

# Computer-Aided (**Systematic**) Innovation

– new tools and new ways of thinking



Dr Paul Filmore, University of Plymouth  
Darrell Mann, Systematic Innovation Ltd.  
Mir Abubakr Shahdad, University of Plymouth



6<sup>th</sup> Japanese TRIZ Symposium, 9-10 September 2010



# Computer-Aided (Systematic) Innovation

– new tools and new ways of thinking

1) Setting The Scene

2) AEGIS

3) ApolloSigma

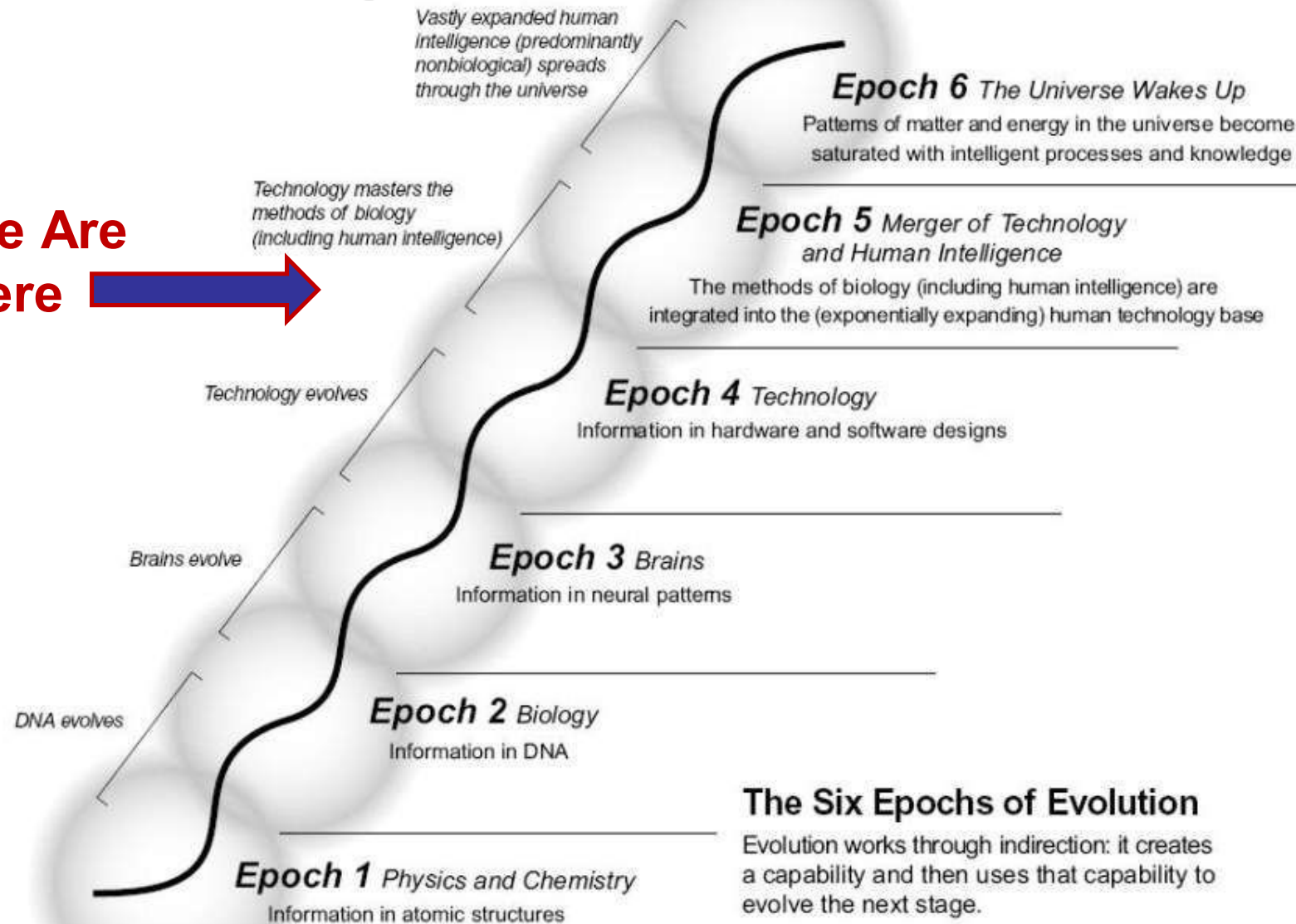
4) iTrenDNA

5) Conclusions/Future Work



# 1. Setting The Scene

**We Are  
Here** →



## The Six Epochs of Evolution

Evolution works through indirection: it creates a capability and then uses that capability to evolve the next stage.

Ray Kurzweil (2005) *The Singularity is Near*

# When...

- Computers are 'more intelligent' than humans (2020)
- Software writes software (2025 (some does already))
- Robots manufacture (already here)
- Robots control agriculture....




...a lot of industries will be transformed beyond recognition...

