99%

Michael Stahl
Intel
October, 2015

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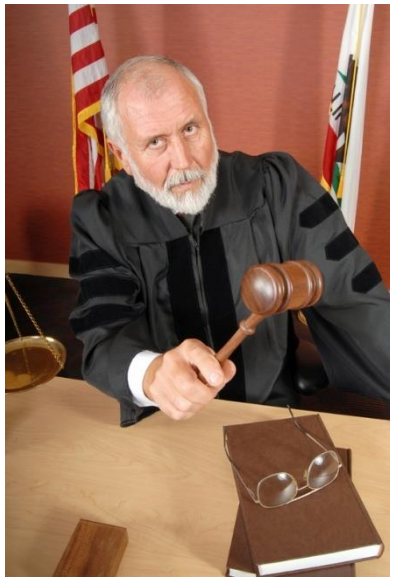

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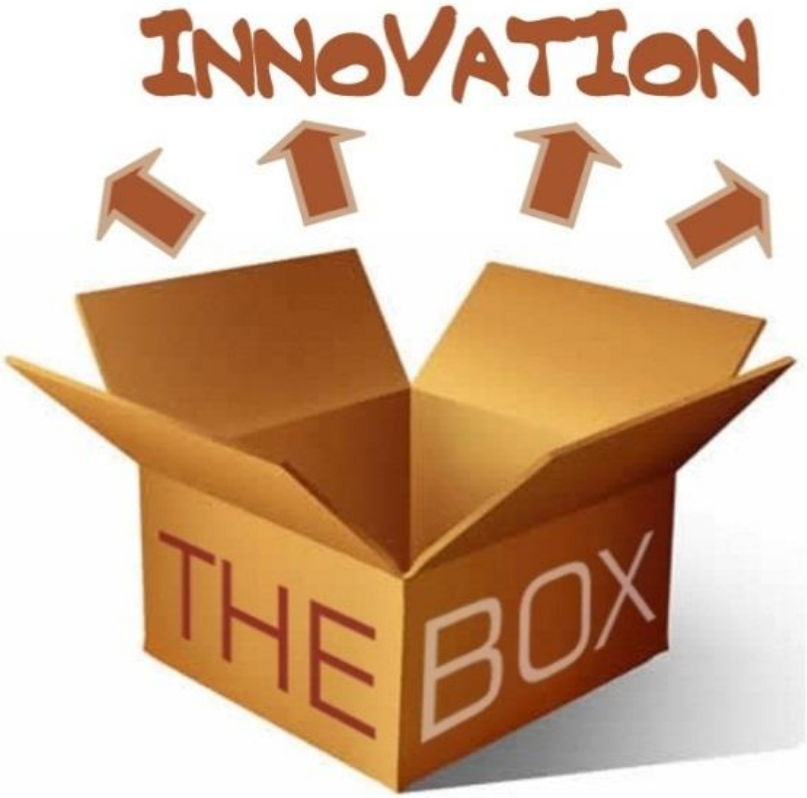

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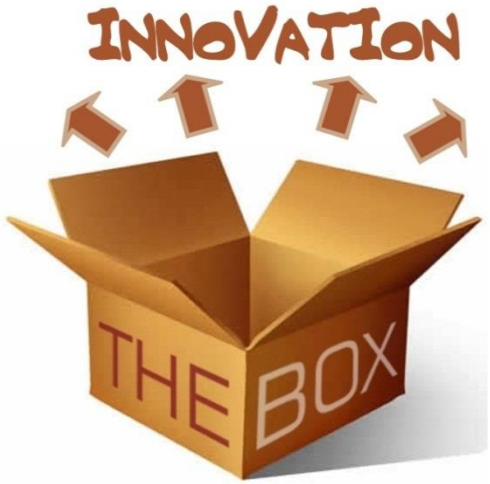
Innovation is Wonderful

Innovation distinguishes between a leader and a follower

Steve Jobs



Innovation is the specific instrument of entrepreneurship. The act that endows resources with a new capacity to create wealth.

Peter F. Drucker quotes (American Educator and Writer, b.1909)

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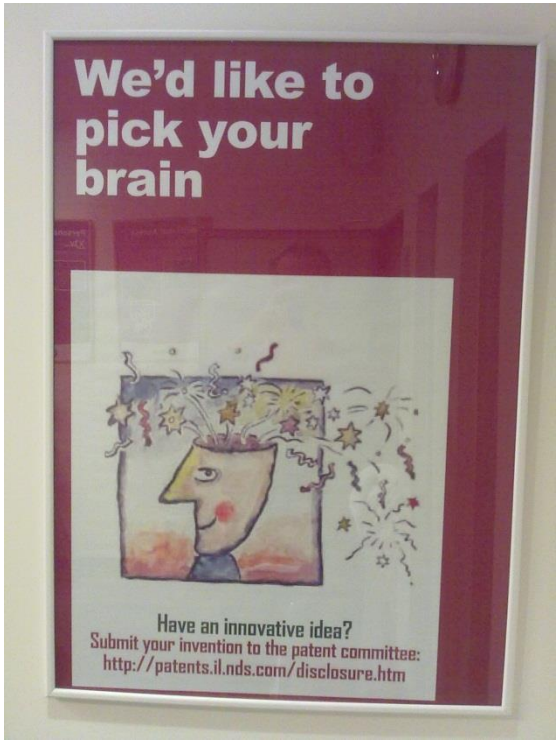
Innovation is Wonderful

Discovery consists of seeing what everybody has seen and thinking what nobody has thought."

Albert von Szent-Gyorgy

Hungarian physiologist; Nobel Prize winner in Medicine (1937)



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Innovation is Wonderful

- Excitement
- Interest
- Retention
- Improvement
- Competitive edge
- Success

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So how come

Innovation campaigns

annoy me?

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Do You?...

Review?

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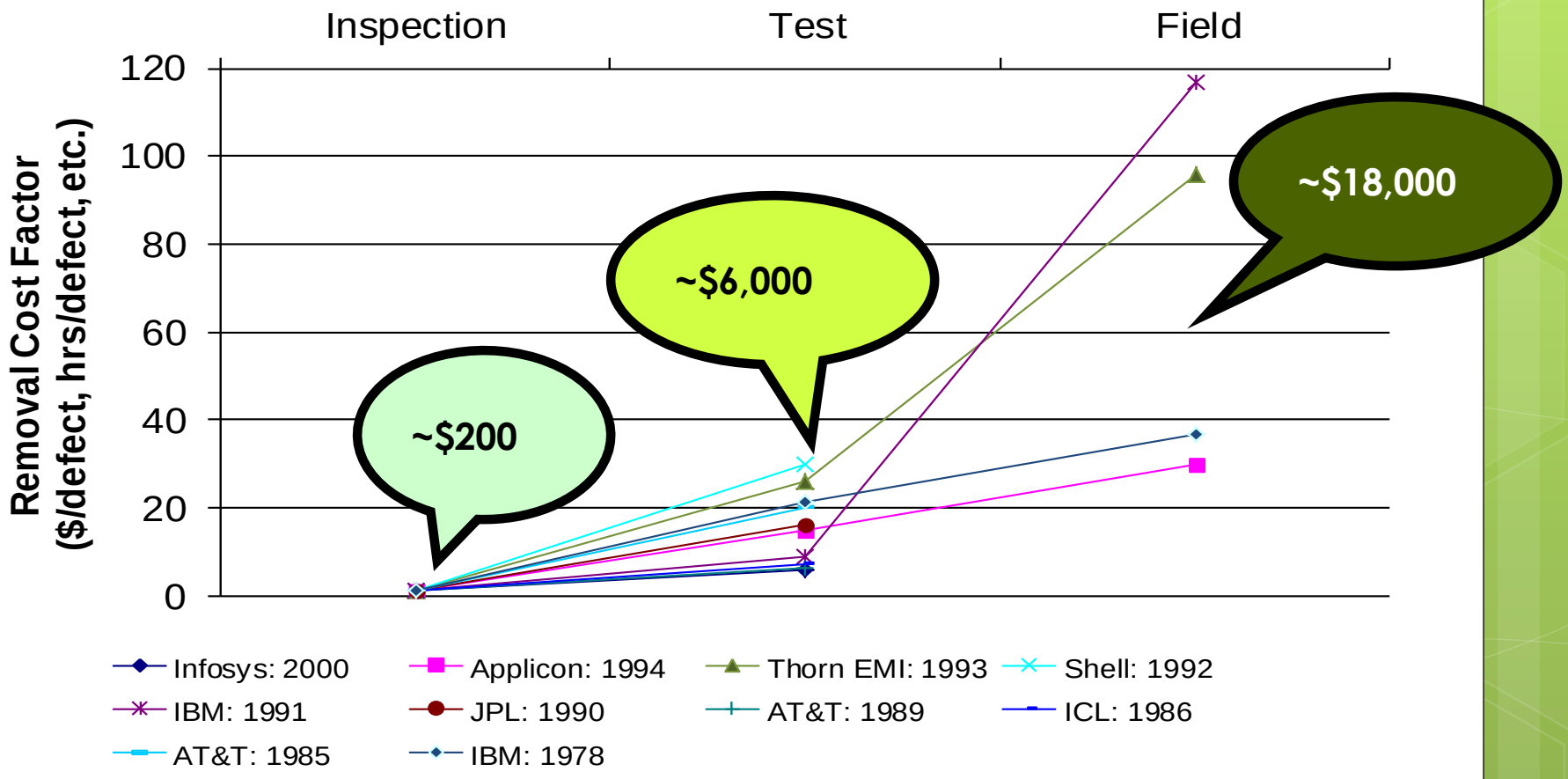
The Cost of Defects

Relative Cost of Defects by Phase Located



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Do You?...

