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Traceability Matrix, Test Pyramid and simple ROI-calculator as a communication tool

Anton Semenchenko

Anton Semenchenko

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- C++ community **CoreHard** co-founder
- “International IT” community **InterIT** founder
- 50+ international conferences organizer
- IT evangelist (300+ speeches on meetups and conferences)
- Field of scientific interest: using math for differential diagnostic in cardiology, psychiatry, virology and immunology
- **BSU** Senior Lecturer
- C++ books editor
- QA Automation, Management
- ICAgile Certified Professional

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Agenda, part 1

1. General **problem** statement
   a) From **Manual QA** standpoint
   b) From **AQA** standpoint
   c) From **Business** standpoint
2. General solution statement
3. **Your solutions** option?
4. Option of **combining** Traceability Matrix, Test Pyramid and Simple ROI Calculator solution
5. Definitions:
   a) Traceability Matrix
   b) Test Pyramid
   c) ROI Calculator

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Agenda, part 2

6. What **formats of TC** would you like to see in examples?
7. Usage example of iteration planning with 3 tools
   a) Test Case
   b) Check list
   c) Gherkin
8. **Additional factors** which can affect planning?
9. Example with Manual QA and Business Value, Risk Management
10. **What tools** would you like to see in examples?
11. **Examples** of implementation Traceability Matrix in context of Test Management Pyramid and ROI Calculator.
    a) Based on **Google Sheet**
    b) Based on **TMS Zephyr**

Agenda, part 3

12. Conclusions
13. What next?
14. *Appendix A: Test Pyramid high level info*
15. *Appendix B: simple ROI Calculator high level info*
16. *Appendix C: how to combine Test Pyramid and ROI Calculator*

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General **problem** statement

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Stakeholders \ points of view?

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From **Manual** QA standpoint

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From **AQA** standpoint

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From **Business** standpoint

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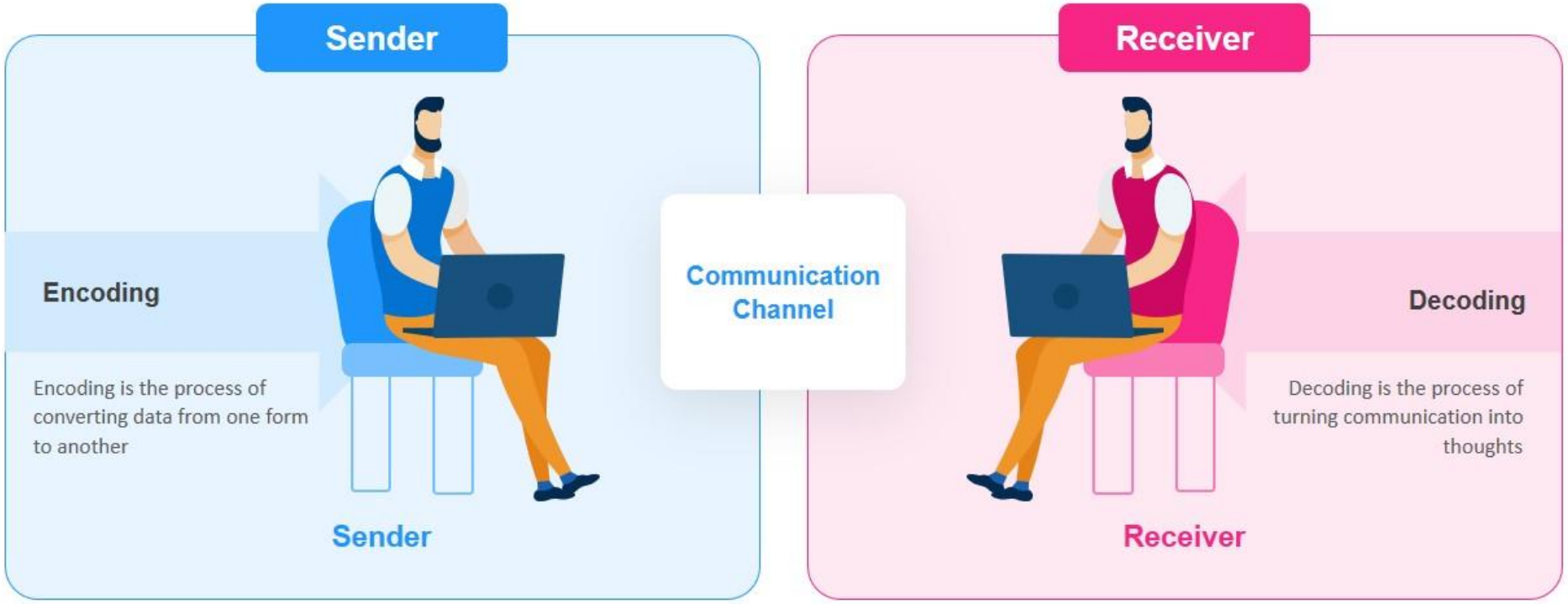
General solution statement