**It will happen whether we like it or not.**

**Play or die. These are the options.**

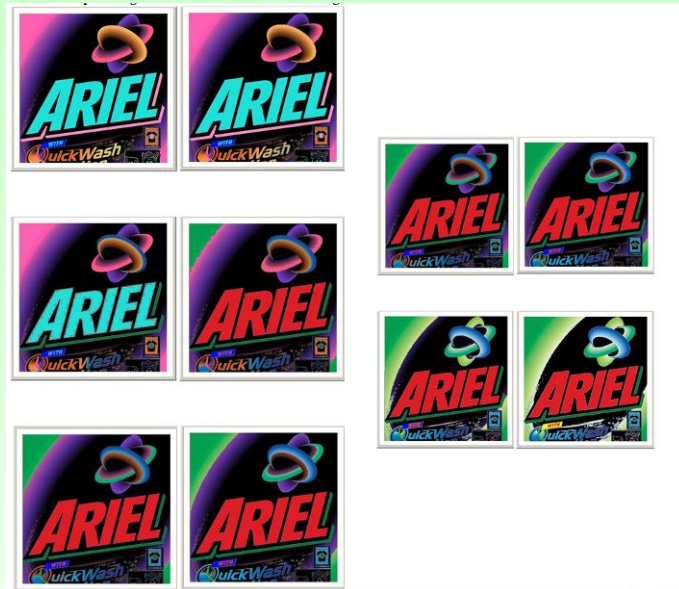




***'Computers  
That Invent'***

## **2. AEGIS**

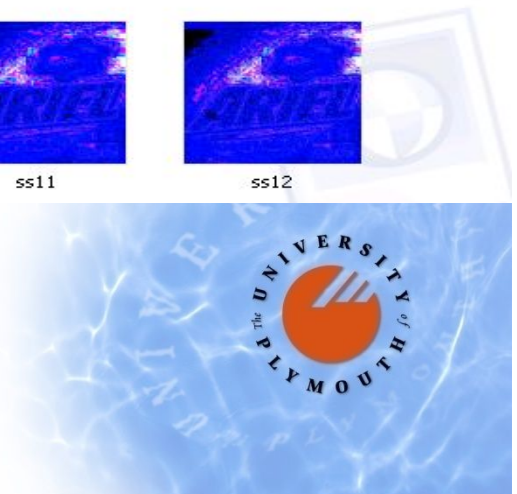
## AEGIS- Version 4



# AEGIS:

## Accelerated Evolutionary Graphics Interface System

## AEGIS- Version 5



# AEGIS Version 6: Layered based version

Accelerated Evolutionary Graphics Interface System

File  
label1

Algorithm- Gamma parameter(R,G,B=2.2 10)

Algorithm- Gamma parameter(R,G,B=10 10 10)

Algorithm- Gamma parameter(R,G,B=2.2 2.2)

Algorithm- Gamma parameter(R,G,B=2.5 10)

Algorithm- Gamma parameter(R,G,B=5000.2 2)

Algorithm- Gamma parameter(R,G,B=10 5 10)

Algorithm- Gamma parameter(R,G,B=5.2 2)

Algorithm- Gamma parameter(R,G,B=5.2 10)

**Layers Used**

**Control Panel**

Apply mutations to:

☒ Fonts ☒ Logo ☒ Extras

☒ Background

Use the following text mutations:

☒ Italic ☒ Reverse Italic ☒ Vertical Italic

Use the following colour mutation:

☐ Smooth ☐ Conv [3x3]

☐ Gamma ☐ Sobel ☐ Laplacian

☐ Sharpen ☐ Color

Submit Changes

## Applied in V6:

### Trends

- Surface segmentation
- Space segmentation
- Asymmetry
- Geometric Evolution
- Increasing use of colour

### Principles

- Merging
- Segmentation
- Colour changes



**'Computers  
That Protect'**

### **3. ApolloΣ**

# How Much Is My IP Worth?

## Re-Thinking IP Valuation

Short Answer:  
whatever someone is prepared to pay for it

But:  
organisations are increasingly expected to include patents and other IP onto their balance sheet

## Why Value IP?

- Evaluating potential merger or acquisition candidates
- Identifying and prioritising assets that drive value
- Strengthening positions in technology transfer negotiations
- Making informed financial decisions on IP maintenance, commercialisation and donation
- Evaluating commercial prospects for early stage R&D
- Valuing R&D efforts and prioritising research projects
- Supporting a valuation for loan collateral

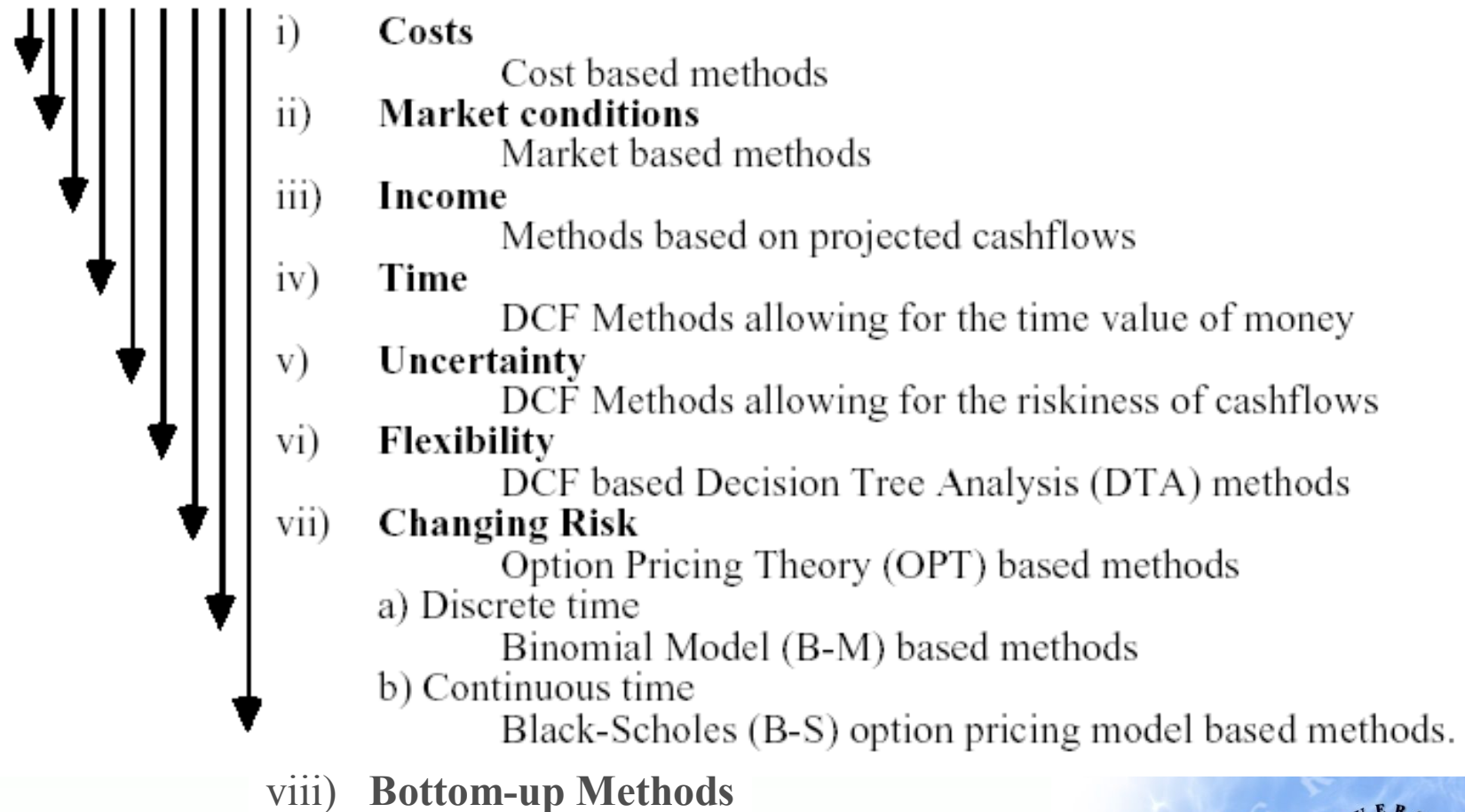


*“The new millenium will see a new breed of corporate raiders who strip out and sell intellectual property, just as their predecessors did with undervalued tangible assets in the 1980s.”*

