

# **Systematic Win-Win Problem Solving In A Stakeholder-Conflict Business Environment**



Darrell Mann: 'Systematic Innovation' (UK)  
Eric Spain: 'Innovation Insight' (HK)

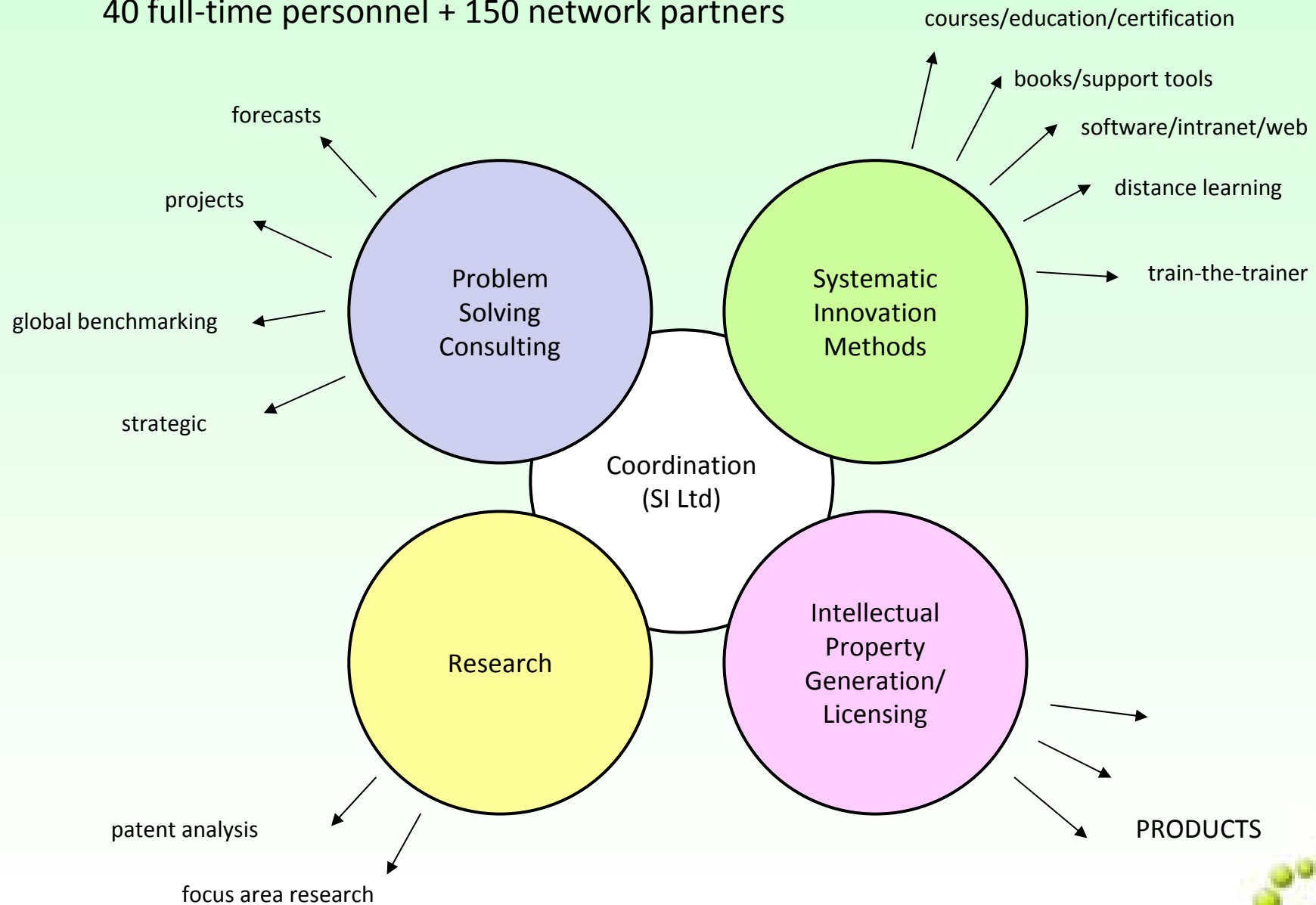


# Who and What



# Systematic Innovation - Overall Business Model

40 full-time personnel + 150 network partners





HM TREASURY



BEKAERT



HEIDELBERG

ILFORD

YOUR PARTNERS IN IMAGING

MGI COUTIER

BAE SYSTEMS

Electrolux



GlaxoWellcome



Bekaert Stanwick



invent



LG Electronics

MITSUBISHI MOTORS

NEWHOLLAND



Ford Motor Company



ALLEN & OVERY



Raychem



PILKINGTON



SHARP

SIEMENS



THE DOCUMENT COMPANY

XEROX



Hong Kong Productivity Council  
香港生產力促進局



United Utilities



# This talk

1. The TRIZ beginnings.
2. How TRIZ deals with Contradictions
3. The development into  
    ‘Systematic innovation’ for  
    ‘Breakthrough Design’.
4. Example of an input into the  
    ‘Breakthrough Database’.
5. How you would use it.



# TRIZ

Teoriya Resheniya Izobreatatelskikh Zadatch

**Теория Решения Изобретательских Задач**

**Theory of Inventive Problem Solving**



# The start of TRIZ

Genrich  
Altshuller  
1926- 1985

QuickTime?and a TIFF (Uncompressed) decompressor are needed to see this picture.





Q: What makes for an invention?

A: Study historical documents

**Studied 200,000 patents**

**....and made some extraordinary  
discoveries  
about the patterns of innovation.**

**Stalin's 'thanks'**

**Siberia: created a methodology**

**Later work**



# The Five Pillars of TRIZ Methodology

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# One Pillar: Contradictions



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The way TRIZ  
deals with contradictions  
in the physical world



Most often conflicts are solved  
using “trade-off” and “compromise”  
strategies.....  
.....sometimes called ‘optimisation’.

*What it actually means, however,  
is “everyone loses”.*





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## THE MESSAGE

- **All systems contain contradictions**
- **Powerful solutions are the ones that don't accept compromising trade-offs**
- **There are ways of 'eliminating' compromise**
- **We should actively look for contradictions**

**Solving Contradictions  
without compromise  
= 'Innovation'**



Altshuller's  
39 contradictions  
and  
40 Inventive Principles



## Altshuller: 39 Contradictions in the physical world

1. Weight of Moving Object
2. Weight of Stationary Object
3. Length of a Moving Object
4. Length of a Stationary Object
5. Area of a Moving Object
6. Area of a 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 by a Moving Object
16. Duration of Stationary of Moving Object
17. Temperature
18. Illumination Intensity
19. Use of Energy by Moving Object
20. Use of Energy by Stationary Object
21. Power
22. Loss of Energy
23. Loss of Substance
24. Loss of Information
25. Loss of Time
26. Quantity of Substance/Matter
27. Reliability
28. Measurement Accuracy
29. Manufacturing Precision
30. External harm affects the object
31. Object-generated harmful factors
32. Ease of Manufacture
33. Ease of Operation
34. Ease of Repair
35. Adaptability or Versatility
36. Device Complexity
37. Difficulty of Detecting and Measuring
38. Extent of Automation
39. Productivity



# Altshuller: The 40 Inventive Principles

1. Segmentation
2. Extraction
3. Local Quality
4. Asymmetry
5. Combination
6. Universality
7. 'Nested Doll'
8. Counterweight
9. Prior Counter-Action
10. Prior Action
11. Prior Cushioning
12. Equi-potentiality
13. 'The Other Way Round'
14. Spheroidality
15. Dynamics
16. Partial or Excessive Action
17. Another Dimension
18. Mechanical Vibration
19. Periodic Action
20. Continuity of Useful Action
21. Skipping
22. 'Blessing in Disguise'
23. Feedback
24. Intermediary
25. Self-Service
26. Copying
27. Cheap/Short Living
28. Mechanics Substitution
29. Pneumatics and Hydraulics
30. Flexible Shells/Thin Films
31. Porous Materials
32. Colour Changes
33. Homogeneity
34. Discarding and Recovering
35. Parameter Changes
36. Phase Transitions
37. Thermal Expansion
38. Strong Oxidants
39. Inert Atmosphere
40. Composite Materials