COMMUNICATION PROCESS DIAGRAM



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Your solutions option?

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Option

Traceability Matrix, Test Pyramid and Simple ROI Calculator combining

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Traceability Matrix

A Traceability Matrix is a document that co-relates any **two-baseline** documents that require a **many-to-many relationship** to check the completeness of the relationship. It is used to **track the requirements** and to **check the current project requirements** are met.

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Requirement Traceability Matrix

Requirement Traceability Matrix is a document that **maps and traces user requirement with test cases**. It captures all requirements proposed by the client and requirement traceability in a single document, delivered at the conclusion of the Software development life cycle. The main purpose of Requirement Traceability Matrix is to **validate that all requirements are checked via test cases** such that no functionality is unchecked during Software testing.

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Requirement Traceability Matrix

MMF	Feature	Backlog Item	Acceptance Test	Project	Module	Automation Level	Dependency	Status

Requirement Traceability Matrix

MMF	Feature	Backlog Item	Acceptance Test	Project	Module	Automation Level	Dependency	Status

MMF	Feature	Backlog Item	Acceptance Test	AQA TC	#	Project	Module	Automation Level	Dependency	Status

Usage example

AQA planning:

When planning PI, we need to formulate 5 or more Acceptance Tests for each MMF. Therefore, we will get an extra high-level Traceability Matrix of the following way:

Also, it will help to build **simplified Gantt Chart**.

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Usage example

Those 2 artifacts will allow us to:

1. See the **tasks** which are on the **critical path**;
2. **Prioritize** the effort of each team in the scope of every sprint in the context of AQA and development (1 or more critical tasks will be marked as priority tasks outside the general flow);
3. **Receive general** high-level **status**;

As result we will guarantee full automated PI Demo, as the top of Automated testing pyramid.

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Usage example

Additional pros of full automation of MMF Acceptance Tests:

1. We will be able to **show demo** to the customer at any moment without attracting technical specialists;
2. We will be **easily able to organize Demo by our customer to the stakeholders without our participation** (deployed by one-click Amazon UI Auto Tests with required environment, run those tests with additional parameter as longer timeouts to make the clicks perform slowly in order to see them);
3. We will be able to show that everything **works on the customers environment** (Unit tests and other very important tools which guarantees stable work are not representative for the business owners);

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Usage example

AQA planning:

When planning PI, we need to formulate 5 or more Acceptance Tests for each MMF. Therefore, we will get an extra high-level Traceability Matrix of the following way:

Also, it will help to build simplified Gantt Chart.

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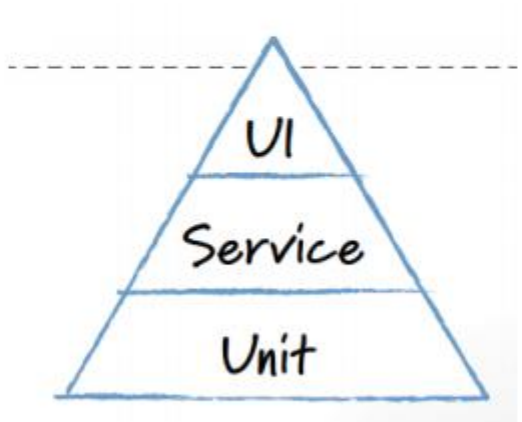
Test Pyramid: definition