Susan Chaplinsky, University of Virginia



# Patent Valuation Methods



Increasing sophistication

Robert Pitkethly, University of Oxford

<http://bus6900.alliant.wikispaces.net/file/view/EJWP0599.pdf>

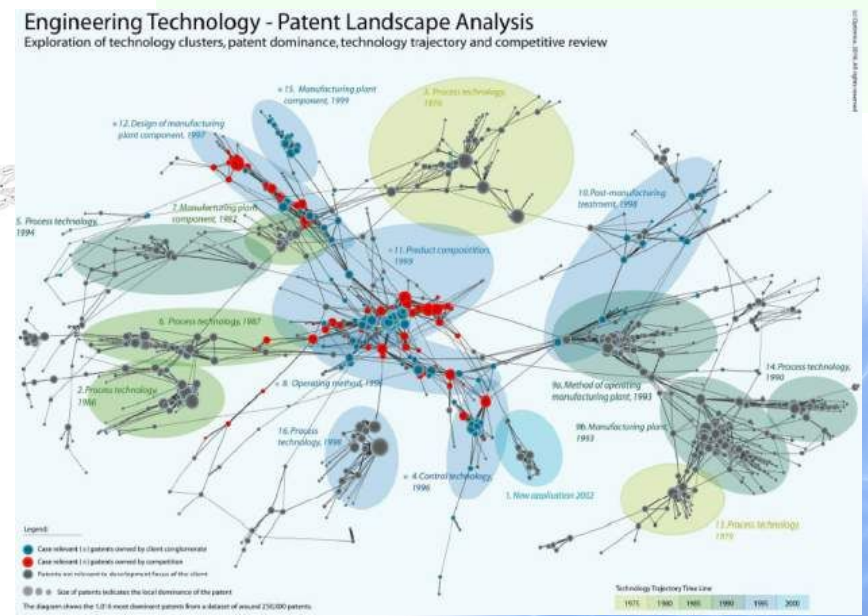


# Crackpot Rigour?

Ease of measurement  
is inversely  
proportional to  
meaning!



### Social Citation Network of EPO Data (Depth 2 or Degree 3)



©2010 DLMann & PRFilmore, all rights reserved

- \* How much is my IP portfolio currently worth?
- \* How will its value change in the coming months and years?
- \* What are the disruptive threats that could appear from other industries, what impact could they have on mine, and what do I need to do about it?
- \* What are the possibilities for me to exploit my existing IP into other industries?

*IP valuation is divorced from business strategy because today it delivers the wrong information, too late.*



# Calculating IP Value (Index)

Current Value = f { problems being solved }

problems · alignment problems · alleviate the impact degree ·

· availability problems · avoids problems ·

cause problems · collision of a robot arm · communication problems · constraint satisfaction problems ·

control

problems

· conventional cable arrangement system of the industrial · conventional control method for the mobile

variations · feeding problems · flash problems · hardware malfunction of software bugs ·

heat resistance of the glass substrate · increase in the cost · increased cost of the robot controller ·

insufficiencies in the point · interaction problems · interference between the first arm · interference problems ·

interference with peripheral equipment · irregularity problems · leakage problems · multiple triggering on speckle effect ·

operator cause problems · presents problems · robotics problems · safety problems ·

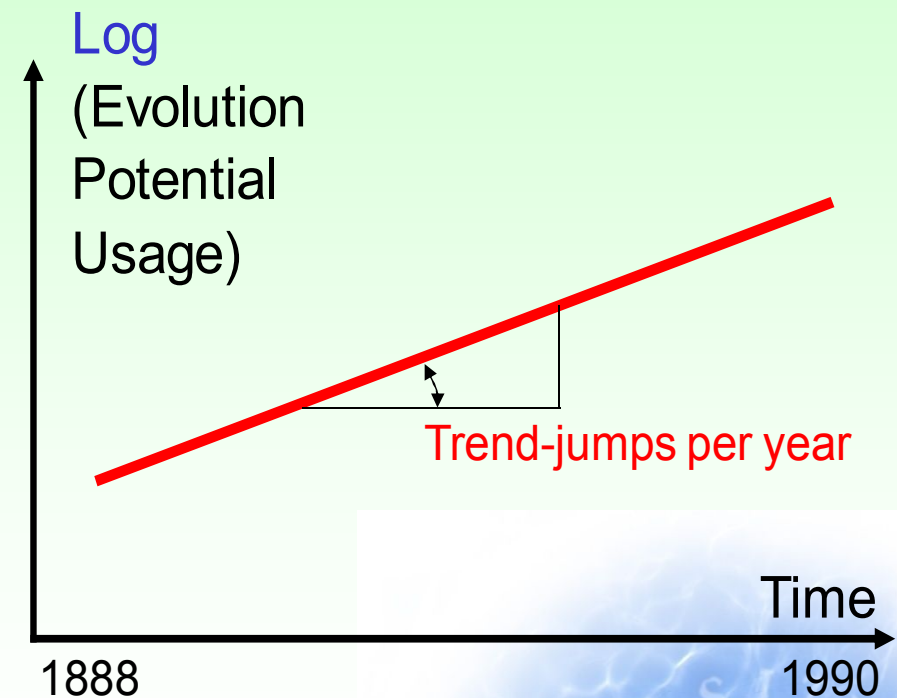
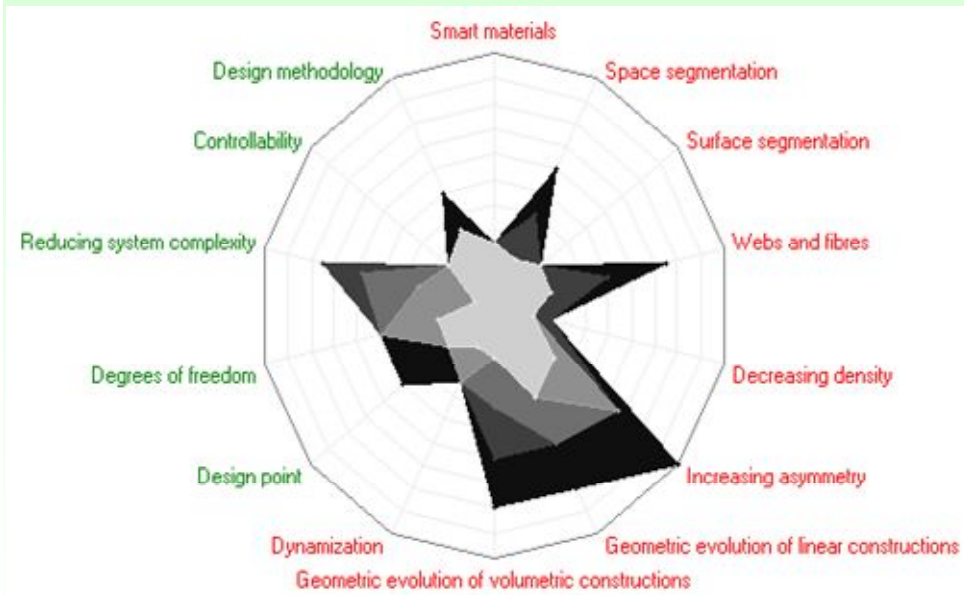
scrap problems · speckle in the resultant image due · term drift problems · variations in

