Right and Wrong in Writing Test Cases

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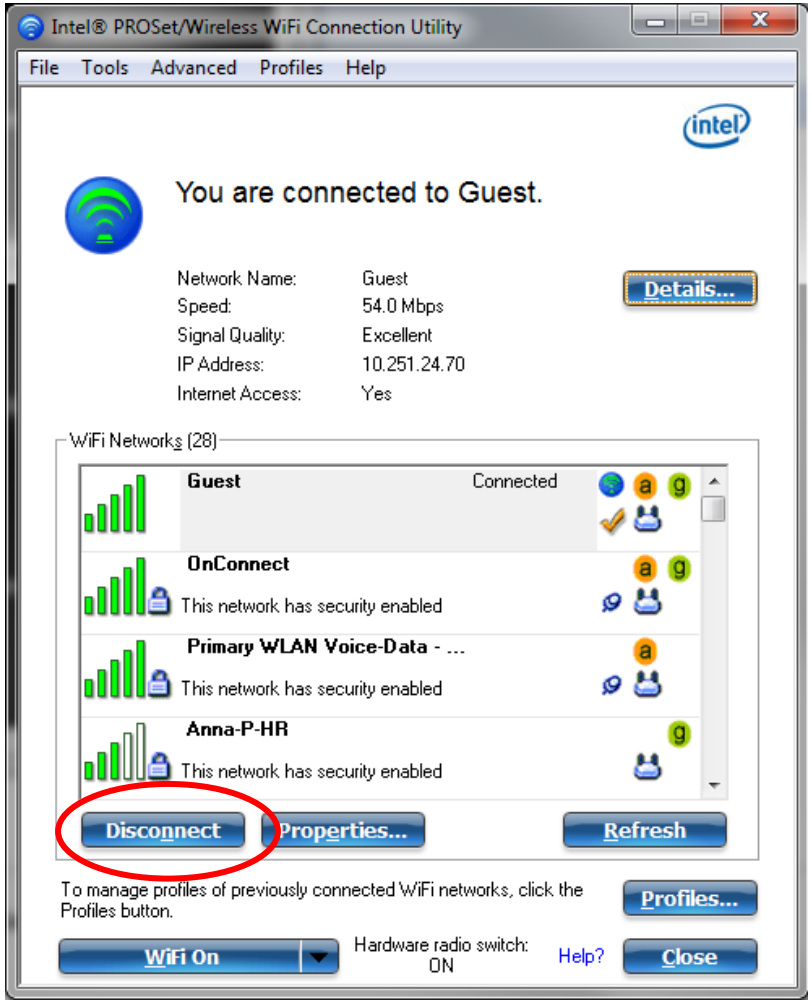
Opening Exercise: Which is a better Test Case?



- **The DUT is connected to the Access Point (AP) using WiFi.**
- **Verify that the "Disconnect" button indeed disconnects the DUT from the AP**

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Opening Exercise: Which is a better Test Case?

- **Application under test:** Wireless Connection Utility
- **Preconditions:** Client is installed
- **Objective:**
  - Verify that the "Disconnect" button disconnects the client from the Wireless network
- **Methodology:**
  - Connect to an Access Point
  - Click "disconnect"
- **Expected Results:** Client is disconnected from the network

1

Step	Action	Expected Result
1	Connect the client to an Access Point (AP) Start continuous Ping to the AP – verify Pings are passing	
2	Click "disconnect"	Ping replies stopped

2

Step	Action	Expected Result
1	Connect the client to an Access Point	The client is connected
2	Click "disconnect" and verify that the client is disconnected	The client is disconnected

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Outline

- Design is not everything
- Test Case Development Flow
- Writing tips
- Adding complexity
- Test Case Organization
- General tips

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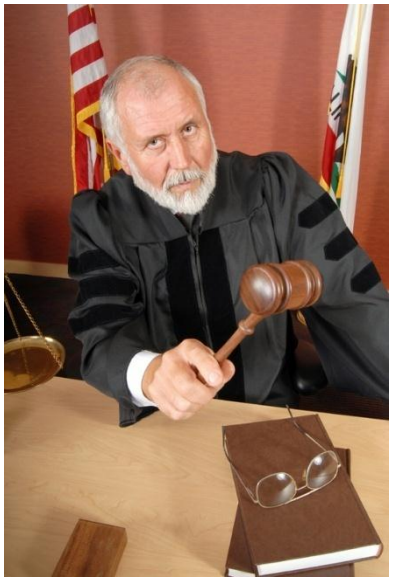

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It is Well Known…

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Design is not everything

- **Testers write…**
- **Focus on Content**
- **Little focus on Style**

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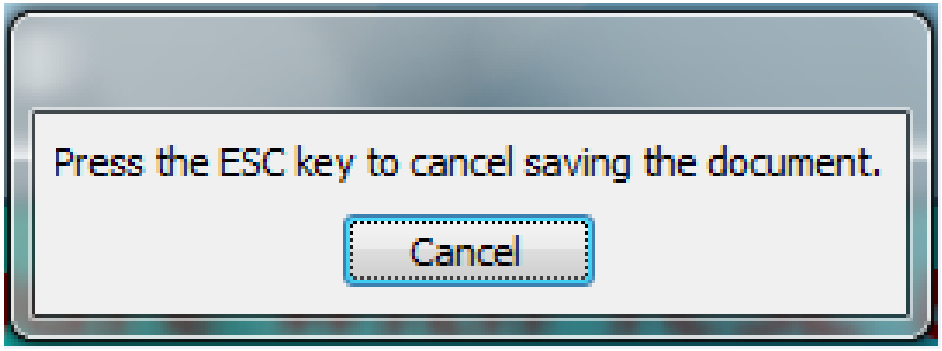
Test Cases are Instructions

- **Writing is hard…**
- **Writing instructions is harder!**

"More simple under FM interface, it only can do until the 3rd step and deleted is present channel."