- «An effective test automation strategy calls for automating tests at three different levels, as shown in Figure, which depicts the **test automation pyramid**»



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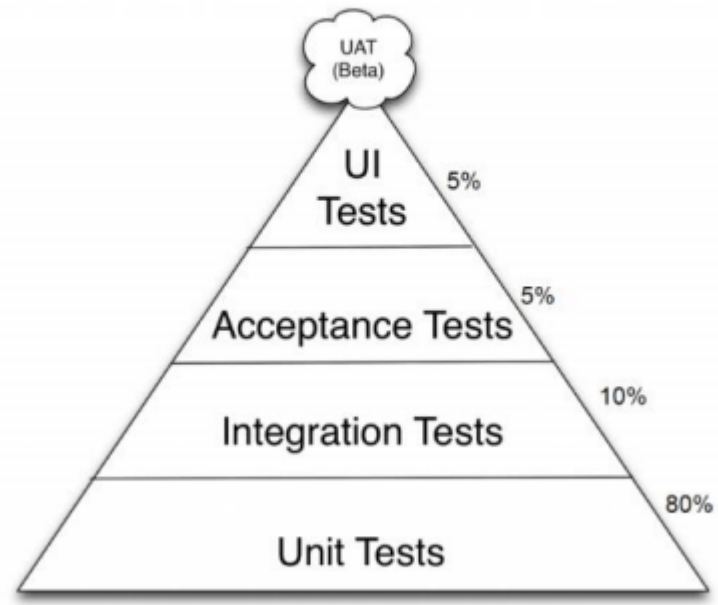
Test Pyramid with percentage #1

1. UI - 5%
2. Acceptance – 5%
3. Integration – 10%
4. Unit - 80%



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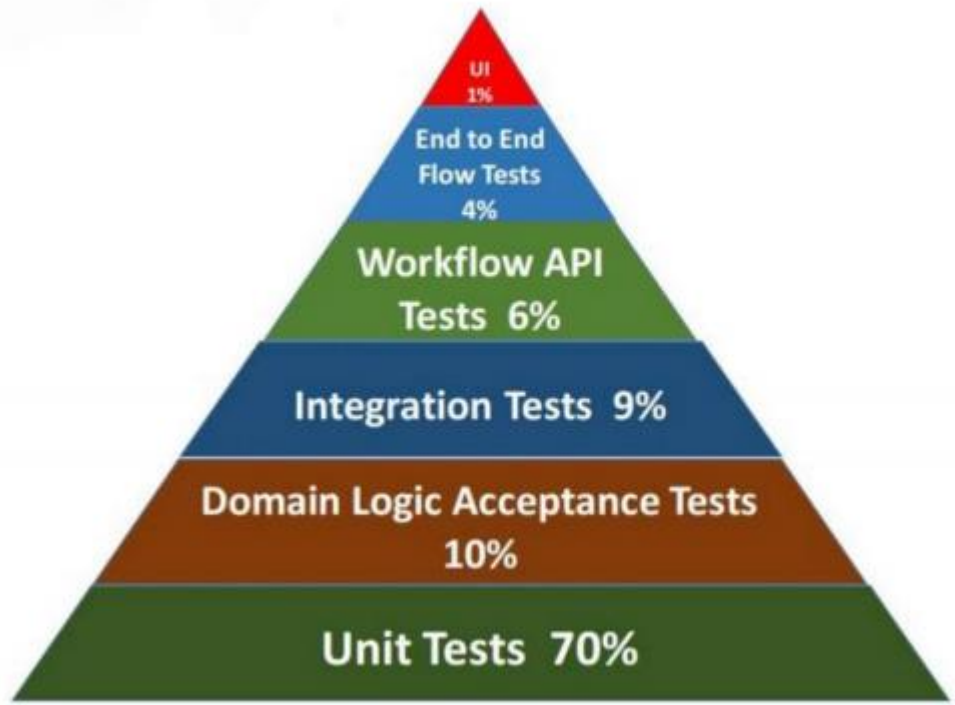
Test Pyramid with percentage #2

1. UI – 1%
2. End to End Flow – 4%
3. Workflow API – 6%
4. Integration – 9%
5. Domain Logic Acceptance – 10%
6. Unit – 70%



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ROI: general information

Answer three simple questions:

1. How many hours do we spend currently?
2. How many hours will we spend after automation?
3. When automation will bring value?