orientation due · verifying that the wireless connection · vision problems · wafer  
slippage on a robot blade



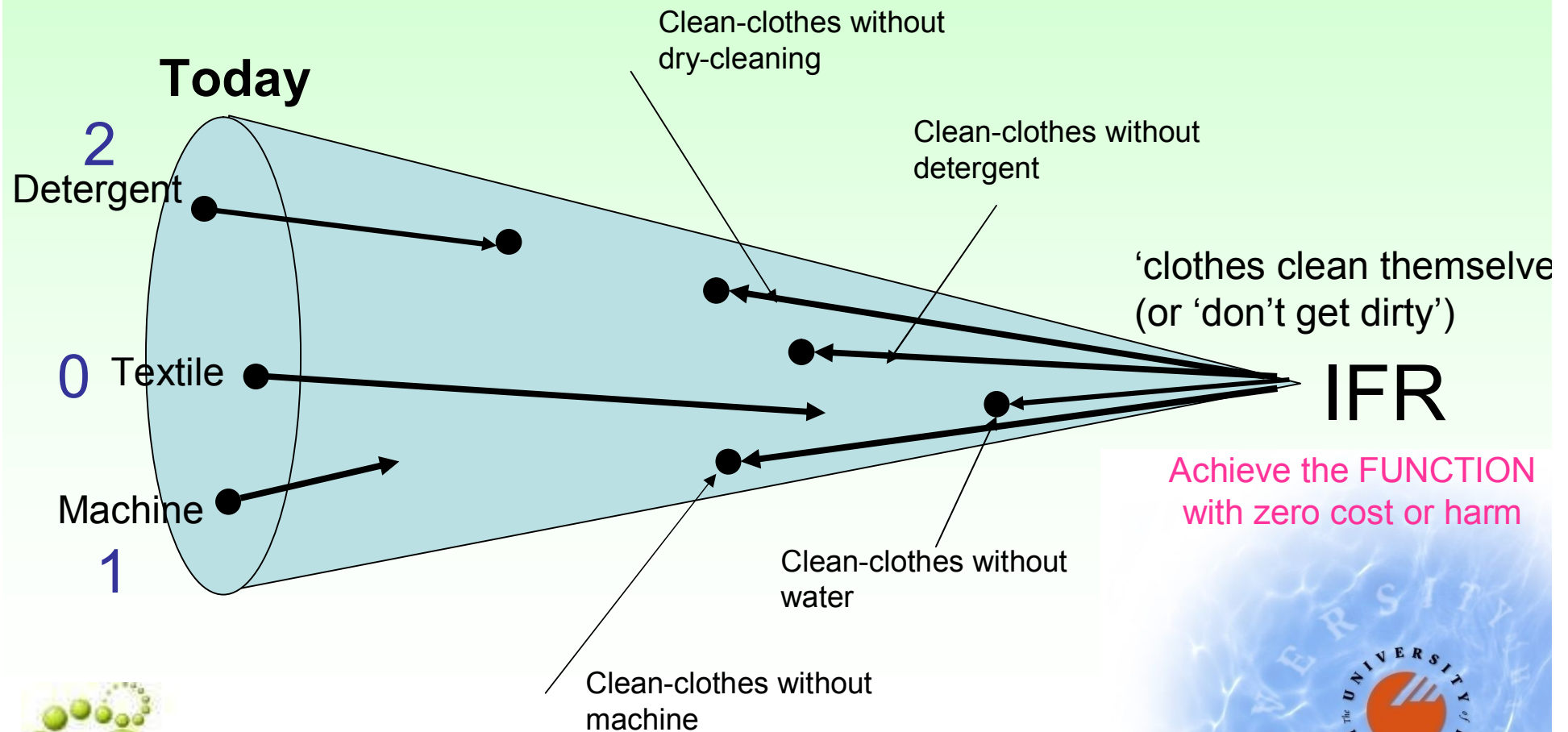
# Calculating IP Value (Index)

