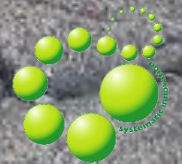


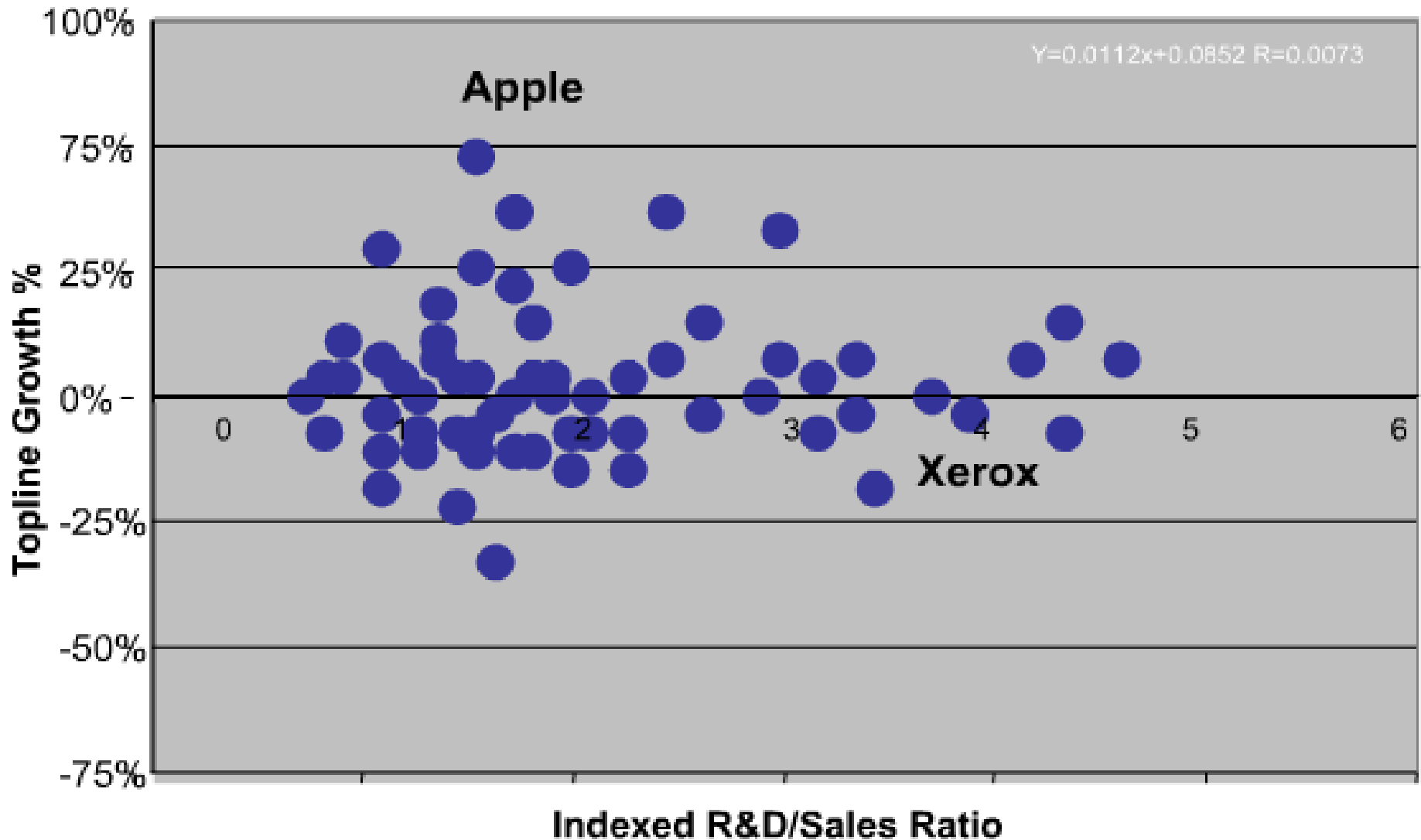
Sustainability Without Compromise

Revealing & Solving Lean Contradictions

Darrell Mann

