# Updating TRIZ

## 2006-2008 Patent Research Findings

Darrell Mann

4th Japanese TRIZ Symposium, 10-12 September 2008



Updating TRIZ
2006-2008 Patent Research Findings

1) Introduction and Background
2) Method
3) Level of Invention
4) Contradictions
5) Trends of Evolution/Evolutionary Potential
6) Conclusions/Future Work

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# Background

* Suggestions by some in the TRIZ community that the method is 'complete', or that there is no need to add more data to the database are not borne out by experience with clients…

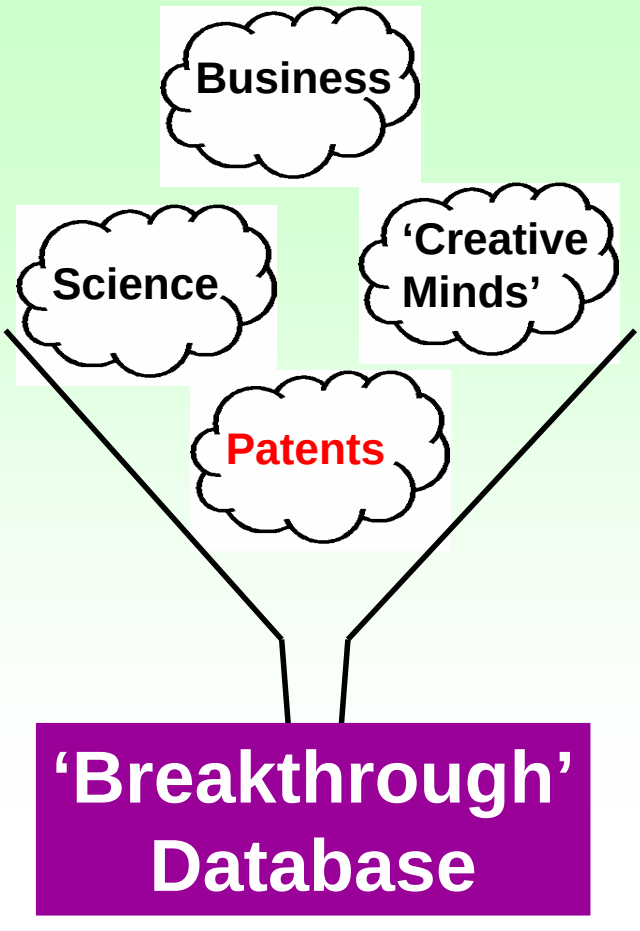
* The world has changed considerably in the last 23 years

* The world of intellectual property has changed even more

* We decided that the only means of reliable delivering tangible benefit to clients was to conduct a comprehensive research programme into patents. We started by looking at the period 1985-2002. We now monitor new patents on a weekly basis.

* At its peak there were 30 full-time researchers.
  Today we have 20 full-time domain-specialised patent analysts





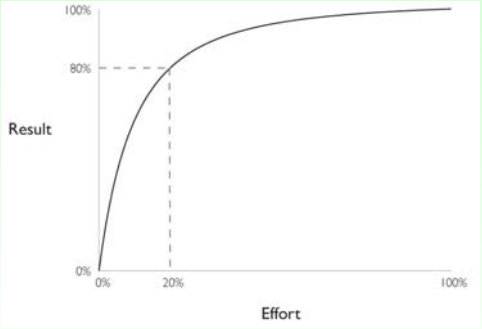

**Distillation of best practices extracted from all fields of human endeavour**

# A Big Task…

**Results of Search in US Patent Collection db for:**
**ISD/20080729**: 2860 patents.
*Hits **1** through **50** out of **2860***