Contradictions

Inventive Principles for each Contradiction.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
1. PROBLEM		2 4	21 26	3 9	13 23	23 29	27 25	25 6	3 5	5 7	9 2	15 8	2 3	11 20	11 26	25 11	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25			
2. PROBLEM	2 4		26 24	27 9	13 26	5 2	26 25	10 2	8 7	15 15	23 8	1 5	35 22	2 16	10 2	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10	25 10			
3. PROBLEM	21 26	25 24		1 29	15 25	5 8	5 29	7 26	8 15	25 29	11 8	5 13	10 25	22 7	11 7	6 10	7 15	7 40	22 24	8 10	9 10	7 19	7 2	6 26	26 2	26 2	15 19	15 19	15 19	15 19	15 19			
4. PROBLEM	9 9	27 9	1 29		8 29	24 35	5 25	5 40	11 29	7 3	5 35	1 11	1 2	19 7	13 22	6 1	11 7	1 2	40 38	9 10	38 19	1 3	30 8	35 2	2 3	26 3	2 40	29 20	25 1	1 29	9 14			
5. PROBLEM	2 13	12 26	15 25	8 29		5 8	15 29	15 40	7 5	3 40	8 35	2 33	5 2	5 26	26 40	6 1	6 7	6 28	5 35	28 40	4 7	1 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8	3 8		
6. PROBLEM	22 29	27 1	5 6	24 35	5 8		15 25	1 25	8 27	2 25	7 13	15 35	9 5	15 16	10 25	25 25	19 10	5 6	8 10	9 40		13 30	6 2	22 24	35 22	2 15	1 15	12 17	26 1	25 1	25 1			
7. PROBLEM	25 6	25 23	1 10	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	10 40	
8. PROBLEM	25 6	10 2	7 26	5 40	15 40	1 25	1 24	10 27	10 15	5 2	3 10	15 2	29 12	1 25	9 10	15 2	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	35 25	
9. PROBLEM	9 5	6 7	6 15	11 23	7 5	9	8 27	10 27	8 6	5 35	5 35	13 22	5 26	5 10	15 25	35 24	14 3	5 35	13 22	5 25	25 28	35 2	25 10	13 28	35 2	25 10	13 28	2 40	25 2	25 10	25 9	9 1		
10. PROBLEM	5 7	15 25	25 29	7 3	28 40	3 25	26 1	10 15	5 8	8 2	5 30	35 29	29 5	29 11	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	29 10	
11. PROBLEM	6 2	22 6	11 6	5 35	9 35	7 13	5 2	5 17	3 25	6 2	7 35	35 1	7 8	6 30	11 29	29 11	29 11	11 23	23 11	10 3	13 4	5 25	13 17	10 1	35 3	13 17	10 1	35 3	13 17	29 30	6 5	2 29	15 5	
12. PROBLEM	15 6	10 5	5 13	1 11	2 33	15 35	5 25	5 2	5 26	5 30	7 35	5 2	3 24	27 3	1 12	10 24	10 12	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24	10 24
13. PROBLEM	1 2	10 19	10 25	1 2	5 2	35 5	2 25	9 10	13 22	5 25	3 24	10 29	5 15	15 19	9 15	29 19	10 2	19 25	35 6	35 25	25 1	37 30	25 25	29 2	29 13	29 1	10 27	16 15	25 2	15 25	5 27	5 27		
14. PROBLEM	11 29	11 13	22 7	13 7	5 35	15 16	2 19	13 2	5 26	29 29	7 8	27 9	10 29	5 10	1 25	19 10	2 27	24 25	5 35	25 22	5 37	6 16	2 13	2 13	2 13	2 13	2 13	2 13	2 13	2 13	2 13	2 13	2 13	
15. PROBLEM	11 26	10 26	11 7	13 22	28 40	10 25	12 9	29 12	5 10	29 5	9 30	1 29	5 19	5 10	10 31	10 29	29 30	5 25	5 8	13 25	3 8	3 35	2 30	3 35	2 30	3 35	2 30	3 35	2 30	3 35	2 30	3 35	2 30	
16. PROBLEM	25 11	10 9	6 10	8 1	9 1 9	35 29	1 25	1 25	13 25	29 11	11 23	35 24	25 10	1 25	10 31	10 31	10 31	2 25	22 25	13 22	28 25	29 25	10 28	10 28	27 35	2 35	27 17	35 19	13 25	11 13	11 25	25 28		
17. PROBLEM	15 25	6 1	7 15	11 7	8 7	13 10	2 2	9 12	9 26	29 10	23 11	2 25	25 27	10 1	2 25	25 10	25 10	5 4	27 35	28 25	24 25	29 3	25 1	1 35	2 24	25 1	17 25	25 1	15 25	25 24	1 25	1 25		
18. PROBLEM	5 2	6 1	4 26	1 2	9 38	5 8	27 9	25 25	24 14	29 12	2 11	10 27	2 2	2 27	29 20	22 25	5 4	15 29	15 29	10 2	19 25	35 6	3 19	10 1	24 35	15 26	2 35	1 3	29 3	13 2	40 29	17 22	27 15	
19. PROBLEM	15 27	15 10	1 26	32 28	20 10	10 12	10 25	5 4	13 25	10 1	26 2	30 35	13 35	10 5	2 25	15 9	25 10	5 4	9 19	10 1	24 35	15 26	2 35	1 3	29 3	13 2	40 29	17 22	27 15	10 40	2 30	2 30		
20. PROBLEM	15 27	15 10	1 26	32 28	20 10	10 12	10 25	5 4	13 25	10 1	26 2	30 35	13 35	10 5	2 25	15 9	25 10	5 4	9 19	10 1	24 35	15 26	2 35	1 3	29 3	13 2	40 29	17 22	27 15	10 40	2 30	2 30		
21. PROBLEM	14 13	7 25	7 19	38 13	4 7	5 15	7 12	13 1	13 22	7 5	10 3	2 35	35 13	25 22	13 25	28 25	24 25	7 20	23 7	18 17		2 29	29 31	39 3	39 10	29 27	40 17	25 1	25 2	2 10	10 40			
22. PROBLEM	27 13	27 25	7 2	1 3	1 6 9	13 32	26 27	13 15	5 25	2 27	13 4	29 35	29 2	5 27	9 6	10 29	29 9	1 2	25 3	1 3	2 29		2 27	22 10	10 21	27 25	15 10	10 25	2 7	2 29	11 13			
23. PROBLEM	6 25	6 19	6 26	30 6	2 8	8 2	6 35	2 27	25 29	2 29	5 31	8 16	2 1	10 29	25 1	6 31	29 31	2 3	29 31	2 3	29 31	2 3	29 31	2 3	29 31	2 3	29 31	2 3	29 31	2 3	29 31	2 3		
24. PROBLEM	11 25	25 27	26 2	35 2	9 26	22 24	2 25	22 25	35 2	9 26	13 11	11 35	35 3	2 19	9 35	27 25	1 25	25 35	11 24	39 3	22 10	6 30		35 3	2 25	35 11	22 19	9 15	11 25	25 24	2 30	2 30		
25. PROBLEM	25 29	29 26	26 2	2 3	9 26	35 22	1 25	25 22	25 10	9 26	10 1	10 35	25 10	2 15	20 20	2 25	2 24	25 3	25 3	25 13	39 10	10 21	1 28	35 3		1 15	9 1	1 1	25 3	11 25	25 40			
26. PROBLEM	15 25	16 5	15 19	11 24	25 28	1 5	2 27	25 26	8 11	29 22	13 2	2 27	34 25	1 10	19 10	9 40	4 10	12 26	13 2	25 10	30	35 40	4 10	19 29	28 29	13 34		1 16	10 2	10 12	14 12	30 25		
27. PROBLEM	30 25	25 29	15 1	2 40	29 27	1 15	1 30	10 15	2 40	29 1	13 17	1 17	15 1	15 17	29 29	25 13	17 25	9 30	1 30	29 30	40 17	15 10	25 6	35 11	3 1	15 34		15 29	25 15	17 40	25 30			
28. PROBLEM	17 25	5 2	5 6	28 30	25 28	12 17	25 5	25 20	25 2	10 16	29 30	35 19	29 24	2 4	20 2	5 1	20 15	13 35	28 17	25 1	10 25	1 25	22 19	19 1	10 25	17 25		25 19	1 10	2 22	2 22			
29. PROBLEM	25 15	25 19	25 29	25 1	8 28	33 1	6 9	28 37	30 12	10 28	8 1	2 29	32 29	2 29	11 10	15 25	29 25	10 25	25 2	2 7	25 1	3 15	25 3	25 5	25 15	25 15		11 24	11 28					
30. PROBLEM	9 2	1 19	2 39	1 23	35 3	35 1	1 25	2 20	25 9	9 40	2 30	10 3	1 10	1 19	5 1	11 25	25 24	2 34	10 11	10 9	2 10	2 29	3 4	6	11 25	11 25	10 5	17 40	1 10	11 24		29 35		
31. PROBLEM	15 26	27 15	25 22	1 12	25 9	23 3	25 27	29 2	27 9	1 3	25 10	25 10	5 27	1 25	29 17	1 10	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	2 29	



## Section of the Matrix

	<b>Worsening Factor→</b>	Weight of Moving Object (1)	Weight of Stationary Object (2)	Length of Moving Object (3)	Length of Stationary Object (4)
	<b>Improving Factor</b>	1	2	3	4
1	Weight of Moving Object (1)			15,8,29,34	
2	Weight of Stationary Object (2)				10,1,29,35
3	Length of Moving Object (3)	8,15,29,34			
4	Length of Stationary Object (4)		35,28,40,29		
5	Area of Moving Object (5)	2,17,29,4		14,15,18,4	
6	Area of Stationary Object (6)		30,2,14,18		26,7,9,39
7	Volume of Moving Object (7)	2,26,29,40		1,7,4,35	
8	Volume of Stationary Object (8)		35,10,19,14	19,14	35,8,2,14
9	Speed (9)	2,28,13,38		13,14,8	
10	Force (Intensity) (10)	8,1,37,18	18,13,1,28	17,19,9,36	28,10
11	Stress or Pressure (11)	10,36,37,40	13,29,10,18	35,16,36	35,1,14,16
12	Shape (12)	8,10,29,40	15,10,26,3	29,34,5,4	13,14,10,7
13	Stability of object's composition (13)	21,35,2,39	26,39,1,40	13,15,1,28	37



# Example: Weight vs. Length

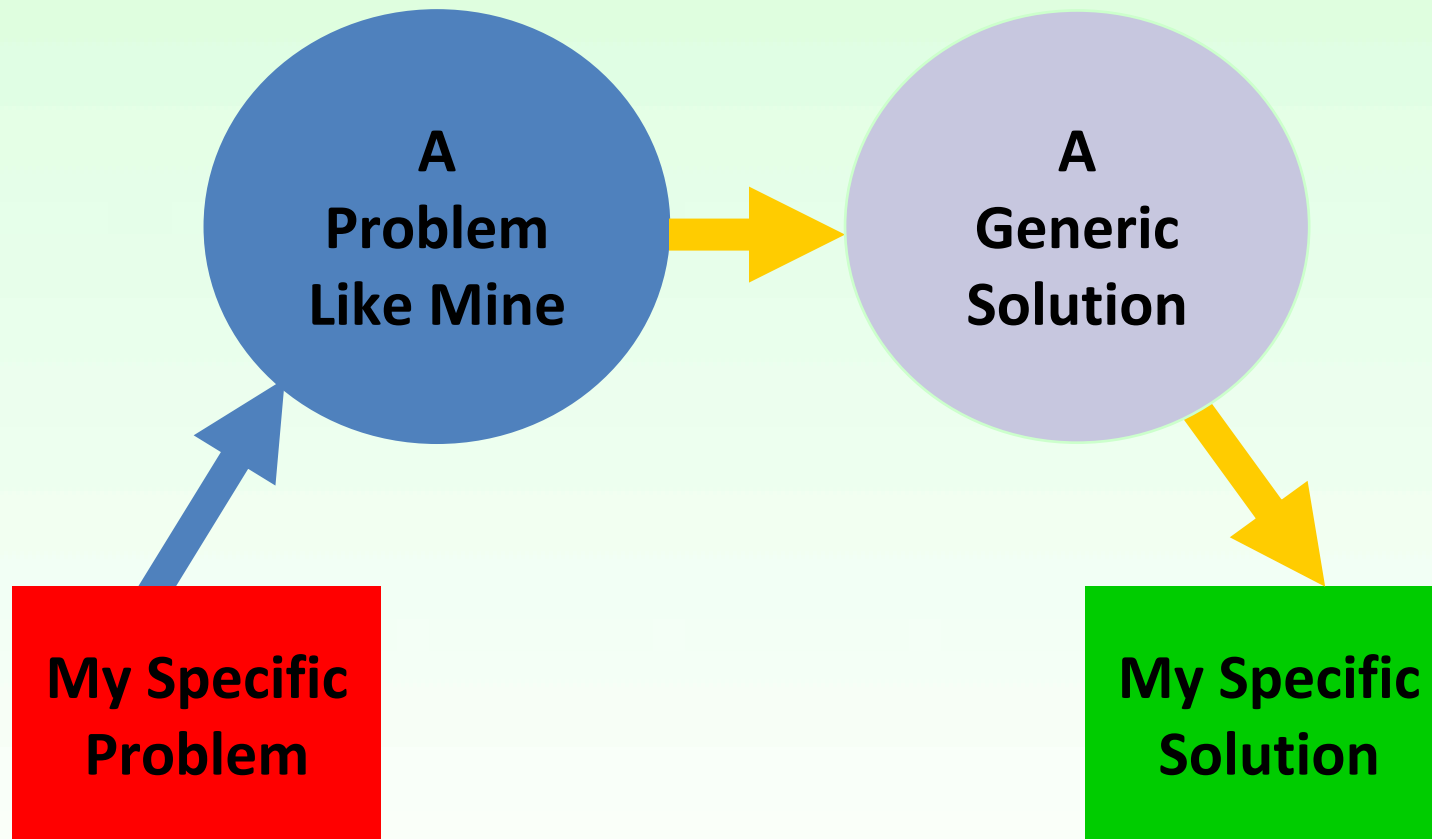
## Matrix says: think about these:

- 28. Mechanics Substitution
- 40. Composite Materials
- 29. Pneumatics and Hydraulics
- 35. Parameter Changes

.....the meaning of each is given.



