Software Project Management

Week – 10

Today's Lecture

- Use – Case Point Analysis

Potential Solution – Our Perspective

| Experience Factory	Technical Risk Phase	Use Cases
• Maintaining experience base with past experiences of effort estimates of old successful projects can help to get more accurate results resulting in continuous improvement.	• Advent of new phase that can flush out the technical risks earlier in the SDLC. •www.lamri.com	• UC can define and manage the scope • They by far are the best way for articulating users view of the system

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Use Cases

- Use cases tries to provide an approximate answer to the right question. – which according to John Tukey is far better than exact answer to approximate question.

- Can provide estimates earlier in SDLC.
    - Before architectural decisions are made
    - Before implementation.

- Use Cases provide user-specific perspective to requirements and have been a successful way to explore the requirements.

- Use case models are used in OO analysis for capturing and describing functional requirements of a system.
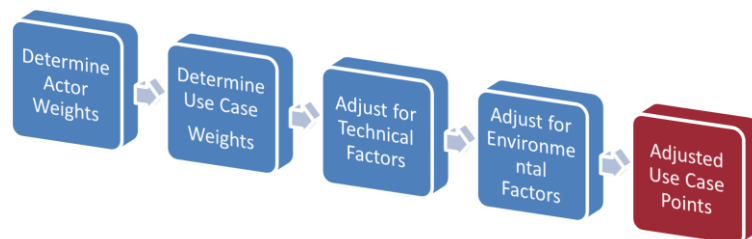
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Use Cases

- Describe the typical interactions between the users of a system and the system itself.

- Specify a form of requirements of what the system has to do (remember, only what, not how).

- Rules:
  - related to at least one actor
  - has an initiator (i.e. an actor)
  - leads to a relevant result (a result with "business value")

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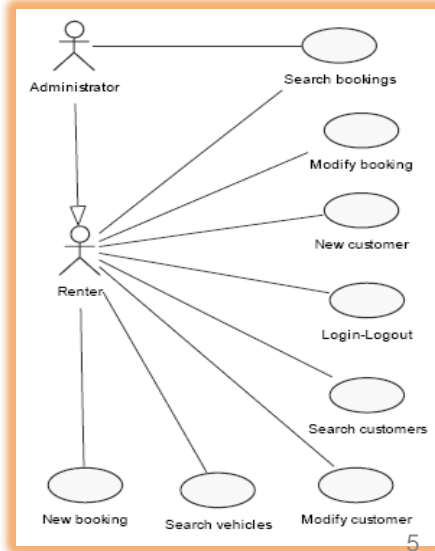
Use Case Point Estimation – Process

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Step involved in Technique

- The UCP equation is composed of four variables:
  - Unadjusted Use Case Point (UUCP)
  - The Technical Complexity Factor (TCF)
  - The Environment Complexity Factor (ECF)
  - The Productivity Factor (PF)

  UCP = UUCP * TCF * ECF * PF

- UUCP is the sum of Unadjusted Actor Weight (UAW) and Unadjusted Use Case Weight (UUCW).

  UUCP = UAW + UUCW

Teken from Reference No. 4

Actors and Types

Unadjusted Actor Weight

1. Actor initiates an interaction with the system to accomplish some goals.

2. Does not represent the *physical* people or systems, but their *role*.

Actor Type	Description	Weight
Simple	The actor represents another system with a defined Application Programming Interface (API)	1
Average	The actor represents another system interacting through a protocol-driver Interface	2
Complex	The actor is a person interacting via a Graphical User Interface (GUI)	3

Adjusting Use Cases

Unadjusted Use Case Weight

1. Based on the total number of activities contained in all the use case scenarios

2. does not represent the *physical* people or systems, but their *role*.

Use Case Type	Description	Weight
Simple	Less than 3 transactions	5
Average	4 to 7 transactions	10
Complex	More than 7 transactions	15

Technical Complexity Factor - TCF

Technical Factor	Description	Weight
T1	Distributed System	2
T2	Performance	1
T3	End User Efficiency	1
T4	Complex Internal Processing	1
T5	Reusability	1
T6	Installability	0.5
T7	Usability	0.5
T8	Portability	2
T9	Modifiability	1
T10	Concurrency	1
T11	Includes special security requirements	1
T12	Provides direct access by third parties	1
T13	Special User training facilities are required	1

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Technical Complexity Factor (TCF)

- Each factor is given a perceived complexity value from 0 to 5 according to its impact

- Technical Total Factor is computed as the sum of all the weights multiplied by their corresponding perceived values

- Technical Complexity Factor (TCF):

TCF = 0.6 + (0.01*Technical Total Factor)

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Adjusting Use Cases

Environment Complexity Factor - ECF

1. Reflects the development team's experience

ECF = 1.4 + (-0.03*Environment Total Factor)

1. Environment Total Factor is the sum of each factor weight multiplied by the perceived value

| Environment Factor	Description	Weight
F1	Familarity with Life-Cycle model used	1.5
F2	Application domain experience	0.5
F3	Experience with development methodologies used	1
F4	Analyst capability	0.5
F5	Team motivation	1
F6	Stability of requirements	2
F7	Use of part-time team members	-1
F8	Use of difficult programming language	-1

Productivity Factor (PF)

- Convert the UCP number into meaningful value in terms of man-hours required.