Each week the US grants between 2500-3000 new patents

Our first job is to do the 80-for-20 filtering to find the most useful inventions…




| | |
|---|---|
| **Total Patents Reviewed** | **1, 890, 000** |
| **Total Patents Studied** | **386, 000** |

http://www.systematic-innovation.com/research/research02.htm



# Patent Search Strategy

Every Patent →

**(All patents are examined, based on a numerical order search)**

# Patent Search Strategy

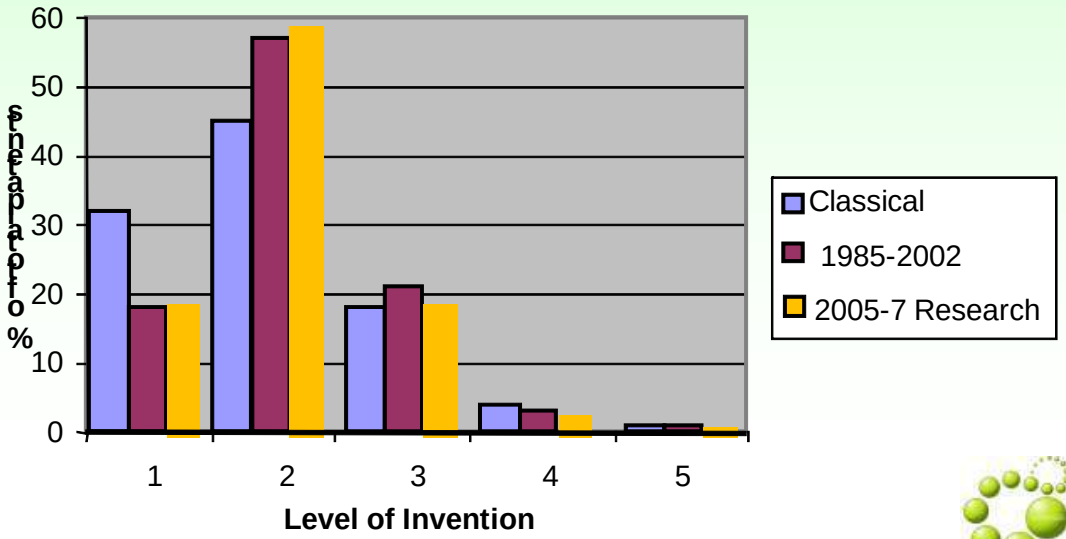
Every Patent → Establish Level of Invention → **Database**

**(97% of patents never pay back the cost of filing the patent…)**



# Level of Invention

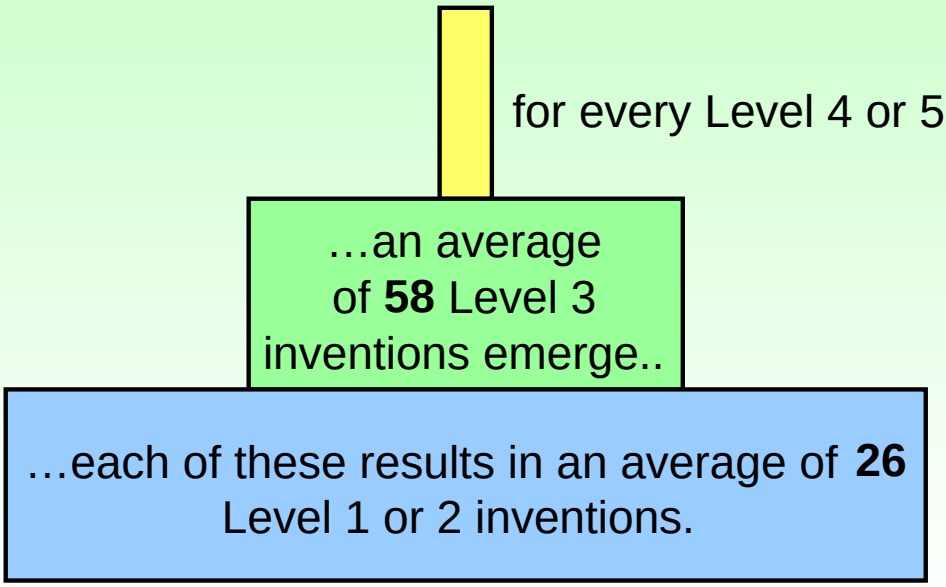
Every Patent → Establish Level of Invention → **Database**





