
|

Data Flow Diagrams

Rectangles: actors outside of system who either input to or receive output from the system
Arrows: direction of flow of information, the description of the information is usually described along the length of the arrow
Circles: actions by system

State Machine Diagram

Arrow:

- [constraint]: necessary input to get to next state
- flow: what the machine is doing

Circles: description of state

All states must go to a termination state!

DDP

Defect Detection Prevention (DDP):

AHP Comparison Matrix

Pairwise Comparisons

This is a way of seeing if your values for your AHP matrix are consistent.
Weights: measure of importance from 0 to 1

$$w_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}}$$

Although the sum of your weights, should equal 1, don't worry if it doesn't. Instead, normalize them by dividing them all by the sum of your weights.

$$x = \sum_{i=1}^{n} w_i$$

a: a_{ij}
b: a_{ik}
c: a_{kj}

Inconsistency index: $cm_A = \max_{i,j,k} \left(\min \left(\left| 1 - \frac{a_{ij}}{a_{ik} a_{kj}} \right|, \left| 1 - \frac{a_{ik} a_{kj}}{a_{ij}} \right| \right) \right)$

Value and range of a_{ij}		relation	**Definition of intensity**
range	starting value	symbol	**or importance (C_i vs C_j)**
1.00-1.27	1	$C_i \approx C_j$	*indifferent*
1.28-1.94	1.6	$C_i \sqsupset C_j$	*slightly in favour*
1.95-3.17	2.6	$C_i \supset C_j$	*in favour*
3.18-6.14	4.7	$C_i > C_j$	*strongly better*
6.15-	7.0	$C_i \succ C_j$	*extremely better*

If the inconsistency value is > 0.3, then you need to tweak your values.