- The value may range from 16 to 30 man-hour/UCP.

Case Study

- Sales scenario

Component Manipulation Scenario

PC Manipulation Scenario

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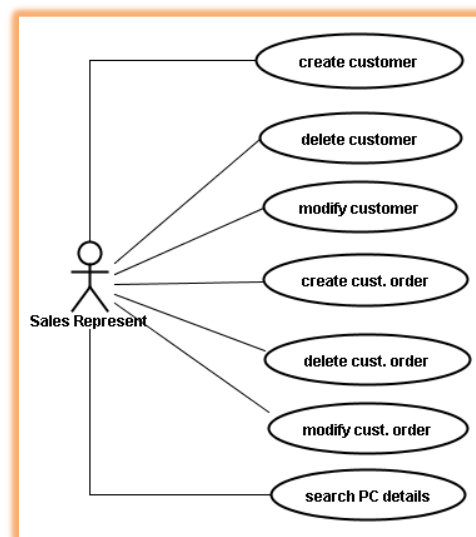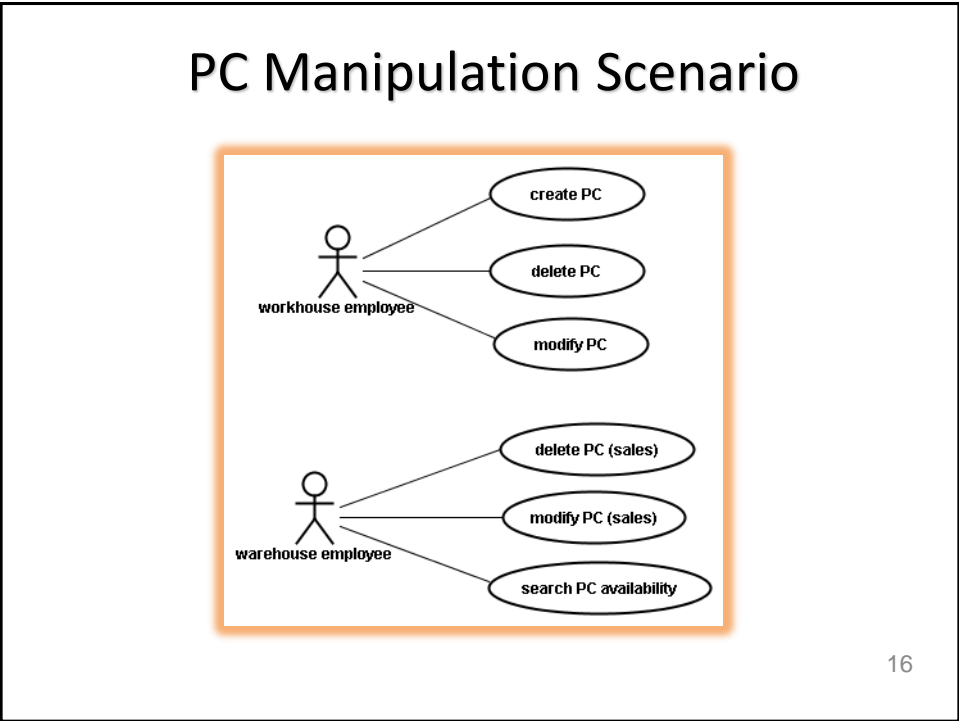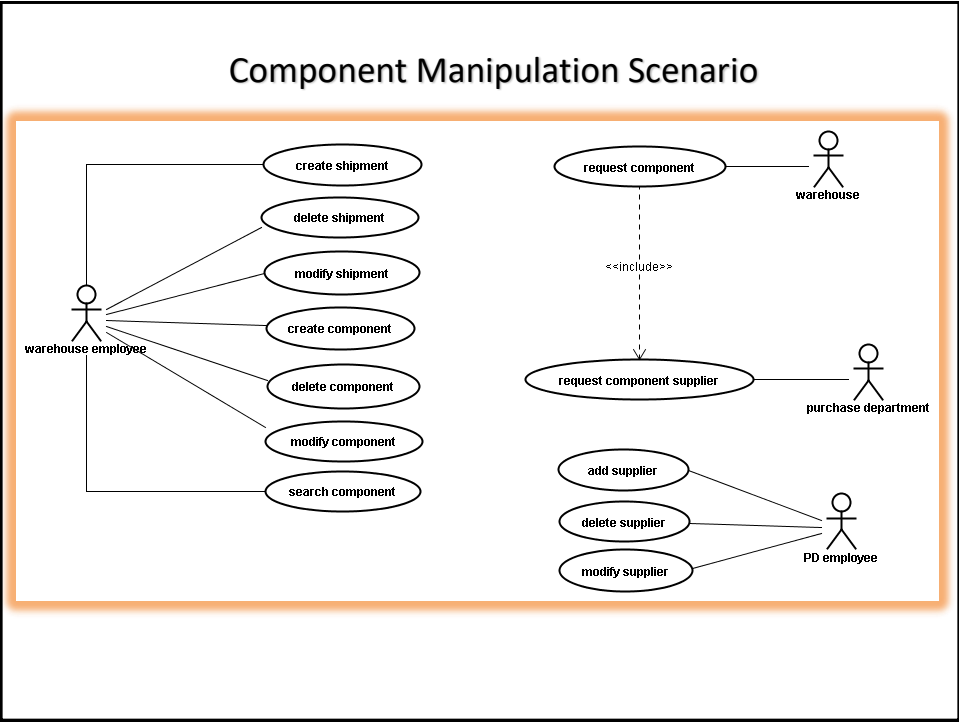
Results