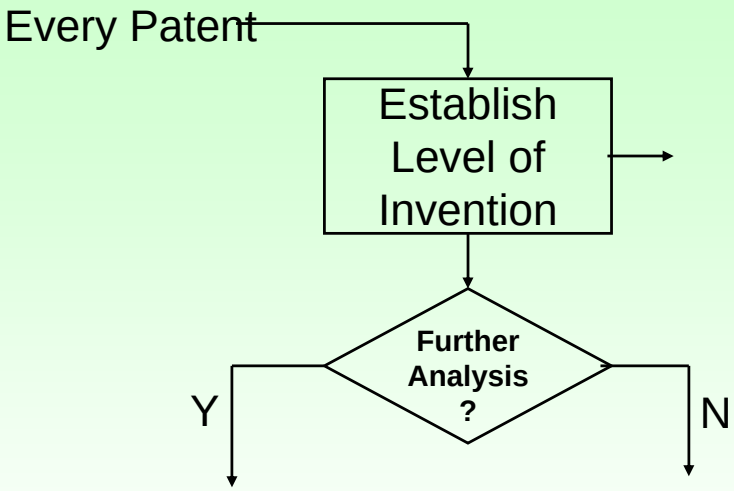

"TRIZ Home Page in Japan", Sept. 2009

# Cascade Effect in Level of Invention

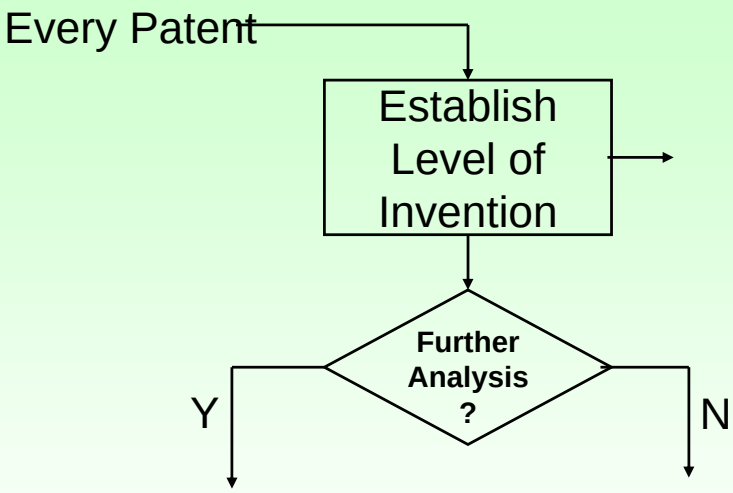





# Patent Search Strategy



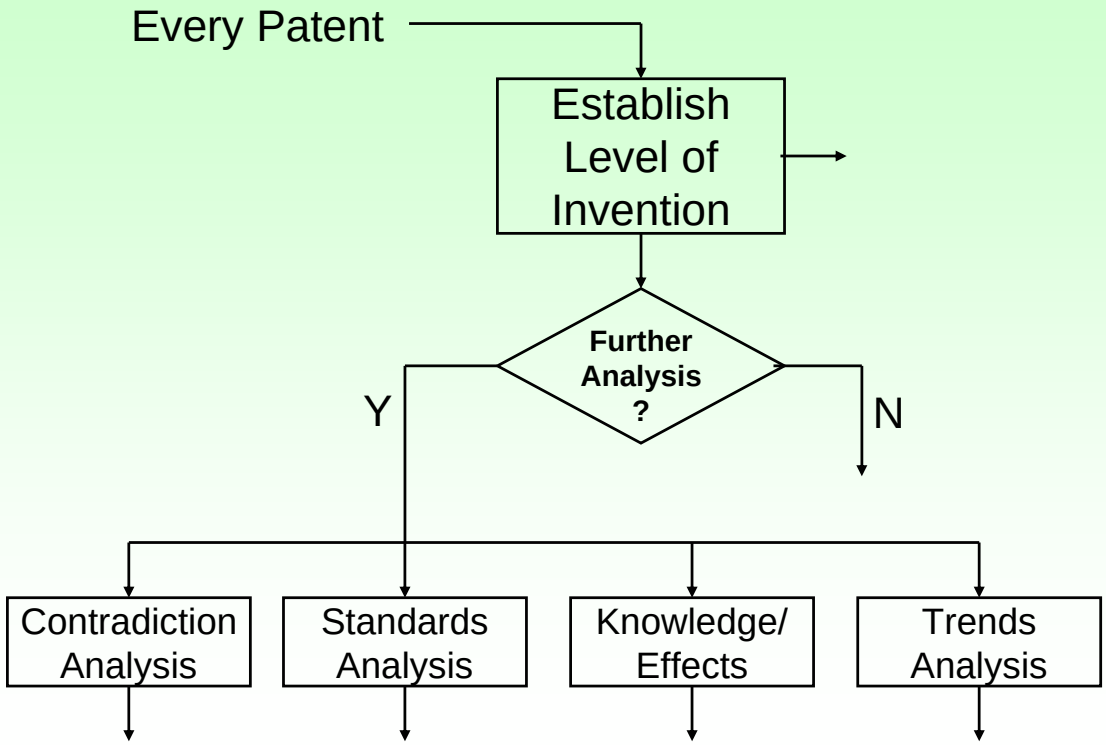
# Patent Search Strategy




**Currently:** **20%** **80%**



# Patent Search Strategy



# Contradiction Analysis

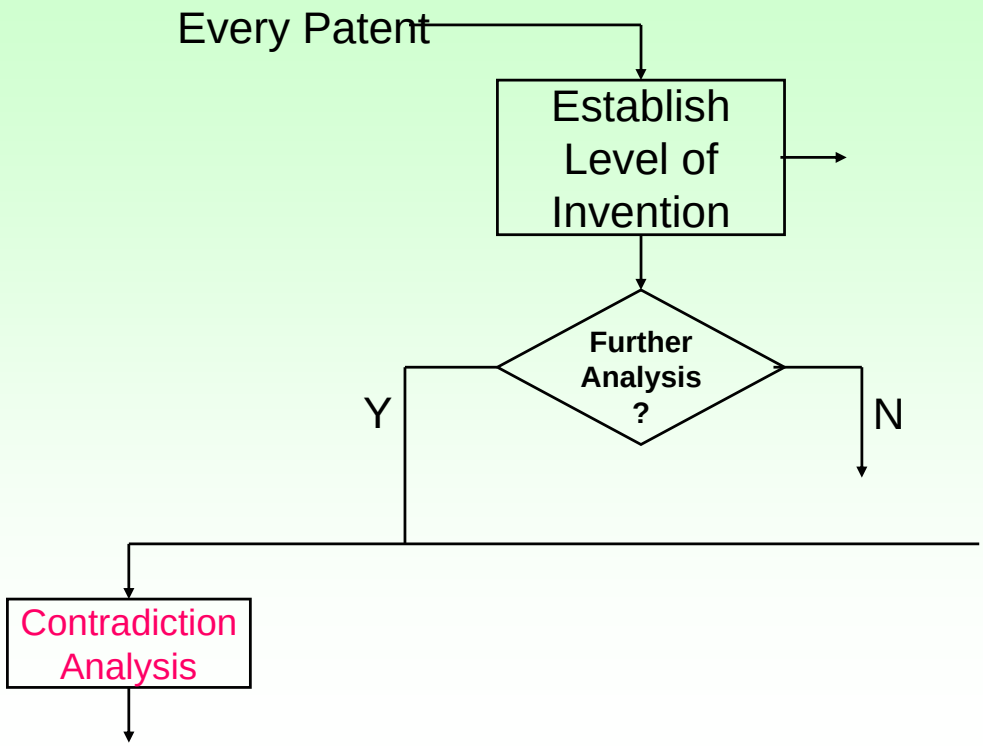





*Image blur is a common problem in photography. Some common causes of blur in a photograph are subject motion, camera motion (shake), and focusing errors. Blur is a particular problem for casual or amateur photographers who may not know how to diagnose the causes of blur or how to change their photographic technique to improve their results. As new consumer camera models are being produced with zoom lenses capable of very long focal lengths, blur due to camera shake is especially troublesome.*