## The basic TRIZ approach to contradictions



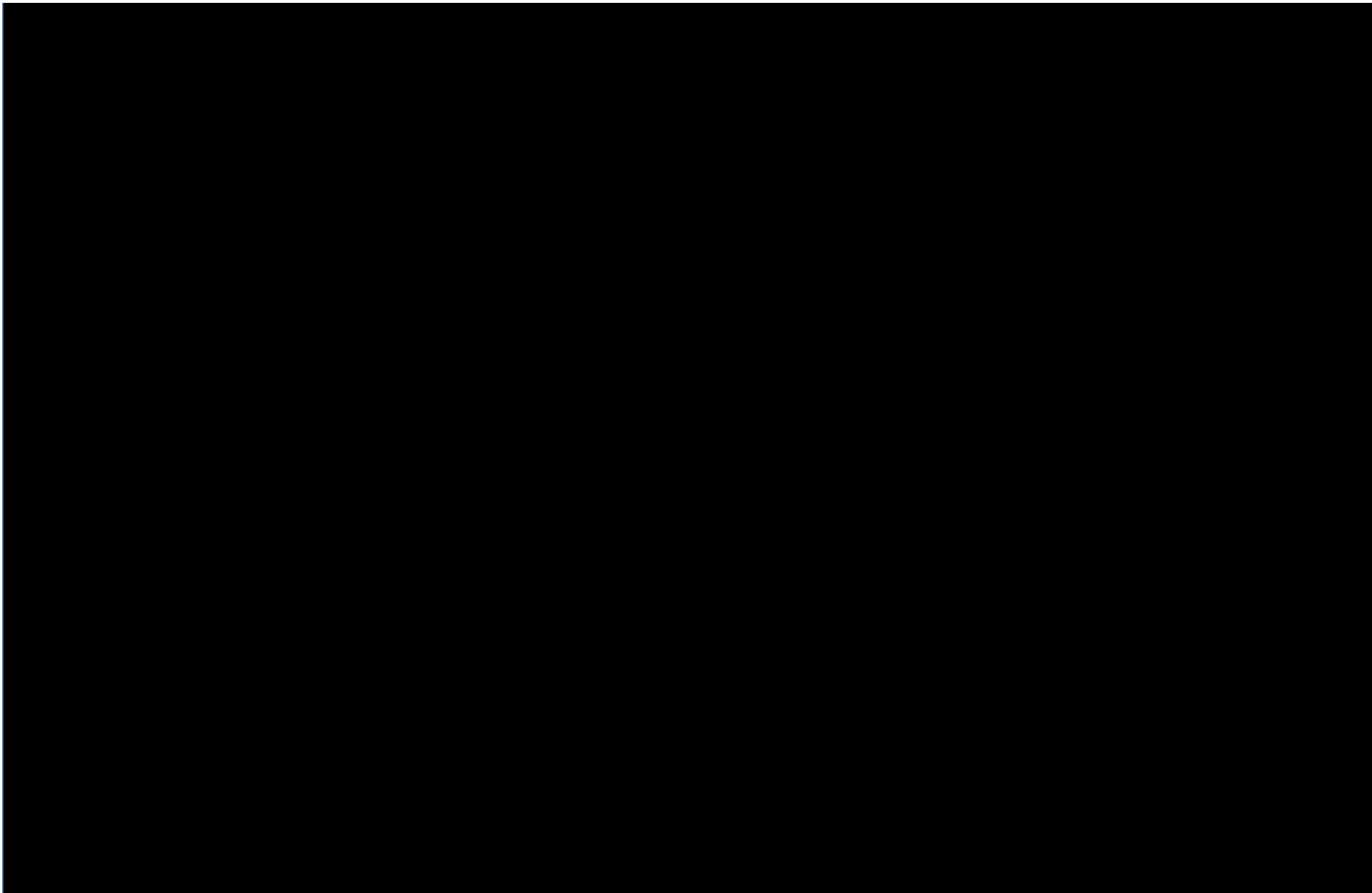
This approach gives:

Discipline to stating the problem  
&  
direction to thinking  
for likely solutions

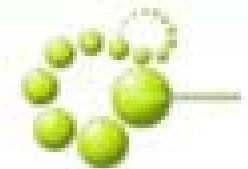
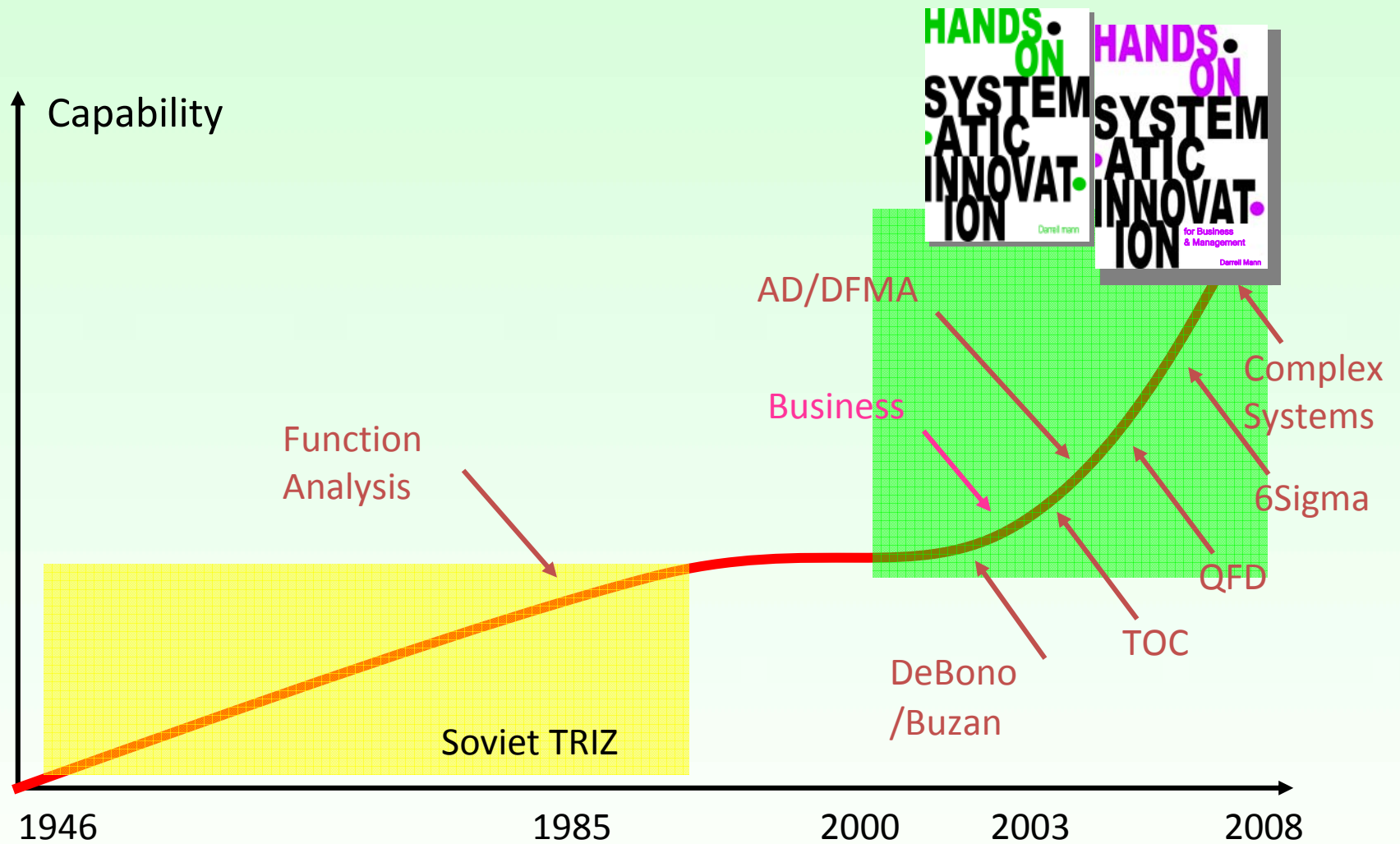


**Solving Contradictions  
without compromise  
= 'Innovation'**





# Systematic Innovation Evolution



TRIZ has been  
developed & broadened into:

## **‘Systematic Innovation Methodology’**

Now over 3 Million documents  
have been analyzed for a  
**Breakthrough Database**



# 'Systematic Innovation'

moves it into other fields  
notably management  
and, recently, software design.



# NOW....The Five Pillars of TRIZ

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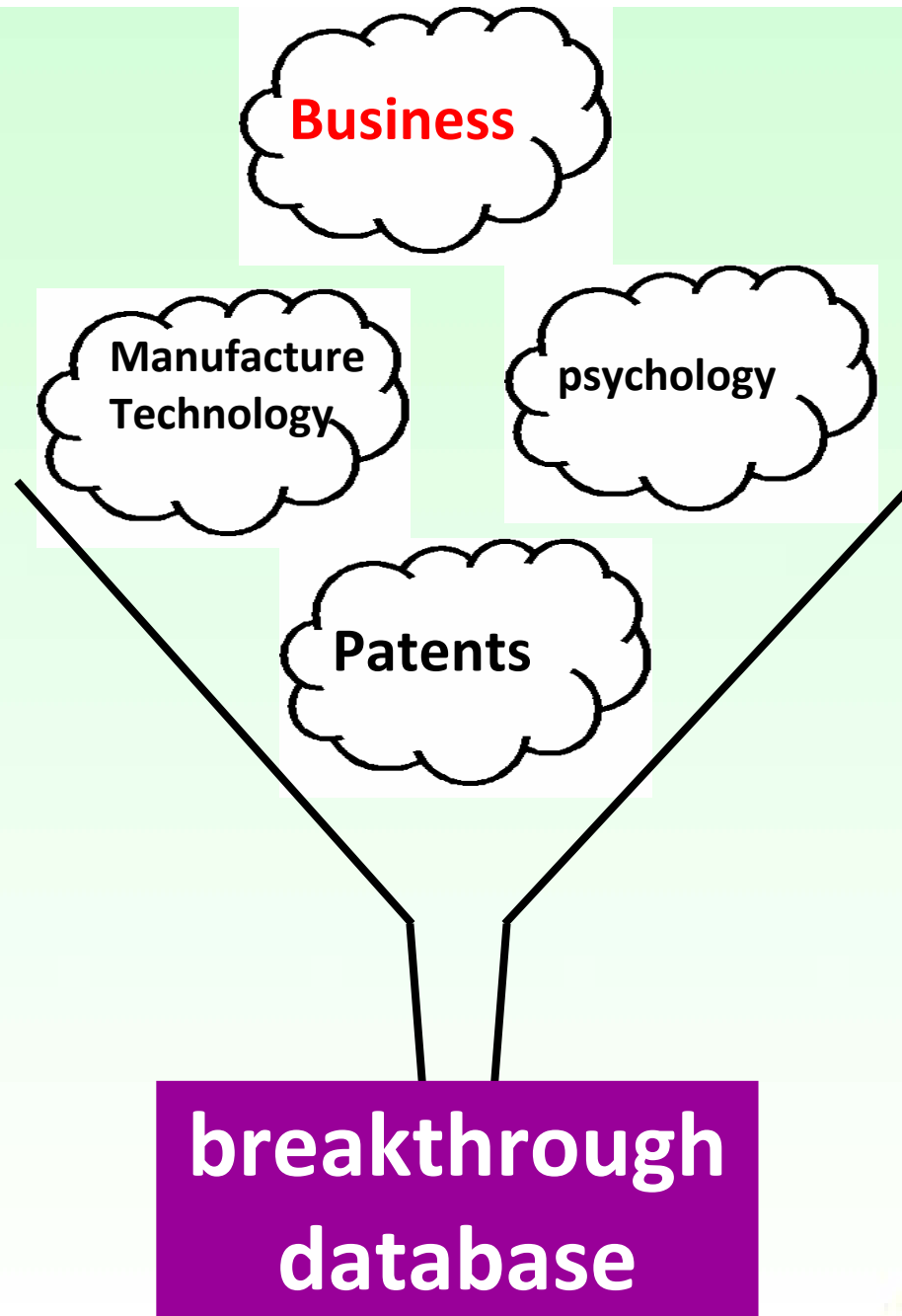
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PLUS:

Distillation of  
best practices  
extracted from  
all fields of  
human  
endeavour



Provides a Complete Methodology for Innovation

Use Method to apply  
Knowledge from history

**WARNING**

The wheel that you are about to invent  
has already been invented.....  
but outside of your discipline.  
And not 'to your knowledge'.



# Question.

## What have:

Cisco, Virgin, Schwab, GE Capital, Benetton, South West Airlines, Home Depot, Wal-Mart, America West, eBay, Barnes and Noble, Body Shop, Sephora, IBM (e-business), Sony Computer Entertainment, Shell, Dell, Disney, Harley-Davidson, IKEA, Tesco, Starbucks, Facebook, Hotmail and Toyota

## got in common?



One answer.  
By eliminating key contradictions  
that their competitors  
**assumed were inherent**  
**(experts!!!)**



# Systematic Innovation

The 31 Management Contradictions  
and  
40 Inventive Principles.

