

## M4 L7 Notes

### Cognitive Walk Through

#### Fundamental Definitions:

**Task:** A task is what the user desires to accomplish when he /she sets out to use a particular device or interact with an interface.

A task may consist of a series of subtasks. Such a task is called as compound task. When the end goal or purpose is achieved the task is said to have been completed.

**Action:** When a specific physical movement is executed. A series of 'actions' in a defined sequence form an 'interaction' cycle between the device and the user.

**Mental model:** The mental concept the user has of the system and its working / functioning. It is how the user has understood the system & visualized its working. A user is said to have a mental model if he /she can predict or explain his /her interactions with the system.

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#### Introduction

Cognitive walkthrough is a usability method that focuses on evaluating a design (existing or proposed) for ease of learning particularly by institute explorations.

Cognitive Walk through has the same basic structure and rationale found in software walkthroughs ( Yourdon 1989). In the code walkthrough, the sequence represents a segment of the program code that is 'walked through' ( experienced first hand) by the reviewers to check certain characteristics (e.g., that coding style is adhered to, conventions for spelling variables versus procedure calls, and to check that system wide invariants are not violated).

In the cognitive walkthrough, the sequence of actions refers to the steps that a user will require to perform on the interface so as to accomplish a task. The evaluators then 'walked through' that action sequence to check it for potential usability problems. Usually, the main focus of the cognitive walkthrough is to establish how easy a system is to learn by operating it. The focus is on learning through exploration.

In its earlier form cognitive walkthrough was done by software developers involving presentation of a proposed design to a closed group and requesting them to review as they are 'walked through' the demonstration. The peers evaluated the solution. Today it

is a 'cognitive' technique used to evaluate a proposed interface in context of one or more specific user tasks.

Input to a Walkthrough session makes use of an interfaces detailed design description (often a physical paper mockup or a wireframe mockup or even a working prototype.) The aim is to investigate experimentally if a user is able to 'interact' and successfully complete the designated task.

Walkthroughs help answer interfaces design questions like:

How will the user approach a task ?

What is the correct action sequence for each task and how it needs to be described to the user.

How to achieve the desired action sequence from the user with minimum human cost and maximum efficiency .

How quickly will the user learn & becomes comfortable with the interface.?

As an example : When ATMs were first introduced one of the questions on the sequence was should balance in account be displayed every time the user enters his/her accounts ? or is it better to display the balance after the transaction is over.

In reality after walk through it was found that both the above assumptions are out of sequence. Balance is a sub goal either before starting of a transaction or after the a transaction is over. In either case it needs to be an independent Goal it self rather than a sub goal of accessing an account.

In hind sight this wanting to know the balance though seems to be simple decision it is not so.

Another context is illustrated here. The Task is to print a document. Will the user know implicitly that to do so ( take a print out) they must first select a printer on the screen given the context of the application ? If a interface or software engineer makes any assumptions in answering this simple question all by themselves he /she risks making the GUI ineffective. A prompt will have to ask the user to first select a printer and then press print button. If the user keeps on pressing the print button multiple times either nothing happens or unwanted multiple copies are spit out by the machine ! Worst still if nothing happens the user is likely to walk away cursing assuming that paper for printing has run out his/her bad luck. Walk through eliminate such errors.

## Theory underlying the walkthrough

Cognitive Walkthrough is based on the Cognitive model of human exploratory learning. When a learner ( User) is put in a problem solving situation a user chooses among alternative actions based on similarity between the expected consequences of an action and the current goal. After an action gets executed the user evaluates the system response and decides whether progress is being made to achieve the goal or not. If goal is reached through the chosen action it leads to positive decision of storing the action in long term memory as a ' rule'. While executing an action a user first attempts to use applicable rule from long term memory which matches current context.

Cognitive Walk Through has two phases:

Preparation    Evaluation

Preparation phase consist of

- i) Building A prototype { paper; mock up; screen based } with description. It need not be perfect or complete in all request..
- ii) Making a list of selected tasks you want the user to 'walk through' the interface along with you. The task should have ready well defined sequences for Goals and sub goals with written actions used to complete each individual task.
- iii) A clear understanding of the user , his /her background; level of expertise in the domain; prior experience of using similar software etc.

The purpose of conducting the walk through must be clear to the evaluator prior to starting the walk through. The evaluator should prepare to look for answers to:

- a) Can the users understand & reach the goal –the very purpose of the assigned task ?

(This will yield what the user is thinking once a task is assigned. Most of the time the users do not think or act the way as the interface designer expects or wants them to. Different users have different strategies and approaches to how they want to start.)

- b) Will users be able to locate the control buttons / GUI elements for the action they are supposed to perform given the task.

(Often it is very difficult for the user to find the control/element to start . This is even more confusing to the user when there are several or multiple possibilities to start the sequence - on the GUI)

- c) Does the interface provide understandable feed back at every action in the task sequence?