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Why is Style important?

- **Readability = Effectiveness**
  - Reviews
  - Execution

When you write a spec, in addition to being correct, it has to be understandable

Joel Spolsky

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This is a somewhat exaggerated, example for a non-ending paragraph of tightly written text that is not broken up even once, even though it could have been broken if anyone would put a little thought into how the sentence is just way too long and too convoluted or a human being to follow what it says without coming once up for air, unless of course you are used to read books by Heinrich Heine, the known author who had sentences that were half a page long. This is a somewhat exaggerated, example for a non-ending paragraph of tightly written text that is not broken up even once, even though it could have been broken if anyone would put a little thought into how the sentence is just way too long and too convoluted or a human being to follow what it says without coming once up for air, unless of course you are used to read books by Heinrich Heine, the known author who had sentences that were half a page long. This is a somewhat exaggerated, example for a non-ending paragraph of tightly written text that is not broken up even once, even though it could have been broken if anyone would put a little thought into how the sentence is just way too long and too convoluted or a human being to follow what it says without coming once up for air, unless of course you are used to read books by Heinrich Heine, the known author who had sentences that were half a page long. This is a somewhat exaggerated, example for a non-ending paragraph of tightly written text that is not broken up even once, even though it could have been broken if anyone would put a little thought into how the sentence is just way too long and too convoluted or a human being to follow what it says without coming once up for air, unless of course you are used to read

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This is a **much better** way to write something you want
People to read

Note how:

- Use of bullets for lists
- White space between paragraphs
- Short sentences
- Large enough, readable font
- Good contrast, utilization of color and *style*

makes this a better reading experience

Test Case Development Flow

Test Case Development Flow

Step 1: Write a Test Plan

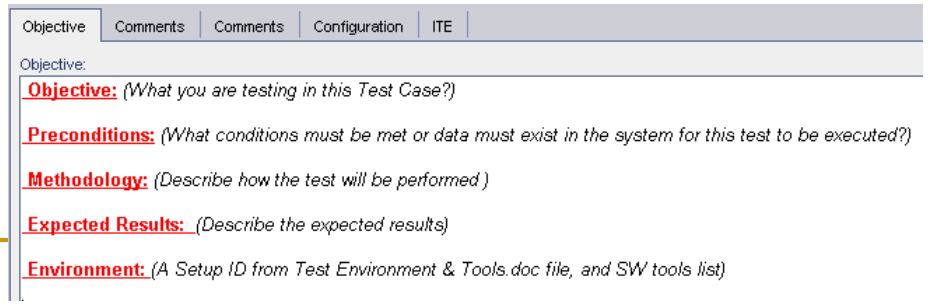
Don't stampede to the Test Cases!

Goal, Scope, Strategy,
and detailed list of
"Items to be tested"

Step 2: Start at the top:

For each Item to be Tested, state:

Test Objective & Methodology, Preconditions, Expected Results



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Test Case Development Flow

Step 3: Review with Stakeholders

Step 4:

- Run in the Lab
- Write Test Steps

Step 5: Review again

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Test Case Writing Tips

Use consistent language

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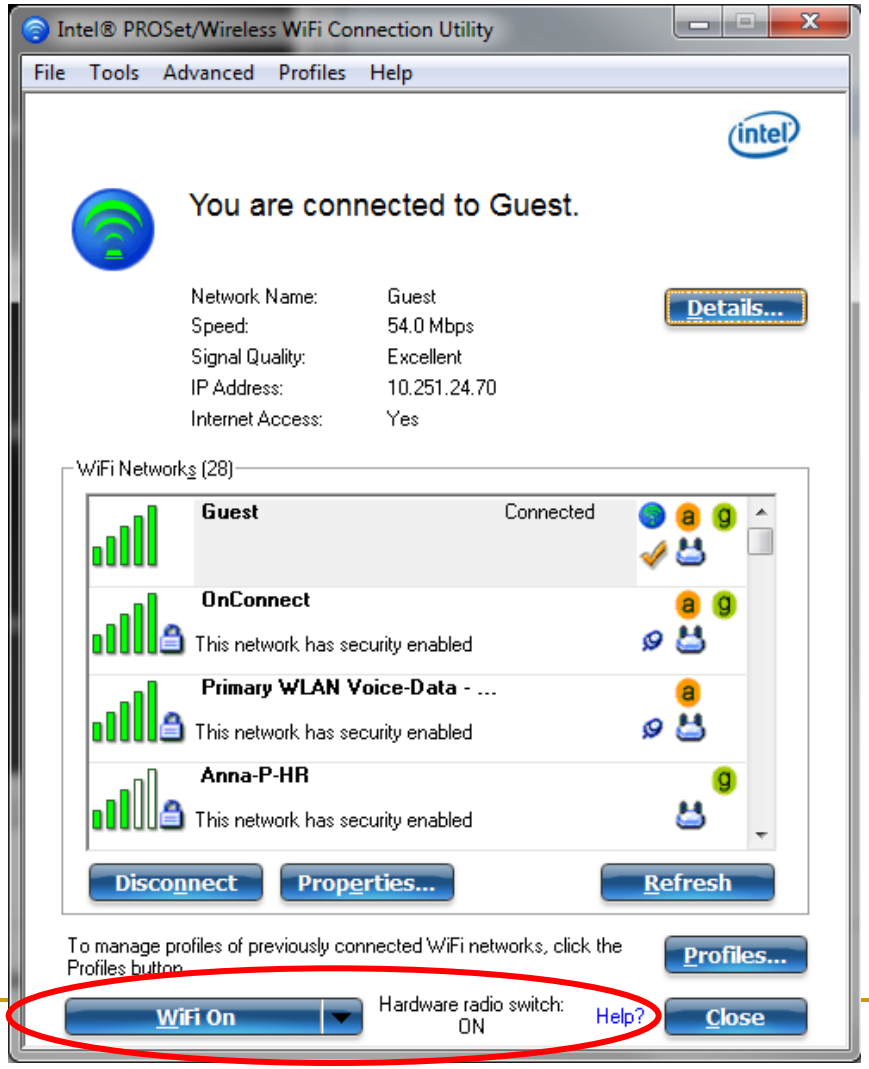
Use Consistent Language