Future Value = f { untapped evolution potential, rate of change }



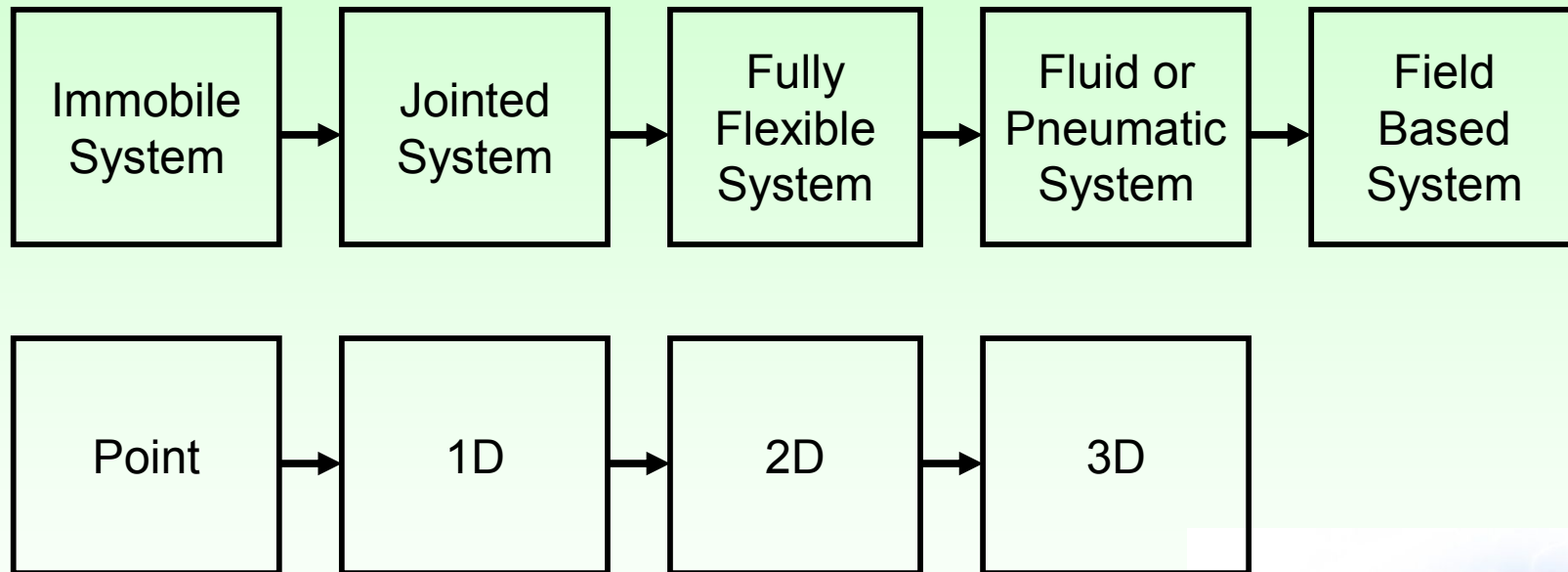
# Calculating IP Value (Index)

Future Value =  $f \{ 1/\text{number of steps from MUF IFR} \}$

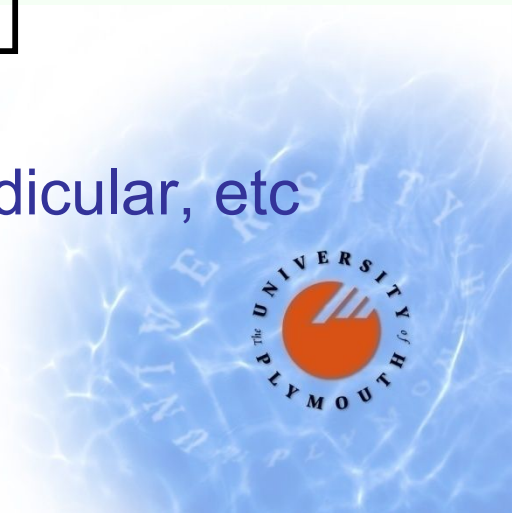


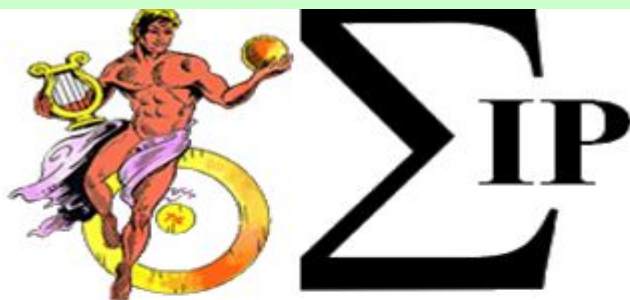
# Calculating IP Value (Index)

‘Good’ Words: flexible, fluid, field...



Bad words: immobile, rigid, straight, perpendicular, etc





Welcome to a new dimension of IP valuation capability, putting right the fundamental flaws of current methods. ApolloΣIP is based on a three million data point study of innovation success. It says that rather than looking at poor success measures like citation indices (which are several years behind today) or litigation levels (which mean the patent was drafted badly), our unique algorithm allow inventors and IP strategists to work out not only the current strength of a patent, but also its likelihood of still being valuable in the future – taking into account the disruptions that can overnight kill the value of your IP.

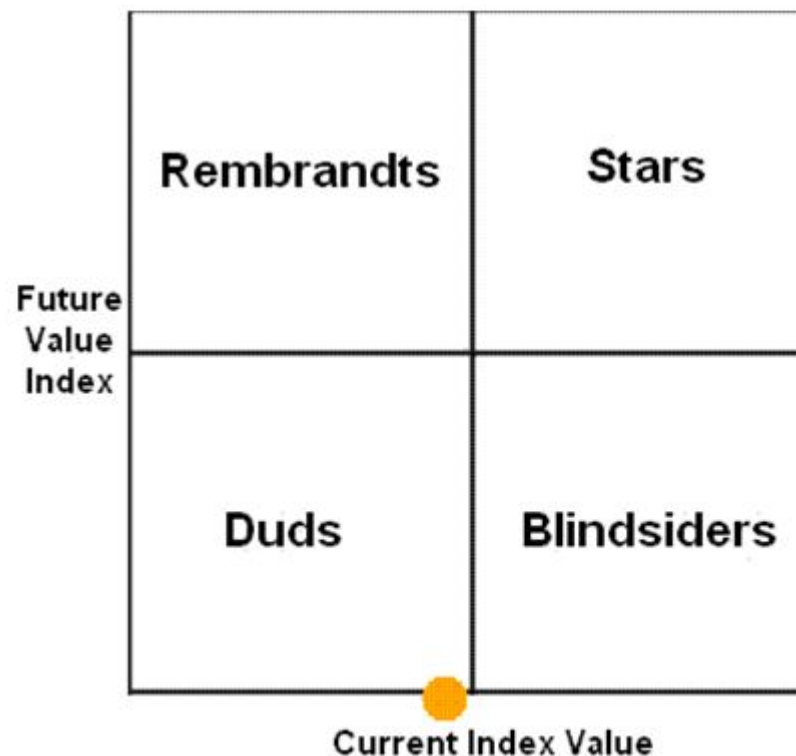
Analyse by Patent Number

Paste the text you want to analyse here:

Progress Status:

DONE!