*Various devices and techniques have been proposed to help address the problem of image blur due to camera shake. For example, Murakoshi (U.S. Pat. No. 4,448,510) uses an accelerometer to detect camera shake, and provides an indication to the user of the camera if the acceleration exceeds a threshold level.*

*Satoh (U.S. Pat. No. 6,101,332) also senses camera shake, and combines the shake information with other camera parameters to estimate how much image blur might result. A set of light emitting diodes communicates the estimate to the photographer.*

*Another approach has been to automate the camera operation, and let the camera choose settings that will minimize blur. For example, Bolle et al. (U.S. Pat. No. 6,301,440) applies a variety of image analysis techniques in an attempt to improve several aspects of photographs.*

*Each of these approaches has its drawbacks. The above techniques may require the addition of expensive electro-mechanical components to a camera, thereby increasing the camera cost. The techniques may address only one potential cause of image blur. The techniques give the camera user little guidance about how to improve her photographs, and in fact, additional automation that reduces the photographer's control of the camera may even add to the mystery of why a particular photograph is blurred.*

*A solution to the problem of image blur is needed that also addresses these difficulties*

# For This Paper…

A quasi-randomly selected sample of 100 patents was made to demonstrate the research procedure:

| Patent Number | Short Title | Improving Parameter | Worsening Parameter | Classical Matrix | Matrix 2003 | Inventor Used.. |
|---|---|---|---|---|---|---|
| US7397500 (HP) | Camera-Shake Warning System | Stability (21) | Ability to Detect (47) | 3, 27, 16 | 7, 24, 17, 35, 9, 37, 32, 28 | 37 |



*Image blur is a common problem in photography. Some common causes of blur in a photograph are subject motion, camera motion (shake), and focusing errors. Blur is a particular problem for casual or amateur photographers who may not know how to diagnose the causes of blur or how to change their photographic technique to improve their results. As new consumer camera models are being produced with zoom lenses capable of very long focal lengths, blur due to camera shake is especially troublesome.*

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*A solution to the problem of image blur is needed that also addresses these difficulties*

*Image blur is a common problem in photography. Some common causes of blur in a photograph are subject motion, camera motion (shake), and focusing errors. Blur is a particular problem for casual or amateur photographers who may not understand the causes of blur or how to change their photographic technique to improve their results. As new consumer camera models are being produced with zoom lenses capable of very long focal lengths, blur due to camera shake is especially troublesome.*

**What are we trying to improve?**

*Various devices and techniques have been proposed to help address the problem of image blur due to camera shake. For example, Murakoshi (U.S. Pat. No. 4,448,510) uses an accelerometer to detect camera shake, and provides an indication to the user of the camera if the acceleration exceeds a threshold level.*

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*Each of these approaches has its drawbacks. The above techniques may require the addition of expensive electro-mechanical components to a camera, thereby increasing the camera cost. The techniques may not address the essential cause of image blur. The techniques give the camera user little guidance for taking better photographs, and in fact, additional automation that reduces the photographer's control of the camera may even add to the mystery of why a particular photograph is blurred.*

**What stops us?**

*A solution to the problem of image blur is needed that also addresses these difficulties*



*Image blur is a common problem in photography. Some common causes of blur in a photograph are subject motion, camera motion (shake), and focusing errors. Blur is a particular problem for casual or amateur photographers who may not understand the causes of blur or how to change their photographic technique to improve their results. As new consumer camera models are being produced with zoom lenses capable of very long focal lengths, blur due to camera shake is especially troublesome.*