Evolved from the study of 3M+ documents



# Management Contradiction Parameters

1. R&D Spec/Capability/Means
2. R&D Cost
3. R&D Time
4. R&D Risk
5. R&D Interfaces
6. Production Spec/Capability/Means
7. Production Cost
8. Production Time
9. Production Risk
10. Production Interfaces
11. Supply Spec/Capability/Means
12. Supply Cost
13. Supply Time
14. Supply Risk
15. Supply Interface
16. Product Reliability
17. Support Cost
18. Support Time
19. Support Risk
20. Support Interfaces
21. Customer Revenue/Demand/Feedback
22. Amount of Information
23. Communication Flow
24. System affected harmful effects
25. System generated side effects
26. Convenience
27. Adaptability/Versatility
28. System Complexity
29. Control Complexity
30. Tension/Stress
31. Stability



# 40 Inventive (Management) Principles

1. Segmentation
2. Taking Out
3. Local Quality
4. Asymmetry
5. Combination
6. Universality
7. 'Nested Doll'
8. Counterweight
9. Prior Counter-Action
10. Prior Action
11. Prior Cushioning
12. Remove Tension
13. 'The Other Way Round'
14. Curvature
15. Dynamics
16. Slightly Less/Slightly More
17. Another Dimension
18. Vibration
19. Periodic Action
20. Continuity of Useful Action
21. Hurrying
22. 'Blessing in Disguise'
23. Feedback
24. Intermediary
25. Self-Service
26. Copying
27. Cheap/Short Living
28. Another Sense
29. Fluidity
30. Thin & Flexible
31. Holes
32. Colour Changes
33. Homogeneity
34. Discarding and Recovering
35. Parameter Changes
36. Phase Transitions
37. Relative Change
38. Enriched Atmosphere
39. Calmed Atmosphere
40. Composite Structures



# Business Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1	PROD CAPACITY	2 4	21 26	2 9	3 13	23 29	10 5	37 25	25 6 10	3 5	7 10	8 2	15 6	2 3	11 25	11 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	15 25	
2	PROD COST	2 4	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	26 34	1 10	
3	PROD TIME	21 26	25 24		1 29	15 25	5 9	5 9	5 9	7 25	8 15	25 29	11 6	5 13	10 25	22 7	11 7	7 15	7 40	22 26	28 24	8 10	7 19	7 2	6 29	26 2	26 2	26 2	26 2	26 2	26 2		
4	PROD Mkt	9 9	27 9	1 29		8 29	24 35	5 35	5 40	11 29	7 9	5 35	1 11	1 2	13 7	13 22	6 1	11 7	1 2	40 38	8 10	38 13	1 3	33 6	25 2	2 3	28 3	2 40	28 20	25 1	1 29	9 14	
5	PROD VARIANCE	3 12	12 26	15 25	4 23		5 8	15 23	15 40	7 5 3	28 40	8 35	2 32	5 2	5 25	28 40	6 1	6 7	6 58	5 35	28 40	4 7	1 6 3	2 6	3 28	3 25	18 13	29 27	25 2	6 29	25 3	15 17	
6	PRODUCING MANUFACTURING	29 25	5 2	5 6	24 35	5 8		15 25	1 25	8 27	2 25	7 13	15 35	25 5	15 16	10 25	25 29	12 10	5 6	8 10	8 40	5 15	19 32	6 2	22 24	25 22	2 15	1 15	12 17	28 1	25 1	25 1	
7	PRODUCTION COST	27 25	10 3	5 29	5 35	15 23	15 25		1 24	28 10	1 3	26 1	5 2	2 35	1 2	12 9	1 25	2 3	27 3	13 10	25 27	6 35	1 35	1 35	1 35	1 35	1 35	1 35	1 35	1 35	1 35	1 35	
8	PRODUCTION TIME	25 6	10 2	7 26	5 40	15 40	1 35	1 24		13 27	10 15	5 17	5 2	3 10	13 2	23 12	1 25	9 13	25 25	25 29	13 9	13 1	19 15	2 37	22 35	25 23	19 2	10 15	25 29	25 27	20 10	15	
9	PRODUCTION Mkt	9 5	8 7	6 15	11 23	7 3	9 3	27 26	10 10		2 6	5 35	5 35	13 22	5 26	10 15	13 25	24 14	7 5 3	5 35	19 22	5 25	3 25	25 38	25 2	25 10	3 28	2 40	25 2	30 12	25 9	9 1	
10	PRODUCTION VARIANCE	5 7	15 25	25 29	7 3	28 40	3 25	26 1	10 15	5 8		8 2	10 30	5 35	29 29	25 25	23 11	23 10	23 10	10 14	40 33	7 5	2 27	2 28	3 28	3 28	5 19	29 1	10 18	10 28	3 40	11 25	
11	SUPPLY Mkt	6 2	22 6	11 6	5 35	8 35	7 13	5 2	5 17	5 25	6 2		7 35	35 1	7 8	6 26	11 29	22 11	22 11	11 23	23 11	10 3	13 4	5 25	13 17	10 1	35 3	13 17	29 30	6 5	2 29	15 5	
12	SUPPLY COST	15 6	10 5	5 12	1 11	2 33	15 35	5 35	5 2	5 35	5 30	7 35		9 24	27 3	1 28	25 24	2 6	5 10	10 27	10 12	10 24	2 35	29 25	25 6	11 35	10 35	30 2	1 17	25 19	22 2	10 3	19 3
13	SUPPLY TIME	2 9	10 19	10 25	1 2	5 2	35 5	2 25	9 10	13 22	5 35	35 1	3 24		10 29	5 15	25 27	27 2	10 25	24 5	35 13	29 2	6 31	35 3	25 10	24 35	15 1	30 24	29 22	1 10	25 3		
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15	SUPPLY VARIANCE	11 26	10 29	11 7	13 22	28 40	10 25	12 3	23 12	5 10	29 5	8 30	1 29	5 19	5 10		10 21	5 10	29 30	25 25	5 8	13 25	3 6	2 3	3 35	2 30	5 25	29 28	28 5	25 9	5 3	29 15	
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17	SUPPORT COST	15 25	6 1	7 15	11 7	8 7	13 10	9 2	9 13	9 26	29 10	23 11	5 25	25 27	19 10	5 10	2 25	5 4	27 25	28 25	24 25	29 3	25 1	1 35	2 24	25 1	17 25	25 1	15 25	25 4	1 35		
18	SUPPORT TIME	5 2	6 1	7 40	1 2	8 38	5 8	27 3	25 25	24 14	11 23	23 11	2 27	29 30	10 25	5 4		15 29	15 29	7 20	1 2	6 31	35 35	35 15	5 25	3 30	28 15	28 25	2 34	10 15			
19	SUPPORT Mkt	15 27	10 25	22 24	40 38	5 35	8 10	10 25	25 29	7 5 3	10 14	11 23	10 12	10 25	24 25	5 25	19 22	27 25	15 29		5 8	20 7	25 3	2 3	1 30	19 25	10 15	10 11	10 35				
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21	OUTSIDE Mkt	14 12	7 25	7 19	38 13	4 7	5 15	7 13	13 1	13 22	7 5	13 3	2 35	35 13	25 22	19 25	28 25	24 25	7 20	30 7	18 17		2 29	23 31	39 3	29 10	29 27	40 17	25 1	25 2	10 10	10 40	
22	ANALYSIS OF INFORMATION	27 19	27 25	7 2	1 3	1 8 3	13 32	26 27	13 15	5 25	2 27	19 4	29 35	29 2	5 27	9 6	10 29	29 3	1 2	25 3	1 3	2 29		2 37	22 10	10 21	27 25	15 10	10 25	2 7	2 29	11 13	
23	COMMUNICATIONS FEE	6 25	6 19	6 26	30 6	2 6	6 2	6 25	2 37	25 39	2 28	5 25	35 6	8 31	8 16	2 3	10 28	25 1	6 21	29 31	2 3	29 31	2 37	6 30	1 29	25 1	25 6	1 25	25 1	3 4 6	37 1		
24	SYSTEM ANALYSIS Mkt	11 25	25 27	26 2	35 2	3 28	22 24	2 35	22 35	35 2	2 25	19 17	11 35	35 3	2 13	9 25	27 25	1 25	25 35	25 35	11 24	29 3	22 10	6 30		35 3	2 25	35 11	22 19	3 15	11 25	25 24	
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26	CONTRACTS	15 25	25 2	1 2	28 3	18 13	2 15	1 25	19 2	3 26	19 1	25 3	30 2	24 35	5 16	5 25	27 27	25 1	5 25	2 3	7 5 6	29 27	27 25	2 25	1 15		15 24	26 27	25 10	10 5	32 35		
27	CONTRACTS VARIANCE	20 25	25 29	15 1	2 40	29 27	1 15	1 30	10 15	2 40	29 1	19 17	1 17	15 1	15 17	29 29	25 19	17 25	3 30	1 30	29 30	40 17	15 10	25 6	35 11	3 1	15 34		15 29	25 15	17 40	25 30	
28	SYSTEM COMPANY	17 25	1 19	2 19	1 23	35 3	35 1	1 35	2 20	25 9	9 40	2 23	10 3	1 10	1 9	5 2	11 25	25 24	2 24	10 11	10 9	2 10	2 29	3 4 5	11 25	11 25	10 5	17 40	1 10	11 24		29 35	
29	SYSTEM COMPANY	25 15	25 19	25 28	25 1	9 28	29 1	6 2	25 27	30 12	10 28	8 5	23 29	3 2	11 19	15 25	28 25	10 15	25 15	25 2	2 7	25 1	3 15	25 3	25 5	25 15	25 15	25 19	1 10	2 22		11 24	
30	TRANSACTION	9 2	1 19	2 19	1 23	35 3	35 1	1 35	2 20	25 9	9 40	2 23	10 3	1 10	1 9	5 2	11 25	25 24	2 24	10 11	10 9	2 10	2 29	3 4 5	11 25	11 25	10 5	17 40	1 10	11 24		29 35	
31	SYSTEM	25 2	11 25	10 3	3 14	15 17	35 1	10 1	10 15	9 1	11 25	15 5	19 3	35 3	9 19	29 15	25 26	1 25	10 15	10 35	11 1	10 40	11 13	37 1	35 24	35 40	32 35	35 30	2 22	11 29	29 25		

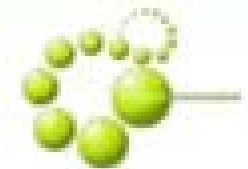
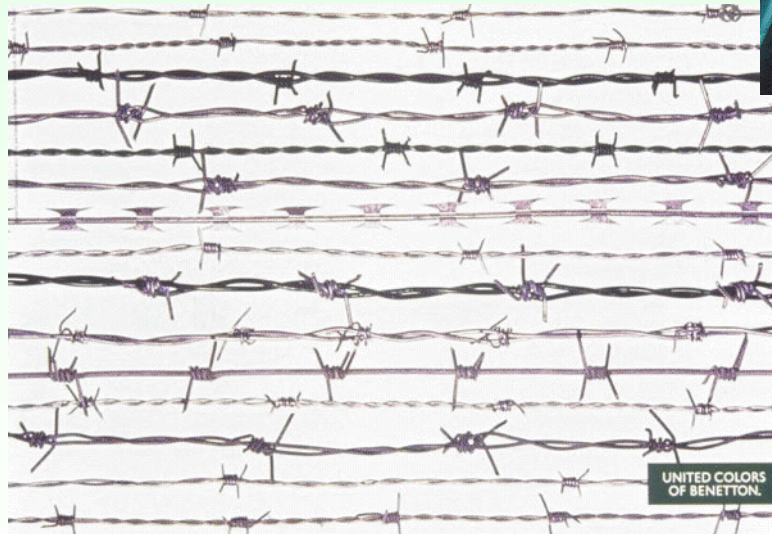