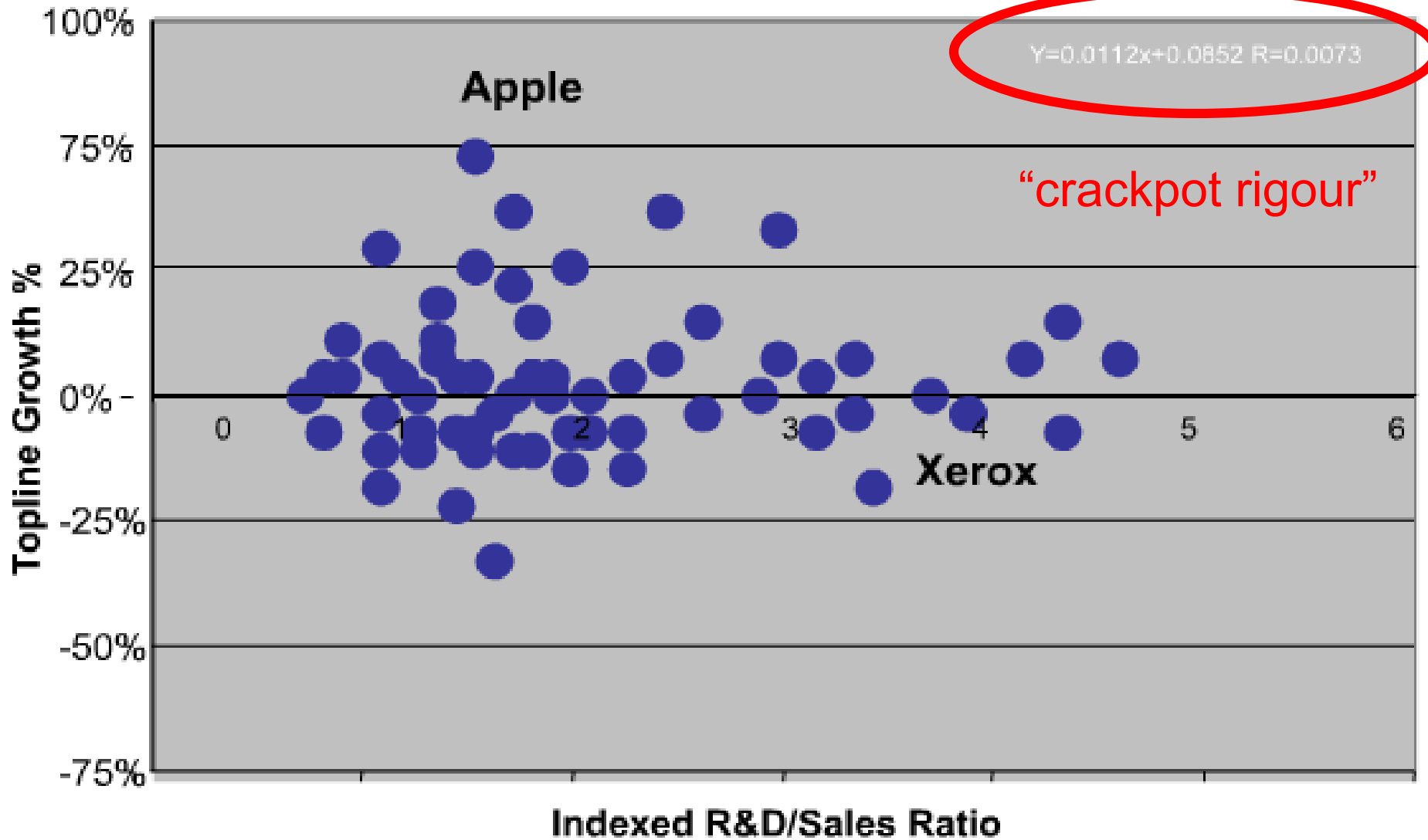


Innovation Performance



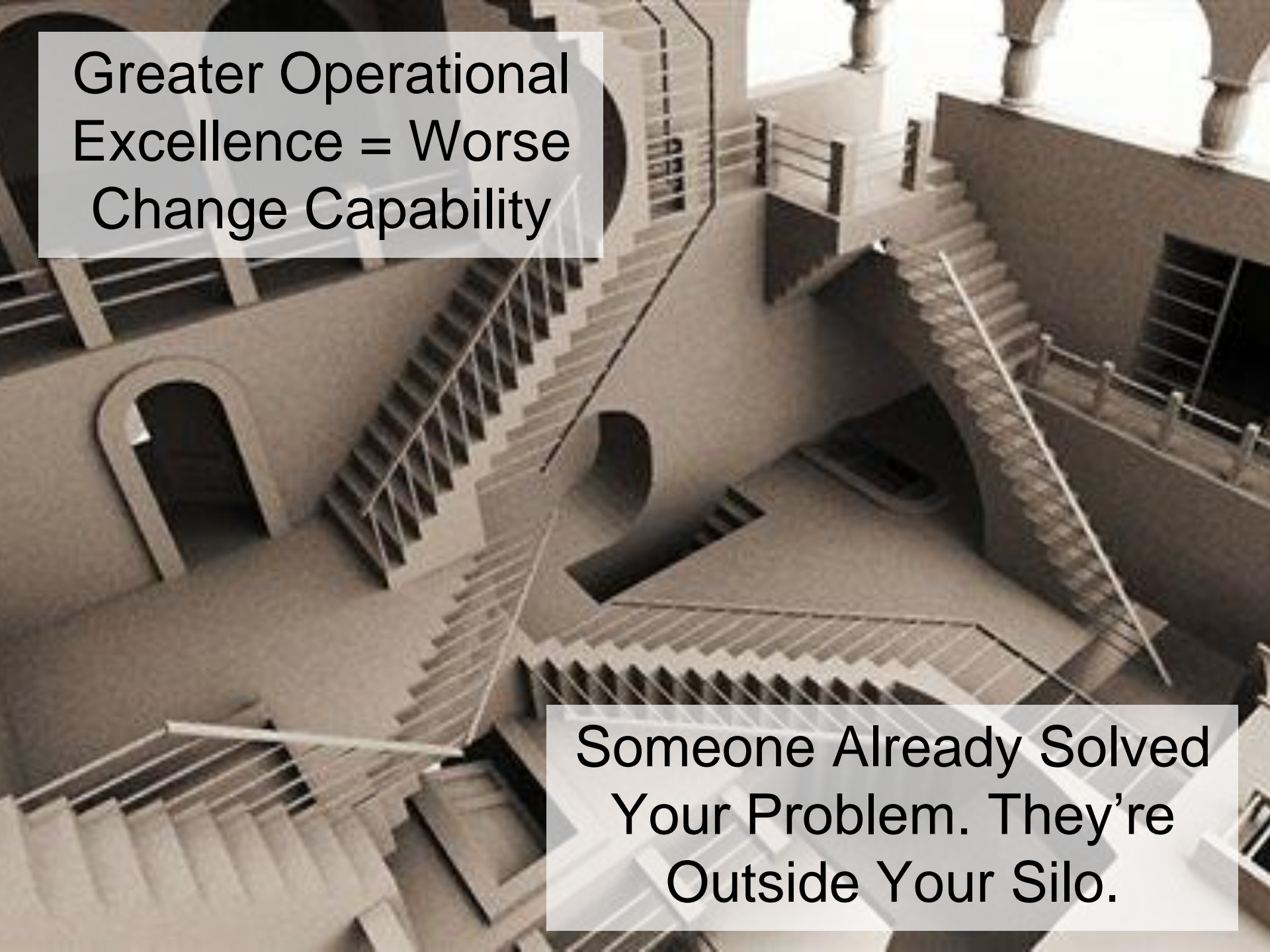
98% of 'innovation' attempts fail

Innovation Performance



Some of our clients from the last 17 yrs:

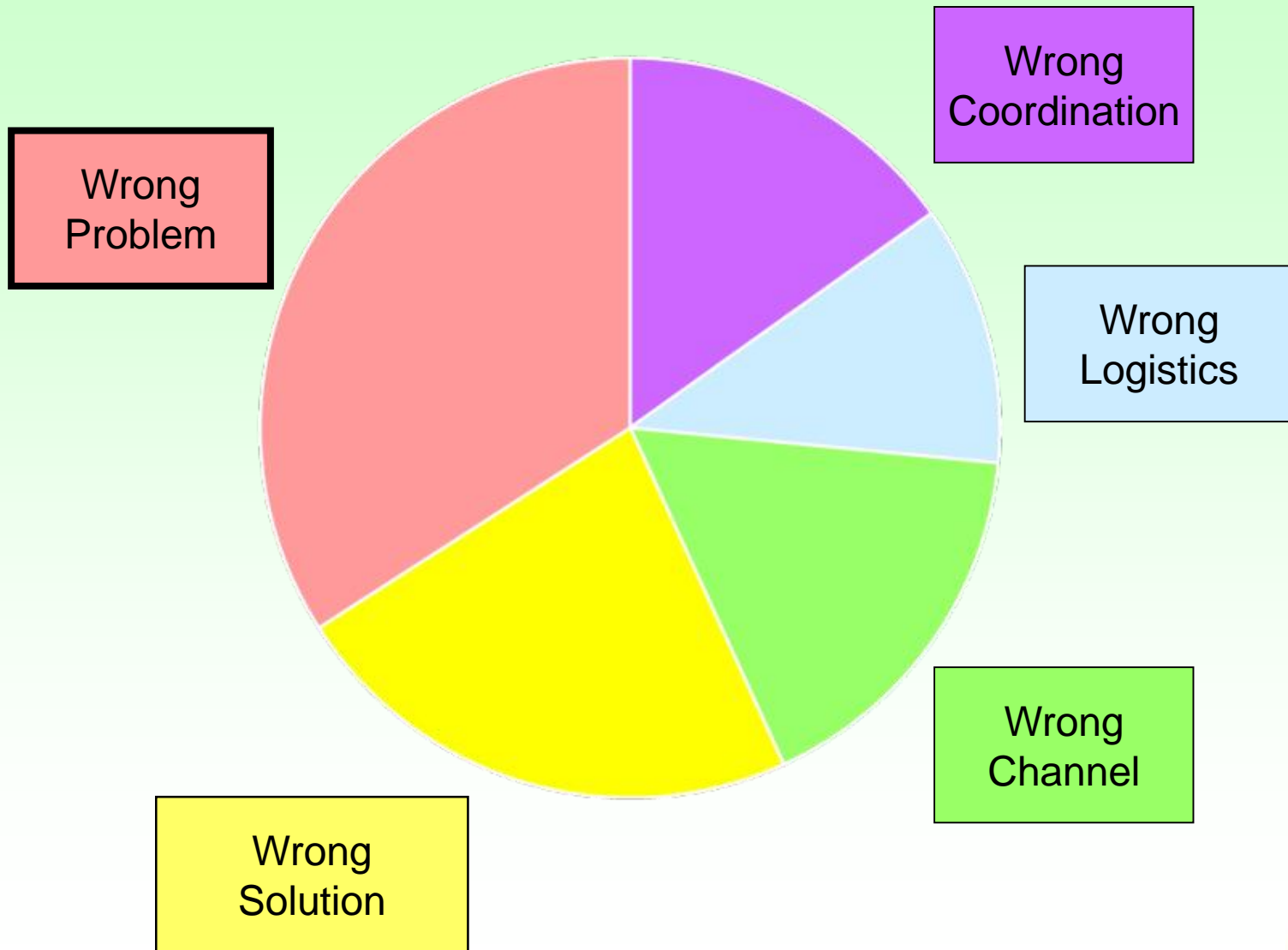




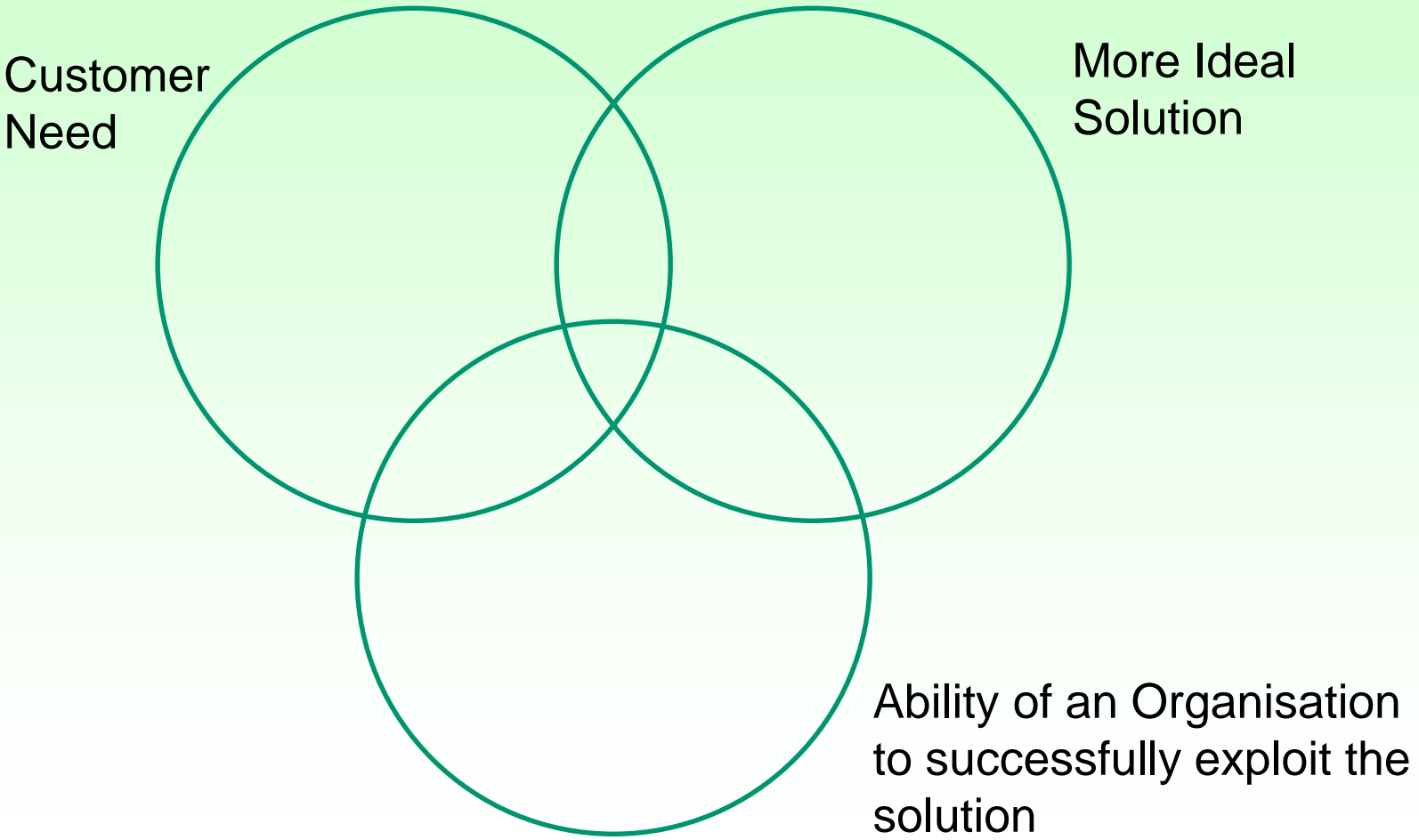
Greater Operational
Excellence = Worse
Change Capability

Someone Already Solved
Your Problem. They're
Outside Your Silo.

Where Change Failures Happen – Service Sector



Innovation... Most Difficult Game In The World?



Intelligence



6 Internal / External Marketing Reports

Consumer Verbatims

Ethnographer / Historian / Demographics / Country Data

Online research

Design History (Inc production tech)

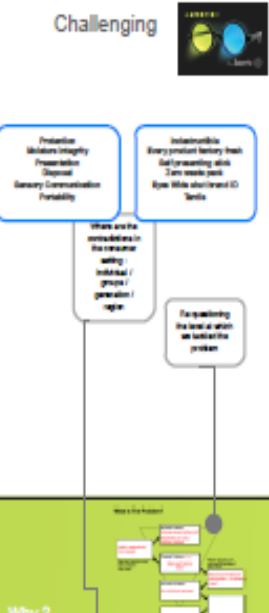
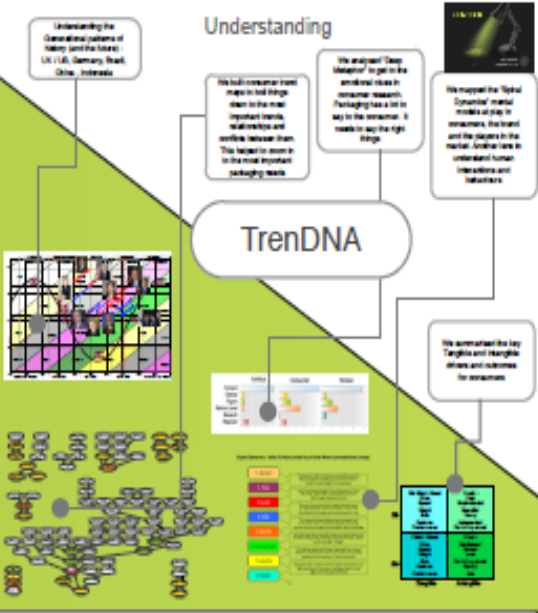
Pipeline / Previous Prototypes

IP Landscaping - In and ex category

Technology Scouting



These methods are underpinned by substantial research programmes over the last 15 years



Results - Where to Innovate ?

