Thinking Outside the Box with ASIT

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Voice of the Customer

20th century…

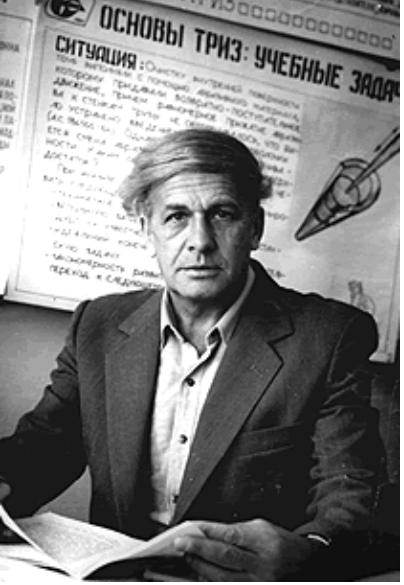
Listen to your customers and give them what they want.

21st century…

Predict what your customer wants and invent it.

Advanced Systematic Inventive Thinking (ASIT)

- Developed by Dr. Roni Horwitz (Visit www.start2think.com)
- Based on TRIZ principle of common traits of creative solutions
- A structured process to discover solutions using constraints



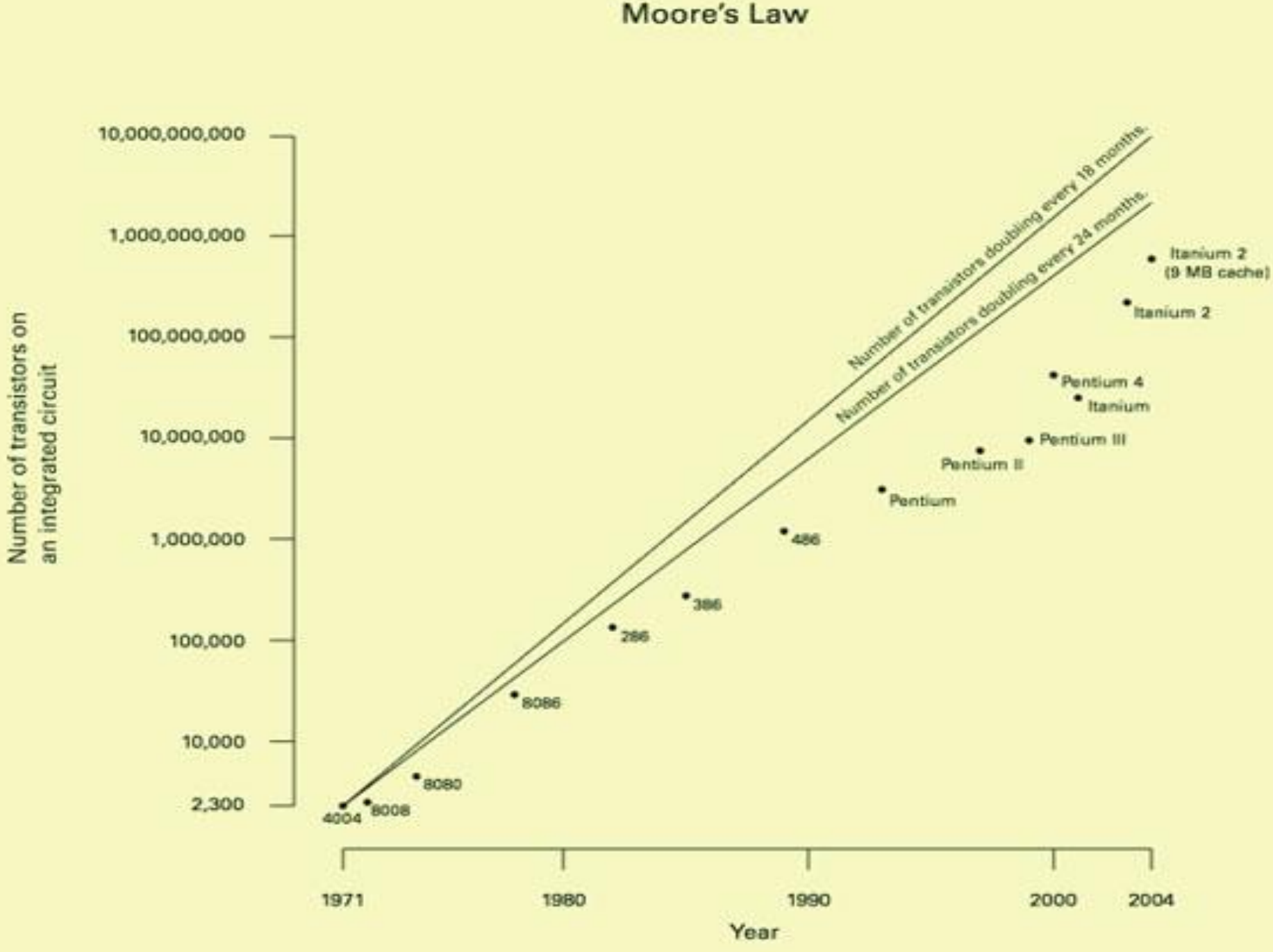
TRIZ

- Theory of Inventive Principles from Russia (Genrich Altshuller, 1926-1998).
- Systematic and structured approach (based on universal principles of invention) that directs you to patented solutions of analogous problems.
- Predicts technological change.

Law of Accelerating (non-linear) Returns

Technologies *of all kinds* double power (price, performance, capability, bandwidth, etc.) **every year**

Ray Kurzweil: Age of Spiritual Machines (1999)


Moore's Law
Number of transistors on an integrated circuit
10,000,000,000
1,000,000,000
100,000,000
10,000,000
1,000,000
100,000
10,000
2,300
Number of transistors doubling every 18 months.
Number of transistors doubling every 24 months.
Itanium 2 (9 MB cache)
Itanium 2
Pentium 4
Itanium
Pentium III
Pentium II
Pentium
486
386
286
8086
8080
8008
4004
1971
1980
1990
2000
2004
Year

Ideas from Constraints

Close your eyes and think of writing a new story…

Now, close your eyes and think of a new story about a penny…

Which was easier?