Measure Code Coverage?

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"...Testing less than 100% statement coverage ... is unconscionable and should be criminalized ... untested code in a system is stupid, short-sighted and irresponsible"

Boris Beizer

Software Testing Techniques 1990

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Do You?...

- Manage requirements?
- Unit-Test?
- ...

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Innovation

Knowledge
Standards
Previous art
Experience
Continuous Improvement
Proper environment
Plain hard work

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Innovation

- Over played, Over hyped
- Redundant, Misplaced
- Empty slogan

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Knowledge

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Before you innovate…

- Did you pay your dues?

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Before you innovate…

Whatever else he was, Picasso was no phony

Andrew Ian Dodge http://www.andrewiandodge.com/2005/11/25/

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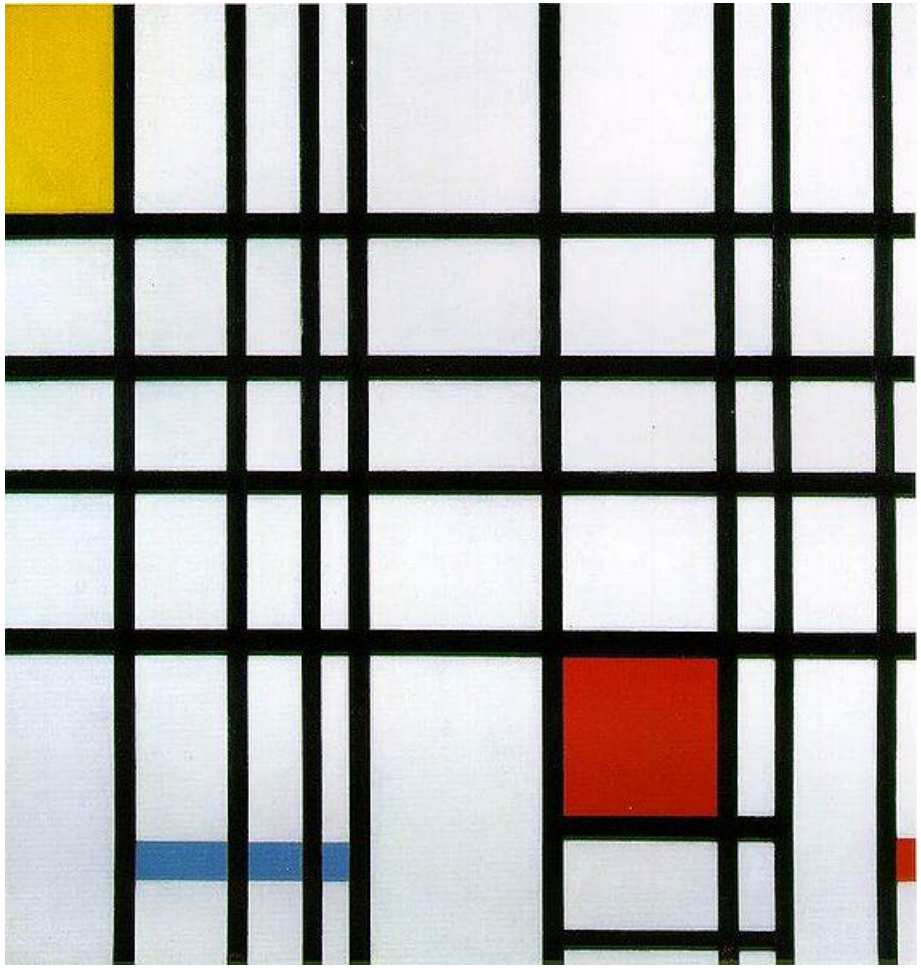
Before you innovate…



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Before you innovate...

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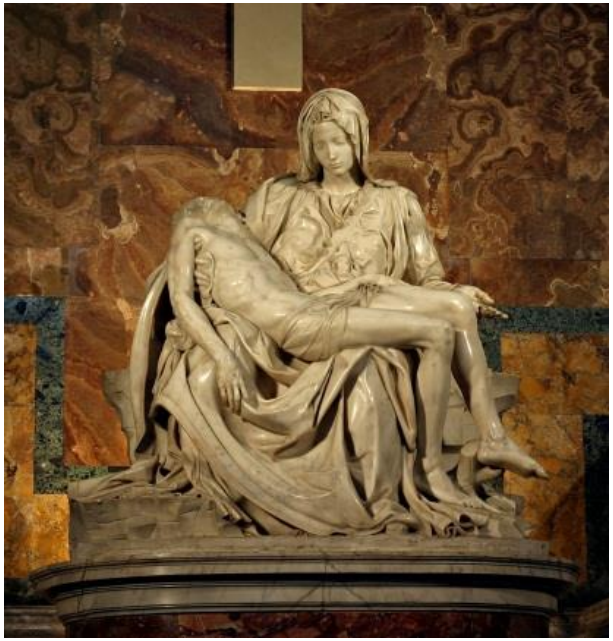
Before you innovate…



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Before you innovate...

"... in order to think originally, we must familiarize ourselves with the ideas of others.

George Kneller, Professor

Ph.D., Philosophy, Columbia University

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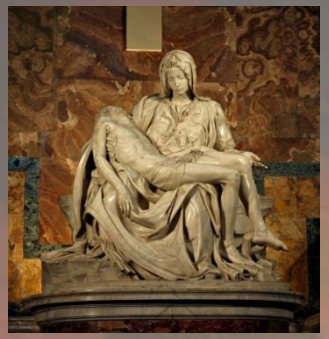

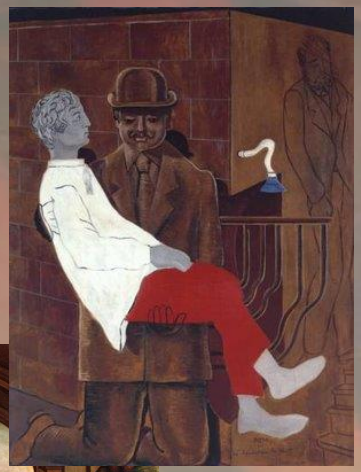

Before you innovate...

"Learn the rules before you break them."

Steven Taylor Goldsberry
The Writer's Book Of Wisdom:
101 Rules For Mastering Your Craft

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What does it mean to Testers?

"How can we call ourselves *professional testers* if we are ignorant of the fundamental techniques of our craft?"

Lee Copeland, The Nine Forgettings

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Before you innovate...

equivalence partition:

A portion of an input or output domain for which the behavior of a component or system is assumed to be the same, based on the specification.

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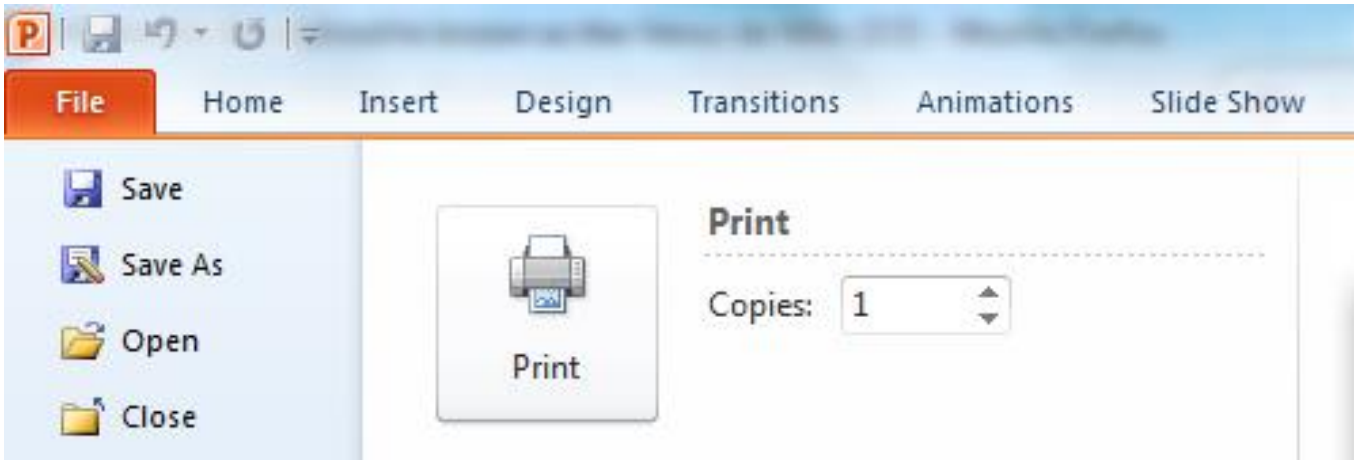
Before you innovate…