Market Demand

New packaging concept :
Enables claim of enhanced freshness
Region specific cues for emotional connection (i.e. Sharing)
Something genuinely new in a mature market

Route to Market

New potential routes identified.
Implementation uses existing network

Production System

Relieved the primary manufacturing bottleneck.
Technology adapted from other industries - low risk, and fast implementation)
(a more IDEAL process)

More Ideal Product / Service

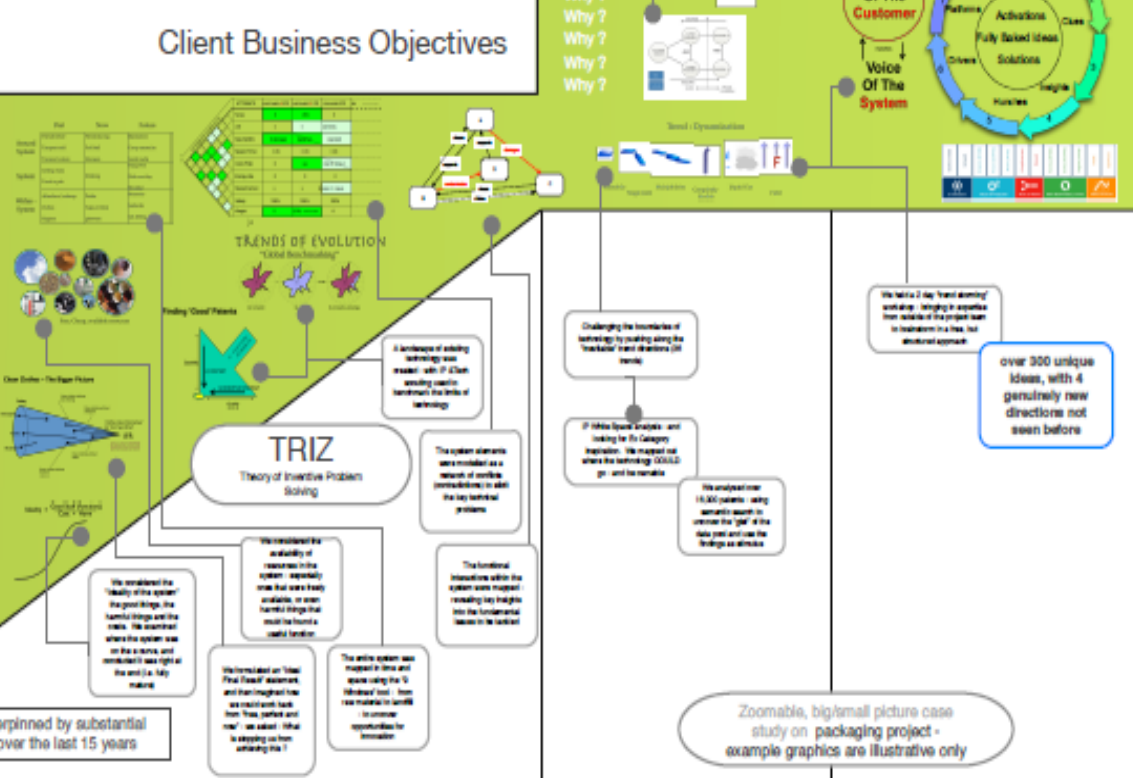
Product that :
Uses less raw materials (approx 10%)
Has less eco impact
Provides higher quality tactile feel for consumers
Significantly Improves freshness
Significantly improves product protection (it is a more IDEAL system)

Co-ordination

Client is actively engaging with us to embed our approach into their internal innovation methods

Intellectual Property

1 Major Patent Family = 1 New packaging approach + 1 Manufacturing Process

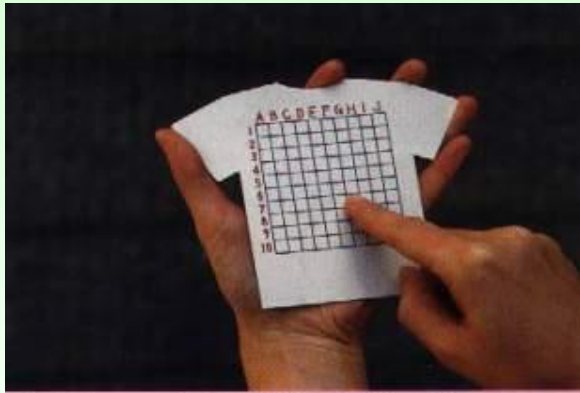


What is a  solution?

When was the last time something
made you go 'wow!'
?



Why Do Some Things Succeed and others fail?



Portable Zebra Crossing
* The pedestrian's best friend



The Dynamics of 'Wow'

1)

We notice things
that are **different**

2)

We work out
what **jobs** they do

3)

We assess
whether they are
better

$$\text{Value} = \frac{\text{(perceived benefits)}}{\text{(perceived costs \& harms)}}$$



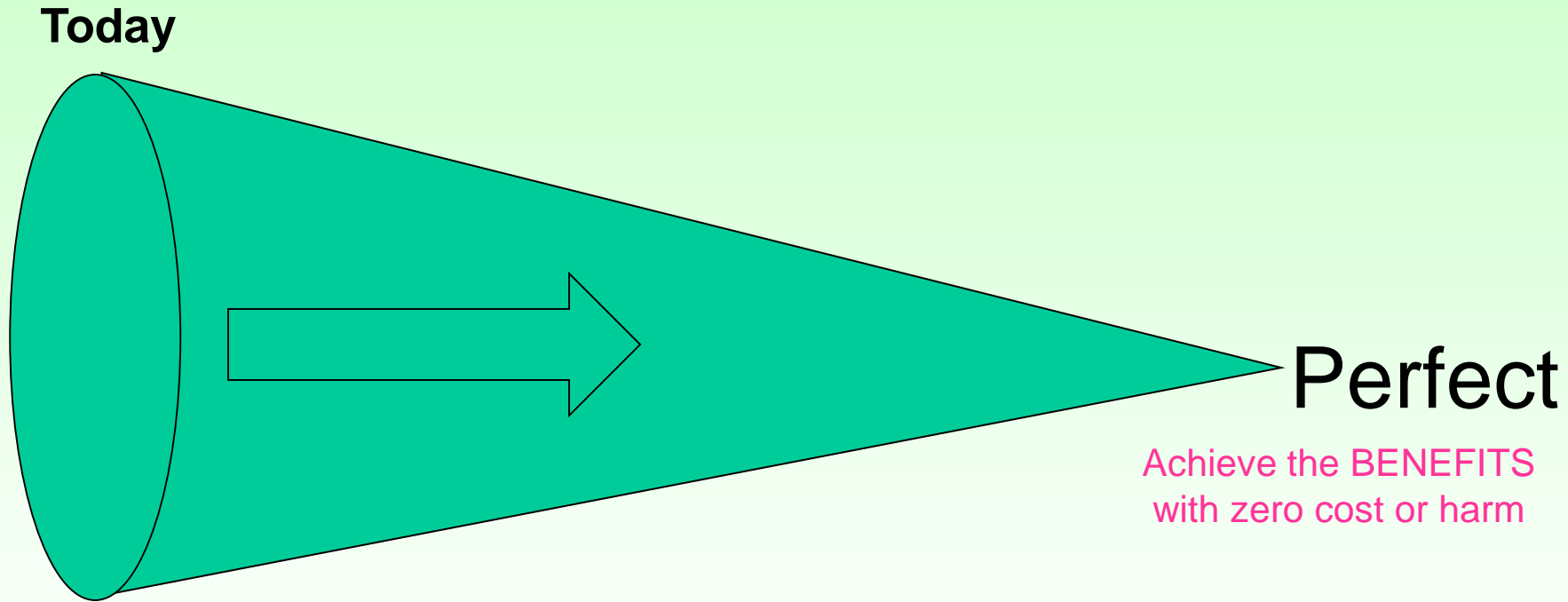
Every concrete object has abstract value, is timeless in the dream parallel.