Table of Contradictions

Worsening Feature → / Improving Feature ↓		1 Weight of moving object	2 Weight of stationary object	3 Length of moving object	4 Length of stationary object	5 Area of moving object	6 Area of stationary object	7 Volume of moving object	8 Volume of stationary object	9 Speed	10 Force (Intensity)	11 Stress or pressure	12 Shape	13 Stability of the object's composition	14 Strength	15 Duration of action of moving object	16 Duration of action of stationary object
1	Weight of moving object	+	-	15, 8, 29,34	-	29, 17,	-	29, 2, 40, 28	-	2, 8, 15, 38	8, 10, 18, 37	10, 36,	10, 14,	1, 35, 19, 39	28, 27,	5, 34, 31, 35	-
2	Weight of stationary object	-	+	-	10, 1, 29, 35	-	35, 30,	-	5, 35, 14, 2	-	8, 10, 19, 35	13, 29,	13, 10,	26, 39, 1,	28, 2, 10, 27	-	2, 27, 19, 6
3	Length of moving object	8, 15, 29, 34	-	+	-	15, 17, 4	-	7, 17, 4, 35	-	13, 4, 8	17, 10, 4	1, 8, 35	1, 8, 10, 29	1, 8, 15, 34	8, 35, 29, 34	19	-
4	Length of stationary object		35, 28,	-	+	-	17, 7, 10, 40	-	35, 8, 2,14	-	28, 10	1, 14, 35	13, 14,	39, 37, 35	15, 14,	-	1, 10, 35
5	Area of moving object	2, 17, 29, 4	-	14, 15,	-	+	-	7, 14, 17, 4		29, 30, 4,	19, 30,	10, 15,	5, 34, 29, 4	11, 2, 13, 39	3, 15, 40, 14	6, 3	-
6	Area of stationary object	-	30, 2, 14, 18	-	26, 7, 9, 39	-	+	-		-	1, 18, 35, 36	10, 15,		2, 38	40	-	2, 10, 19, 30
7	Volume of moving object	2, 26, 29, 40	-	1, 7, 4, 35	-	1, 7, 4, 17	-	+	-	29, 4, 38, 34	15, 35,	6, 35, 36, 37	1, 15, 29, 4	28, 10, 1,	9, 14, 15, 7	6, 35, 4	-
8	Volume of stationary object	-	35, 10,	19, 14	35, 8, 2, 14	-		-	+	-	2, 18, 37	24, 35	7, 2, 35	34, 28,	9, 14, 17, 15	-	35, 34, 38
9	Speed	2, 28, 13, 38	-	13, 14, 8	-	29, 30, 34	-	7, 29, 34	-	+	13, 28,	6, 18, 38, 40	35, 15,	28, 33, 1,	8, 3, 26, 14	3, 19, 35, 5	-
10	Force (Intensity)	8, 1, 37, 18	18, 13, 1,	17, 19, 9,	28, 10	19, 10, 15	1, 18, 36, 37	15, 9, 12, 37	2, 36, 18, 37	13, 28,	+	18, 21, 11	10, 35,	35, 10, 21	35, 10,	19, 2	
11	Stress or pressure	10, 36,	13, 29,	35, 10, 36	35, 1, 14, 16	10, 15,	10, 15,	6, 35, 10	35, 24	6, 35, 36	36, 35, 21	+	35, 4, 15, 10	35, 33, 2,	9, 18, 3, 40	19, 3, 27	
12	Shape	8, 10, 29, 40	15, 10,	29, 34, 5,	13, 14,	5, 34, 4, 10		14, 4, 15, 22	7, 2, 35	35, 15,	35, 10,	34, 15,	+	33, 1, 18, 4	30, 14,	14, 26, 9,	
13	Stability of the object's composition	21, 35, 2,	26, 39, 1,	13, 15, 1,	37	2, 11, 13	39	28, 10,	34, 28,	33, 15,	10, 35,	2, 35, 40	22, 1, 18, 4	+	17, 9, 15	13, 27,	39, 3, 35, 23