[How do we do it? What should you do next?](#)

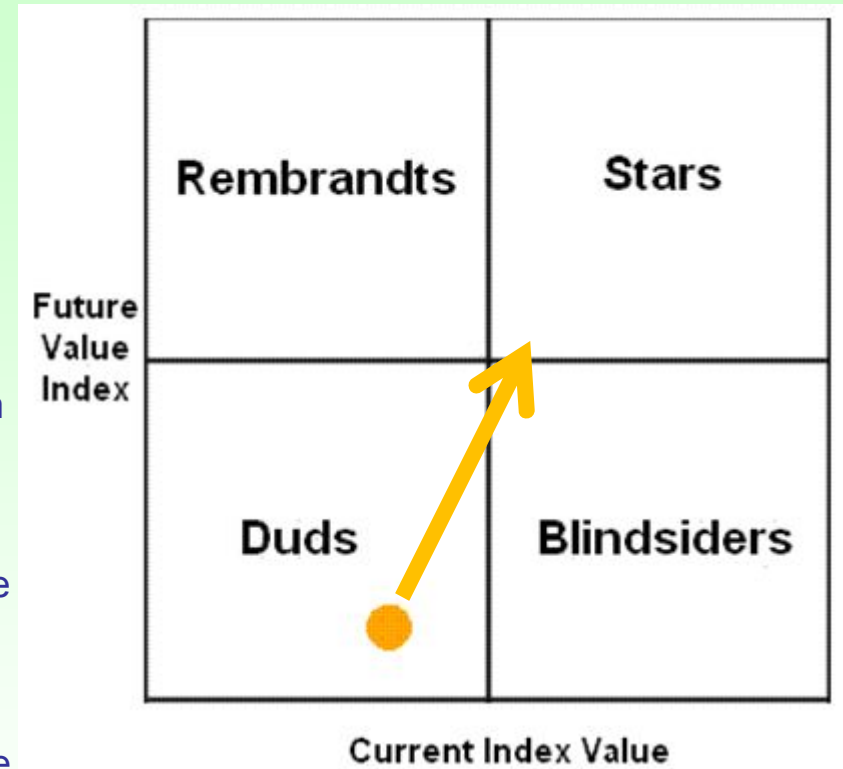


# From Analysis To Design

1) Inventor analyses solution prior to filing:

2) Recommendations based on bad and good words

1. A method of updating a code image in a storage medium storing an operating system having a first region, on which a boot code is loaded, a second region, in which a first code image is stored, and a third region, in which the boot code and a first check data for verifying the first code image are stored, the method comprising: storing a second code image in the second region; extracting information about a secure **one-way** function from the first check data; and generating second check data for verifying the second code image using the extracted information of the secure one-way function and **storing the generated second check data in the third region**, wherein, when the **second check data is set as a parameter** of the secure one-way function, the first check data is generated.

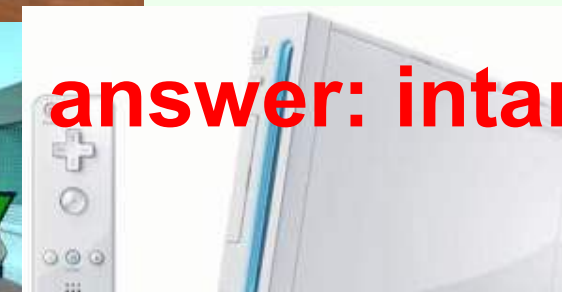
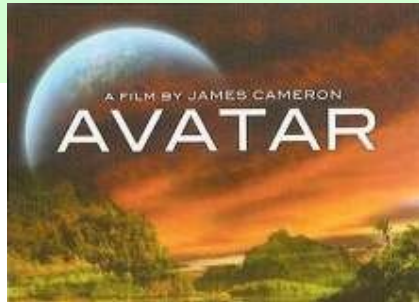




**'Computers  
That Find The  
Right Problem'**

**4. iTrenDNA**

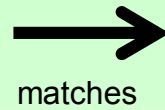
# What Makes These Things So Successful?



answer: intangible

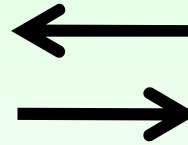
# Innovation Happens When....

**Voice  
Of The  
Customer**




**Voice  
Of The  
System**

**TRIZ very good  
at this job**

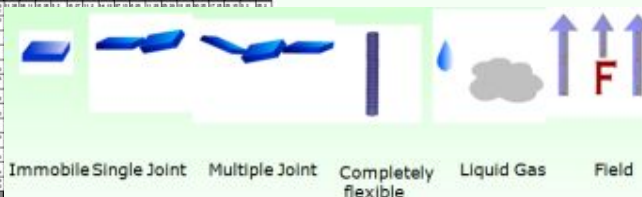


**Voice  
Of The  
System**

	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	32	33	34	35	36	37	38	39	40
1. Weight																																								
2. Length																																								
3. Area																																								
4. Volume																																								
5. Mass																																								
6. Force																																								
7. Torque																																								
8. Power																																								
9. Energy																																								
10. Frequency																																								
11. Temperature																																								
12. Time																																								
13. Reliability																																								
14. Accuracy																																								
15. Cost																																								
16. Complexity																																								
17. Portability																																								
18. Flexibility																																								
19. Adaptability																																								
20. Maintainability																																								
21. Manufacturability																																								
22. Testability																																								
23. Scalability																																								
24. Interoperability																																								
25. Compatibility																																								
26. Reliability																																								
27. Maintainability																																								
28. Manufacturability																																								
29. Testability																																								
30. Scalability																																								
31. Interoperability																																								
32. Compatibility																																								
33. Reliability																																								
34. Maintainability																																								
35. Manufacturability																																								
36. Testability																																								
37. Scalability																																								
38. Interoperability																																								
39. Compatibility																																								
40. Reliability																																								



Immobile Single Joint      Multiple



# The Perfect Shirt?



Big AND small

Thick AND thin

Cheap AND expensive

Sport AND formal

Harmonious AND striking...