— *Hilda Doolittle* —

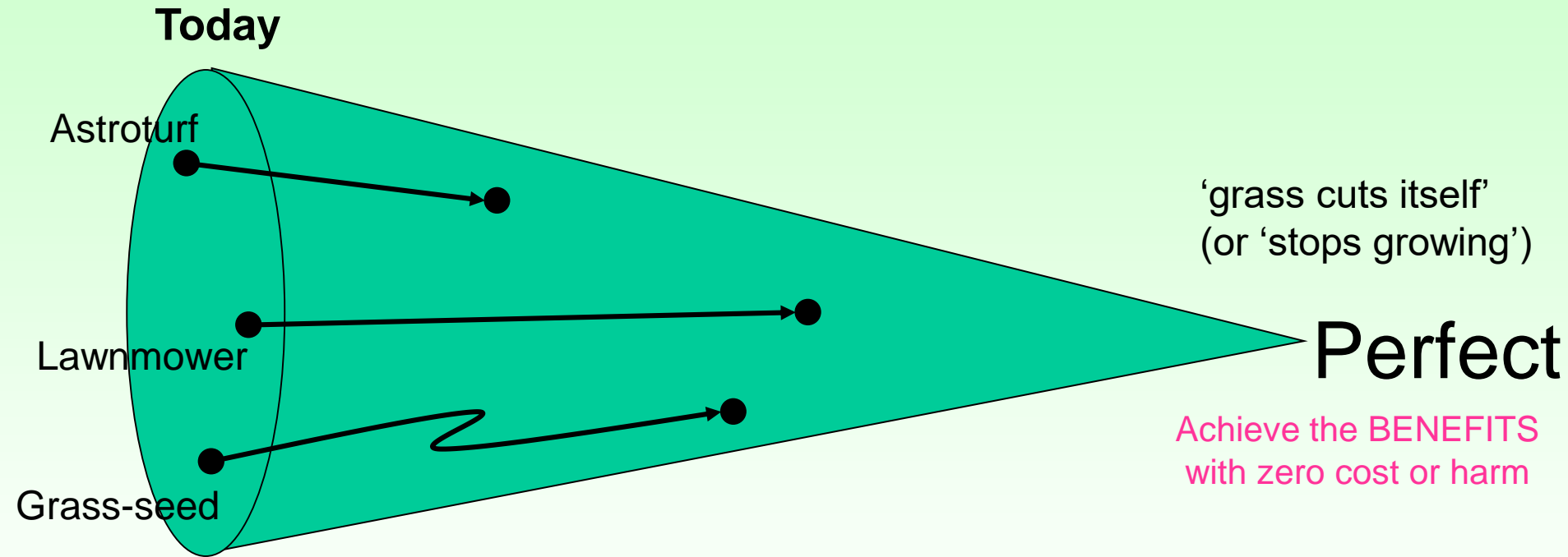
$$\text{IDEALITY} = \text{PERCEIVED} \left\{ \frac{\text{BENEFITS}}{\text{COST} + \text{HARM}} \right\}$$



The Direction Of Success Is Clear...



The Direction Of Success Is Clear...



...so are the winners

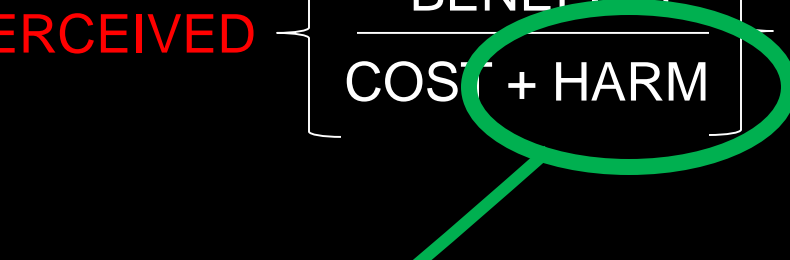


Sustainability...

$$\text{IDEALITY} = \text{PERCEIVED} \left\{ \frac{\text{BENEFITS}}{\text{COST} + \text{HARM}} \right\}$$



Sustainability... The Good News

$$\text{IDEALITY} = \text{PERCEIVED} \left[\frac{\text{BENEFITS}}{\text{COST} + \text{HARM}} \right]$$


'Harm' reduces over the long run.

Things become more sustainable.



Sustainability... The Bad News

$$\text{IDEALITY} = \text{PERCEIVED} \left[\frac{\text{BENEFITS}}{\text{COST} + \text{HARM}} \right]$$

given the choice between benefits, cost or harm, sadly, 'harm' usually takes third place.



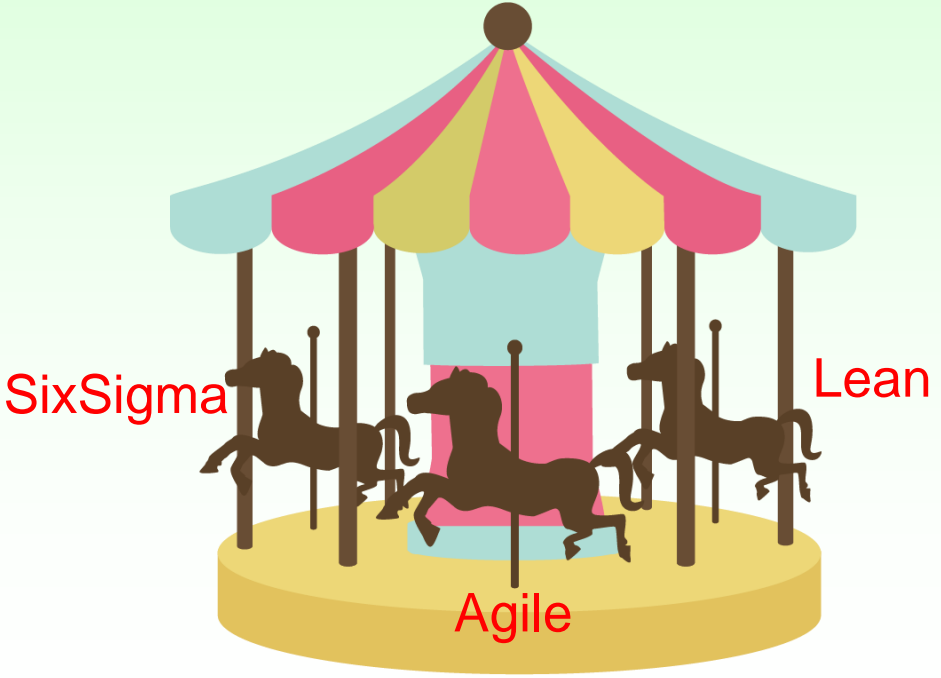
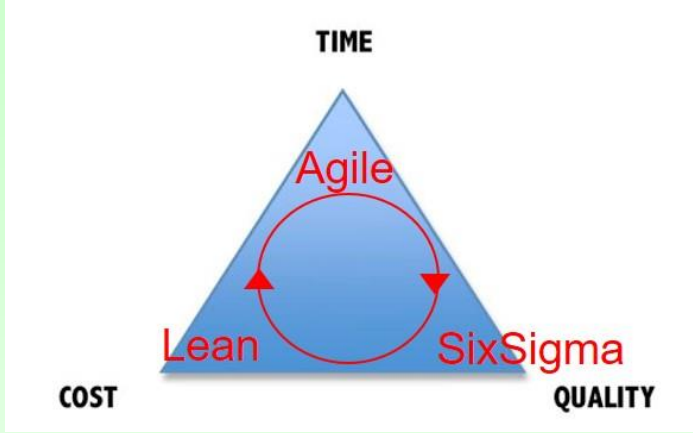
Sustainability... The Solution

given the **choice** between benefits, cost **or** harm,
sadly, 'harm' usually takes third place.