14	Strength	1, 8, 40, 15	40, 26,	1, 15, 8, 35	15, 14,	3, 34, 40, 29	9, 40, 28	10, 15,	9, 14, 17, 15	8, 13, 26, 14	10, 18, 3,	10, 3, 18, 40	10, 30,	13, 17, 35	+	27, 3, 26	
15	Duration of action of moving object	19, 5, 34, 31	-	2, 19, 9	-	3, 17, 19	-	10, 2, 19, 30	-	3, 35, 5	19, 2, 16	19, 3, 27	14, 26,	13, 3, 35	27, 3, 10	+	-
16	Duration of action by stationary object	-	6, 27, 19, 16	-	1, 40, 35	-		-	35, 34, 38	-				39, 3, 35, 23		-	+
17	Temperature	36,22, 6, 38	22, 35, 32	15, 19, 9	15, 19, 9	3, 35, 39, 18	35, 38	34, 39,	35, 6, 4	2, 28, 36, 30	35, 10, 3,	35, 39,	14, 22,	1, 35, 32	10, 30,	19, 13, 39	19, 18,
18	Illumination intensity	19, 1, 32	2, 35, 32	19, 32, 16		19, 32, 26		2, 13, 10		10, 13, 19	26, 19, 6		32, 30	32, 3, 27	35, 19	2, 19, 6	
19	Use of energy by moving object	12,18 28,31	-	12, 28	-	15, 19, 25	-	35, 13, 18	-	8, 35, 35	16, 26,	23, 14, 25	12, 2, 29	19, 13,	5, 19, 9, 35	28, 35, 6,	-
20	Use of energy by stationary object	-	19, 9, 6, 27	-		-		-		-	36, 37			27, 4, 29, 18	35		
21	Power	8, 36, 38, 31	19, 26,	1, 10, 35, 37		19, 38	17, 32,	35, 6, 38	30, 6, 25	15, 35, 2	26, 2, 36, 35	22, 10, 35	29, 14, 2,	35, 32,	26, 10, 28	19, 35,	16

40 Inventive Principles

1. Segmentation
2. Extraction
3. Local Quality
4. Asymmetry
5. Combining
6. Universality
7. Nesting
8. Counterweight
9. Prior counter-action
10. Prior action
11. Cushion in advance
12. Equipotentiality
13. Inversion
14. Spheroidality
15. Dynamicity
16. Partial or overdone action
17. Moving to a new dimension
18. Mechanical vibration
19. Periodic action
20. Continuity of a useful action
21. Rushing through
22. Convert harm into benefit
23. Feedback
24. Mediator
25. Self-service
26. Copying
27. Inexpensive, short-lived object
28. Replacement of a mechanical system
29. Pneumatic or hydraulic construction
30. Flexible membranes or thin film
31. Use of porous material
32. Changing the color
33. Homogeneity
34. Rejecting and regenerating parts
35. Transformation of the physical and chemical states of an object
36. Phase transformation
37. Thermal expansion
38. Use strong oxidizers
39. Inert environment
40. Composite materials

The Six ASIT Tools

Systematically Introducing constraints

1. *Sacrifice*
2. *Parasite*
3. *Unification*
4. *Multiplication*
5. *Division*
6. *Breaking Symmetry*

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ASIT Exercise

Group one:

Suggest new ideas that improve the product.