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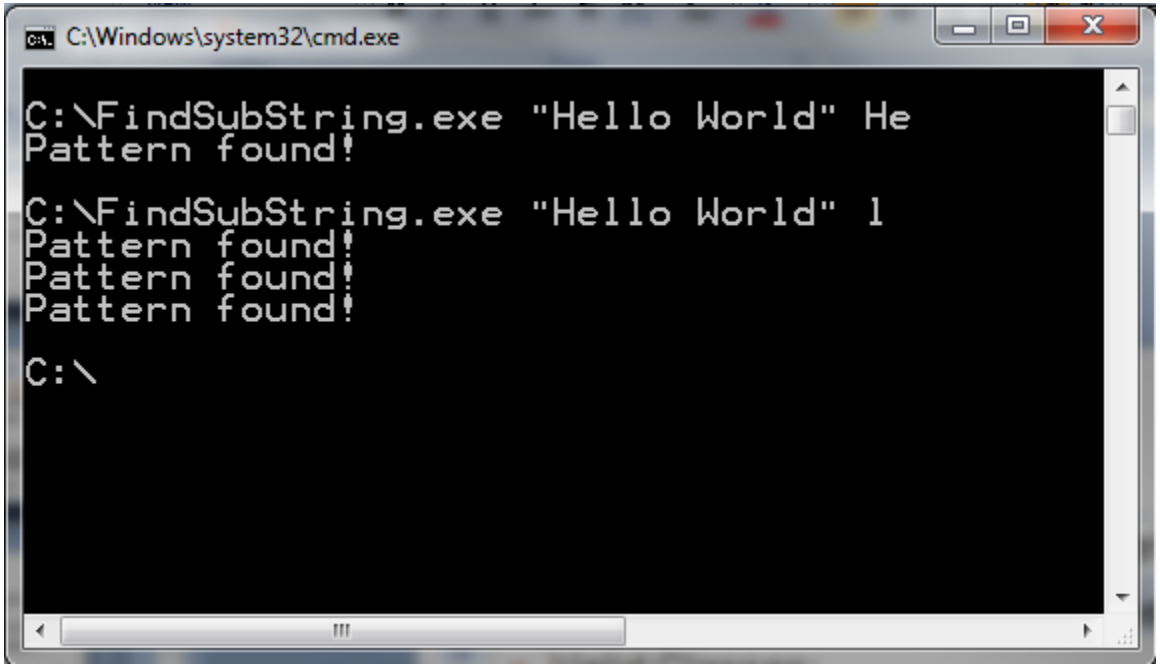
Example

A function searches for a substring within another



What are the equivalence classes? Why?

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FindSubStr ECs: a few options…

Input-validation

Valid classes:

- { two strings of one or more characters }
- { No entry at all (shows the Usage blurb) }

Invalid classes:

- { One string } // possibly the same as "no entry"!
- { More than two strings }

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FindSubStr ECs: a few options…

String length

Valid classes:

- { 1 char }
- { 2 chars }
- { 3 chars}
- Etc. …

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FindSubStr ECs: a few options…

Substring match location

Valid classes:

- { Strings where B is not in A}
- { Strings where B is in A – starting from char 1 of A}
- { Strings where B is in A – starting from char > 1 of A}
- { Strings where B is in A – last char of A is in B}

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FindSubStr ECs: a few options…

Same result

Valid classes:

- { String pairs where string B is not found in string A }
- { String pairs where string B is found in string A once }
- { String pairs where string B is found in string A twice }
- etc. …

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FindSubStr ECs: a few options…

Same processing

Valid classes:

- { String pairs where string B is not found in string A }
- { String pairs where string B is found in string A once }
- { String pairs where string B is found in string A n times, non overlapping (“aaaabaaaabaaaa” “b”) }
- { String pairs where string B is found in string A twice, overlapping once (“aaaa” “aaa”) }
- { String pairs where string B is found in string A three times, overlapping twice (“aaaaa” “aaa”) }
- … etc. (unless we assume same processing for further overlaps)

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FindSubStr ECs: a few options…

Processing of special characters

Valid classes:

- Strings with "&"
- Strings with "^"
- Strings with "\"
- Etc.

Note: Special characters have a different meaning – depends on the OS.

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"How dare we decide to just wing it?

You owe it … to learn everything you can.

Feel free to ignore what you learn, but at least learn it."

Seth Godin

a writer, a speaker and an agent of change

http://sethgodin.typepad.com/seths_blog/2011/07/the-arrogance-of-ignorance.html

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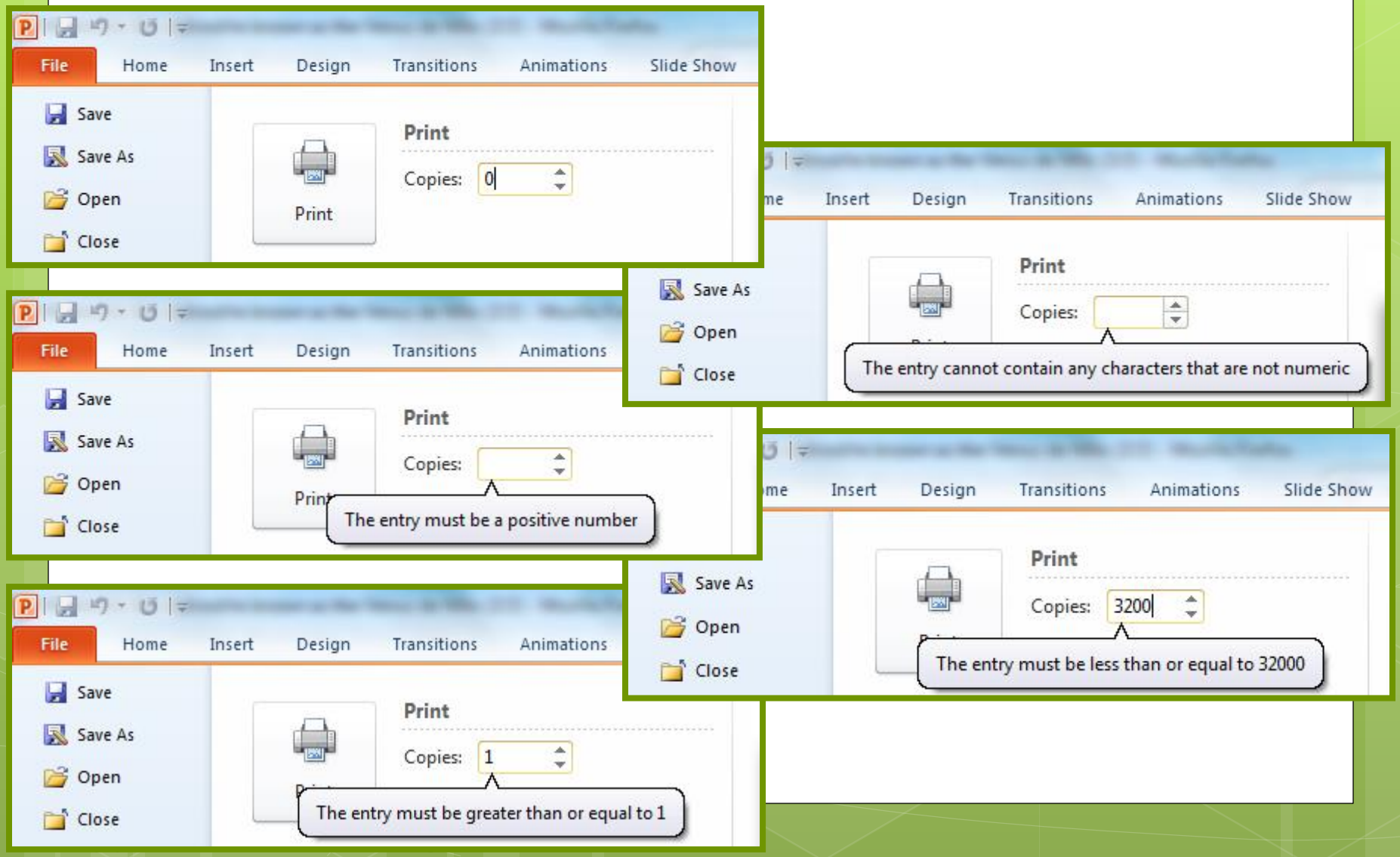
P.S. - Nothing is as simple as it seems



Standards

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The value of Standardization

מאימתי פרק ראשון ברכות ב.

מאימתי

מסורת הש"ס

הגהות הב"ח

גליון הש"ס

מוסף רש"י

עין משפט נר מצוה

תורה אור השלם

רבינו חננאל

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The value of Standardization:

- Effective Communication

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The value of Standardization

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The value of Standardization