- Example:

  WiFi Radio Off/On switch



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Use Consistent Language

- During test, the switch is toggled, and Radio status is verified

Description
Turn the radio ON
Turn the Radio On
Turn ON the WiFi radio
Turn on radio
Enable the radio
Set RF-Kill to OFF
Turn off RF-Kill
Turn on the RF-Kill button
…

Expected Results
Radio is ON
Radio is active
RF is ON
WiFi radio is On
WiFi is Enabled
RF-Kill is OFF
…

How do I phrase Thee? Let me count the ways…

(apologies, Ms. Browning)

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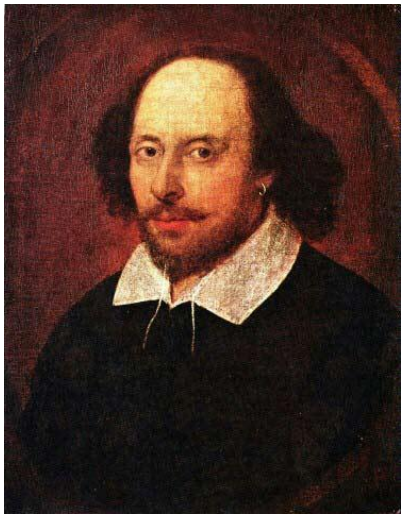
Use Consistent Language

- **Test Case is not poetry**
- **Choose a single format - language and style**
  - Enable/Disable or On/Off
  - Capitalization, fonts, colors
  - Tone
  - Passive / Active
  - Single / Plural



Adopt a single format and use it consistently

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How Much Detail?

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How much Detail?

- The test case is NOT “just for me”
- Align the detail level to the testers’ knowledge
- Align the detail level to the importance of hitting specific cases

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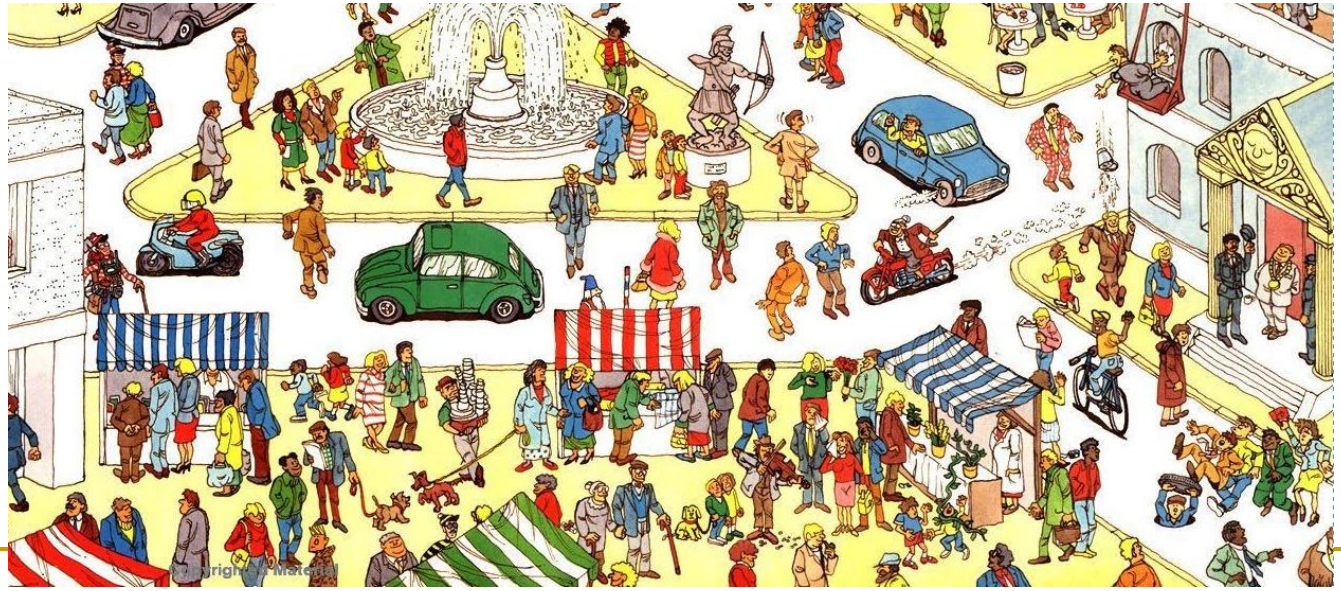
Example 1: Too Much Detail?