An example of one of the 'stories' that  
contributed to the data base

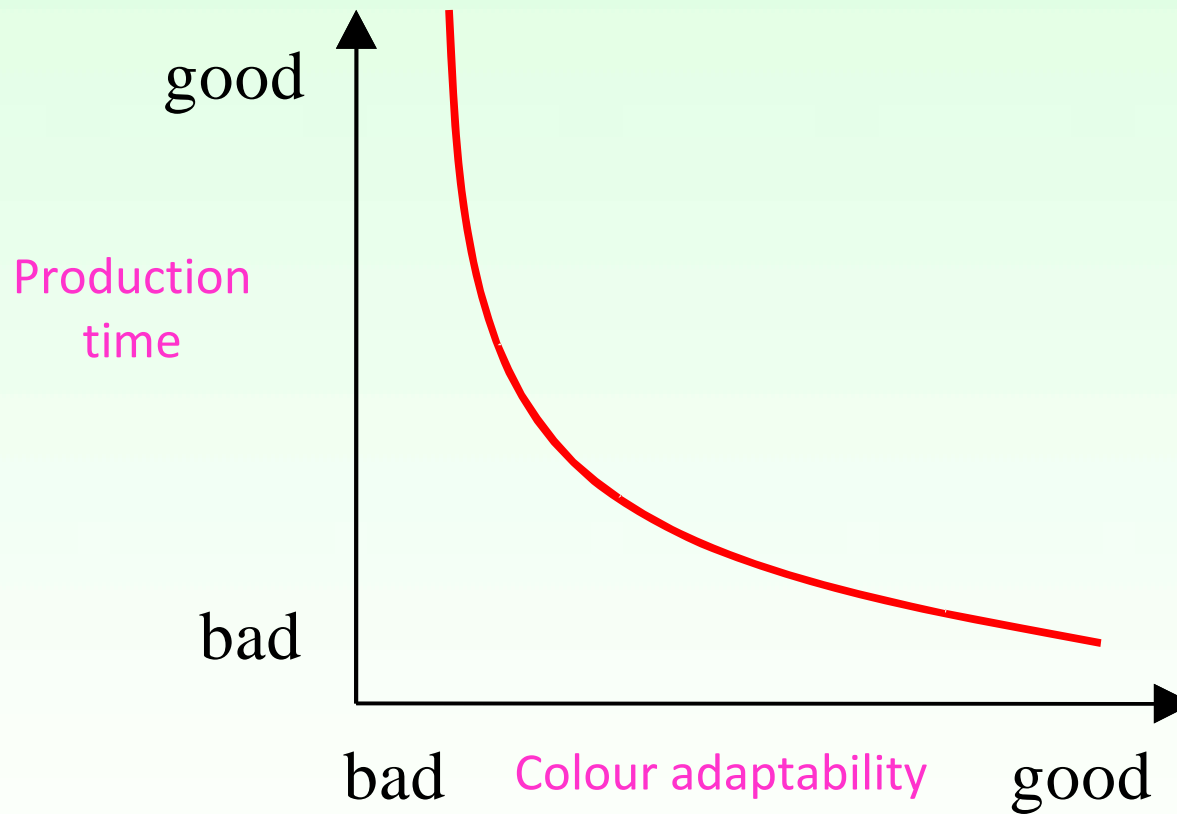


# UNITED COLORS OF BENETTON.

Success Strategy?



Fashion industry's annual challenge:  
Aim to get products to **market first**  
but not before we know  
what are **this year's colours?**



# Management Contradiction Matrix

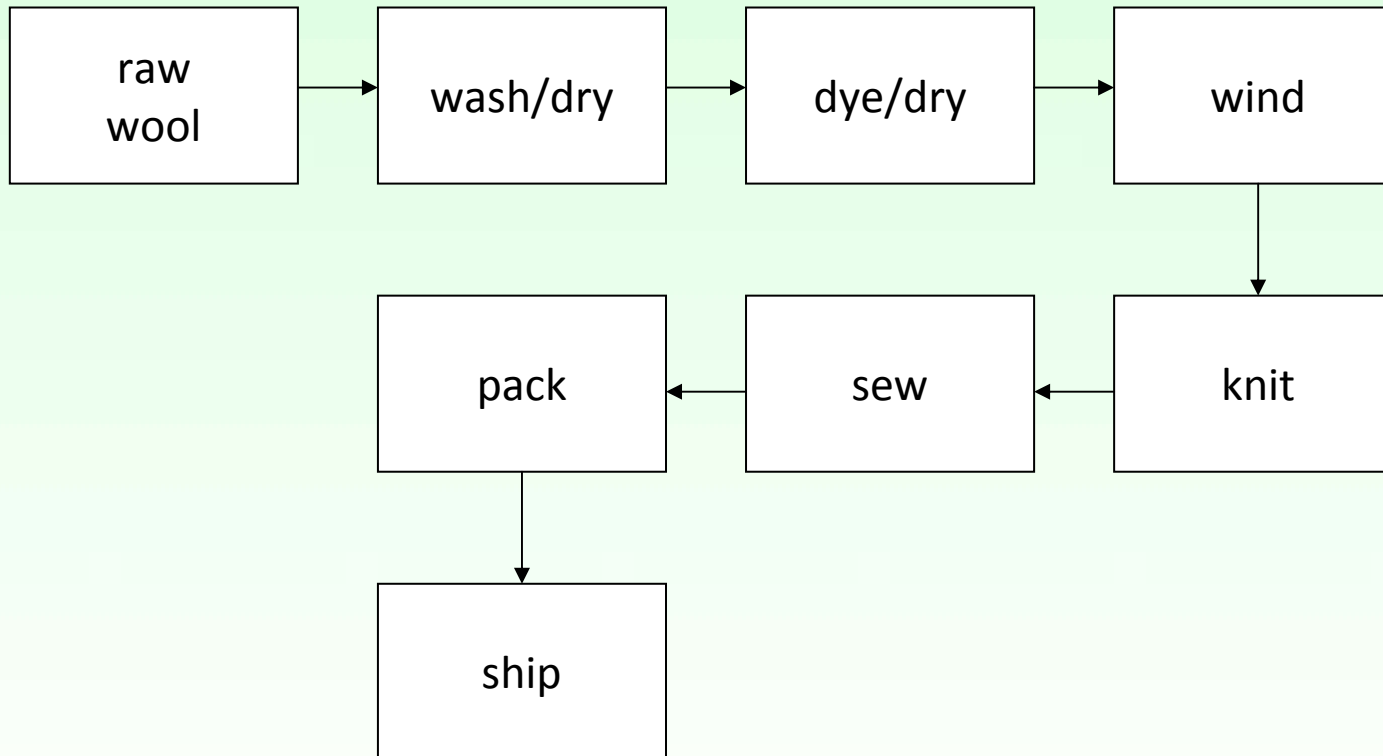
## Parameters

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1. R&D Spec/Capability/Means        | 16. Product Reliability              |
| 2. R&D Cost                         | 17. Support Cost                     |
| 3. R&D Time                         | 18. Support Time                     |
| 4. R&D Risk                         | 19. Support Risk                     |
| 5. R&D Interfaces                   | 20. Support Interfaces               |
| 6. Production Spec/Capability/Means | 21. Customer Revenue/Demand/Feedback |
| 7. Production Cost                  | 22. Amount of Information            |
| <u>8. Production Time</u>           | 23. Communication Flow               |
| 9. Production Risk                  | 24. System affected harmful effects  |
| 10. Production Interfaces           | 25. System generated side effects    |
| 11. Supply Spec/Capability/Means    | 26. Convenience                      |
| 12. Supply Cost                     | <u>27. Adaptability/Versatility</u>  |
| 13. Supply Time                     | 28. System Complexity                |
| 14. Supply Risk                     | 29. Control Complexity               |
| 15. Supply Interface                | 30. Tension/Stress                   |
|                                     | 31. Stability                        |