What information should be gathered?

1. Number of test cases (for estimations)
2. Number of executions per release
3. Effort for manual execution of the test cases

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ROI: general information

What should be estimated?

Implementation effort:

1. Effort to create/adopt automation framework
2. Effort to automate test cases

Maintenance effort:

1. Execution of automated scripts
2. Results analysis
3. Bug reporting
4. Fixing “broken” scripts

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ROI: calculation

How many hours do we spend currently?

Manual effort per release = Effort for TC execution * number of runs per release

How many hours will we spend after automation?

Effort after automation per release = Maintenance efforts +
Effort for TC execution (non-automatable) * number of runs per release

When automation effort will bring value?

Number of Releases to invest in automation = Automation implement
/ (Manual effort per release - Effort after automation per release)

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AQA MVP?

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Minimum Valuable Product

QA Automation MVP for project:

1. CI \ CD Pipeline;
2. 3 Auto Tests (UI, API, Unit level);
3. Reporting: high level for business and low level with tech info;
4. Run on event (nightly, on demand, as a post build \ setting up env);
5. B.E. Reporting: Auto calculation progress and some other metrics based over a period of time;

QA Automation MVP for product:

1. CI \ CD Pipeline;
2. 1 successful pass user flow;
3. Reporting focusing on Business;
4. Run on event (on demand, as a post build \ setting up env);

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User Story, Test Case, Check List, Gherkin?

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User Story, Test Case, Check List, Gherkin examples

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Additional factors?

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Manual QA value, Business value, Risk Management examples

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Your TMS?

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TMS Zephyr example

Epic	Coverage	MPH-T12816 - AS...	MPH-T12821 - AS...	MPH-T12848 - As ...	MPH-T12914 - EF...	MPH-T12915 - EF...	MPH-T12974 - As ...	MPH-T12975 - NA...	MPH-T13112 - AS ...	MPH-T13113 - AS ...	MPH-T13115 - Blo...	MPH-T13116 - Un...	MPH-T13117 - Not...	MPH-T13118 - Tra...	MPH-T13119 - NA...	MPH-T13321 - As ...
COREINTEGR-	COREINTEGR-1332 -															
COREINTEGR-	COREINTEGR-117															
	COREINTEGR-1172															
	COREINTEGR-1180															
	COREINTEGR-1177															
	COREINTEGR-1178															
	COREINTEGR-1169															
	COREINTEGR-1176															
No Epic	COREINTEGR-1286															
	No Coverage															

Displaying (3 of 3)

Last test execution: Not Executed Pass

Google Sheet example

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5	Project	Team	Module (Subsystem)	Feature	Backlog item	Business requirements	AC Id	Granulated AC
6					MPH-35053	User is allowed to enter only 9-digit routing number	1	Doesn't allow letters
7							2	Doesn't allow special symbols
8							3	Allowes 9-digit entery
9							4	Doesn't allow less than 9 digits
10								4
11								100%
12								
13	The column AC Id we can use to trace automated tests and AC							

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Google Sheet example

	H	I	J	K	L	M	N	O	P	Q	R	S
1		Test Coverage										
2		Manual	AET			JS		Orchard		DS		XBEA
3			AET E2E		AET API	JS unit tests	JS integr tests	Orchard unit tests	Orchard integr tests	DS unit tests	DS integr tests	
4												
5	Granulated AC	MPH-C125	E2E-1	E2E-2								
6	Doesn't allow letters	1										
7	Doesn't allow special symbols			1								
8	Allowes 9-digit entery						1			1		
9	Doesn't allow less than 9 digits		1									
10	4		2				1				1	
11	100%		**50%**				**25%**				**25%**	

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Questions?