(Often even if the users are able to locate the right control /element can they tell with high degree of confidence that this is the right control for the action they want to perform and that by interacting they will indeed reach the goal. Intermittent feedback assures users that they are, indeed, proceeding in the right direction. Feedback can be in the form of sound or labels or motion or change in status. A clearly labeled control /GUI element may reinforce users to confidently act even if they have not done the right action initially)

## **Over view of the Processes**

### **Pre-preparation:**

#### **Define Users:**

Who are the users. Identify them .(Categorise them as Novices, Intermittent & Experts)  
The walk through can be either an individual or a group process.

#### **Identify the tasks for the evaluation**

Ex: Evaluation for “Checking out Balance on an ATM”

Prepare notes on what the user must know prior to performing the task and what the user should be learning while performing the task.

#### **Prepare action sequences for completing the Tasks as bellow**

Make a “ AND THEN “ list of Goals & sub goals.

Ex: Overall Goal: Find out balance from the ATM

Sub-goal1 : Activate ATM [Physical action Insert Card (Artifact)]

Sub-goal 2: Identify self [Input pin code]

Sub-goal 3 : Get balance [ press action button with label]

Sub-goal 4: Get a print out [if required]

Sub-goal 5: Log out from ATM .

Conduct The walk through session

Using the mock up prototype ask the user to perform a task .

Make the user walk through the action sequences for each task .

Make a recording of observations in a Recording Sheet . (See example bellow)

#### **Analysis:**

Analysis is done on two premises: what the user must know prior to performing the task & ii) what the user must learn with ease while performing the task.

Analysis is done on the data collected in a form which is normally binary ( Yes – No)

Did the user try to achieve the end goal.( Yes – NO)

Did the user notice the correct action choices available.( YES- PARTALLY – NO)

Could the user associate information on the interface to his action to reach end goal.( YES- PARTLY – NO).

### **Inferences:**

Correct Goals and sub goals including their sequence By

- a) Eliminating inappropriate goals & sub goals from the users point of view.
- b) Adding new Goals or sub goals as revealed in the walkthrough.

### **Results**

If the interface design / mockup/prototype is appropriate the users intention should enable him/her to chose the appropriate action with least confusion or hesitation.

If not , as the form recordings would indicate, at what steps in the sequence things went wrong or the interface is unsuccessful in making the user 'learn' as he /she completes the tasks.

### **Discussions:**

Cognitive walkthroughs focus on many cognitive attributes of usability but main one is ease of learning intuitively. Interfaces that facilitate learning by explorations facilitate skill acquisitions at a faster rate and bring down the errors in interaction.

Cognitive walkthroughs evaluate each sequence necessary to perform a task in the process uncover design errors both including unintentional ones. The method finds a mismatches between users mental models and designers conceptualization.

Cognitive walkthrough evaluations are therefore not only usability testing but also a method to optimize design concepts and design elements such as poor chose of words on labels, layout, menu title categorization, button labels etc.

Example of an Action sequence in a TASK.

Need: Forward phone calls to my office assistant / friends desk while I am out for a short period and reset it back to original state.

*A1. Activate call interface.*

*R1. Sound feed back of activation done by tone 1*

*A2. Press #2 ( Command to cancel call forwarding)*

*R2. Sound of registering press command by tone 1.*

*A3 . Listen to sound feed back confirming completion of action.*

*Time lapse Second Tone 2*

Reverse cycle

*A4 Activate call interface*

*R1. Sound feed back of activation done by tone 1*

*A6. Press \*2 ( Command to cancel forwarding)*

R2. Sound of registering press command by tone 1.

A7. Listen to sound feedback confirming completion of action. Tone 2

End of sequence

End of Task.

The above task is assigned to a user. The user is asked to proceed executing the task on a mock up / paper prototype / wire frame prototype. The user is asked to achieve a goal( of forwarding a call in his absence and informed about the sequence of actions. The sequence of inputs as carried out by the user are observed. The errors committed (deviation from the expected sequence and corresponding action) are noted. The difficulties are mutually discussed with the user. Why a user acted in particular way and did not act in ways that was expected is explored. How this finding needs to be embedded into the interaction sequence is the next step of HCD.

## Recording Sheet

Description of step.	Did the user try to achieve the end goal or did he give up At the start itself.	Did the user notice that the correct action choices are available. Yes – PARTLY-No	Did the user confidently know that the choice being made by him/her is the right one ? Y N	Did the user understand the feedback after every action	Did the user Complete the Task With satisfaction  Yes PARTLY No	Comments / Alternative suggestions/ solutions / discussion points.

