TOPIC
EMBEDDED SYSTEMS
EMBEDDED IN YOUR FUTURE

Eliminating Waste: How To Make Testing Lean

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Benefit of TPI

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Status	#Average PRs / Month	% Musts
Before I arrived	40	< 1% ?
TPI not started	72	1.6% ?
TPI 0 -> 1	114	28%
TPI 1 -> 2	101	50%
TPI 2 -> 3	115	53%
TPI 3 +	139	58%

What Is Lean?

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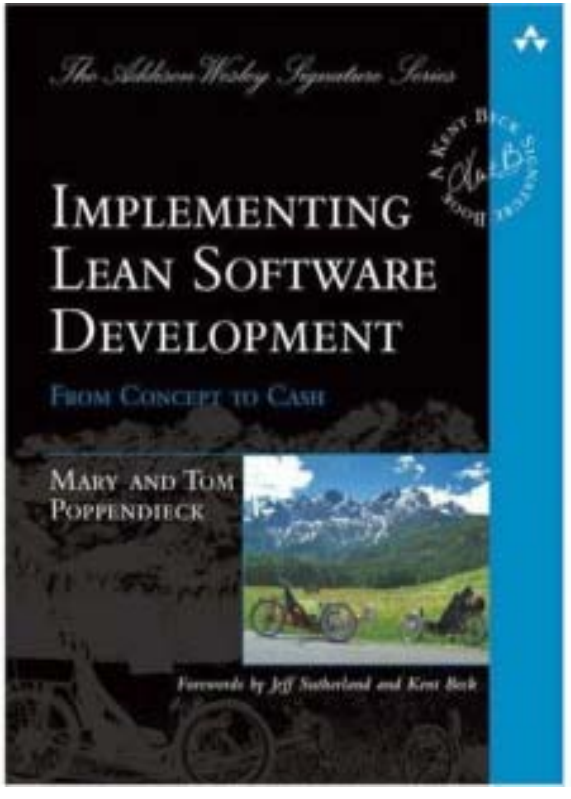
"All we are doing is looking at the timeline from the moment a customer gives us an order to the point when we collect the cash.

And we are reducing that timeline by removing the non value-added wastes."

Taiichi Ohno (Toyota)

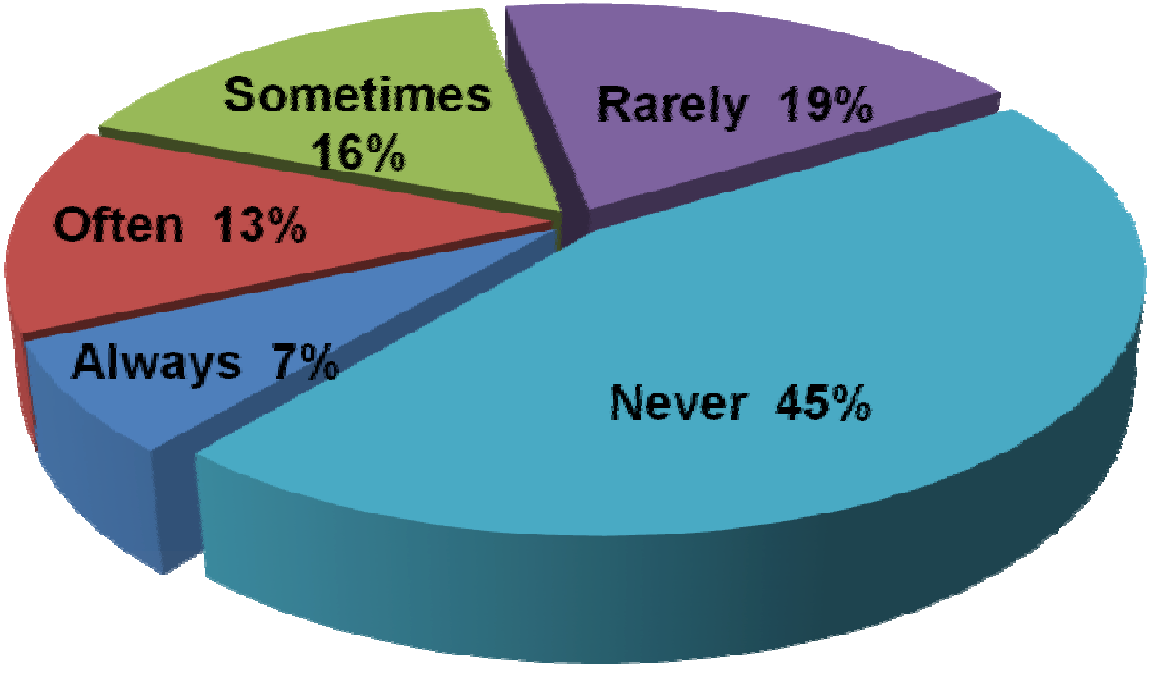


What Is Waste?