**What are we trying to improve?**
**Blur!**

*Various devices and techniques have been proposed to help address the problem of image blur due to camera shake. For example, Murakoshi (U.S. Pat. No. 4,448,510) uses an accelerometer to detect camera shake, and provides an indication to the user of the camera if the acceleration exceeds a threshold level.*

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**What stops us? – expensive additions**

**Root issue? – ability to measure**

*A solution to the problem of image blur is needed that also addresses these difficulties*

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**What are we trying to improve?**

**What stops us? – expensive additions**

**Root issue? – ability to measure**

**How did the inventor solve the problem?**

*"A camera creates successive digital images of a scene, and computes a stability measure estimate blur in a final photograph of the scene."*



**What are we trying to improve?**

**What stops us? – expensive additions**

**Root issue? – ability to measure**

**How did the inventor solve the problem?**

*"A camera creates successive digital images of a scene, and computes a stability measure estimate blur in a final photograph of the scene."*

= Principle 37
('Relative Change')

# For This Paper…

A quasi-randomly selected sample of 100 patents was made to demonstrate the research procedure:

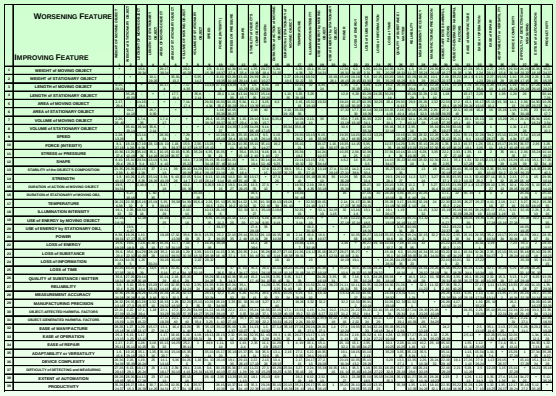
| Patent Number | Short Title | Improving Parameter | Worsening Parameter | Classical Matrix | Matrix 2003 | Inventor Used.. |
|---|---|---|---|---|---|---|
| US7397500 (HP) | Camera-Shake Warning System | Stability (21) | Ability to Detect (47) | 3, 27, 16 | 7, 24, 17, 35, 9, 37, 32, 28 | 37 |