## Evaluators Rating Sheet

Action in Sequence	System mismatch question	Potential Problem & Design solution	% Mismatch to ideal situation (qualitative estimation)
A1. Activate call interface.	Is it clear to the user that system has taken input	Low clarity of sound. Ambient Noise. Increase volume	30%
	Can the user resume control for the next action	YES	
	Are the systems response visible & interpretable	No	
	Is the end of the system action clear	YES	
A2. Press #2  (Command to cancel call forwarding)	Is it clear to the user that system has taken input	PARTLY	50%
	Can the user resume control for the next action	NO	
	Are the systems response visible & interpretable	PARTLY	
	Is the end of the system action clear	NO	

Summarize the findings: Did Users goals match the Designers action sequence ?

What was the percentage of mismatch?

List of Corrections needed.

## References:

Yourdon .E Structured Walkthroughs (4<sup>th</sup> edition) Englewood cliffs .NJ Yourdon Press.

Polson P., Lewis C ,Rieman J and Wharton C ; Cognitive walkthroughs : A method for theory based evaluation of user interfaces ; International Journal of Man-Machine studies , 36 -741-773 , 1992.

## Assignment.

Conduct a Walkthrough for a new product being designed to train Computer servicing technicians.

Users: College dropouts (education upto Plus 2 + - 1)

Context: Undergoing training for routine computer maintenance Job : Running Virus Scans in a Computer service centre.

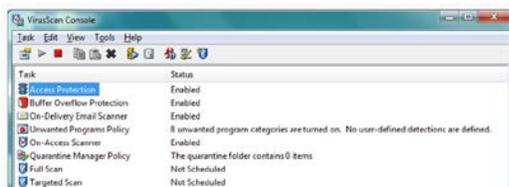
Level of expertise : Novice. Users knowledge of computers includes starting a computer accessing files and folders , opening and closing files.

Task:

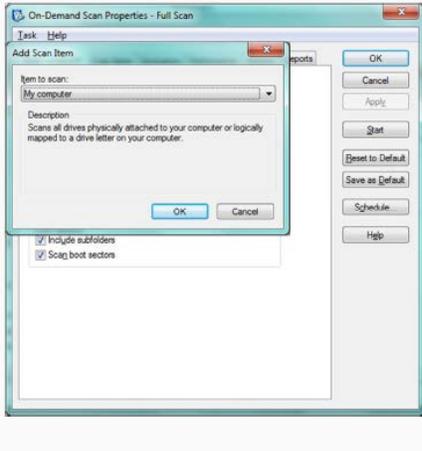
Schedule a virus scan of System Files for a given time and date.

List of Actions: As given bellow in sequence.

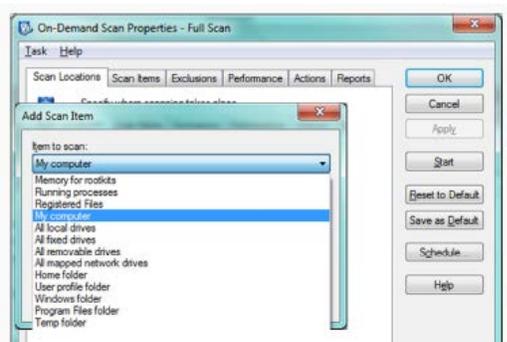
1. Select target Scan from Virus scan Software files on computer.