Seven Wastes

1. Partially done work
2. Extra features

How Much Are Features Used?



Often or Always used: 20% Rarely or Never used: 64%

Standish Group Study Reported at XP2002 by Jim Johnson, Chairman;
quoted by Mary Poppendieck at TOPIC evening, March 2008

Too Many Features: Impact On Testing

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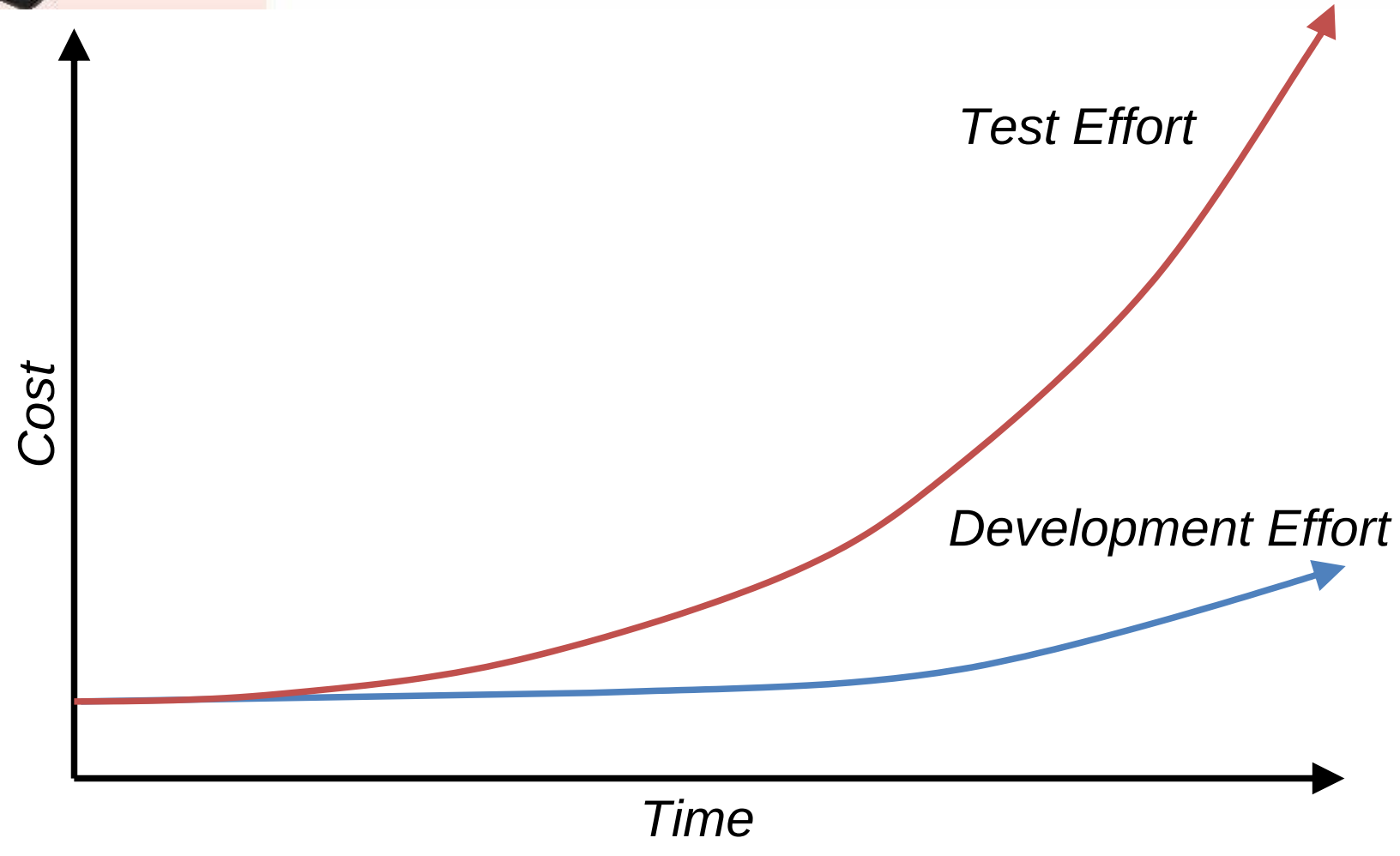

What Is Waste?