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Questions*

1) **BDD** - one of the popular development and software testing methodologies. Don't BDD contradict with additional artifact such as Traceability Matrix?

2) In every engineering discipline including software development following the **DRY** (Don't repeat yourself) and **SSOT** (Single Source of Truth) concepts. Does Traceability Matrix contradict with basic engineering concepts.

3) Can we implement automated updates of Traceability Matrix in any Test Management System? Or how to effectively **support actuality of Traceability Matrix**?

4) **Methodological questions**!

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Conclusions

1. Developed obvious communication infrastructure!
2. Appendix A, B and C :)

Appendix A

Test Pyramid high level info

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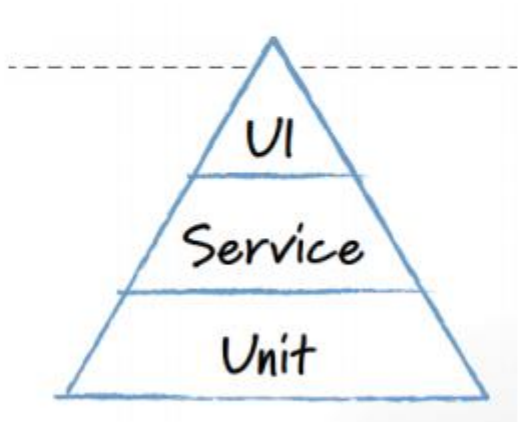

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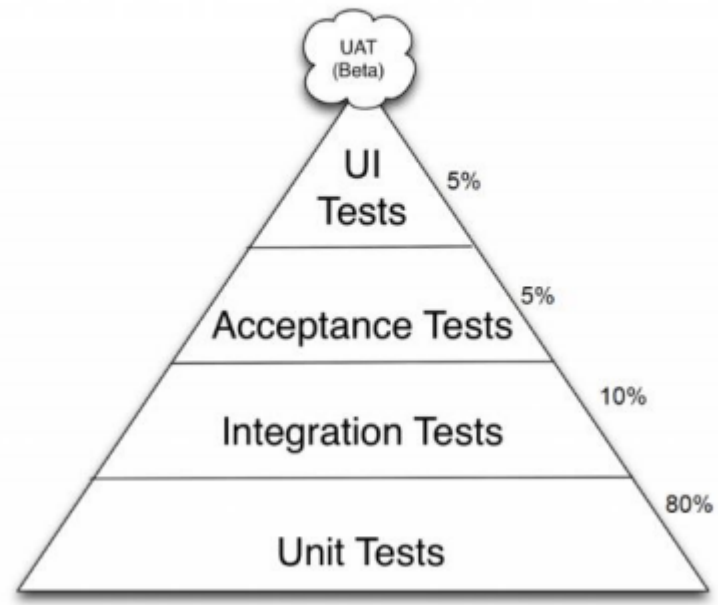