| | | |
|---|---|---|
| Matrix 2003 | - | 96% |
| Classical Matrix | - | 18% |



# Contradiction Analysis – Matrix Accuracy

**1973**

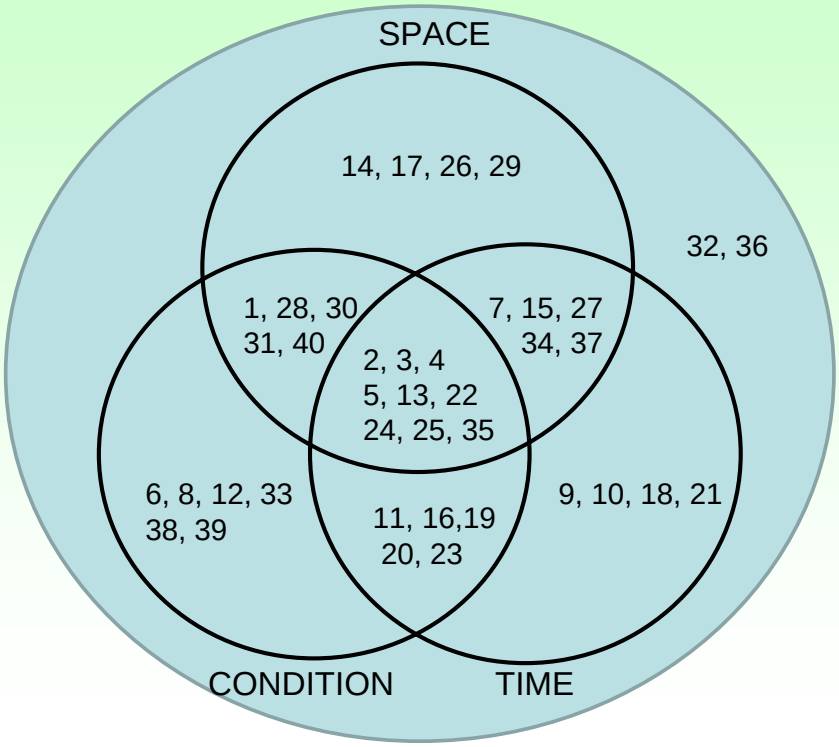




| | 2005 (classical) | 2006 (classical) | 2007 (classical) | 2008 (classical) | 2005 (M2003) | 2006 (M2003) | 2007 (M2003) | 2008 (M2003) |
|---|---|---|---|---|---|---|---|---|
| Mechanical | 44 | 41 | 38 | 36 | 96 | 96 | 96 | 95 |
| Electronics | 26 | 23 | 22 | 20 | 94 | 94 | 93 | 93 |
| Chem/Pharm | 25 | 24 | 24 | 24 | 95 | 95 | 93 | 91 |
| ICT | 22 | 21 | 19 | 15 | 94 | 92 | 90 | 89 |
| Overall Average | 27 | 26 | 24 | 21 | 95 | 94 | 93 | 91 |

% likelihood that Principles present in patent were the ones predicted by the Matrix

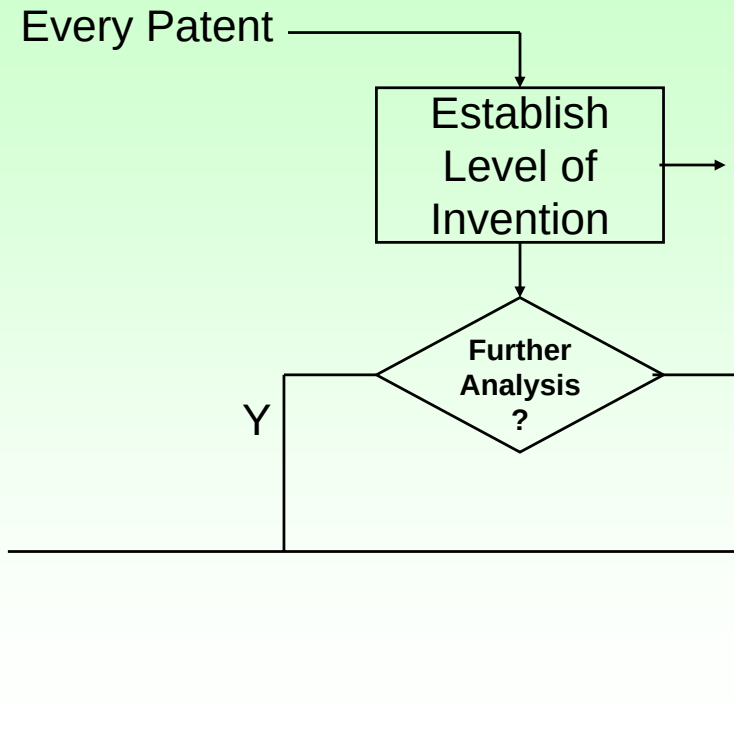
# Physical Contradiction Solution Strategies




(Systematic Innovation E-Zine, Issue 76, July 2008)

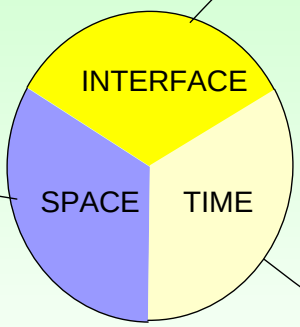


# Trends of Evolution/Evolution Potential



# Trends of Evolution

Mono-Bi-Poly (Similar)
Mono-Bi-Poly (Various)
Mono-Bi-Poly (Inc.Diff.)
Trimming
Controllability
Human Involvement
Reducing Energy Conversions