Seven Wastes

1. Partially done work
2. Extra features
3. Relearning
4. Hand offs
5. Task switching

Task Switching

The output: rows versus columns

A	1	I
B	2	II
C	3	III
D	4	IV
E	5	V
F	6	VI
G	7	VII
H	8	VIII
I	9	IX
J	10	X
K	11	XI
L	12	XII
M	13	XIII

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6. Delays

How To Reduce Delays

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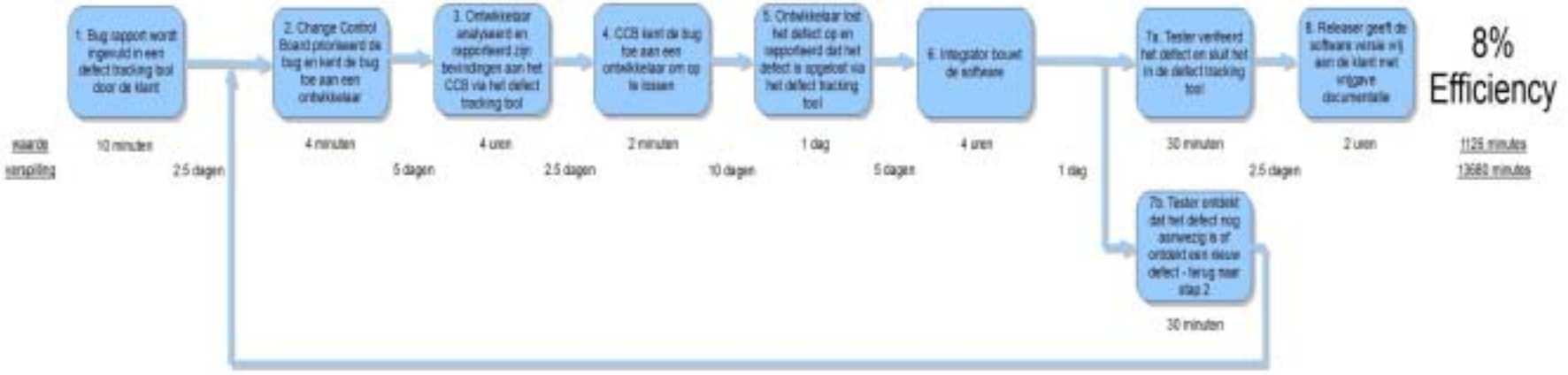
Value Stream Map



What Is Waste?

Seven Wastes

1. Partially done work
2. Extra features
3. Relearning
4. Hand offs
5. Task switching
6. Delays
7. Defects

How To Reduce Defects

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"Mistake Proofing"

How To Make Testing Lean

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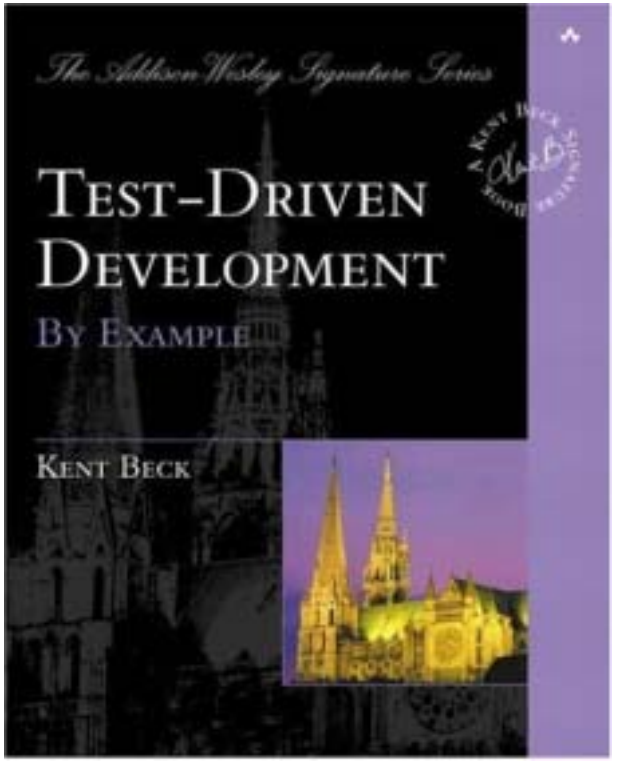
- Shorter test cycles.
- Automate.