I want all the Benefits
AND
none of the Cost
AND
none of the Harm



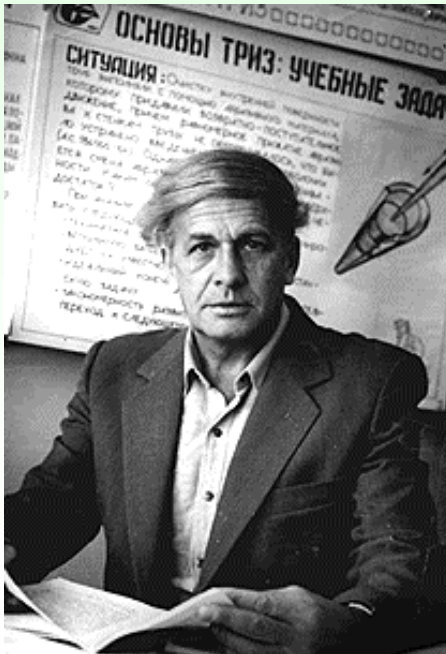
Sustainability... (Not) The Solution



Two Different 'PERFECT's



Elimination of all waste
Only value-add activities remain
The perfect CAR



'All the benefits, zero cost, zero harm'
Customer wants the function
Perfect MOBILITY



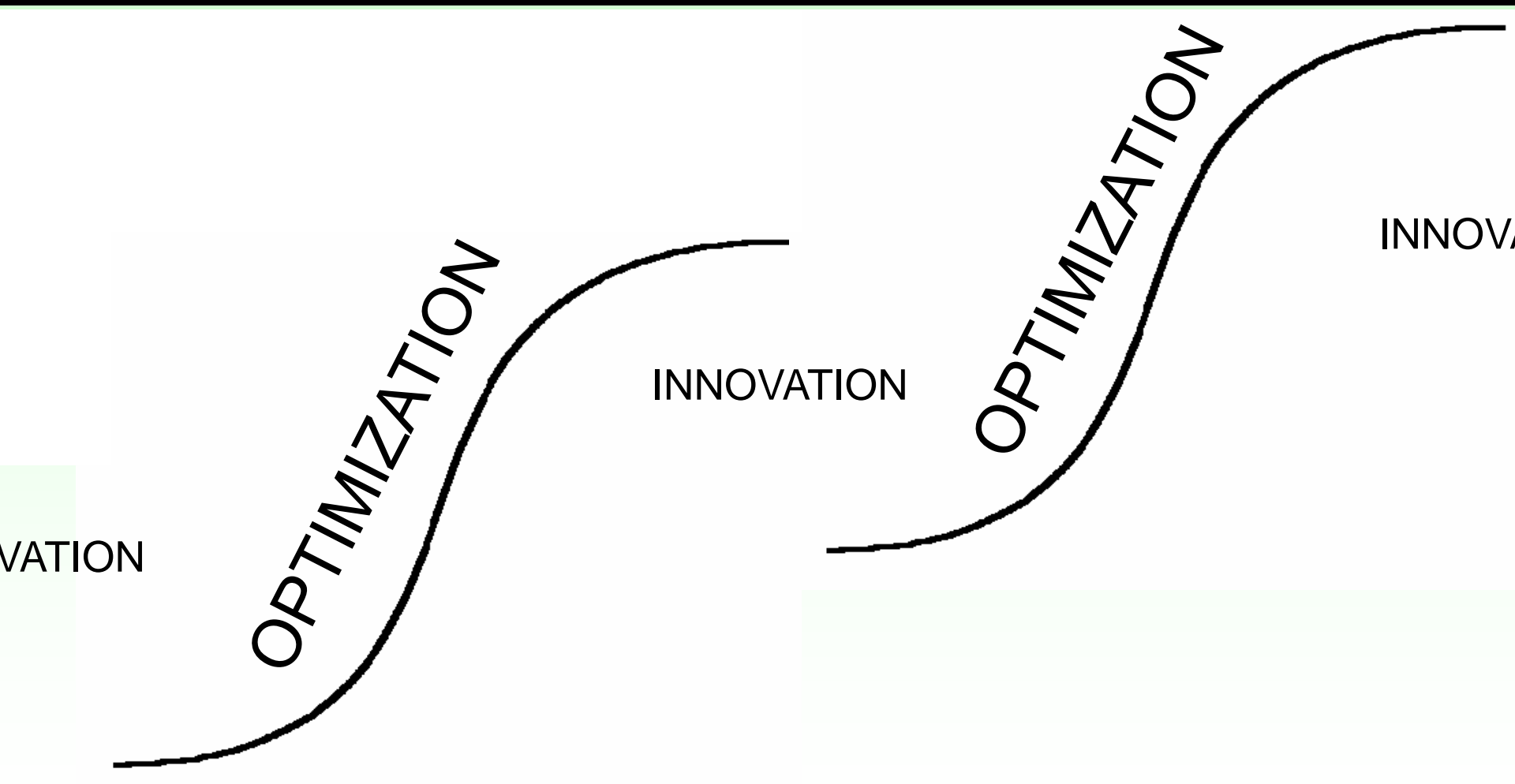
VATION

OPTIMIZATION

INNOVATION

OPTIMIZATION

INNOVATION





OPTIMIZATION

INNOVATION

OPTIMIZATION

INNOVATION

VATION



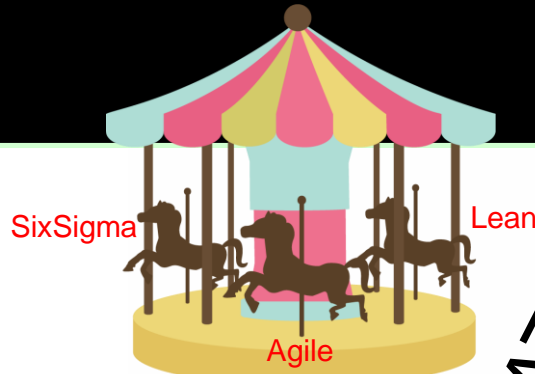
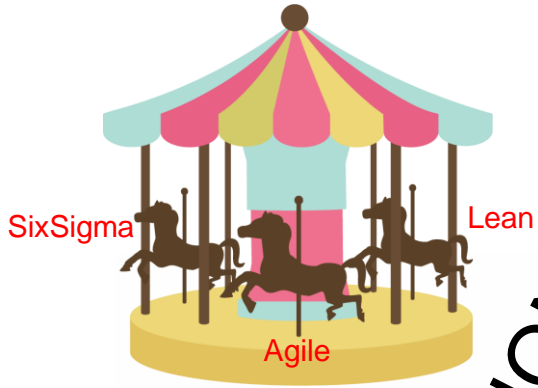
VATION