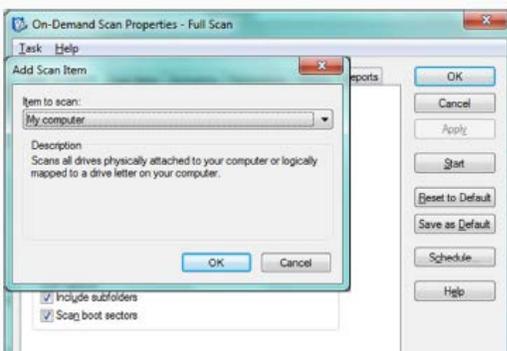
2. Select & Open MY Computer



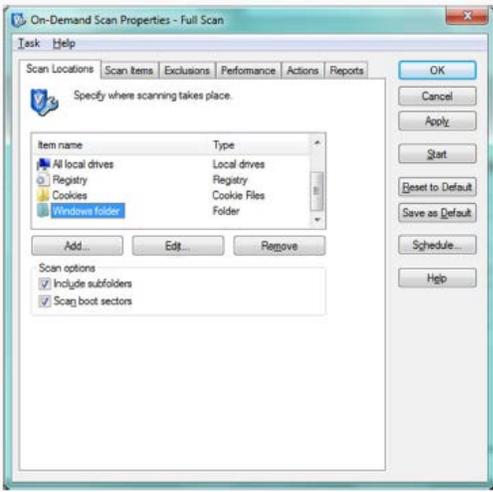
### 3. Select Windows Folder



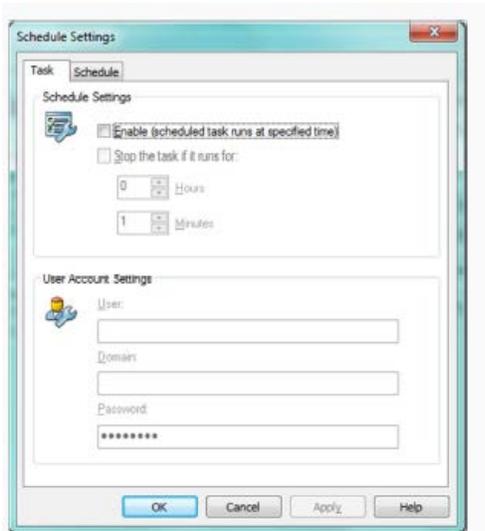
### 4. Select OK



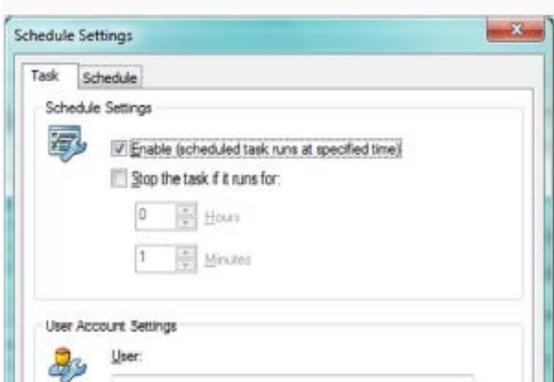
### 5. Select Schedule



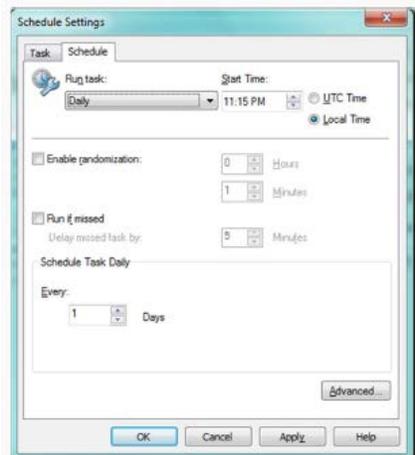
## 6. Select Enable



## 7. Determine Time for Scan



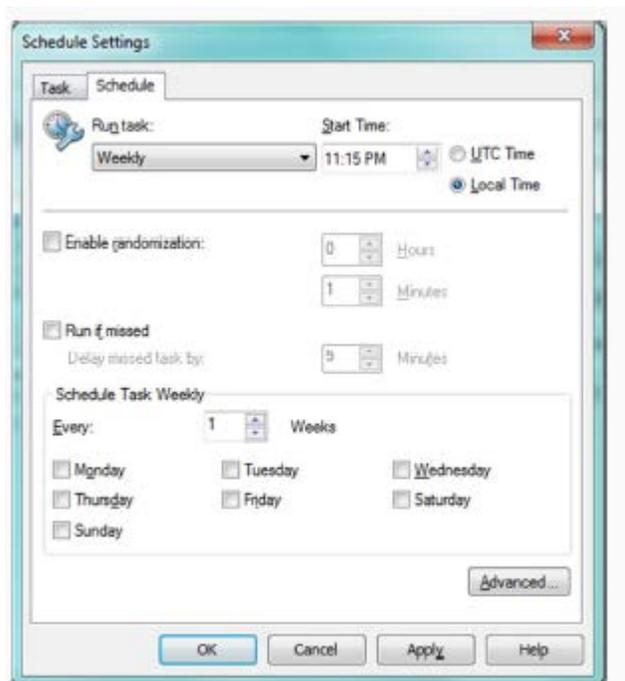
## 8. Set Weekly as Schedule



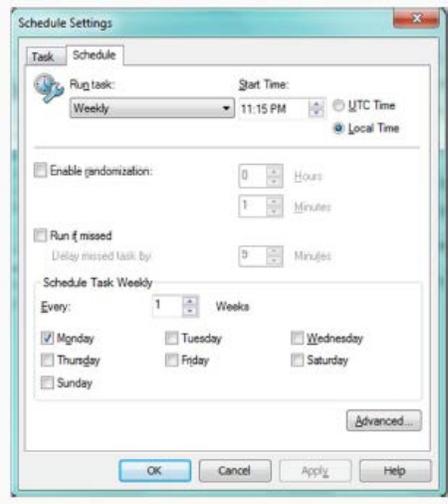
## 9. Select Tuesday

Submit a Walk Through Report consisting of Record Sheet,

Change in sequence if warranted, Change in Feed back if warranted and all other aspects that a Walk Through Report should contain.



10. Select OK to complete task.



11. Check if Scan is Scheduled as per settings