Automated Testing: Smoke Test

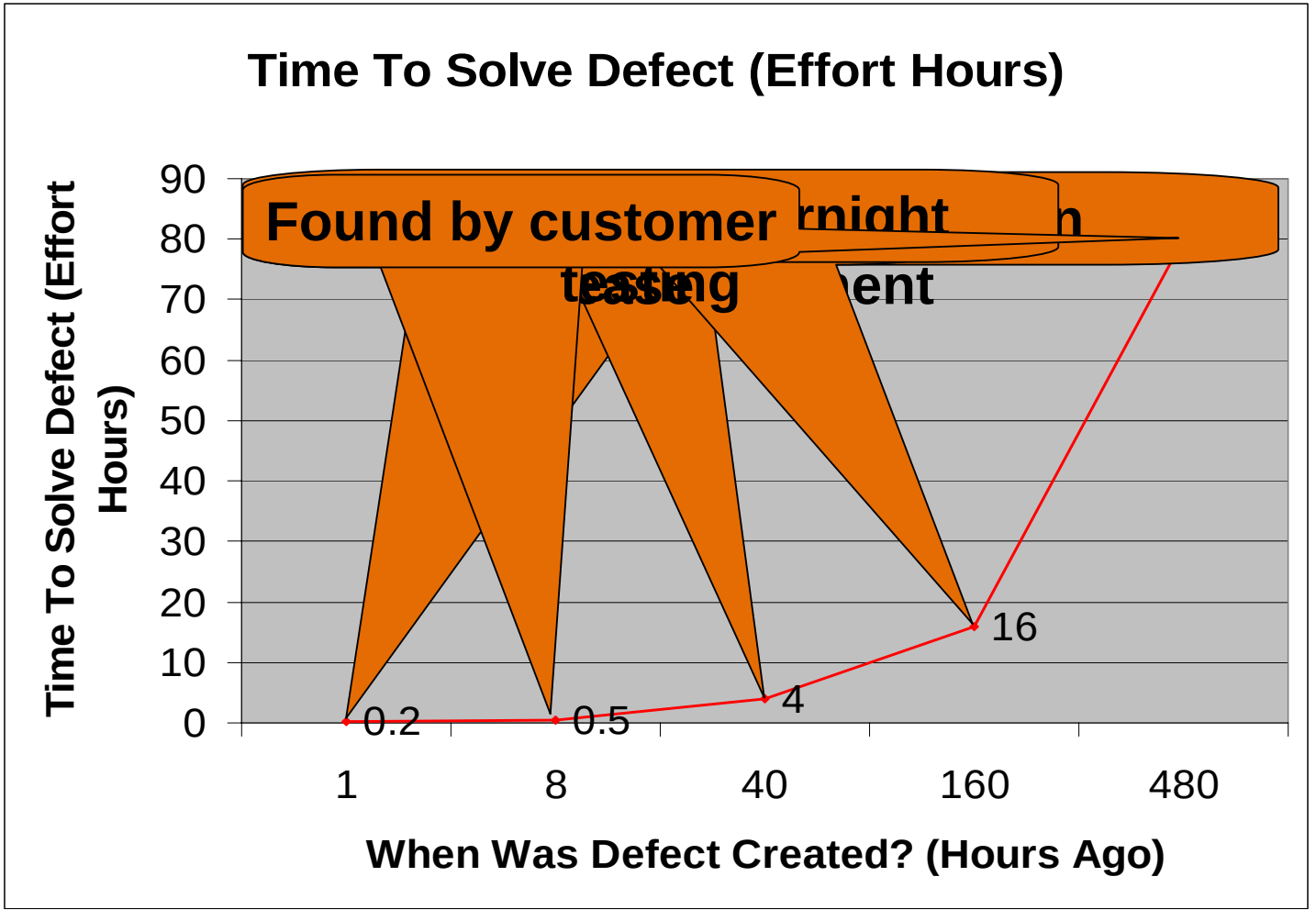
- What is your “smoke test”?
  - Essential feature to automate. E.g. basic start up / shut down or end-to-end of all components.
- Then consider how you can expand e.g.:
  - Run more often (daily to hourly or more).
  - Add more tests.
  - Add more configurations.

Automate Testing: TDD

- Test Driven Development.
  - Improves design (smaller components).
  - Add new test cases quickly.
  - Can always run all tests.
  - Defects found very quickly.
  - Defects solved very quickly.
  - *Every time* a new defect is found and solved, write a test case for it.



How Is Time Saved By Testing More Often?