[…] edit required fields "Name" (double click, inline edit), “Owner" (double click on the empty field, select name and click OK), “Description" (double click, inline edit) […]



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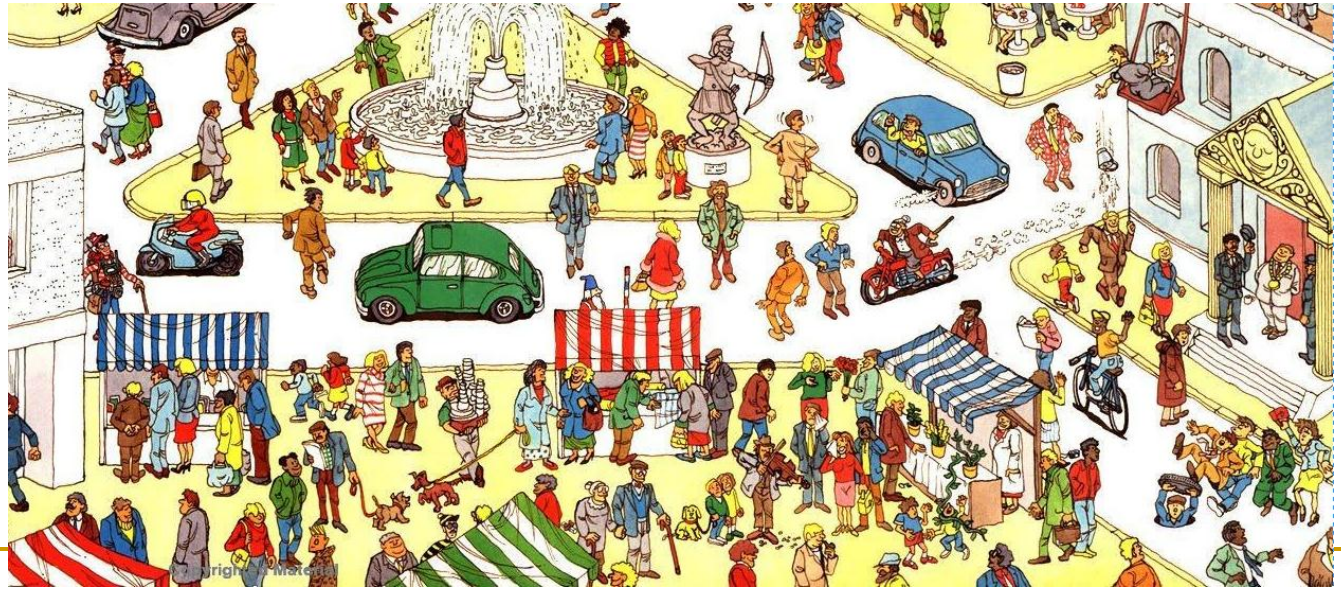
Example 1: Too Much Detail?

[…] edit required fields "Name" *(double click, inline edit),* "Owner" *(double click on the empty field, select name and click OK)*, "Description" *(double click, inline edit)* […]

Items in red may be redundant



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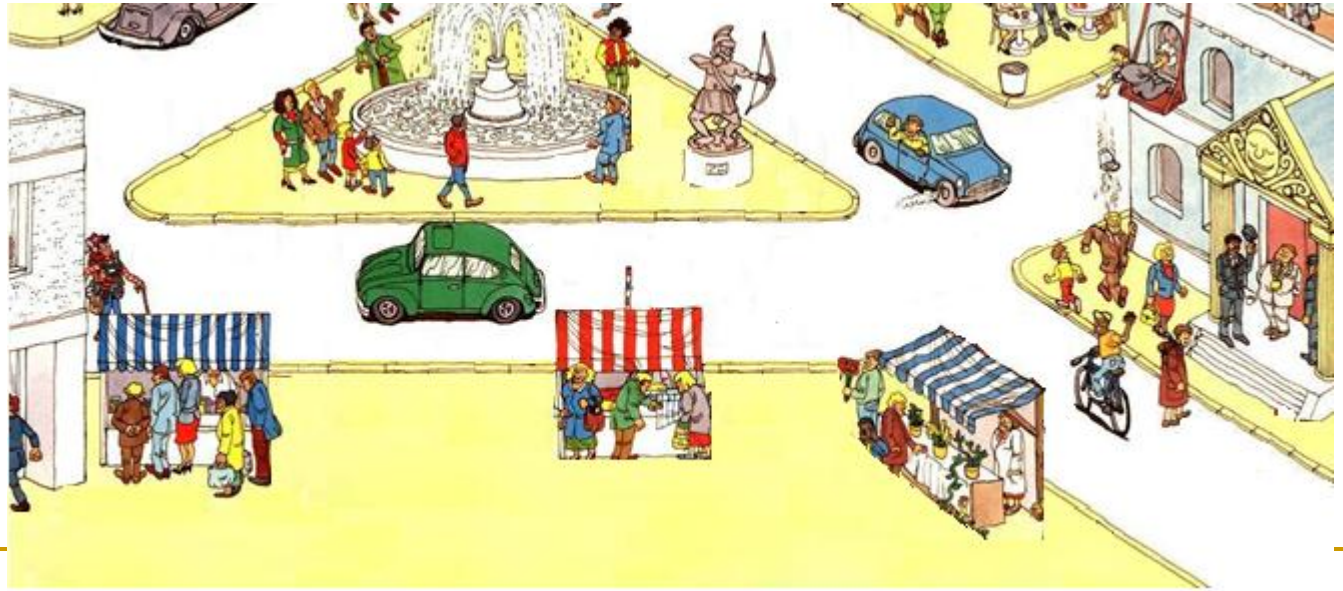
Example 1: Too Much Detail?

[…] edit required fields "Name“, “Owner", “Description" […]

On the other hand:
Name, Owner, Description:
Any specific value?



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Example 2: Too Little Detail?

Step 1	Set an AP with ACM for AC_VO Connect to the AP Start a sniffer	
Step 2	Run Chariot Test 3.1.1-1 for 1 min.	
Step3	Analyze sniffer capture	All traffic to Chariot-console interface1 is in AC_VI bursts
		All traffic to Chariot-console interface2 is not part of the burst

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Example 2: Too Little Detail?