‘X-Factor’

SELF – cleaning

SELF – ironing

SELF - repairing



# TRIZ great for getting this far...



**...but which directions  
should we pursue?  
And in what order?**



Big AND small

Thick AND thin

Cheap AND expensive

Sport AND formal

Harmonious AND striking...

'X-Factor'

SELF – cleaning

SELF – ironing

SELF - repairing





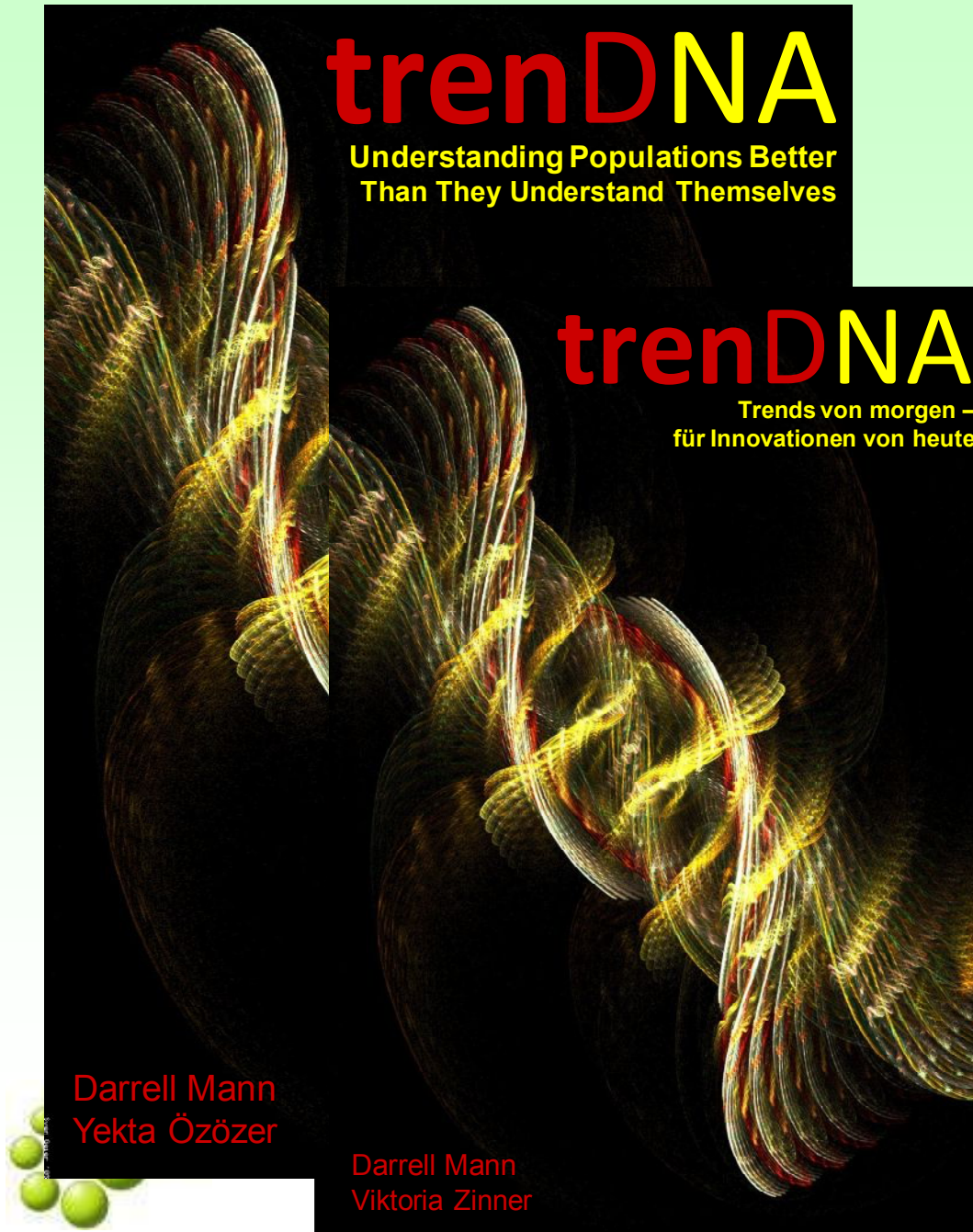
# Consumer Trends – What's Going On?

Every retailer spends time capturing and analysing consumer trend information. Almost invariably, once the information is captured, the future will very quickly deviate from what the trend predicts.

Even though, we can look at any individual trend and say to ourselves 'yes, I can see that this is a logical trend relevant to my operations' What is going on here?

- ageing population
- longer life expectation (active for longer)
- greater determination to live life to the full
- sharp increase in single-occupancy homes/single parent families
- increasing importance of the extended family
- increasing property prices – children staying home longer
- increasingly sedentary lifestyle (compensated by guilt-trips to gym)
- increasing safety/health consciousness
- increasing religious/spiritual awareness
- 'chutneys' – hand-made goods
- authenticity
- increasing risk aversion
- increasing awareness of sustainability/environmental issues
- Internet shopping/delivery of consumables
- desire for 'little luxuries' – affordably expensive rewards
- highly aspirational materialistic lifestyles ('I-want-more' culture)
- increasing desire to simplify a complex world
- desire for more convenience in mundane tasks
- rising power and influence of female
- disappearance of Mr/Mrs 'Average' – desire for individuality
- desire for 'cocooning' (nest-building)
- higher expectations as customer/greater inclination to complain
- 'Big Mother'