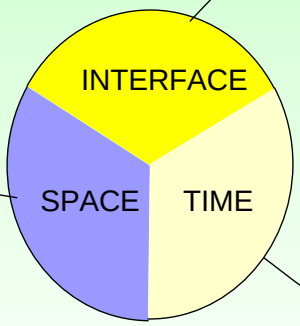

Space Segmentation
Surface Segmentation
Object Segmentation
Macro to Nano Scale
Geometric Evolution (Lin)
Geometric Evolution (Vol)
Dynamisation

Action Co-ordination
Rhythm Co-ordination
Mono-Bi-Poly (Sim)
Mono-Bi-Poly (Var)
Macro to Nano Scale



# New Trends of Evolution

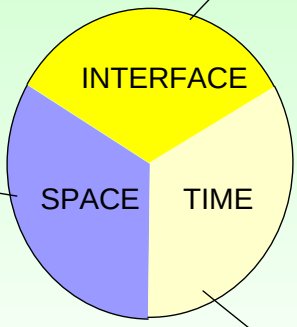
Mono-Bi-Poly (Similar) – Interface
Mono-Bi-Poly (Various) – Interface
Mono-Bi-Poly (Inc.Diff.) – Interface
Damping
Sense Interaction
Colour Interaction
Transparency
Customer Purchase Focus
Market Evolution
Design Point
Degrees of Freedom
Boundary Breakdown – Interface
Trimming
Controllability
Human Involvement
Design Methodology
Reducing Energy Conversions




Smart Materials
Space Segmentation
Surface Segmentation
Object Segmentation
Macro to Nano Scale – Space
Webs and Fibres
Decreasing Density
Asymmetry
Boundary Breakdown - Space
Geometric Evolution (Lin)
Geometric Evolution (Vol)
Dynamisation

Action Co-ordination
Rhythm Co-ordination
Non-Linearity
Mono-Bi-Poly (Sim) – Time
Mono-Bi-Poly (Var) – Time
Macro to Nano Scale – Time

# New New Trends of Evolution (2008)




Mono-Bi-Poly (Similar) – Interface
Mono-Bi-Poly (Various) – Interface
Mono-Bi-Poly (Inc.Diff.) – Interface
**NESTING (UP)**
Damping **(CHANGED)**
Sense Interaction
Colour Interaction
Transparency
Customer Purchase Focus
Market Evolution
Design Point
Degrees of Freedom
Boundary Breakdown – Interface
Trimming
Controllability
Human Involvement
Design Methodology
Reducing Energy Conversions
**SUSTAINABILITY**
**CUSTOMER INTANGIBLES**

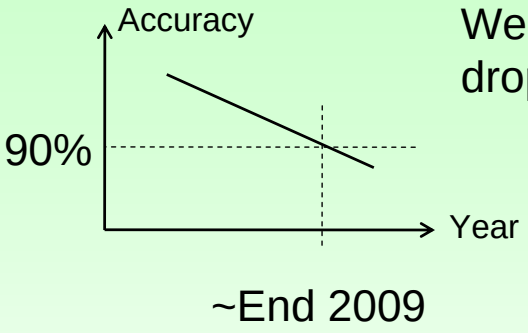
Smart Materials
Space Segmentation
Surface Segmentation
Object Segmentation
Macro to Nano Scale – Space
Webs and Fibres
Decreasing Density
Asymmetry
Boundary Breakdown - Space
Geometric Evolution (Lin)
Geometric Evolution (Vol)
**NESTING (DOWN)**
Dynamisation

Action Co-ordination
Rhythm Co-ordination **(CHANGED)**
Non-Linearity
Mono-Bi-Poly (Sim) – Time
Mono-Bi-Poly (Var) – Time
Macro to Nano Scale – Time
**NESTING (TIME)**



# Into The Future

# A Prediction…




We always said that when the efficiency drops below 90% we will re-issue…

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