Group two:

Suggest ideas that will make the product worse.

Next, Each group take half of the "worse" ideas and use them to create a new product.

ASIT's Sacrifice Tool

A loud crash is heard from your kids room. You enter to find a TV with a broken screen on the floor, but the sound still works.

What can you do with the TV?

Besides throwing it away…

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ASIT's Sacrifice Tool

1. Make a list of all product attributes/parts ranked according to importance.
2. Remove the first attribute and define a new product.
3. Develop the idea, determine the target market and customer benefits.
4. Repeat with the next attribute.

ASIT's Parasite Tool

Examples:

Remove the screen from the TV and find another product in the home to take the role of the TV screen…

Any ideas?

How about a toothbrush without a handle?

Any ideas?

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ASIT's Parasite Tool

1. Make a list of the main product parts.
2. Remove the first main part.
3. Choose an object in the environment that will replace the missing function, then define the new product.
4. Develop the idea, determine the target market and customer benefits.
5. Repeat with another part and environment object.

ASIT's Unification Tool

1. Start with a product.
2. Choose another product in the environment to take the role, action or function of the first product and define a new product.
3. Develop the idea, determine the target market and customer benefits.
4. Repeat with another product in the environment.

Unification is the opposite of the Parasite tool.

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ASIT's Unification Tool

Examples:

Take candles and a cake…

Any ideas?

How about a new bicycle lock?

Any ideas?

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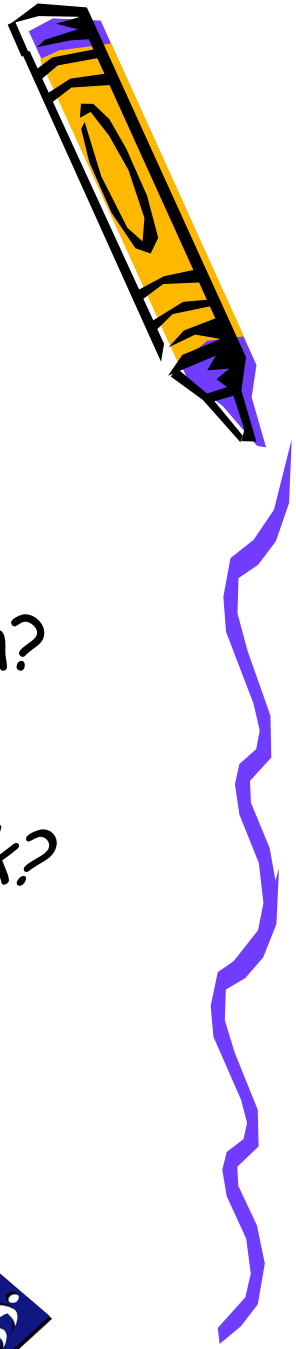
ASIT's Multiplication Tool

Example:

You spill red wine on
a white table cloth.

How do you remove the stain?

How does a vaccine work?



ASIT's Multiplication Tool

1. Make a list of the main product parts.
2. Select one part.
   The new product is the original product with the addition of a new object of the same kind of part.
3. Develop the idea, determine the target market and customer benefits.
4. Repeat with another part.

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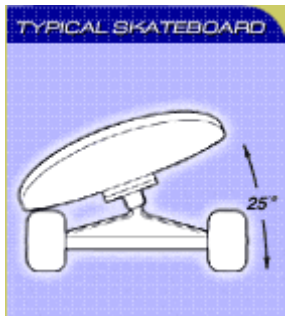
ASIT's Multiplication Tool

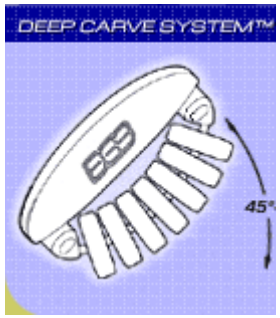


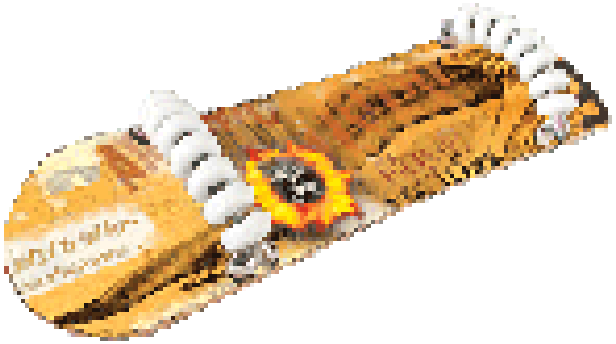
Example:

What could you do with a skateboard?