Step 1	Set an AP with ACM for AC_VO Connect to the AP Start a sniffer	
Step 2	Run Chariot Test 3.1.1-1 for 1 min.	
Step3	Analyze sniffer capture	All traffic to Chariot-console interface1 is in AC_VI bursts
		All traffic to Chariot-console interface2 is not part of the burst

Items in red assume **a lot** of knowledge

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Example 3: Too vague?

Step 1	Login as a user with Read permission	
Step 2	Attempt to change a record in the database	The change is not accepted
Step3		The application pops up an informative error message

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Example 3: Too vague?

Step 1	Login as a user with Read permission	
Step 2	Attempt to change a record in the database	The change is not accepted
Step3		The application pops up an informative error message

Is "informative message" good enough?

It depends…

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Expected Results

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Specifying Expected Results – Example (1)

Wrong:

Step	Action	Expected Result
Step 1	Enter a username and password and click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons If the user clicks “Yes”: - Proceed with the login process - Save the username and password for future logins If the user clicks “No”: - Proceed with the login process - Do not save the username and password for future logins

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Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1		
Step 2		
Step 3		
Step 4		
Step 5		
Step 6		

- Single Expected Result per step
- Don't mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2		
Step 3		
Step 4		
Step 5		
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3		
Step 4		
Step 5		
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3	Logout and access the login page again	
Step 4		
Step 5		
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3	Logout and access the login page again	
Step 4	Enter the first letter of the username	Auto-complete option with the saved user name shows up
Step 5		
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3	Logout and access the login page again	
Step 4	Enter the first letter of the username	Auto-complete option with the saved user name shows up
Step 5	Select the username	The Password field is filled automatically
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3	Logout and access the login page again	
Step 4	Enter the first letter of the username	Auto-complete option with the saved user name shows up
Step 5	Select the username	The Password field is filled automatically
		The focus shifts to the “Login” button
Step 6		

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Specifying Expected Results – Example (1)

Right:

Step	Action	Expected Result
Step 1	Enter a valid username and password; click OK	A popup appears: “Save Username and Password?” with a Yes / No buttons
Step 2	Click “Yes”	The user is logged in
Step 3	Logout and access the login page again	
Step 4	Enter the first letter of the username	Auto-complete option with the saved user name shows up
Step 5	Select the username	The Password field is filled automatically
		The focus shifts to the “Login” button
Step 6	Press “Enter”	Login succeeds

- Single Expected Result per step
- Don’t mix Steps and Expected Results
- One test at a time…

Opening Exercise revisited

Step	Action	Expected Result
1	Connect the client to an Access Point (AP) Start continuous Ping to the AP – verify Pings are passing	
2	Click “disconnect”	Ping replies stopped

1

Step	Action	Expected Result
1	Connect the client to an Access Point	The client is connected
2	Click “disconnect” and verify that the client is disconnected	The client is disconnected

2

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Specifying Expected Results – Example (2)

- **Application under test:** Wireless Connection Utility
- **Preconditions:** Client is installed
- **Objective:**
  - Verify that the "Disconnect" button disconnects the client from the Wireless network
- **Methodology:**
  - Connect to an Access Point
  - Click "disconnect"
- **Expected Results:** Client is disconnected from the network

Step	Action	Expected Result
Step 1	Connect the client to an Access Point	The client is connected
Step 2	Click "disconnect" and verify that the client is disconnected	The client is disconnected

2

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Specifying Expected Results – Example (2)

Wrong:

Step	Action	Expected Result
Step 1	Connect the client to an Access Point	The client is connected
Step 2	Click “disconnect” and verify that the client is disconnected	The client is disconnected

Better:

Step	Action	Expected Result
Step 1	Connect the client to an Access Point	The client is connected
Step 2	Click “disconnect”	The client is disconnected

Avoid Expected Result in the Action area

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Specifying Expected Results – Example (2)

Still wrong…

Step	Action	Expected Result
Step 1	Connect the client to an Access Point	The client is connected
Step 2	Click “disconnect”	The client is disconnected

Still Better…

Step	Action	Expected Result
Step 1	Connect the client to an Access Point Start continuous Ping to the Access Point	Pings are passing
Step 2	Click “disconnect”	The client is disconnected

Make sure the setup is OK – specify how!

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Specifying Expected Results – Example (2)

Wrong again…

Step	Action	Expected Result
Step 1	Connect the client to an Access Point Start continuous Ping to the Access Point	Pings are passing
Step 2	Click “disconnect”	The client is disconnected

Better again

Step	Action	Expected Result
Step 1	Connect the client to an Access Point Start continuous Ping to the Access Point – verify Pings are passing	
Step 2	Click “disconnect”	The client is disconnected

Setup steps should have no “Expected Results”

Specifying Expected Results – Example (2)

Almost…

Step	Action	Expected Result
Step 1	Connect the client to an Access Point Start continuous Ping to the Access Point – verify Pings are passing	
Step 2	Click “disconnect”	The client is disconnected

Right:

Step	Action	Expected Result
Step 1	Connect the client to an Access Point Start continuous Ping to the Access Point – verify Pings are passing	
Step 2	Click “disconnect”	Ping replies stopped

1

Be specific about how to check the Expected Results

Adding Complexity

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Increasing coverage "while at it" (1)

- Rationale: Same test can cover more then just one item
- Example: Disconnect test:

Step 1	**Import** a **WPA2-PEAP-MSCHAPv2** profile Set a **XYZ** Access Point to **Channel 7** Connect the client to an Access Point **by clicking "Connect" on the GUI** Start continuous Ping to the Access Point – verify Pings are passing	
Step 2	Click "disconnect"	Ping replies stopped
		Task Tray icon changes color to all-white
		Floating tip on Task Tray indicates "disconnected"
		Main GUI window shows "disconnect" next to the profile name
		Main GUI window shows "disconnected from *profile name*"

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Increasing coverage "while at it" (2)

- **Pros:**
  - Increase Coverage
  - Saves time: many things tested at once
- **Cons:**
  - Increases setup time; may complicate automation
  - Hard to manage: What is being tested?
  - Lumps low and high risk items together
  - Calls for tight coordination with other feature-owners

Test Name:
Manual Disconnect - Profile Import - MSCHAPv2 - Ch7 – XYZ AP ???