- Efficiency

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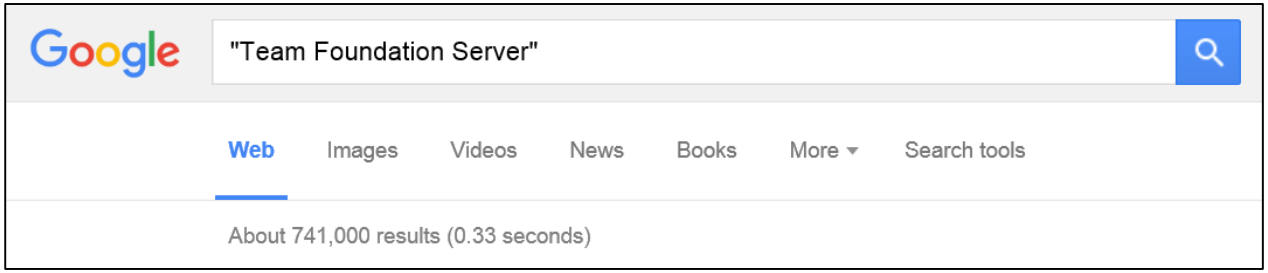
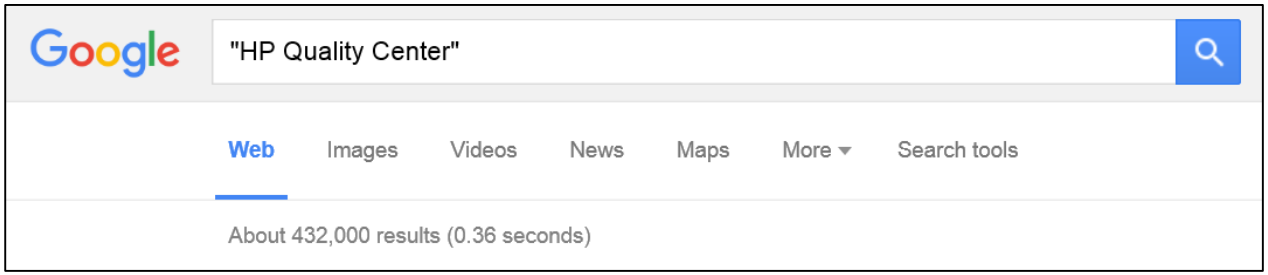
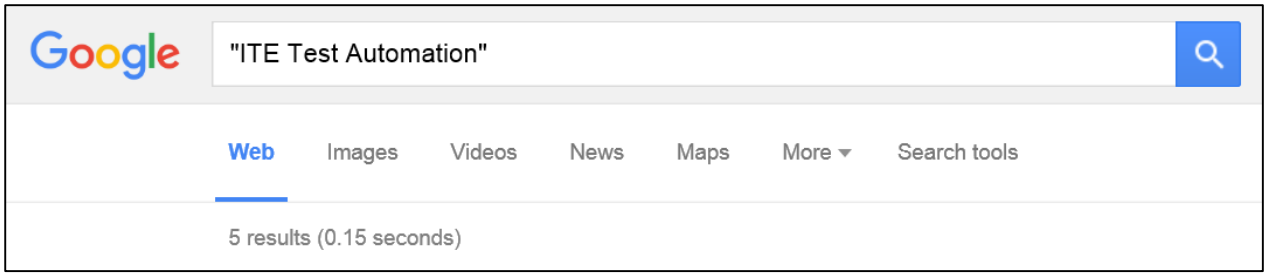
The value of Standardization







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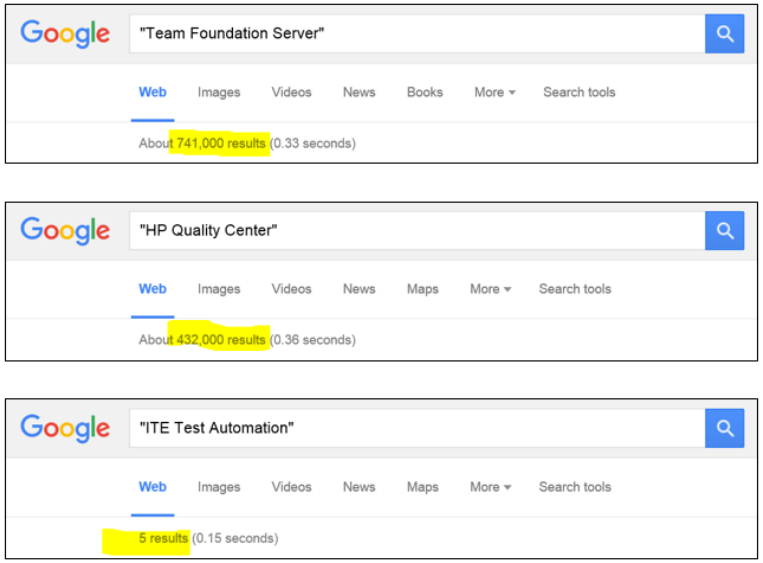
The value of Standardization

- Community



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Previous Art

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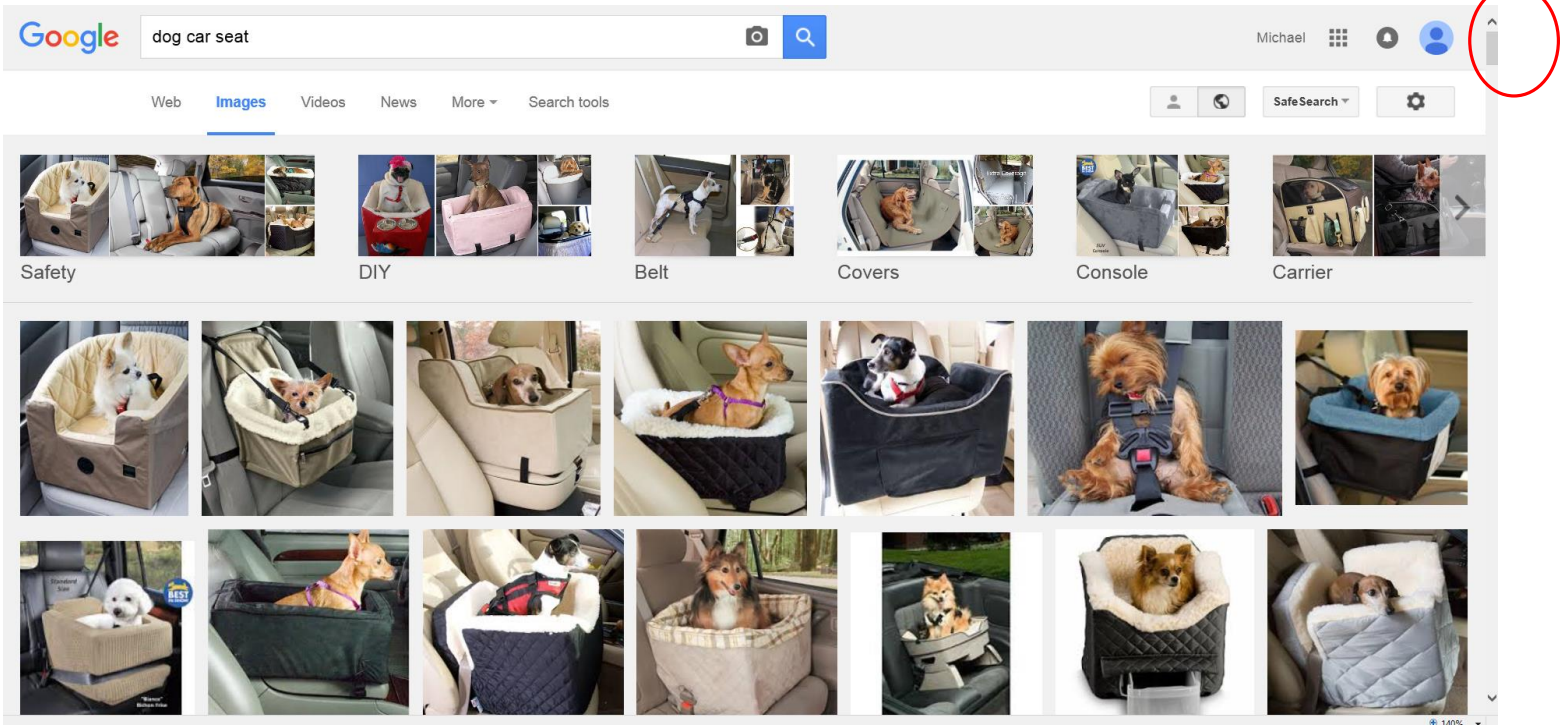
The wheel… The wheel…



…there is no new thing under the sun

Ecclesiastes Ch.1, verse 9

אין כל חדש תחת השמש

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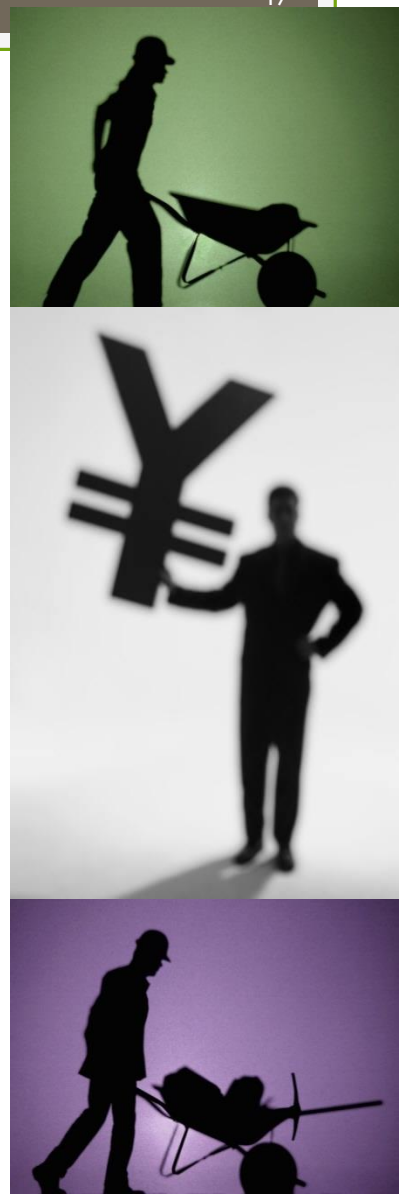
Make VS Buy

Build it - if…

- ☑ Competitive edge
- ☑ Existing expertize; Core competency
- ☑ Cheaper; Faster
- ☑ Good use of resources
- ☑ Acceptable risk
- ☑ Long term support



Main source: Allen Eskelin
http://www.informit.com/articles/article.aspx?p=21775

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Not to say you can't reinvent the wheel...