How about adding more wheels to make a Flowboard?

http://www.flowlab.com





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ASIT's Division Tool

Exercise – Division Race:

- Split into two groups.
- Fold your paper six times.
- The winner is the one who is **the last** to fold his/her page.

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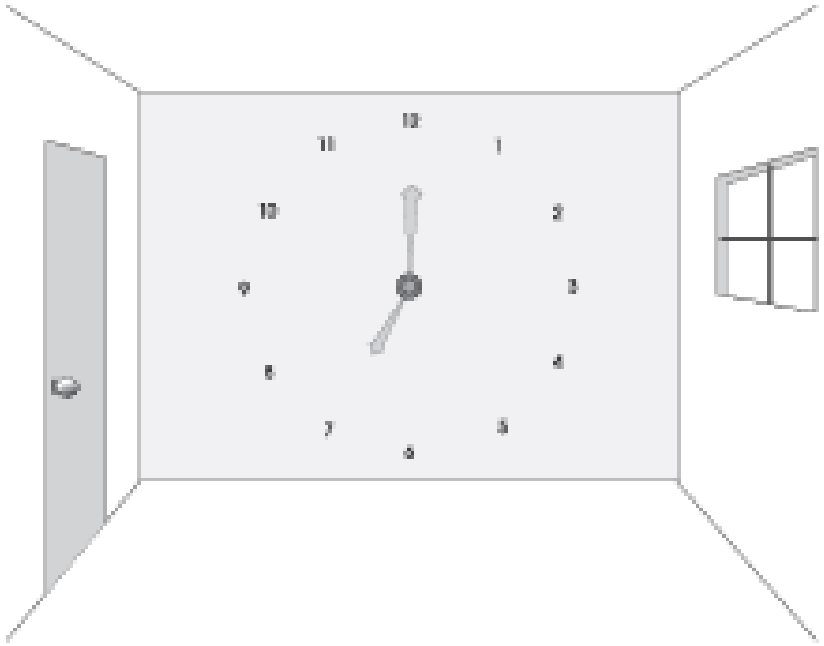
ASIT's Division Tool

1. Make a list of the main product parts.
2. Select one part.
   Define a new product in which the selected part will be separated from the product.
3. Consider different organizations of the product in which the part that was separated will be moved to a different place within or outside the product.
4. Develop the idea, determine the target market and customer benefits.
5. Repeat with another part.

Similar to unification, parasite, multiplication…
There is some overlap between ASIT tools.

ASIT's Division Tool

What could you divide?



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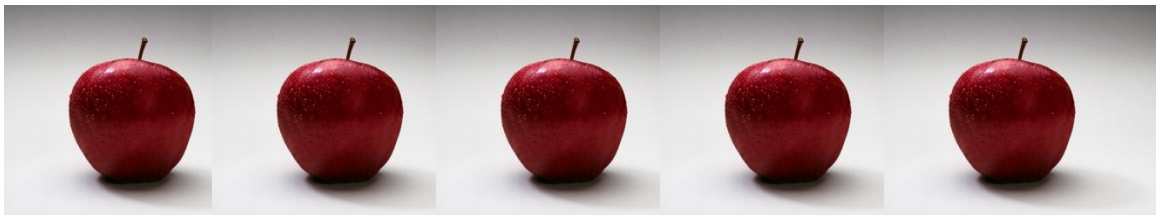
ASIT's Division Tool

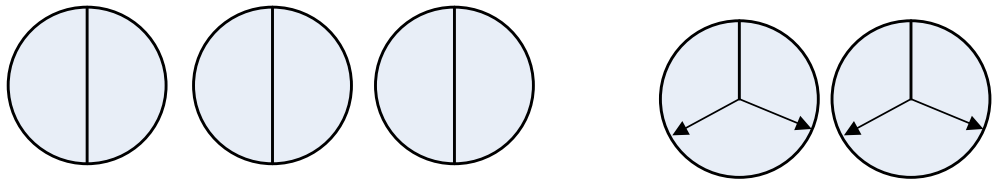
- Layaway plan. Divides payment over time into small pieces.
- Slice a bar of soap into small, single use, pieces.
- Single serving packages of food.
- Start paying a mortgage before you buy a house.