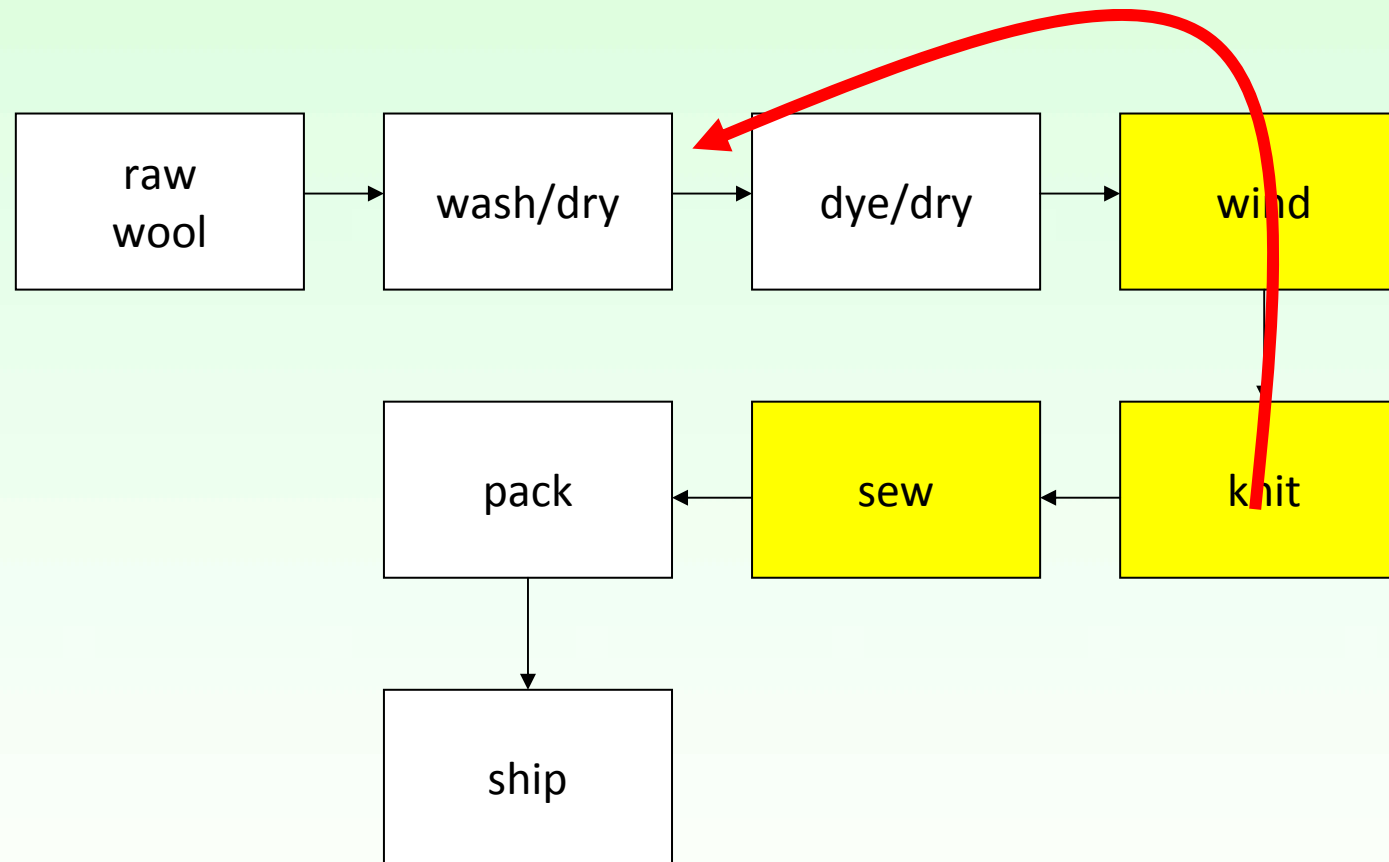
*-contradiction-*



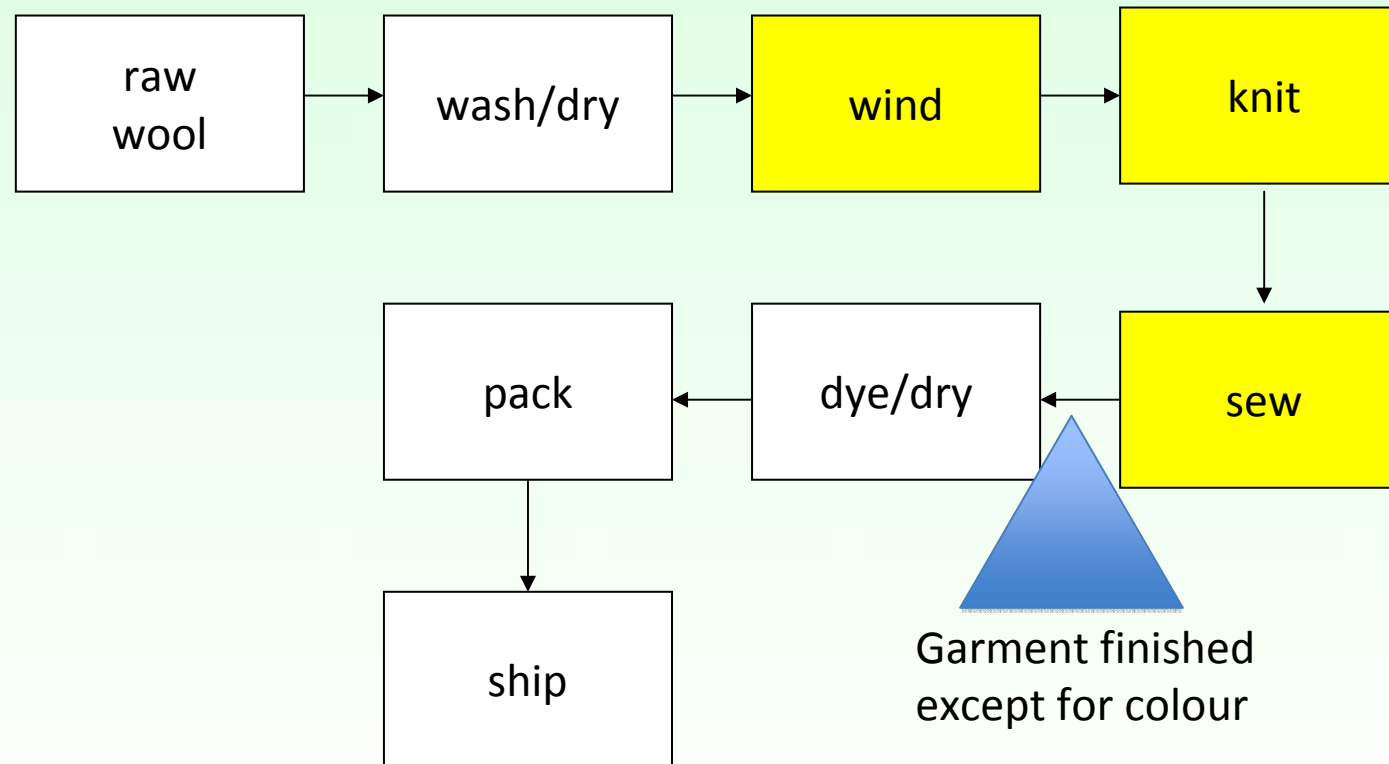
# Traditional Knitted Garment Manufacture Sequence:



# Benetton Knitted Garment Manufacture Sequence:

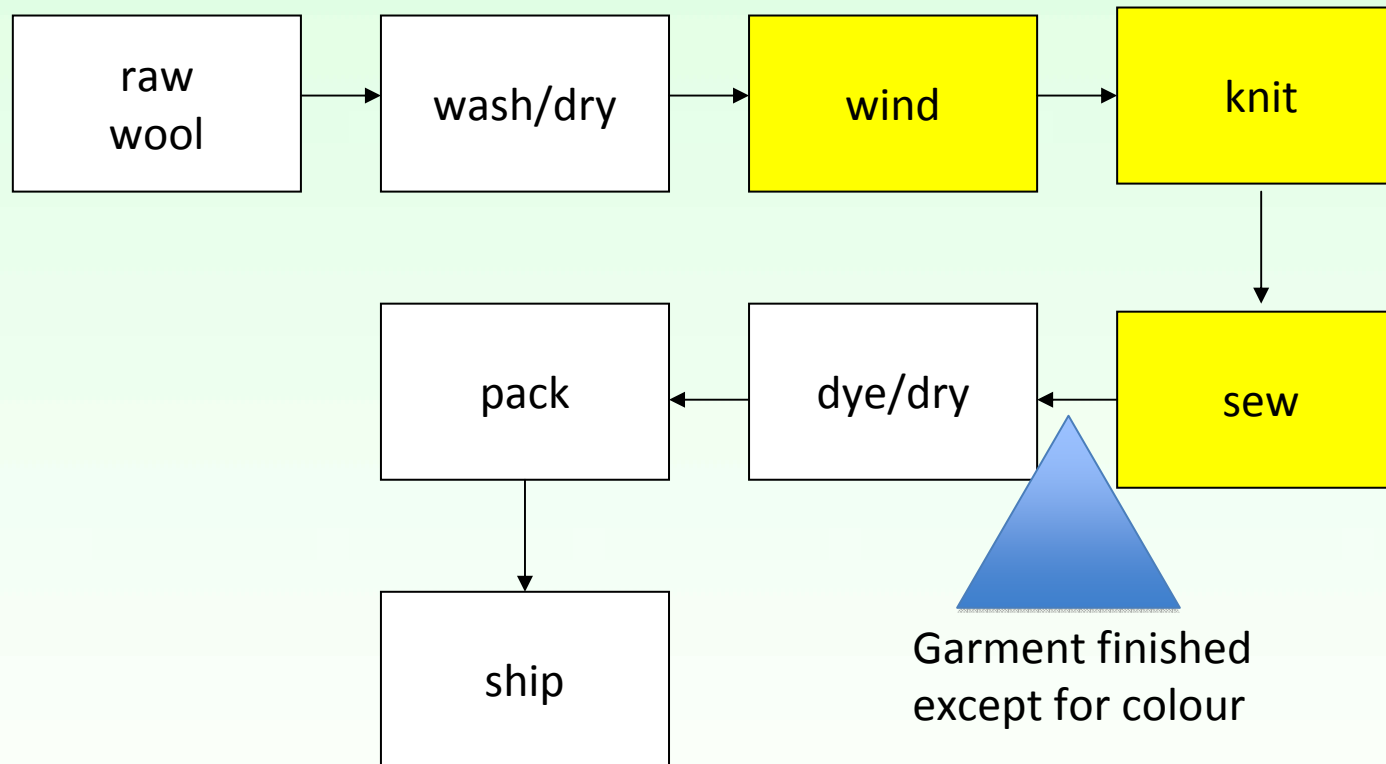


# Benetton Knitted Garment Manufacture Sequence:



# Benetton Knitted Garment Manufacture Sequence:

Their solution: 'Prior Action'



# 40 Inventive (Management) Principles

1. Segmentation
2. Taking Out
3. Local Quality
4. Asymmetry
5. Combination
6. Universality
7. 'Nested Doll'
8. Counterweight
9. Prior Counter-Action
- 10. Prior Action**
11. Prior Cushioning
12. Remove Tension
13. 'The Other Way Round'
14. Curvature
15. Dynamics
16. Slightly Less/Slightly More
17. Another Dimension
18. Vibration
19. Periodic Action
20. Continuity of Useful Action
21. Hurrying
22. 'Blessing in Disguise'
23. Feedback
24. Intermediary
25. Self-Service
26. Copying
27. Cheap/Short Living
28. Another Sense
29. Fluidity
30. Thin & Flexible
31. Holes
32. Colour Changes
33. Homogeneity
34. Discarding and Recovering
35. Parameter Changes
36. Phase Transitions
37. Relative Change
38. Enriched Atmosphere
39. Calmed Atmosphere
40. Composite Structures



We 'discovered' that  
a contradiction between  
**Production time**  
and  
**Adaptability/Flexibility**  
can be resolved by  
**Prior Action**