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Texas A&M
Society of Physics Students
2006-2007

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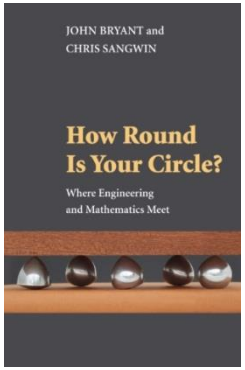

http://www.youtube.com/watch?v=270qEZKXAfQ
Or: www.howround.com

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… but do you need this on YOUR car?

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Experience

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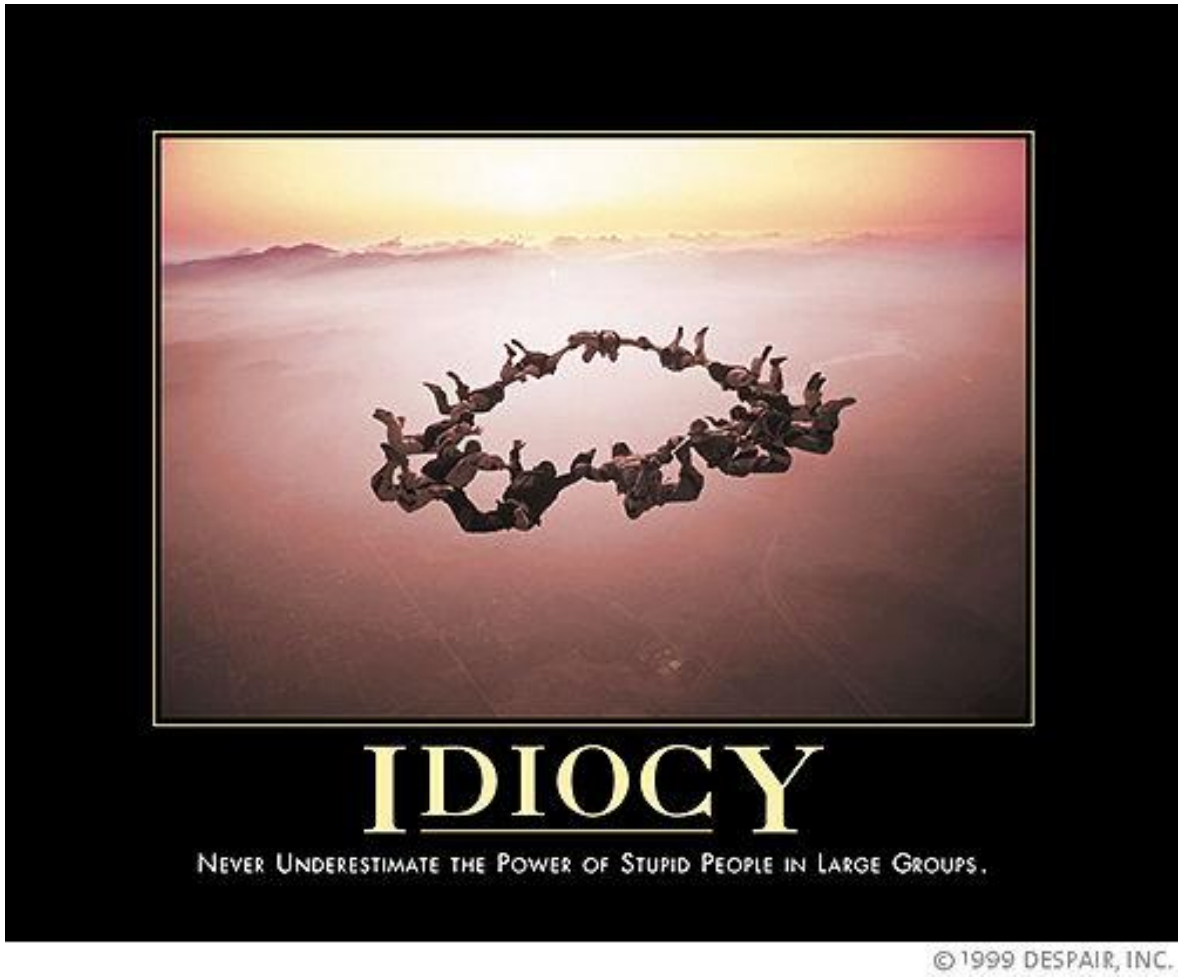
Innovation – for the masses?



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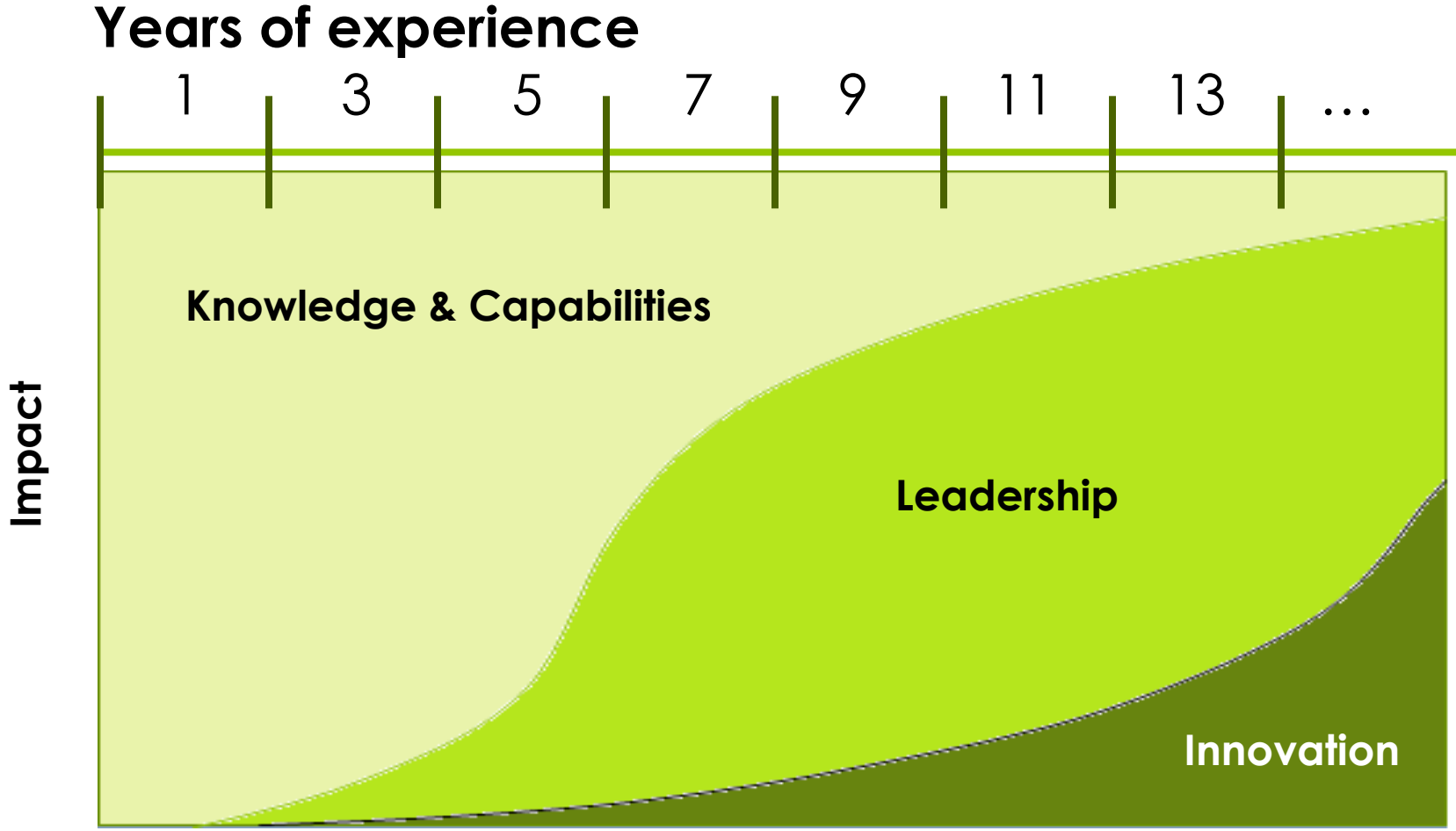
Innovation – for the masses?



Inspired by Michael Bair, Principal Engineer, Intel

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Recap:

Innovate! But…

- Not before you know a lot…
- Not before you find out what others did…
- Not if you can buy it…
- Not if you can't take the risk…
- Not by everyone…

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So..

when, exactly?

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What's the goal?

- Excitement
- Interest
- Retention

- Improvement
- Competitive edge
- Success

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What's the goal?