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Simple tests VS complicated tests

- **Simple Test:** Every little thing gets its own test case
- **Complicated tests:**
  - Type1: Tests a few features at once
  - Type 2: “Thread testing”: One test is the setup for the next
- **Rule of thumb:**
  - New Feature; buggy areas: Simple tests
  - Legacy; solid areas: Complicated Tests
- **Feature Test “Life Cycle”**
  - Start with many simple tests
  - Aggregate into Complicated tests as the feature becomes Legacy

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Adding Randomness

- **Increase coverage by NOT specifying details**
  - Let the tester choose
- **Examples:**
  - **Channels** (“set the AP to a channel of your choice”)
  - **User types** (“log in with one of the available test-users”)
  - **Data types** (“add a record to the database, and update a string-type attribute”)
- **Cannot be counted-on for Coverage**

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Parameters, Permutations

- **Various options exist**
- **The main message:**

Consistency

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Order please…

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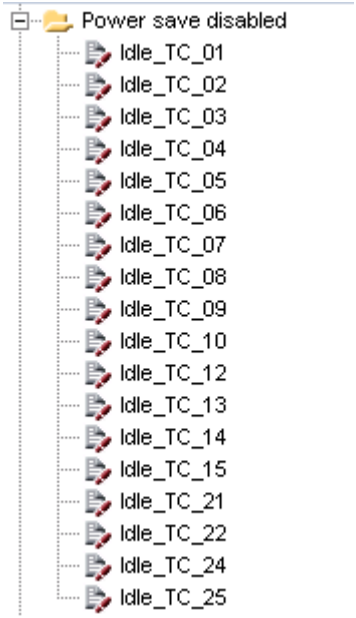
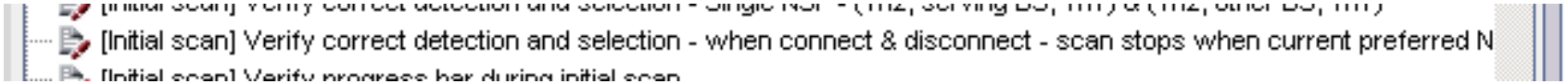
Test Case Name

- Not cryptic



- Not the whole script



- If it gets too long… maybe the test is too complicated?
- Using hierarchies can shorten the name (see next)

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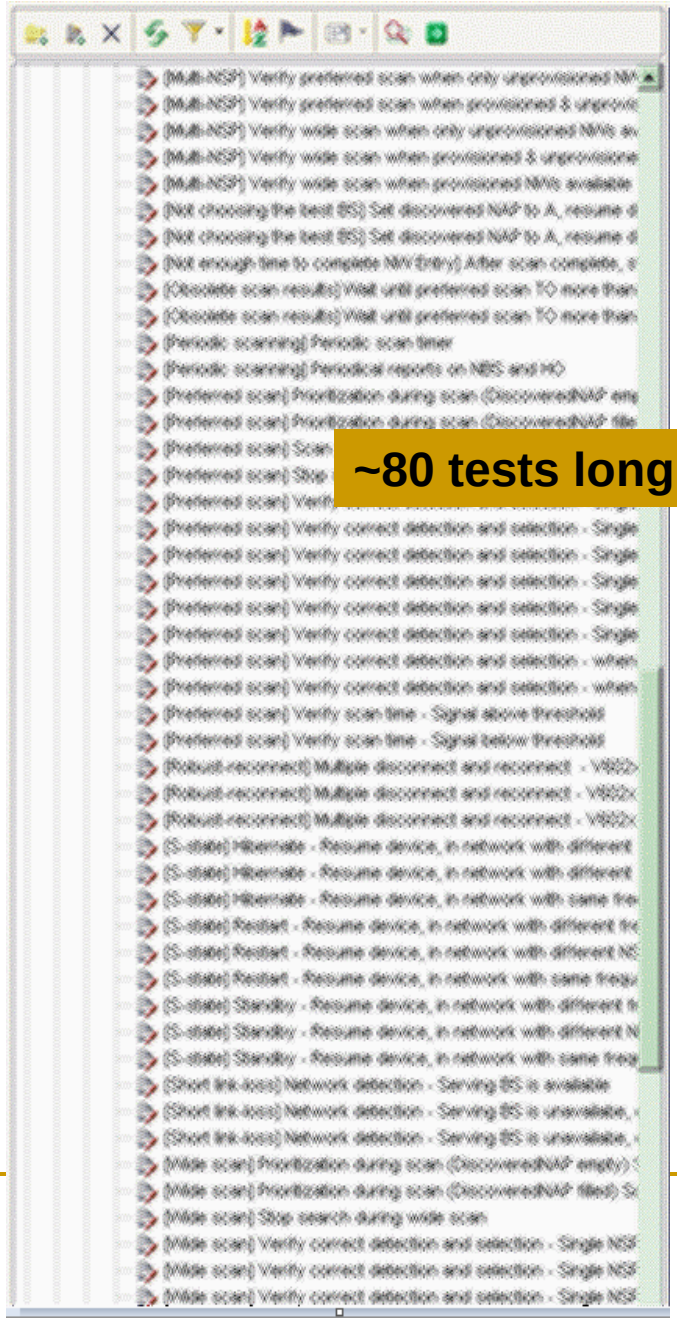
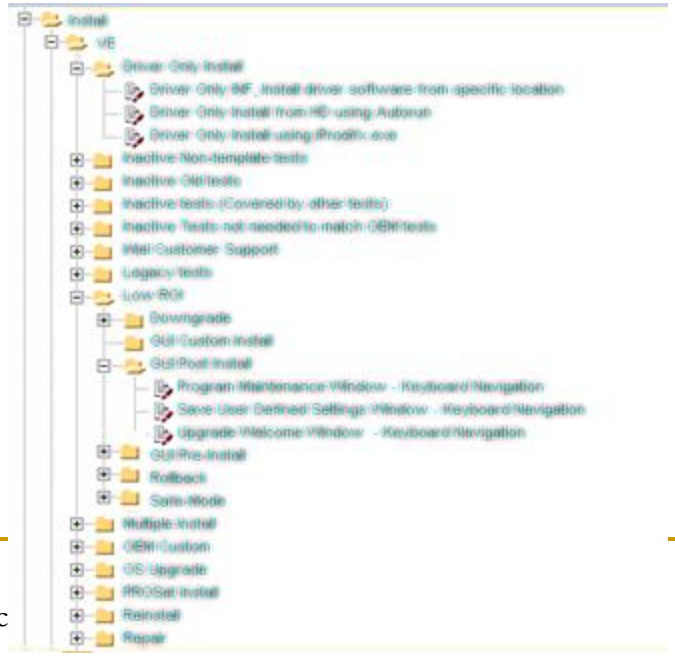
Use Hierarchies