Summary

Se

1. Pa
2. Ex
3. Re
4. Ha
5. Ta
6. De
7. De

"If it's not value, it's waste!"

Backup Slides

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Respect For People

Stonecutters:
- Cutting stones?
- Earning a living?
- Building a cathedral?

The test: When workers are annoyed by their job, do they:
- Complain about it?
- Ignore it?
- Fix it?

KPIs And Clarity

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What do you measure? Input or output variable? Prison: number of escapees or re-offenders?

TPI: Test Maturity Matrix

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		0	1	2	3	4	5	6	7	8	9	10	11	12	13
(*)			Controlled					Efficient					Optimising		
L	Key Area 1 - Test strategy		A					B				C		D	
L	Key Area 2 - Life-cycle model		A			B									
L	Key Area 3 - Moment of involvement			A				B				C		D	
T	Key Area 4 - Estimating and planning				A							B			
T	Key Area 5 - Test specification techniques		A		B										
T	Key Area 6 - Static test techniques					A		B							
T	Key Area 7 - Metrics						A			B			C		D
I	Key Area 8 - Test automation				A				B			C			
I	Key Area 9 - Test environment				A				B						C
I	Key Area 10 - Office environment				A										
O	Key Area 11 - Commitment and motivation		A				B						C		
O	Key Area 12 - Test functions and training				A			B				C			
O	Key Area 13 - Scope of Methodology					A						B			C
O	Key Area 14 - Communication			A		B							C		
O	Key Area 15 - Reporting		A			B		C					D		
O	Key Area 16 - Defect management		A				B		C						
O	Key Area 17 - Testware Management			A			B				C				D
O	Key Area 18 - Test process management		A		B								C		
-	Key Area 19 - Evaluation							A			B				
-	Key Area 20 - Low-level testing					A		B		C					

PR Template

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Identifier	1234
Date	13/12/2008
Title	Program X Crashes When Ctrl-F Is Pressed
Submitter	Mark Robinson
Priority	Critical
Status	Active
Type	PR
Assignee	Developer Y
Summary	In the Upload File screen, pressing Ctrl-F causes a crash. Note that this may also occur on other screens (and even with other Ctrl key combinations), this has not further been tested.
Impact	It is not possible for users to upload files. And the program crashes (but apparently no effect on stored data).
Component	Program X
Version	0.1.234
Hardware Used	Box 1.2 & Monitor XYv3.
How To Reproduce	1.Start Program X. 2.Press the “Upload File” button on the main screen to go to the Upload File screen. 3.When screen is fully loaded, press Ctrl-F.
Expected Result	“Select File” dialog pops up.
Actual Result	Program crashes – dialog not shown. (1)

(1) Extra details like this help developers pinpoint where defect is in the code.

Requirements Template

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Title	Word should be able to create new documents.
Identifier	WORD-SRS-REQ-001
Parent Requirement	WORD-URS-REQ-001
Priority	Must
Rationale	The user must be able to create new blank documents.
Solution Overview	Word should be able to create a blank document with no formatting. (Other requirements specify new non-blank documents created with wizards.)

Detailed Solution

#	Sub-Requirements
1	Word will create a new document when File->New is selected.
2	Word will create a new document when Ctrl-N is pressed.
3	Word will then enable the following buttons: Save, Print, Print Preview, ... (1)

Scope	Standalone application: no affect on other programs.
Risks	The project could become corrupted if it is stored on a network and it is opened simultaneously by two or more users.
Related Concerns	This functionality should be familiar to users of Microsoft Office programs, e.g. Excel, PowerPoint. So there should be no obvious difference (e.g. different command names, key strokes, etc.).

(1) In a real requirements document, the requirements will never have "…" – this is just to save time in creating this example.

Test Case Template

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Title	WORD: Open Project
Identifier	WORD-TC-001
Requirement Identifier	M4.4-TC-3.1
Priority	Must
Preconditions	1.Latest version of <program> installed. 2.An application has already been created with the latest version of <program> and it is on an available drive.
Description	Check that an existing project may be opened.
Additional Information	This test case is a prerequisite for almost all other <program> test cases.

Main Flow Description

#	Action	Expected Result
1	Click Open Button on menu.	“Open Project File” dialog appears.
2	Open “C:\Demo Applications\<program>\program.prg”.	Project opened; “Project Settings” tab displayed.

Alternative Flows	1.Replace #1 with Ctrl-O. 2.Replace #1 with File->Open.
Additional Points Of Attention	• The time to open a project that exists on the current computer hard drive should be less than two seconds.