- Excitement
- Interest
- Retention

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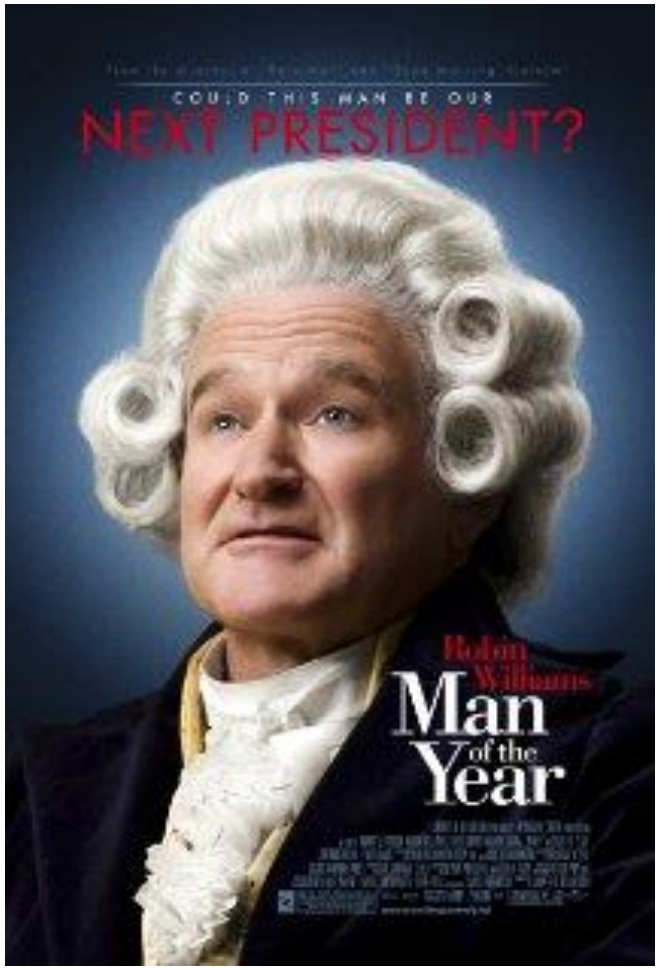

The Process is the Success

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What's the goal?

- Improvement
- Competitive edge
- Success

"Sustainable Innovation"

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Some *(innovative?)* ideas...

* there is no new thing under the sun!...

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A different look at Innovation

"Creativity… consists largely of **rearranging what we know** in order to find out what we do not know"

George Kneller, Professor

Ph.D., Philosophy, Columbia University

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A different look at Innovation

"innovation" is defined as "introducing something new"

"... it only needs to be better than what was there before."

Shyamalee Bhand

Testing-Process COE Lead at Capgemini

QA&Test 2013 abstract

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Continuous Improvement

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Small-scale Innovation

Improvement = Innovation

Enjoy what's out there:

- Steal with Pride
- Drag in the Wheel

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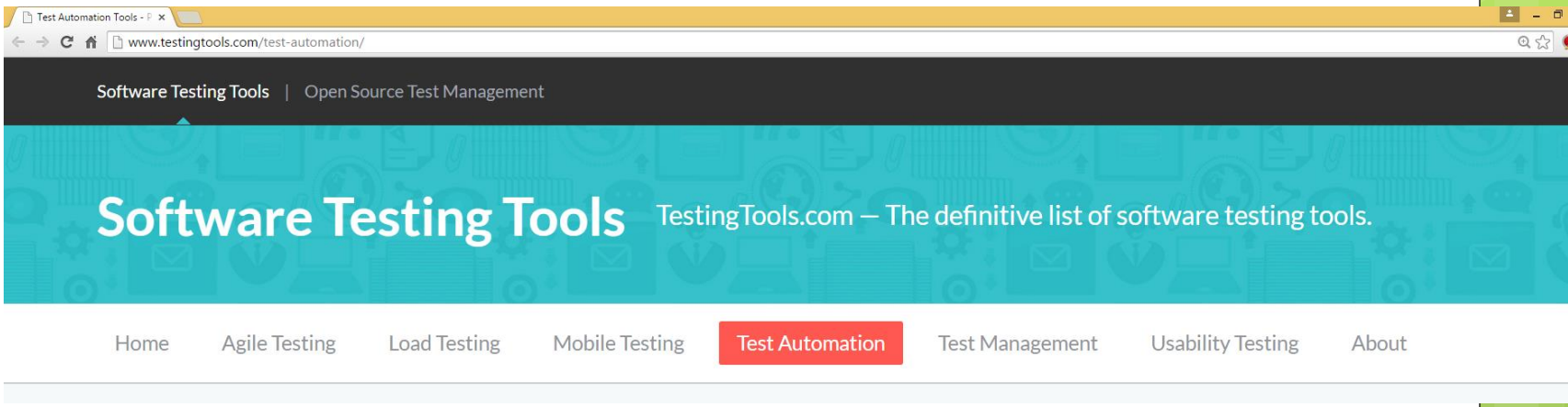
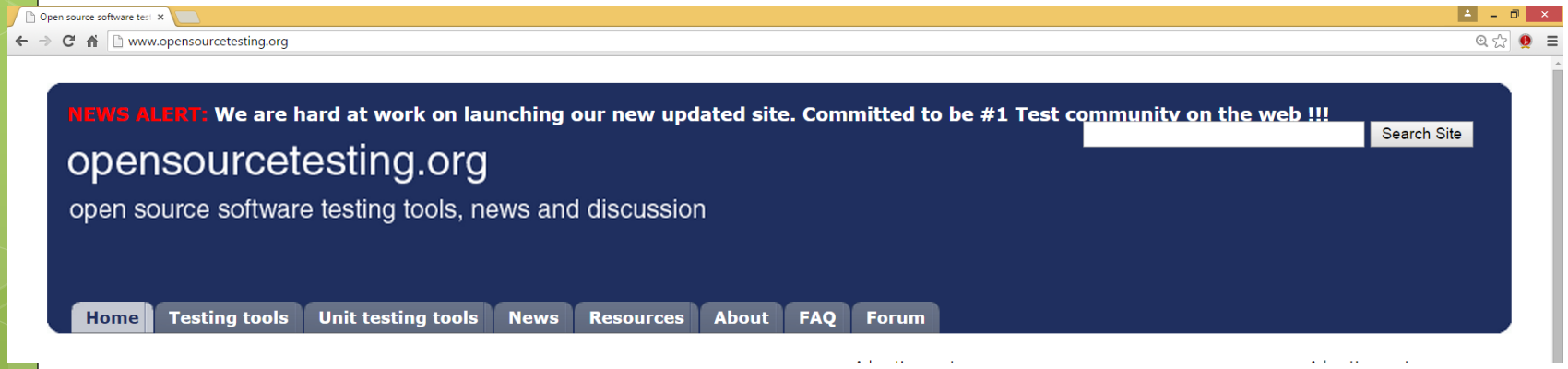
Small scale Innovation





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Simple tools with high impact

(My favorites)

- PerlClip (James Bach; http://www.satisfice.com/tools.shtml)
- PICT

(http://blogs.msdn.com/b/nagasatish/archive/2006/11/30/pairwise-testing-pict-tool.aspx)

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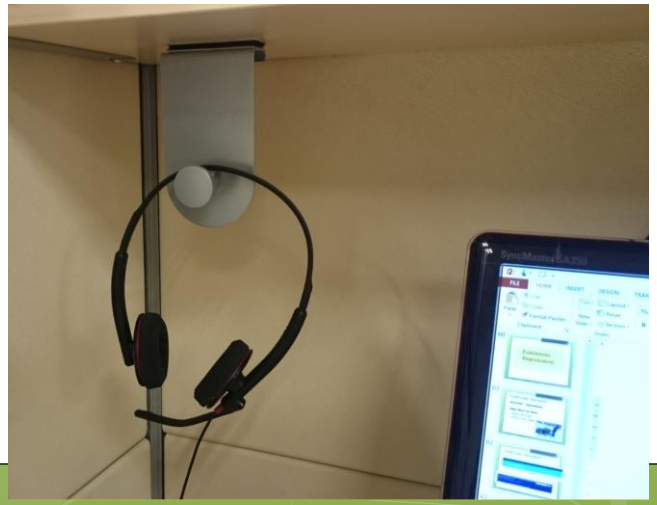
Every-day, routine small improvements

- Streamline a test cases
- Add coverage to a test case
- Small changes in the way we do things



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Every-day, routine small improvements

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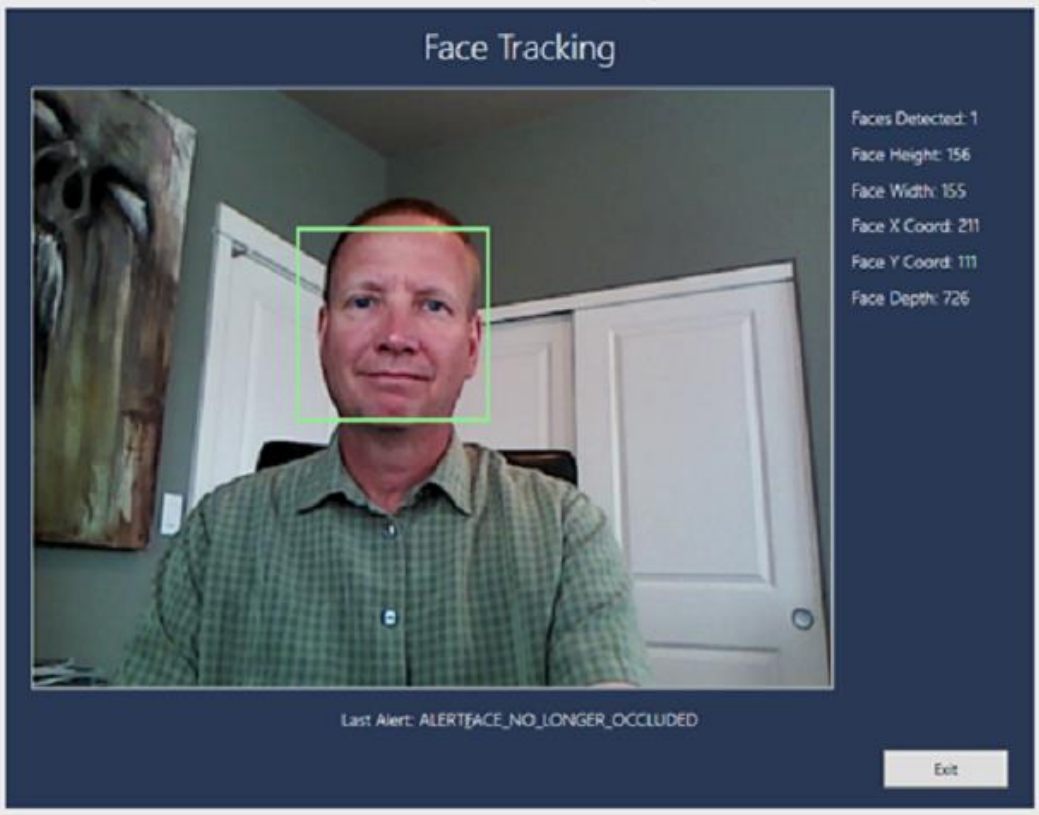
Drag in the Wheel...