OPTIMIZATION

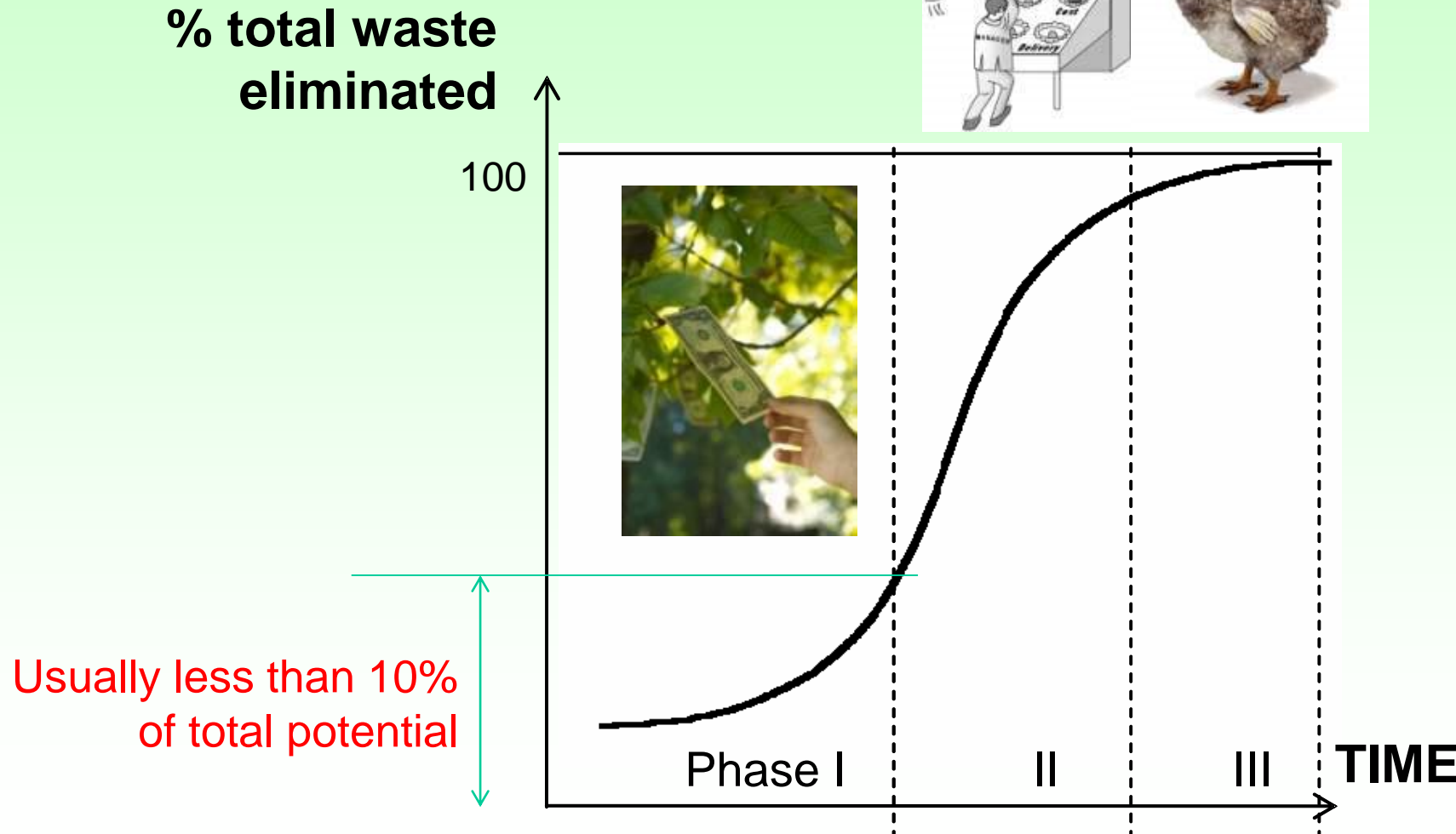
INNOVATION

OPTIMIZATION

INNOVATION



Lean & S-Curves



Phase II – Lean With Consequences



...needs a fundamentally different mindset and toolkit... beyond Lean



Two And Three...

...two ways to innovate:

- 1) New **Function** / deliver Function new way
- 2) Solve a **Contradiction**

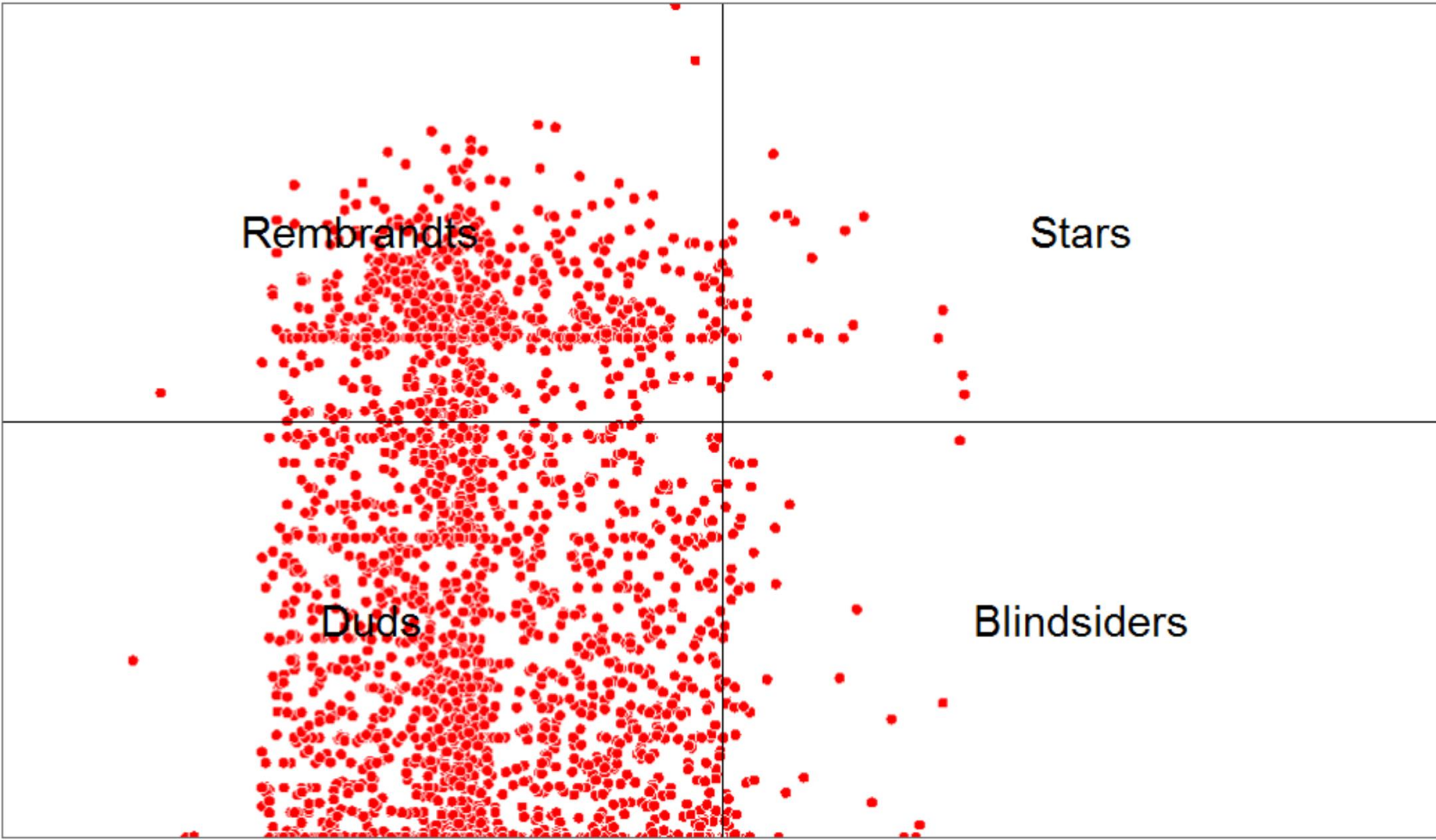
...three ways to generate:

- 1) **FUNCTION** database
- 2) **CONTRADICTION** database
- 3) **EVOLUTION POTENTIAL** database