Use Case Actors

Actor Type	Number	Weight	R
Simple	0	1	0
Average	Purchase Department	2	2
Average	Warehouse	2	2
Complex	Sales Representative	3	3
	Warehouse Employee	3	3
	PD Employee	3	3
	Workhouse Employee	3	3
	Warehouse Employee	3	3
Total UAW			19

Use Case Weights

Use Case Types	Num.	Weight	R
Simple	25	5	125
Average	0	10	0
Complex	0	15	0
Total UUCW			125

Technical Complexity Factor - TCF

ID1	Description	Weight	Rating	Value	Explanation
T1	Distributed System	2	4	8	because the system is distributed across many departments.
T2	Performance	1	3	3	the performance is not a concern as we are not dealing with any criticality of time or data.
T3	End User Efficiency	1	3	3	the system don't need to be fast/swift but also not too slow that it effects the business categorically.
T4	Complex Internal Processing	1	1	1	the system does not have complex business rules present internally, it is more of data being added, deleted or modified.
T5	Reusability	1	3	3	the approach of the company coincides with cmmi level 3 and the software can be used for different other solutions. Reusability is encouraged
T6	Installability	0.5	4	2	it should be easy to install the system as there are many departments and the system should be easy to install everywhere
	Total Technical Factor			20	

ID	Description	Weight	Rating	Value	Explanation
	TTF (previous slide)			**20**	
T7	Usability	0.5	4	2	usability is imperative as it has strong human interactions.
T8	Portability	2	2	4	we are not thinking about changing the platform, configuration, location etc etc. so portability is not a concern.
T9	Modifiability	1	4	4	modifibility will depend on the business but we expect the business to grow.
T10	Concurrency	1	4	4	the employees will be accessing the system concurrently for information and making changes.
T11	Includes special security requirements	1	1	1	security is not a major concern as the data is not critical as mentioned before.
T12	Provides direct access by third parties	1	0	0	no access to third parties
T13	Special User training facilities are required	1	0	0	irrelevant
	Total Technical Factor			**35**	

ID	Description	Weight	Rating	Value	Explanation
F1	Familiarity with Life-Cycle model used	1.5	3	4.5	making the assumption that we don't know so keeping to average value.
F2	Application domain experience	0.5	3	1.5	the application belongs to strategic domain and the organisation has little experience in it.
F3	Experience with develompment methodologies used	1	4	4	we assume that we have experiece in it and use cases will help us.
F4	Analyst capability	0.5	3	1.5	
F5	Team motivation	1	3	3	
F6	Stability of requirements	2	4	8	we expect the requirements not to change more often
F7	Use of part-time team members	-1	0	0	wpart time team members are not part of the plan
F8	Use of difficult programming language	-1	0	0	PL will be in agreement with current standards and application does not require complex language
Environmental Complexity Factors	**Total Environmental Factor**			**22.5**	

Positives

- Understandability
  - Easy to learn and quick to apply.

  - Versatile and extensible for different flavors of development and testing projects.

- Well Suited
  - When the complexity of the system resides in the interaction between the actor and system.

  - Objected Oriented Applications / Systems.

  - Development time is too short. e.g. Web Applications.

  - Management intends to have an early project estimate for planning.

Drawbacks

- Use Cases have some limitations. E.g. flight reservation system, UCPM will be unsuitable for such applications.
- Many variations in Use Case specifications formalities and styles
- Syntax and Semantics to describe Use Case Models and scenarios are incomplete and not precise.
- Heuristics and rules are still missing which define the right degree of detail imperative for correct estimation.
- There is no use case point standard. Therefore, it is difficult to use case point values across companies.

Conclusions

- There is no secret formula which will work for everything.

- UCPM has the potential to become a mature and widely accepted estimation tool like FP.
  - It can have significant impact when used with other estimates like expert knowledge.

- Further Studies are required for precision of UCPM in different kinds of projects.

- Improvements in dimension of solving the problem areas can help making it a success.

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