https://software.intel.com/en-us/articles/intel-realsense-depth-camera-r200-code-sample-face-tracking

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Drag in the Wheel… Combinatorial coverage

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	…
30cm	Nolight	White	None	0	Black	Eyeglasses	Clean shaved	…
50cm	50lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	…
70cm	100lux	Olive	Medium	20	Blond	Rings	Short	…
100cm	200lux	Brown	Fast	30	Red	Earings	Long	…
	500lux	DarkBrown		40	White	Necklace	VeryLong	…
	1000lux	Black		50		Hat	ThinnMoustache	…
	5000lux	Asian				Earphones	ThickMoustache	…

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Combinatorial coverage

- One way

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair
50cm	50lux	LightBrown	Slow	30	Black	Earphones	Clean shaved
100cm	100lux	Olive	Medium	40	Blond	Necklace	VeryLong
70cm	500lux	Brown	Fast	10	White	Rings	Short
30cm	Nolight	White	None	0	Red	Earings	Long
30cm	1000lux	DarkBrown	Medium	50	Brown	Sunglasses	ThinnMoustache
50cm	5000lux	Asian	Fast	20	Blond	Hat	ThickMoustache
100cm	200lux	Black	Slow	30	White	Eyeglasses	Stubble

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Combinatorial coverage

- All pairs

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair
100cm	100lux	DarkBrown	None	50	Brown	Eyeglasses	ThinnMoustache
30cm	5000lux	LightBrown	Medium	0	Black	Earings	Long
50cm	1000lux	Black	Slow	10	White	Hat	ThinnMoustache
30cm	500lux	Asian	Fast	40	Red	Sunglasses	VeryLong
50cm	50lux	Olive	Medium	20	Blond	Rings	Short
70cm	200lux	White	None	30	Red	Earings	ThickMoustache
70cm	Nolight	LightBrown	Slow	40	Brown	Rings	Stubble
100cm	200lux	LightBrown	Fast	10	Blond	Eyeglasses	Clean shaved
30cm	50lux	Brown	Fast	30	White	Earphones	Stubble
100cm	Nolight	Brown	Slow	20	Red	Eyeglasses	Long
50cm	5000lux	LightBrown	None	50	Red	Hat	Short
100cm	1000lux	DarkBrown	Medium	30	Black	Necklace	VeryLong
30cm	500lux	LightBrown	None	20	White	Necklace	ThickMoustache
70cm	5000lux	Black	Fast	20	Brown	Earphones	Clean shaved
100cm	5000lux	DarkBrown	Slow	0	Blond	Sunglasses	ThickMoustache
70cm	1000lux	Olive	None	50	Black	Sunglasses	Clean shaved
30cm	200lux	Black	Slow	40	Black	Necklace	Short
70cm	100lux	Brown	Medium	40	Blond	Hat	VeryLong
50cm	100lux	Black	Fast	50	Blond	Earings	Stubble
30cm	Nolight	Olive	Medium	10	Black	Earphones	ThinnMoustache

66 tests

(c) M

Combinatorial coverage

- Base Choice

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	...
30cm	Nolight	White	None	0	Black	Eyeglasses	Clean shaved	...
50cm	50lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
70cm	100lux	Olive	Medium	20	Blond	Rings	Short	...
100cm	200lux	Brown	Fast	30	Red	Earings	Long	...
	500lux	DarkBrown		40	White	Necklace	VeryLong	...
	1000lux	Black		50		Hat	ThinnMoustache	...
	5000lux	Asian				Earphones	ThickMoustache	...

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Combinatorial coverage

- Base Choice

	Light							
Distance	Nolight	**Skin tone**	**Movement**	**Angle**	**Hair color**	**Accessories**	**Facial hair**	**...**
50cm	50lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
	100lux							
	200lux							
	500lux							
	1000lux							
	5000lux							

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Combinatorial coverage

- Base Choice

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	...
50cm	Nolight	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
	50lux							
	100lux							
	200lux							
	500lux							
	1000lux							
	5000lux							

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Combinatorial coverage

- Base Choice

	Light							
	Nolight							
Distance	50lux	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	...
50cm	100lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
	200lux							
	500lux							
	1000lux							
	5000lux							

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Combinatorial coverage

- Base Choice

	Light							
	Nolight							
	50lux							
Distance	100lux	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	...
50cm	200lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
	500lux							
	1000lux							
	5000lux							

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Combinatorial coverage

- Base Choice

Distance	Light	Skin tone	Movement	Angle	Hair color	Accessories	Facial hair	...
50cm	50lux	White	Slow	10	Brown	Sunglasses	Stubble	...
		LightBrown						
		Olive						
		Brown						
		DarkBrown						
		Black						
		Asian						

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Combinatorial coverage

- Base Choice

		Skin tone						
Distance	Light	White	Movement	Angle	Hair color	Accessories	Facial hair	...
50cm	50lux	LightBrown	Slow	10	Brown	Sunglasses	Stubble	...
		Olive						
		Brown						
		DarkBrown						
		Black						
		Asian						

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Combinatorial coverage

- Base Choice

		Skin tone						
		White						
Distance	**Light**	LightBrown	**Movement**	**Angle**	**Hair color**	**Accessories**	**Facial hair**	**...**
50cm	50lux	Olive	Slow	10	Brown	Sunglasses	Stubble	...
		Brown						
		DarkBrown						
		Black						
		Asian						

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Small scale Innovation

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Proper environment

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Innovation-friendly environment

G80/20gle™

Windows Mobile

Incubation Week

Adobe Live 2011

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Innovation-friendly environment

"Innovation Week" @ Intel Jerusalem

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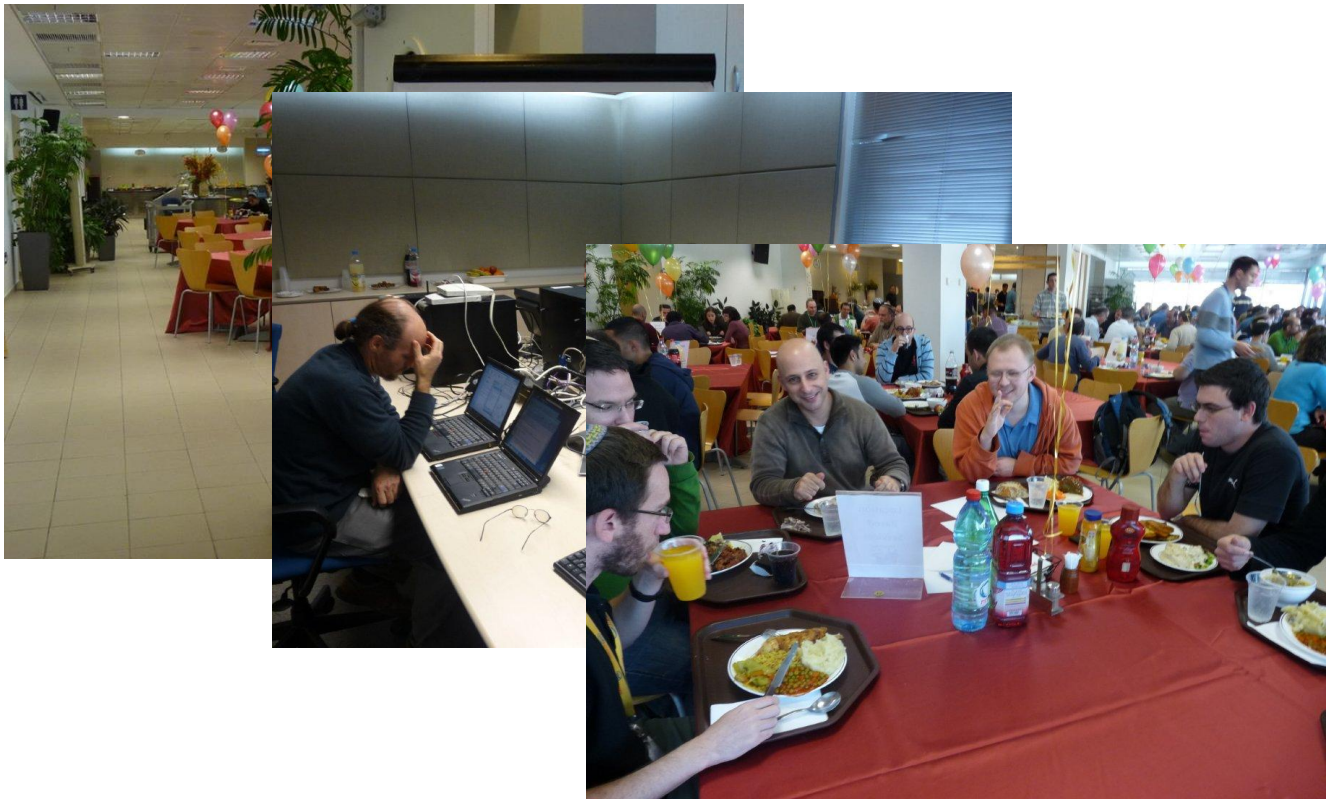
Innovation-friendly environment

"Innovation Week" @ Intel Jerusalem



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Small-Scale-Innovation-friendly environment

Active

- Bug fests, Hackathons
- Exploratory testing
- Brain storming
- …

Seeding

- "Smoking corner"
- Technical forums
- Technology update lectures
- Conferences

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Still looking for

"Real Innovation"?