**UK**  
**Germany**

**Australia**  
**Brazil**  
**Japan**  
**China**  
**India?**





Title: SW design

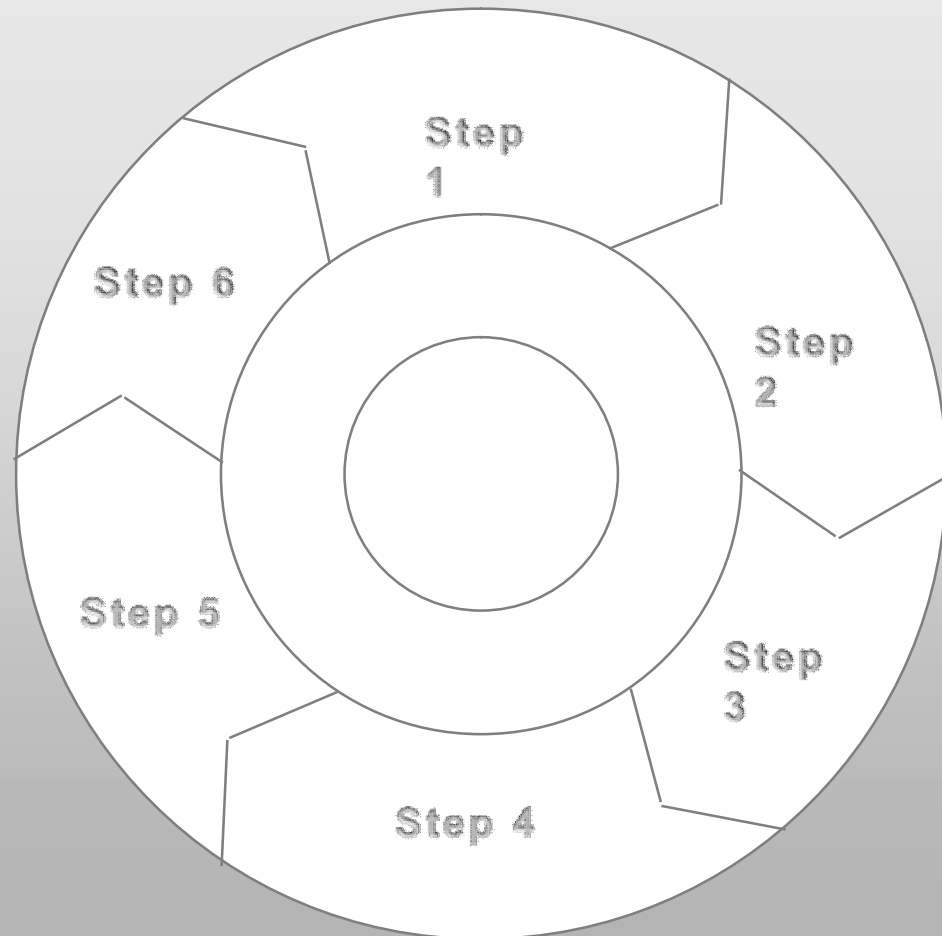
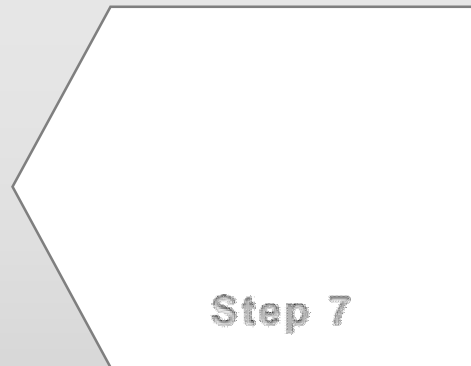
100



%



trenDNA



Step 0

Define project

Function & IFR

Perfection

White spaces

Define customer

Trend mapping

Step 6

Contradiction

Action plan

# the (computer-aided) science of intangibles

Intangibles:  
80% of the  
new  
innovation  
challenge...



...20% of the  
knowledge  
database



# Conclusions/ Future Work

## TRIZ

Technical

Tangible

Complicated

Newtonian

## SI

Technical+Business

Tangible+Intangible

Complex

Quantum



# Innovation Capability Maturity Model

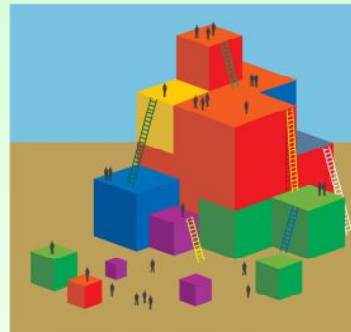
Innovation strategy depends on the capabilities  
of the organisation



SEEDING



CHAMPIONING



MANAGING



STRATEGISING



VENTURING

Ditto Computer-Aided Innovation Strategy...

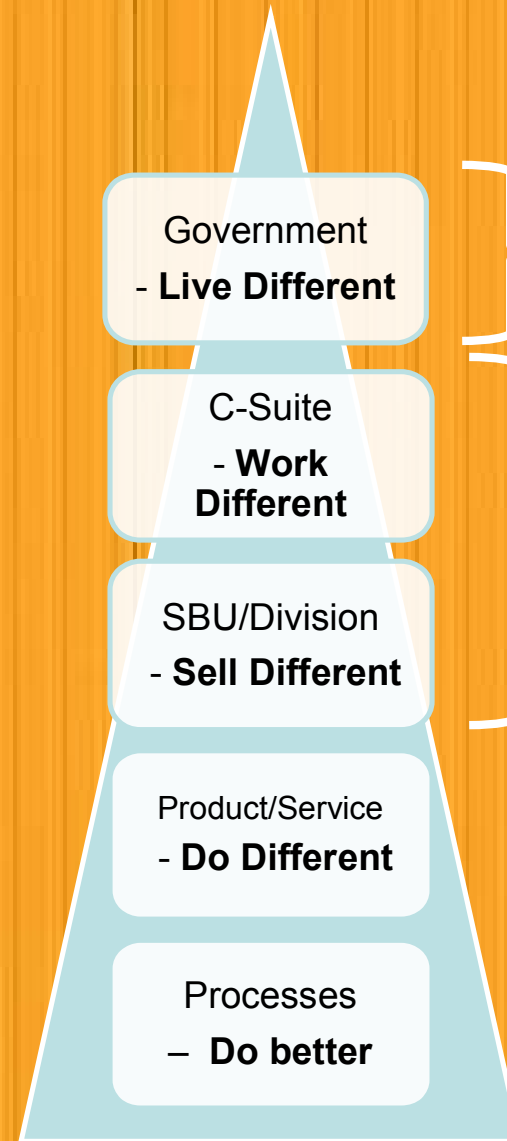
we need to measure  
before we deploy.



# Different Types Of Innovation



you can't  
innovate  
here...



...and  
eventually  
here

...without  
innovating  
here

# Thank you

**Dr Paul Filmore (University of Plymouth)**

pfilmore@plymouth.ac.uk

&

**Darrell Mann**

darrell.mann@systematic-innovation.com

[www.systematic-innovation.com](http://www.systematic-innovation.com)

- **Strategic Studies**
- **Problem Solving Consulting**
- **IP Generation/Design-Around/Strategy**
- **‘Voice Of The Product’**
- **Unspoken Voice Of The Consumer**
- **Consumer Insight**