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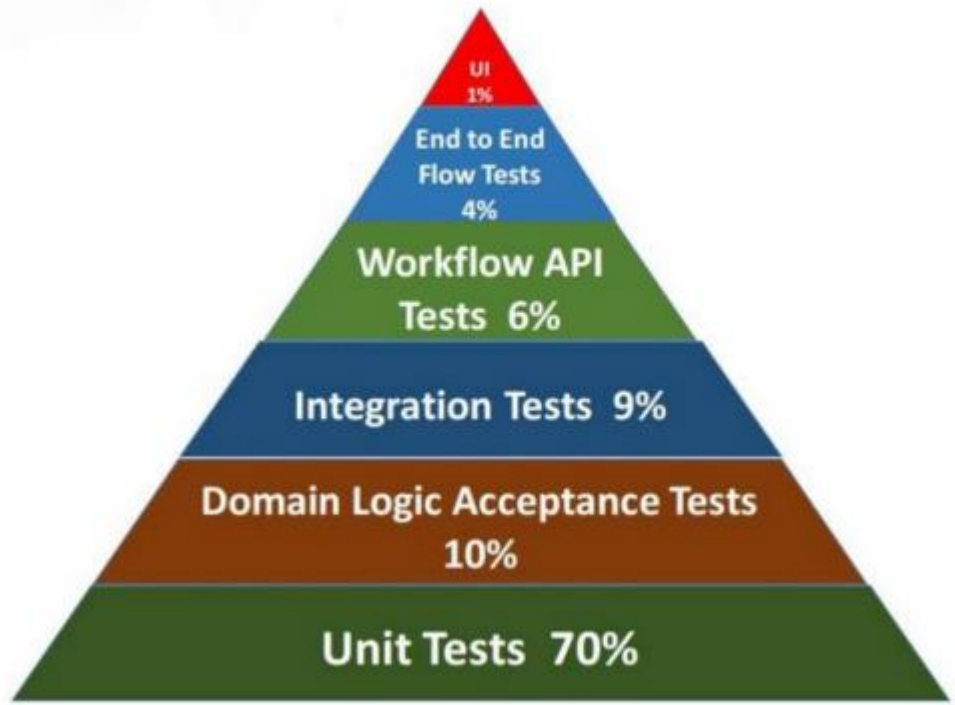

Appendix B

simple ROI Calculator high level info

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When automation effort will bring value?

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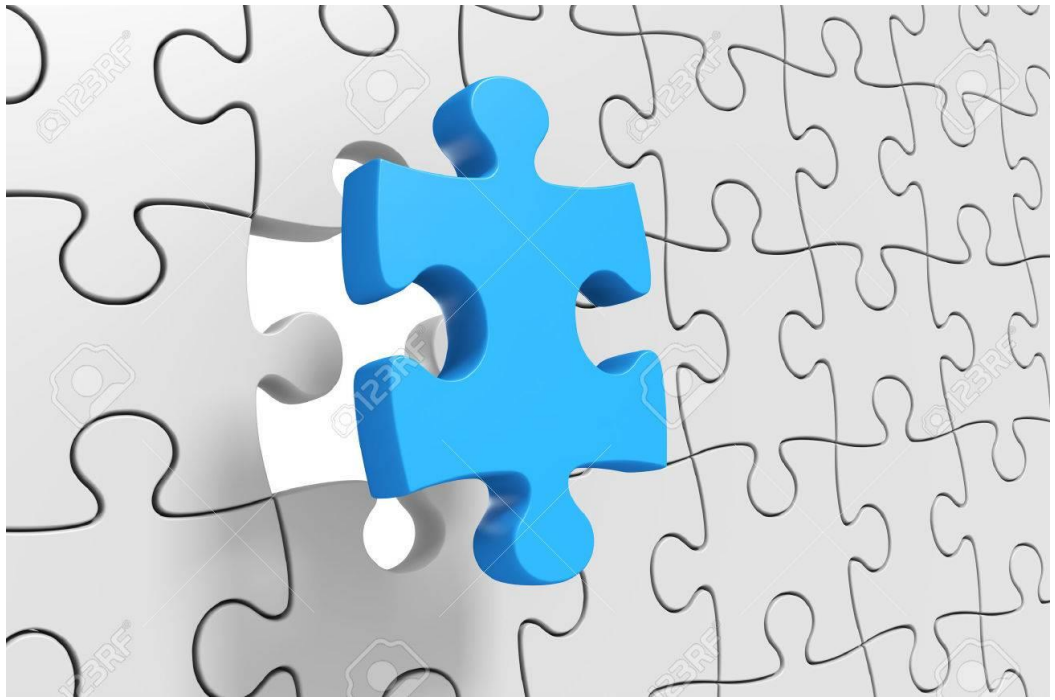
Appendix C

how to combine Test Pyramid and ROI Calculator



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Two questions (or 4 ☺)

- Percent ??? Time \ Money or amount of Test Cases?
- Pyramid \ Triangle angels ???
- How to “calculate” 2 pyramids for exact project \ context?
- How to “calculate” exact percentage for exact project \ context?

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Thank you for you attention!

Bid you farewell!

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