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Questioning the Status Quo

"A prudent question is one half of wisdom"

Francis Bacon, 1561 – 1626, English philosopher, statesman, scientist, lawyer, jurist, author and pioneer of the scientific method

Not to be mixed with the artist…

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Questioning the Status Quo

"To be able to ask a question clearly is two-thirds of the way to getting it answered"

John Ruskin, 1819 – 1900, English art critic and social thinker, a poet and an artist

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¾ anyone?

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Testing challenges – old stuff

- Live, useful test documents
- Scaling known solutions
- Effective automation
- [your own challenge here]

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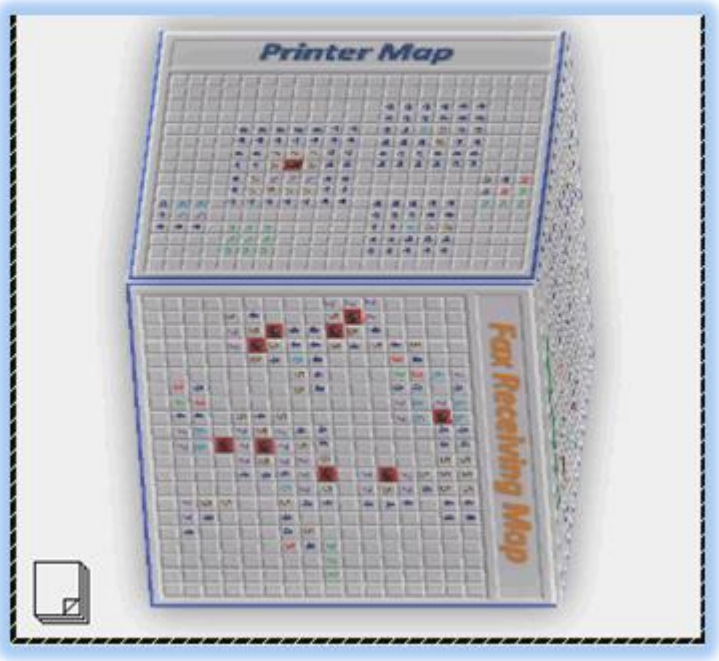
Example: Scaling known solutions

- Automation of Risk-Based parameters update

Interop Maps iRBA 3D-Cube



Source: Eli Menasheof, Intel, as presented in SIGiST Israel, June 2011

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Example: Is test-code reuse overrated?

- Test applications
  - Feature 1 tests
  - Feature 2 tests
  - Feature 3 tests
  - Feature 4 tests
  - Feature 5 tests
  - Libraries
    - Logging
    - Output parser
    - Trafic generator

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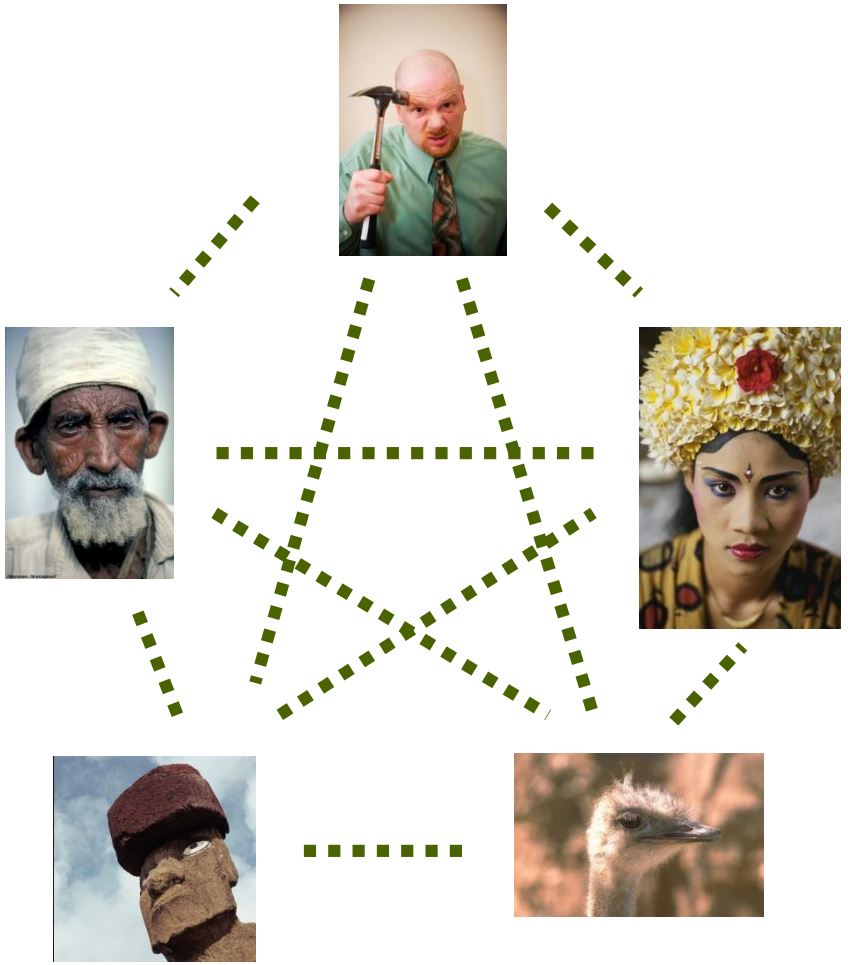
Example: Is test-code reuse overrated?

- Test applications
  - Feature 1 tests
    - Trafic generator
  - Feature 2 tests
    - Logging
    - Output parser
    - Trafic generator
  - Feature 3 tests
    - Output parser
    - Trafic generator
  - Feature 4 tests
    - Logging
  - Feature 5 tests
    - Logging
    - Output parser
    - Trafic generator



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Testing challenges – new stuff

- Objective evaluation of video quality
- Cloud services
- Computer Vision
- …
- [your own challenge here]

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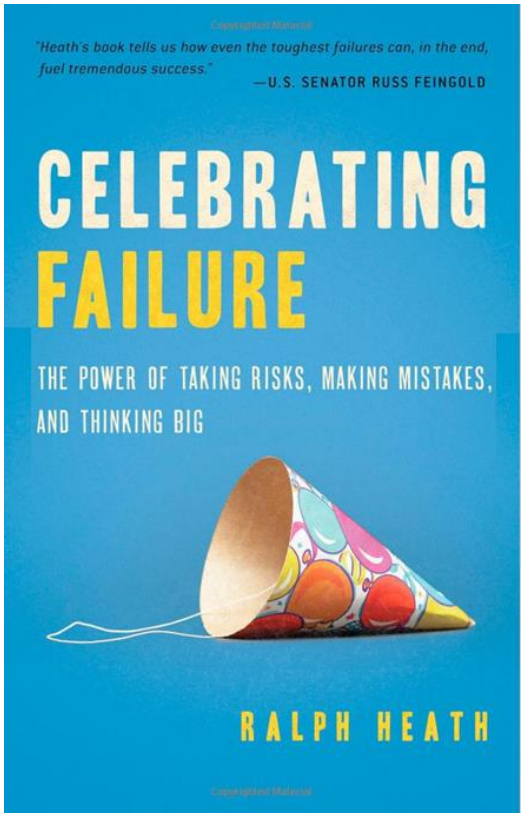
Failure tolerant environment

"... praise the individual's intention, risk-taking approach, or whatever. Find something positive to acknowledge and celebrate."



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Recap: how come

Innovation campaigns

annoy me?

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The message…

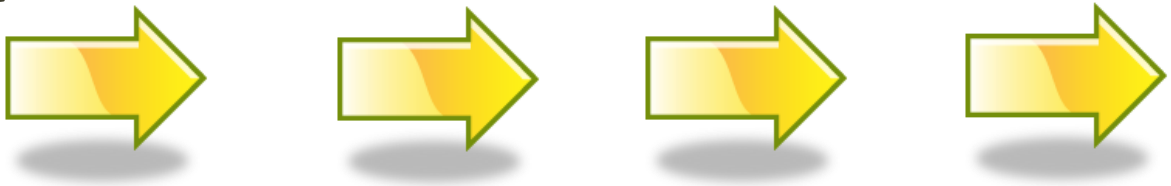
Knowledge,

Standards,

Previous art,

Experience,

Proper environment



Continuous Improvement

Sustainable, Effective Innovation

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Which means... it's mostly

Plain Hard Work

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Genius is

1%

inspiration, and

99%

perspiration.

— Thomas Edison

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Thank You!

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