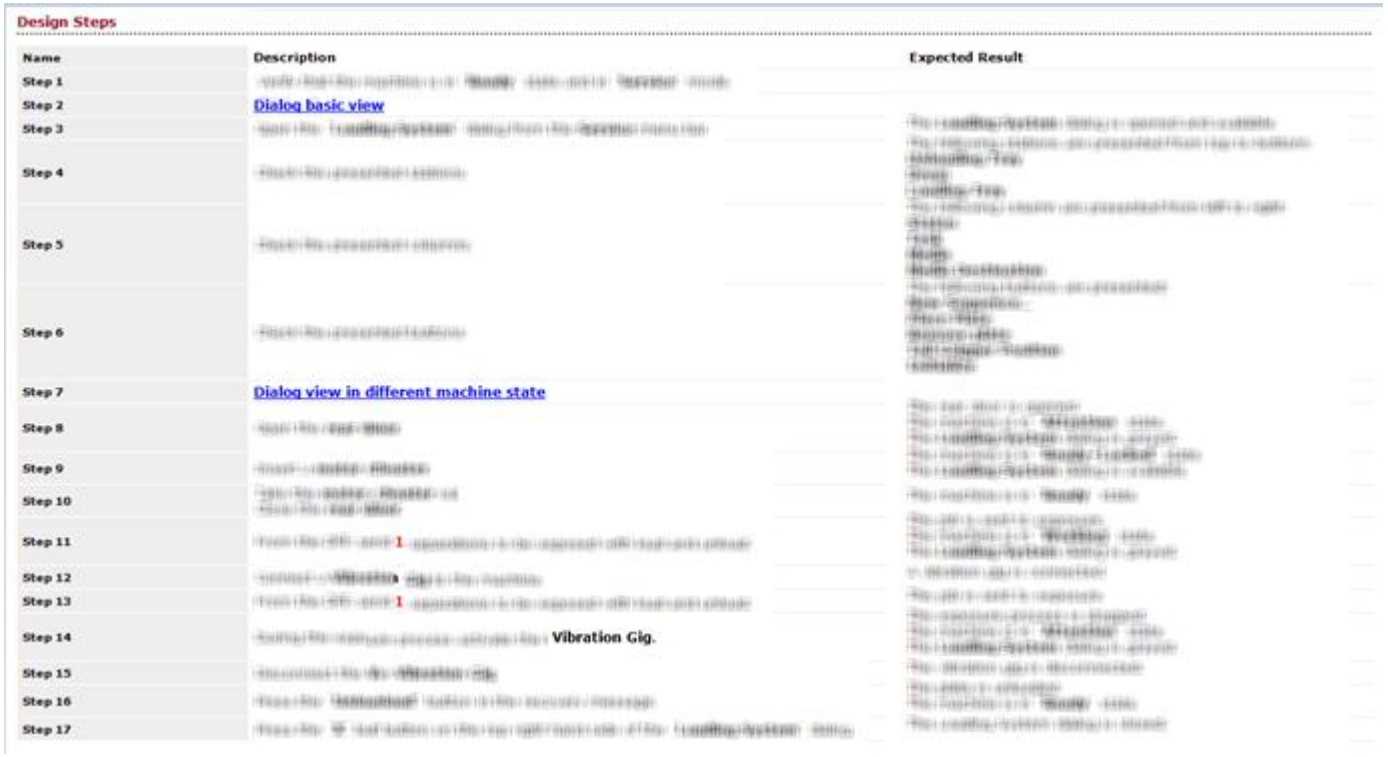
- Tool sorts the tests alphabetically, not by test-area
  - Hard to follow what's being tested
- Follow feature-breakdown in the Test Plan or in the Functional Spec





Standard Formatting

Use colors, empty rows, formatting to make clear what's happening



Design Steps

Name	Description	Expected Result
Step 1		
Step 2	Dialog basic view	
Step 3		
Step 4		
Step 5		
Step 6		
Step 7	Dialog view in different machine state	
Step 8		
Step 9		
Step 10		
Step 11		
Step 12		
Step 13		
Step 14	Vibration Gig.	
Step 15		
Step 16		
Step 17		

Source: Kodak

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Last Comments

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Test Ownership

- **A single person should be responsible for all activities around the test case – except (possibly) execution**
  - Write
  - Review
  - Update