ASIT's Breaking Symmetry Tool

Exercise – Apple Sharing

- You have six friends and five apples.
- How do you cut the apples to give each friend 5/6 of an apple?





ASIT's Breaking Symmetry Tool

1. Make a list of the products main attributes/characteristics.
2. List the products dimensions:
    1. Space
    2. Time
    3. User
    4. Environment
    5. Group/categories (parts that appear in a group of identical objects)
    6. Attributes/characteristics (that may be used as dimensions)
3. Select an attribute and a dimension, then create a new product:
   For each [dimension value] there will be [characteristic value].
4. Develop the idea, determine the target market and customer benefits.
5. Repeat with another part.

ASIT's Breaking Symmetry in Space

- Characteristic: Firmness of mattress.
- Dimension: Length from space group.
- Product: firmness of mattress changes along length of mattress.

ASIT's Breaking Symmetry in Time

An exhausted couple was hiking along the road and heard a bus coming. They considered taking the bus but decided to hike instead.

A few moments later they heard a loud crash. They ran to the bus to discover a big rock had fallen, hit the bus, and killed all the passengers.

The women exclaimed *"Too bad we didn't take the bus."* Her partner looked at her in horror and said *"are you crazy?"*

What do you think the women said in return?

ASIT's Breaking Symmetry in the Environment

How could you break symmetry using sunglasses?

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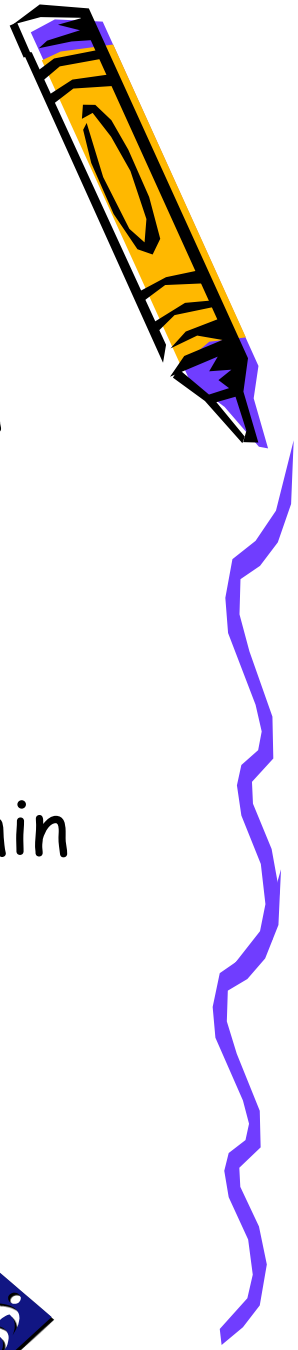
ASIT vs. Brainstorming



- In brainstorming, systematic thinking is the enemy.
- In ASIT, we move in an organized way from tool to tool, object to object, within a closed world.

Common factor: criticism is not welcome!

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Creative tips

- Challenge rules and assumptions
- Simplify

"Everything should be made as simple as possible, but not simpler." Albert Einstein

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ASIT Exercise

Imagine that you are a platoon commander with orders to take the nearby fort.

What are your alternatives to taking the fort?

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Projection vs Position Thinking

- Projection responses
  - Take by force, attack; Overcome power level;
  - External change based on adding something to solve the problem
- Position responses
  - Take by not taking; Reduce power level;
  - Starve, burn, or smoke them out; take away sleep with load noise; take away morale with radio broadcasts, leaflets;
  - Internal change based on taking something away to solve the problem

Questions to find a "creative" solution

Similarity

Am I not looking too far from the most obvious solution?

The Problem Is the Solution

Maybe I'll try to use the object that I wanted to get rid of?

Uniqueness

Am I using the unique properties of the problem?

Ideality

Am I not trying to do more than is really needed?

ASIT Premier, Roni Horowitz

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Course Summary

Paradigms:
- you see what you believe

TRIZ
- Technology Evolution

ASIT
- *Sacrifice*
- *Parasite*
- *Unification*
- *Multiplication*
- *Division*
- *Breaking Symmetry*

The superfluous is the most necessary.
-- Voltaire

What we really want is for things to remain the same but get better.
-- Sydney J. Harris

(American journalist for the Chicago Daily News)