## Without Compromise

We found a total of four ways  
in which this conflict was resolved



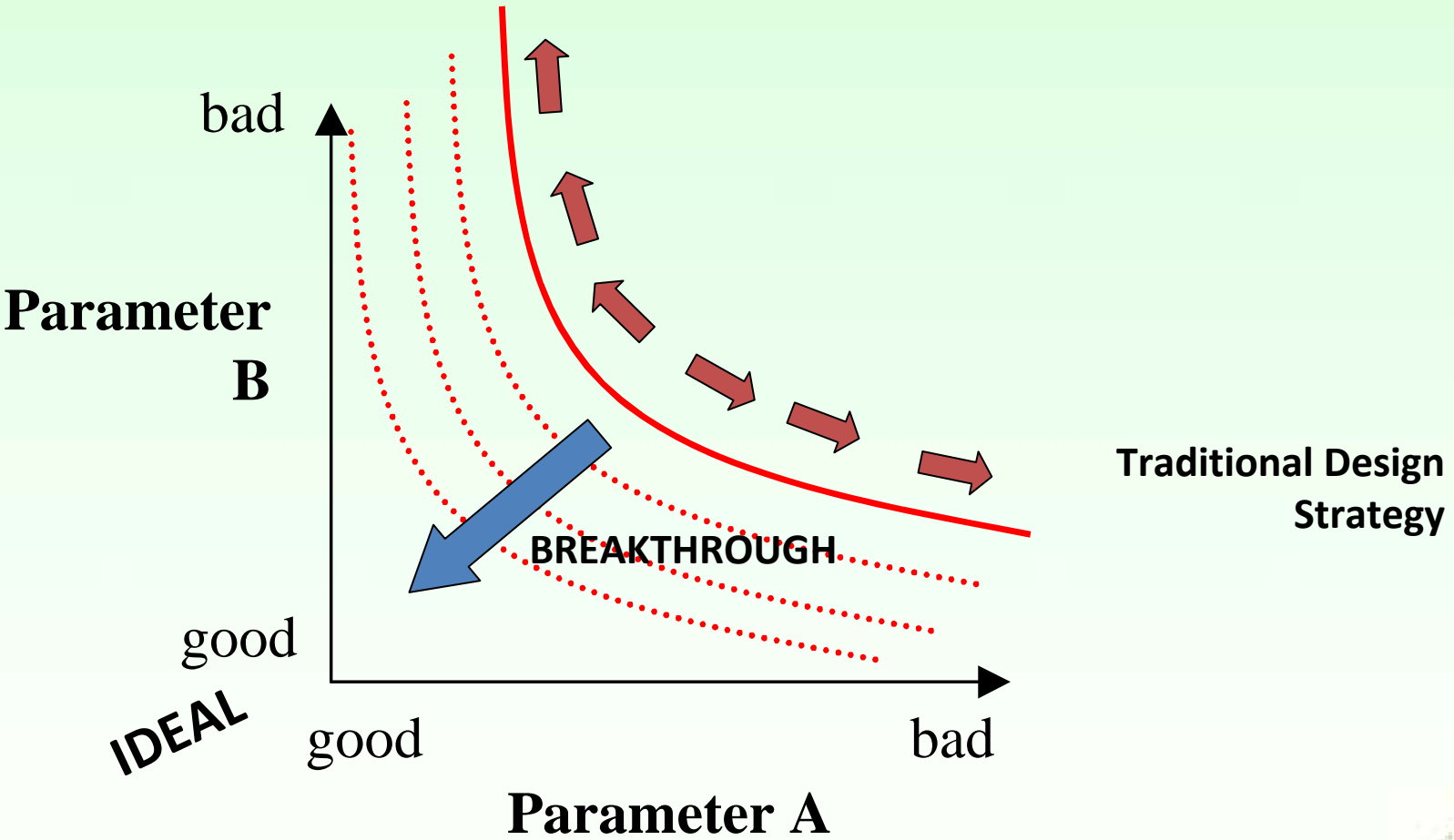
# Business Matrix

Four possible 'Inventive Principles' for solving this conflict

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1	MAC CAPACITY	2 4	15 26	21 26	2 9	3 13	23 29	10 5	37 26	25 6	3 5	2 7	1 8	2 3	15 6	2 3	11 26	11 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26	15 26		
2	MAC COST	2 4	15 26	26 34	1 10	24 18	35 10	27 1	1 7	6 15	23 26	10 25	11 28	35	1 5	10 19	2 16	13 12	10 26	27 6	1 6	1 10	25 20	22 2	1 7	30 21	29 2	37 25	6 18	35 27	25 2	25 19	11 25	
3	MAC TIME	21 26	25 24		1 29	15 25	5 6	5 29	7 26	8 15	25 29	11 6	5 13	10 25	22 7	11 7	6 10	7 15	7 40	22 26	28 24	8 10	7 19	7 2	6 29	26 2	26 2	26 2	15 19	15 19	15 19	15 19	15 19	15 19
4	MAC PWR	9 9	27 9	1 29		8 29	24 35	5 35	5 40	11 29	7 9	5 35	1 11	1 2	13 7	13 22	6 1	11 7	1 2	40 38	8 10	38 13	1 3	33 6	25 2	2 3	26 3	2 40	28 20	25 1	1 29	9 14		
5	MAC EFFICIENCY	3 12	12 26	15 25	4 29		5 8	15 23	15 40	7 5 3	28 40	8 35	2 32	5 2	5 35	29 40	6 1 3	6 7	6 28	5 35	28 40	4 7	1 6 3	2 6	3 29	3 26	16 13	29 27	25 2	6 29	25 3	15 17		
6	PRODUCTION MANUFACTURING	29 25	5 2	5 6	24 35	5 6		15 25	1 25	8 27	2 25	7 13	15 35	35 5	15 16	10 25	25 29	12 10	5 6	8 10	6 40	5 15	19 32	6 2	22 24	35 22	2 15	1 15	12 17	28 1	25 2	25 2	25 2	
7	PRODUCTION COST	27 25	26 25	1 29		5 29	5 35	15 23	15 25		1 24	26 10	1 2	26 1	5 2	2 35	2 12	1 2	10 25	10 25	27 3	7 13	26 27	6 35	1 35	1 25	1 25	1 25	1 25	1 25	1 25	1 25	1 25	
8	PRODUCTION TIME	25 6	1 7	7 26	5 40	15 40	1 35	1 24		10 27	10 15	5 17	5 2	3 10	13 2	29 12	1 25	9 13	25 25	35 29	13 3	13 1	2 37	22 35	35 23	2 10	15 25	25 27	2 20	10 15				
9	PRODUCTION PWR	9 5	6 7	6 15	11 23	7 3	3 29	27 10		10 27		6 6	5 35	5 35	15 22	5 26	5 10	13 25	5 25	24 14	7 5 3	5 35	13 22	5 25	25 38	25 2	25 10	3 2	30 12	25 9	9 1			
10	PRODUCTION EFFICIENCY	5 7	15 25	25 27	7 3	28 40	3 25	26 1	10 15	5 6		8 2	10 30	5 35	29 29	25 22	25 11	29 10	29 10	10 14	40 33	7 5	2 37	2 28	3 26	3 26	5 19	29 1	10 18	10 26	3 40	11 25		
11	SUPPLY PRICE	6 2	29 6	11 6	5 35	8 35	7 13	5 2	5 17	5 25	6 2		7 35	35 1	7 6	6 26	11 29	29 11	29 11	11 23	23 11	10 3	13 4	5 25	13 17	10 1	35 3	13 17	29 30	6 5	2 29	15 5		
12	SUPPLY COST	15 6	10 5	5 12	1 11	2 33	15 35	5 35	5 2	5 36	5 30	7 35		9 24	27 3	1 26	26 24	2 6	5 12	10 27	10 12	10 24	2 35	29 26	35 6	11 35	10 35	30 2	1 17	25 19	22 2	10 3	19 3	
13	SUPPLY TIME	2 9	10 19	10 25	1 2	5 2	35 5	2 25	9 10	13 22	5 35	35 1	3 24		10 29	6 19	5 19	25 27	27 2	10 25	24 5	35 13	29 2	6 31	35 3	25 10	24 35	15 1	30 24	35 1	1 10	25 3		
14	SUPPLY PWR	11 29	11 19	29 2	13 7	5 35	15 16	2 13	13 2	5 26	29 29	7 8		27 3	10 29		6 10	1 25	19 10	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	2 27	
15	SUPPLY EFFICIENCY	11 26	10 26	11 7	13 22	28 40	10 25	12 3	29 12	5 10	29 5	8 30		1 29	5 19	5 10		10 21	5 10	29 30	5 25	5 8	13 25	3 6	3 35	2 30	2 29	28 5	25 6	5 3	39 15			
16	PRODUCT RELIABILITY	26 11	27 6	6 10	8 1	6 1 3	35 23	1 35	1 25	13 25	29 11	11 23		35 24	25 10	1 35	10 21		2 25	22 25	13 22	28 25	29 25	10 26	10 28	27 25	2 25	27 17	35 13	13 25	11 19	11 25	25 26	
17	SUPPORT COST	15 25	6 1	7 15	11 7	8 7	13 10	9 2	2 13	9 26	29 10	23 11		5 25	25 27	19 10	5 10	2 25		4 27	25 26	24 25	29 3	25 1	1 35	2 24	25 1	17 25	25 1	15 25	25 4	1 35		
18	SUPPORT TIME	5 2	6 1	7 40	1 2	6 38	5 8	27 3	35 25	24 14	19 13	23 11		2 27	20 22	10 25	5 4		15 29	15 29	7 20	1 2	6 31	35 15	35 15	5 25	3 30	28 15	28 25	2 34	10 15			
19	SUPPORT PWR	15 27	10 25	23 24	40 38	5 35	8 10	10 25	35 29	7 5 3	10 14	11 23		10 12	10 25	24 25	5 25	19 22	27 25	15 29		5 6	20 7	25 3	29 31	25 35	2 3	1 30	13 25	10 11	10 35			
20	SUPPORT EFFICIENCY	11 2	6 10	6 10	8 10	28 40	8 40	10 25	13 9	5 36	40 39	23 13		10 24	24 5	5 35	6 5	26 25	26 25	15 29	5 8		16 17	1 3	2 3	11 24	25 13	7 5 6	29 30	28 17	25 15	10 9	11 1	
21	OUTSIDE PRICES	14 12	7 25	7 19	38 13	4 7	5 15	7 13	13 1	13 22	7 5	13 3		2 35	35 13	25 22	19 25	28 25	24 25	7 20	30 7	18 17		2 29	29 31	39 3	29 10	29 27	40 17	25 1	25 2	2 10	10 40	
22	ANALYSIS OF INFORMATION	27 19	27 25	7 2	1 3	1 6 3	13 32	26 27	13 15	5 26	2 27	19 4		29 35	29 2	5 27	9 6	10 26	29 3	1 2	25 3	1 3	2 29		2 37	22 10	10 21	27 25	15 10	10 25	2 7	2 29	11 13	
23	COMMUNICATION PWR	6 25	6 19	6 26	30 6	2 6	6 2	6 25	2 37	25 39	2 28	5 25	35 25	6 31	8 16	2 3	10 26	25 1	6 21	29 31	2 3	29 31	2 37		6 30	1 29	25 1	25 6	1 25	25 1	3 4 6	37 1		
24	SYSTEM ANALYSIS METHODS	11 25	25 27	26 2	35 2	3 26	22 24	2 35	22 35	35 2	2 26	19 17		11 35	35 3	2 13	9 25	27 25	1 35	25 15	25 35	11 24	29 3	22 10	6 30		35 3	2 25	35 11	22 19	3 15	11 25	25 24	
25	SYSTEM ANALYSIS METHODS	2 27	2 22	15 19	35 15	35 37	19 39	27 10	19 10	39 24	25 39	34 35		2 12	19 13	19 23	40 22	4 24	25 22	29 3	4 35	22 10	8 5	22 29	4 35	24 4		13 34	29 15	21 3	15 22	12 9	27 39	
26	CONFORMANCE	15 25	25 2	1 2	28 3	16 13	2 15	1 25	19 2	3 26	19 5	39 3		30 2	34 35	5 16	5 25	27 17	25 1	5 25	2 3	7 5 6	29 27	27 25	25 1	2 25	1 15	15 24	26 27	25 5	10 5	32 35		
27	ANALYSIS OF INFORMATION	20 25	25 29	15 1	2 40	29 37	1 15	1 30	10 15	2 40	29 1	19 17		17 15	1 1	15 1	15 17	29 29	26 19	17 25	3 30	1 30	29 30	40 17	15 10	25 6	35 11	3 1	15 34		15 29	25 15	17 40	35 30
28	SYSTEM COMPLEXITY	17 25	1 19	2 19	1 23	35 3	35 1	1 35	2 20	25 9	9 40	2 23		10 3	1 10	1 9	5 2	11 35	26 24	2 24	10 11	10 9	2 10	2 29	3 4 5	11 25	11 25	10 5	17 40	1 10	11 24		29 35	
29	SYSTEM COMPLEXITY	25 15	25 19	25 26	25 1	9 28	29 1	6 3	25 37	30 12	19 8 5	29 2		11 19	15 26	39 25	10 15	25 15	25 2	2 7	25 1	3 15	25 3	25 5	25 15	25 15		15 24	25 17	25 19	11 24	11 28		
30	TECHNOLOGICAL	9 2	1 19	2 39	1 23	35 3	35 1	1 35	2 20	25 9	9 40	2 23		10 3	1 10	1 9	5 2	11 35	26 24	2 24	10 11	10 9	2 10	2 29	3 4 5	11 25	11 25	10 5	17 40	1 10	11 24		29 35	
31	EMERGENCY	25 2	11 25	10 3	3 14	15 17	35 1	10 1	10 15	9 1	11 25	15 5		19 3	35 3	9 19	29 15	25 26	1 25	10 15	10 35	11 1	10 40	11 13	37 1	35 24	35 40	32 35	35 30	2 22	11 26	29 25		



# DIFFERENCE BETWEEN TRADITIONAL AND BREAKTHROUGH DESIGN PHILOSOPHIES



Traditional Design Strategy

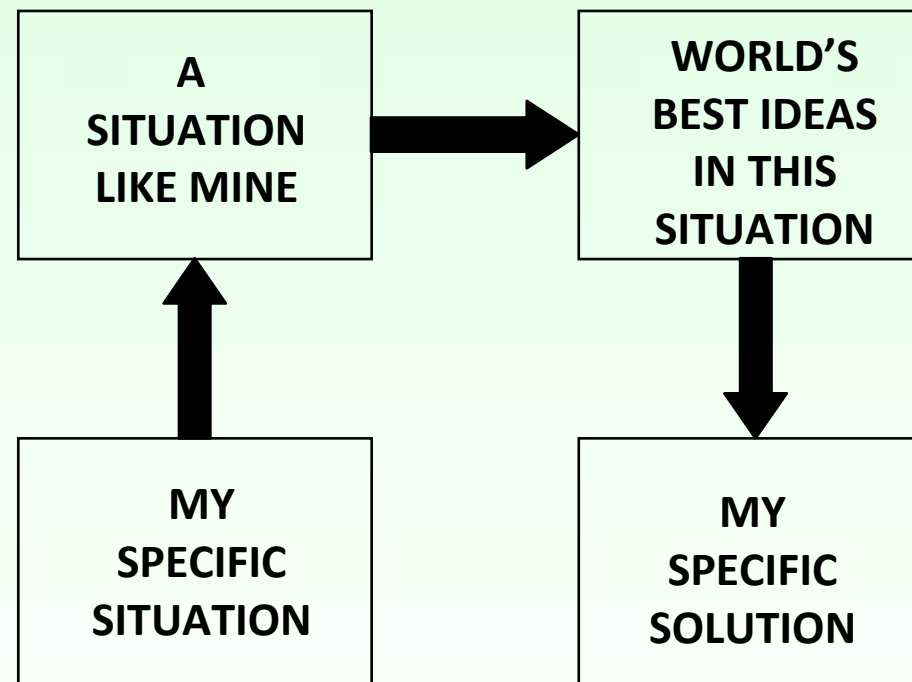


Your new problem



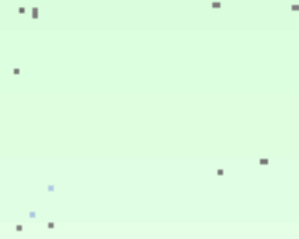
# Contradictions Solution Procedure

1) Define problem  
in terms of generic  
Contradiction  
parameters

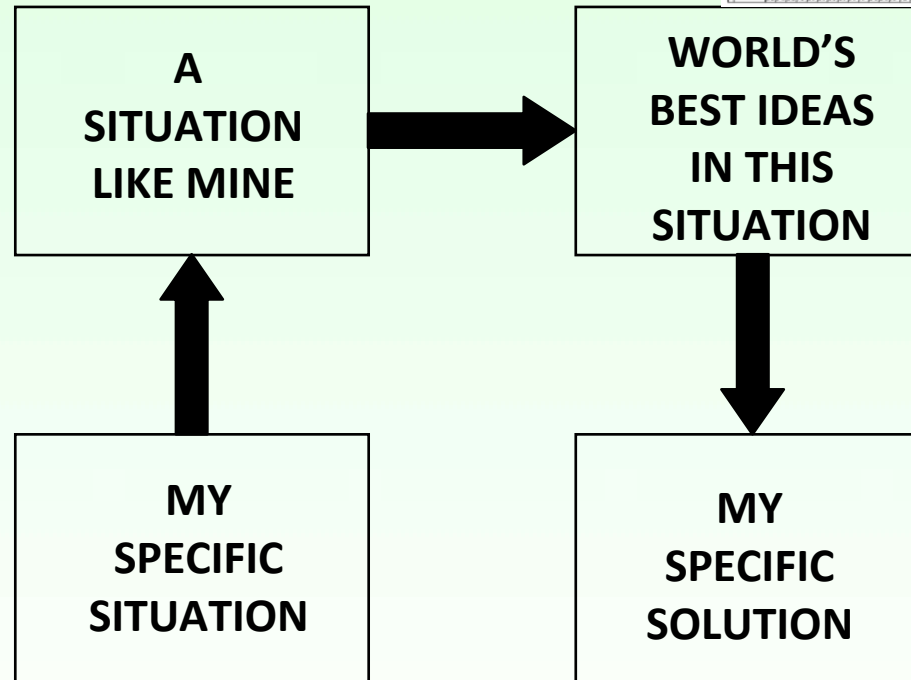


# Contradictions Solution Procedure

TRIZ is a systematic method for solving problems



2) Use Contradiction Matrix to obtain relevant Inventive Principles



Matrix recommends  
that you think about:

10. Prior Action

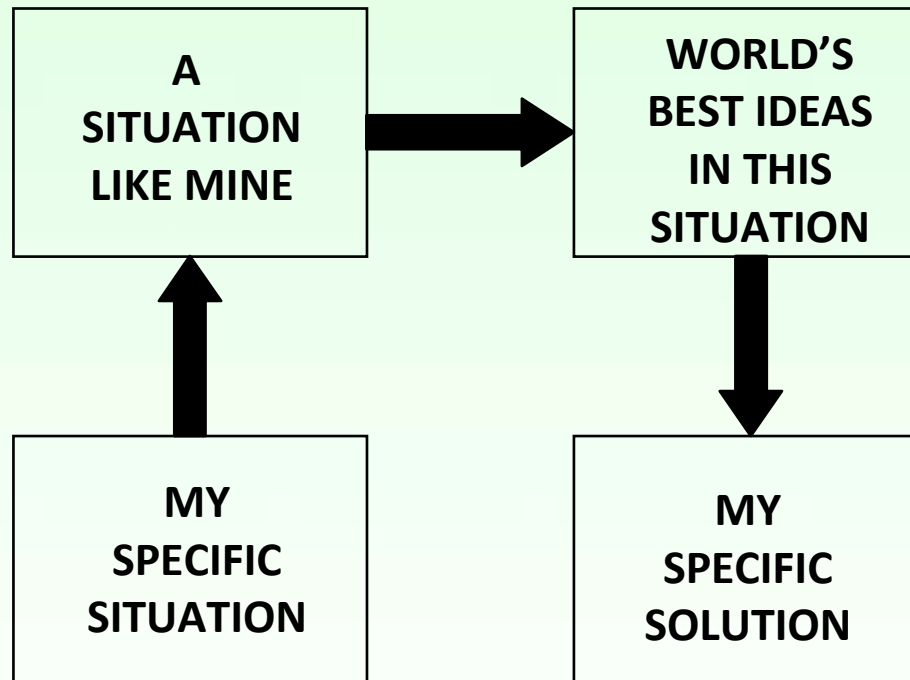
15. Dynamics

30. Thin & Flexible

7. Nested Doll



# Contradictions Solution Procedure



**3) 'Brainstorm'.**  
What might  
**'Prior Action'**  
mean  
in your case?

**\*Group or alone\***



## Principle 10: Prior action

*A. Perform the required change of a system or object (either fully or partially) before it is needed.*

- Project pre-planning.
- perform a noncritical path tasks early (where circumstances permit).
- off the shelf / ready-made / pre-packaged solutions.
- create 'buzz' about a new product by leaking news ahead of formal launch.

*B. Pre-arranged element is such that they can come into action from the most convenient place and without losing time for their delivery.*

- Kanban arrangements in a just-in-time factory.
- Cell-based manufacturer.
- Publish an agenda before meetings.
- 'If I had eight hours to drop down a tree, I spend six hours sharpening my axe' Abraham Lincoln.
- Benetton retarded differentiation -- clothing is knitted before it is died: colour only applies when the season's popular colours emerge.
- Dealer-fit car accessories -- CD player, alloy wheels, air con, etc.
- Distributed Systems -- local depots, etc



Responses.....

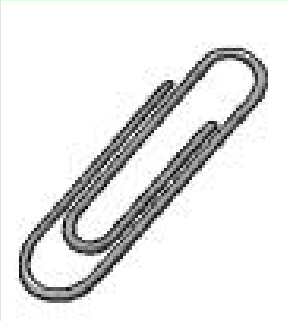
Why didn't I think of that before???

That's obvious!!





The Dark Ages!!

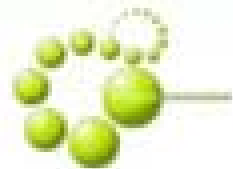


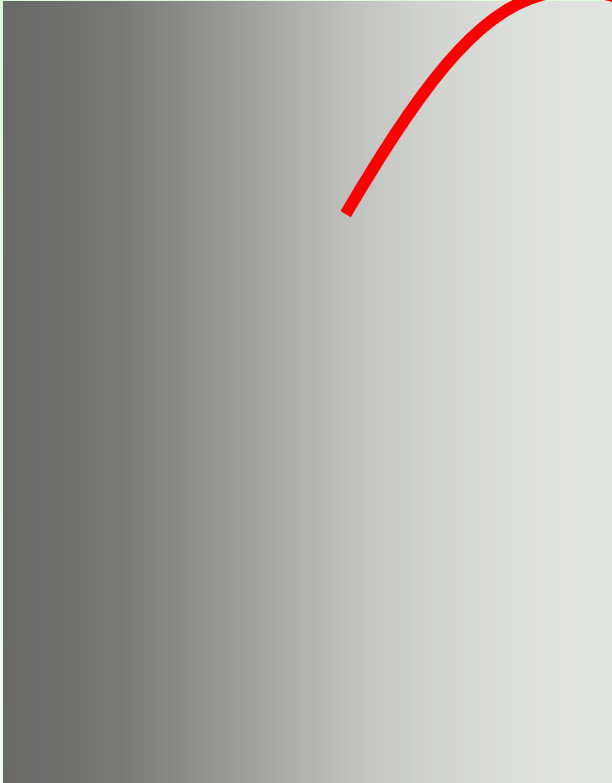
Obvious!



1877

First patent





The Dark Ages!!

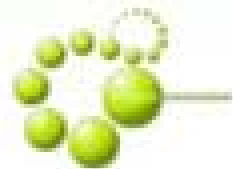
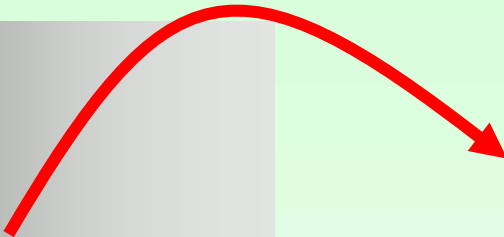
1877

First patent



The leap that Systematic Innovation helps you to make

Obvious!



To Innovate.....



# Five Pillars of Breakthrough Methodology

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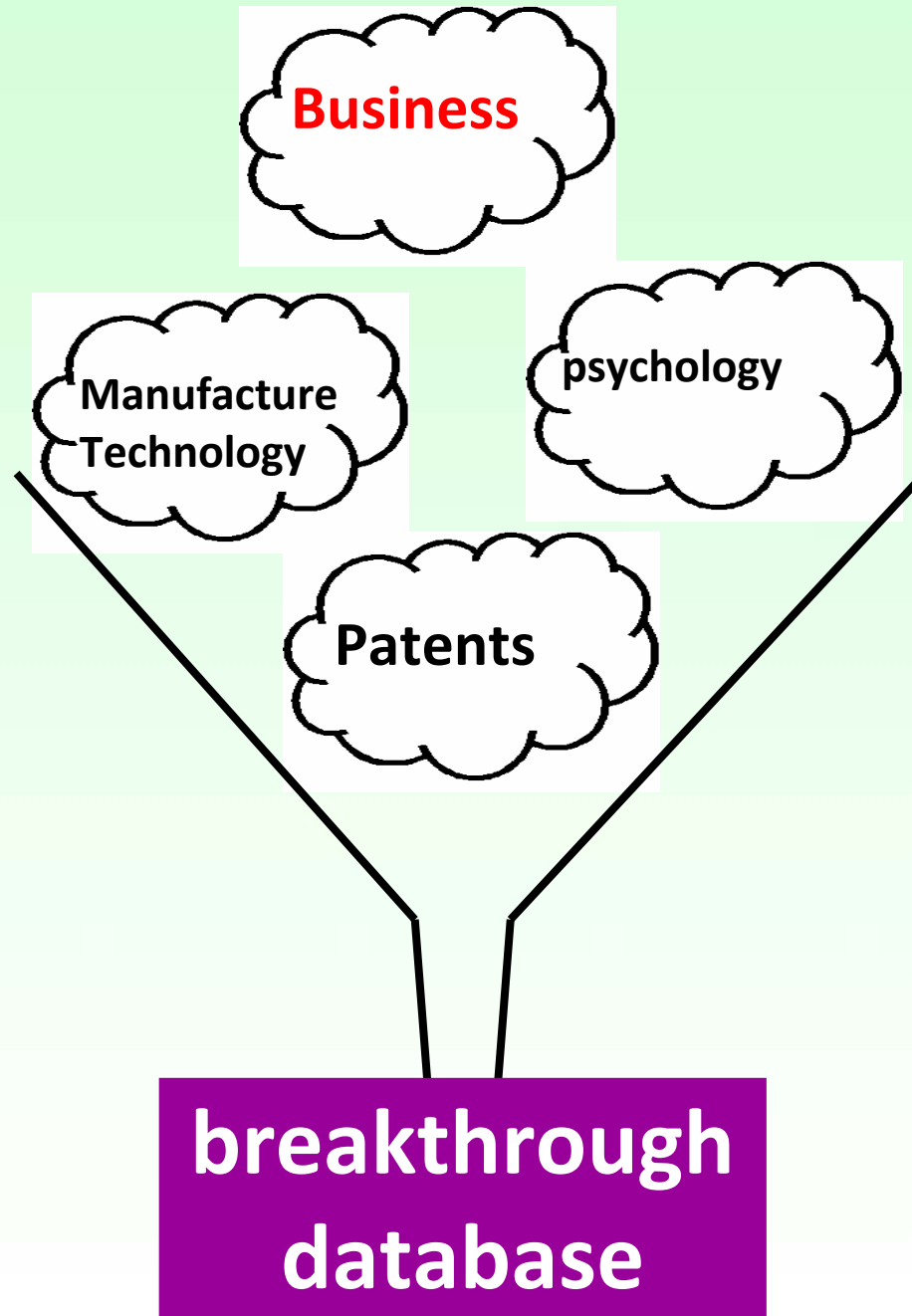
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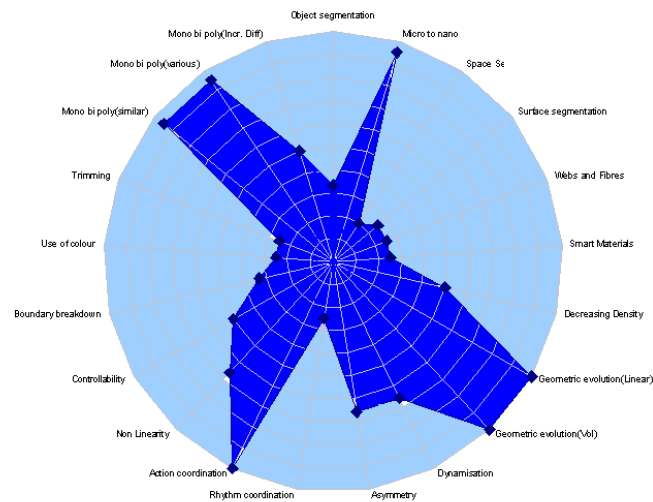
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