Single Ownership does not guarantee Quality;
Ownership by a team guarantees a mess

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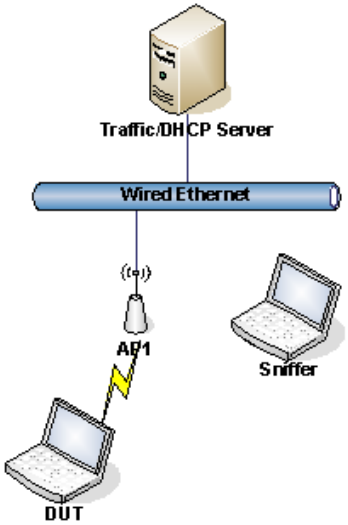
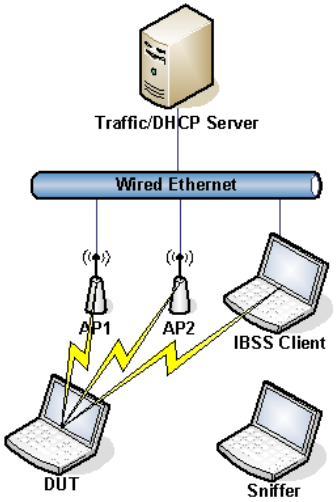
Setups

- **Describe the setups in the Test Plan**
  - Identify superset Setup(s)
- **For each test: specify the simplest setup needed**
  - You can always use the superset



Basic Setup



Full Setup

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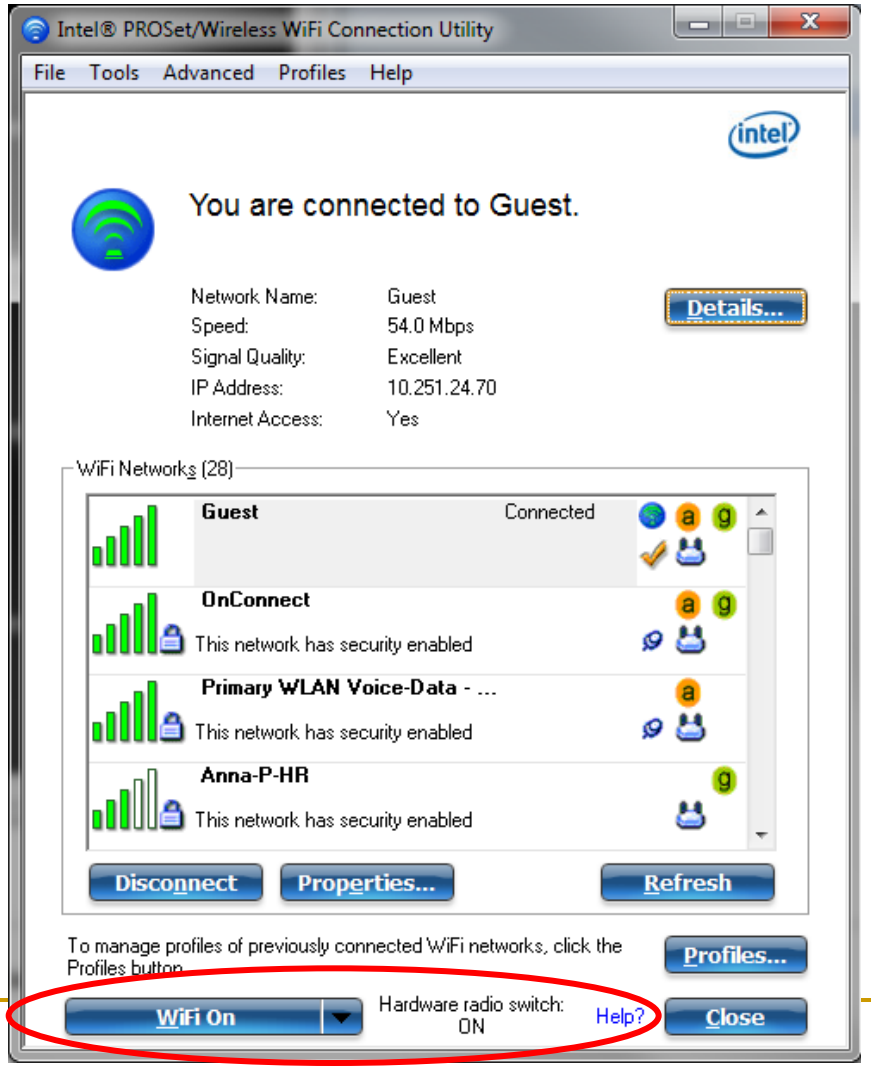
Can I trust the GUI?

- You can… once you verify the indicator (every cycle!)



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Seconds add up to days

- Think of the test time from day one
- 3000 tests, each with 10 redundant seconds…

  … add up to a full work-day
- Long tests become **longer** due to tester's context-switch

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Typing skills

What is the dog doing? _____

Expected answer: "The dog is running after the cat"

- **When writing is difficult, there is a tendency to cut corners…**
- **Slow typing is a roadblock to good test documents**

Get a Touch-type program and invest the time – it pays in the long run

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Tpyos

- Spell check your tests
- Re-read them after 24 hours

Diagnostic test	
Run a full diagnostic on the machine.	The diagnostic is finished without successfully.
Develop the plate and check the quality.	The quality off the plates good.

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Summary

- Writing skill is an important engineering skill
- Consistency
  - Format
  - Language
- Test case writing recommendations
  - Proper detail level
  - No Expected Results for setup
  - Separate Steps and Expected Results
  - Single Expected Result per step
  - Simple tests / Complicated tests

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Now…
Your Comments!

Thank you!

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