Sustainability Focused Patents

Stars : 1.67%



Rembrandts

Stars

Duds

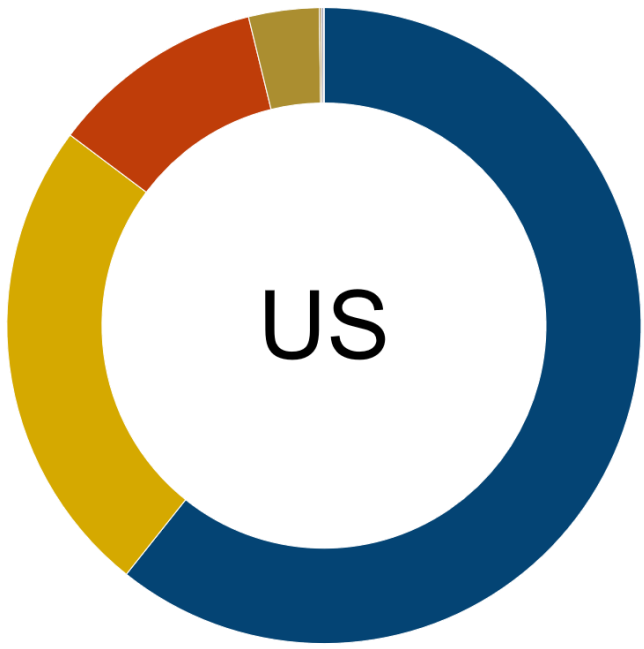
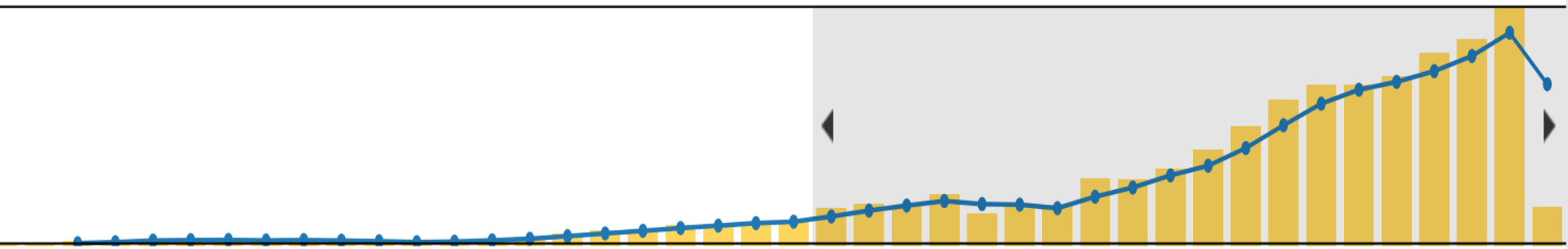
Blindsiders

Future Value Index

Current Value Index



Sustainability Focused Patents

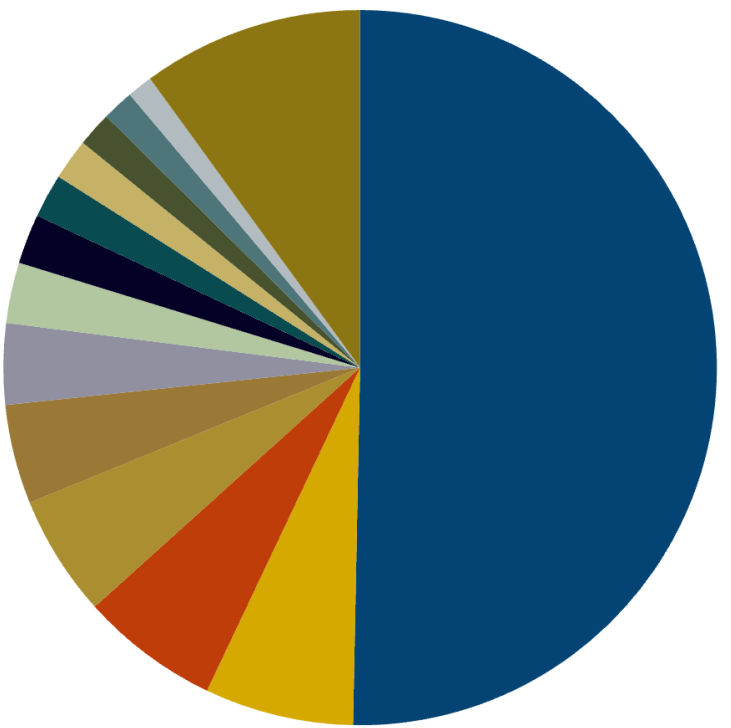


- A1 (14119 patents, 61%) FIRST PUBLISHED PATENT APPLICATION [FROM 2001 ONWARDS]
- B2 (5703 patents, 25%) REEXAM. CERTIF., N-ND REEXAM. or GRANTED PATENT AS SECOND PUBLICATION [FROM 2001 ONWARDS]
- A (2545 patents, 11%) PATENT [FROM BEGIN UNTIL END 2000] or PATENT ISSUED AFTER 1ST PUB. WITHIN THE TVPP
- B1 (835 patents, 4%) REEXAM. CERTIF., N-ND REEXAM. or GRANTED PATENT AS FIRST PUBLICATION [FROM 2001 ONWARDS]
- A9 (25 patents, 0%) CORRECTED PATENT APPLICATION [FROM 2001 ONWARDS]
- E (25 patents, 0%) REISSUE or DESIGN REISSUE or PLANT REISSUE
- A2 (3 patents, 0%) REPUBLISHED PATENT APPLICATION [FROM 2001 ONWARDS]
- H (2 patents, 0%) STATUTORY INVENTION REGISTRATION (SIR) or STATUTORY INVENTION REGISTRATION FOR DESIGN or STATUTORY INVENTION REGISTRATION FOR PLANT PATENT

25,000 patents with declared 'sustainability' goal



Sustainability Focused Patents



- United States (US patents)
- Italy (IT patents)
- United Kingdom (GB patents)
- Japan (JP patents)
- Canada (CA patents)
- Germany (DE patents)
- China (CN patents)
- Netherlands (NL patents)
- France (FR patents)
- Switzerland (CH patents)
- Australia (AU patents)
- Sweden (SE patents)
- Spain (ES patents)
- Others (Others patents)

3M INNOVATIVE PROPERTIES CO • ABB TECHNOLOGY AG • ARKEMA FRANCE
 ASAHI GLASS CO LTD • AUSIMONT SPA • BAKER HUGHES INC • BOEING CO • CHEVRON USA INC
 DOW CHEMICAL CO • DOW GLOBAL TECHNOLOGIES LLC • DSM IP ASSETS BV • **DU PONT**
 E INK CORP • EASTMAN CHEM CO • **EASTMAN KODAK CO** • ECOLAB INC • ENI SPA
 FORD GLOBAL TECH LLC • FUJIFILM CORP • **GEN ELECTRIC**
HALLIBURTON ENERGY SERV INC • HENKEL KGAA
 HEWLETT PACKARD DEVELOPMENT CO • HITACHI LTD • **HONEYWELL INT INC** • **IBM**
 JOHNSON MATTHEY PLC • KHASHOGGI E IND • MICROSOFT CORP • MINNESOTA MINING & MFG
OCCIDENTAL OIL SHALE INC • PIONEER HI BRED INT • **PROCTER & GAMBLE**
 QUALCOMM INC • RICOH KK • ROHM & HAAS • ROLLS ROYCE PLC • SABIC INNOVATIVE PLASTICS IP
 SCHLUMBERGER TECHNOLOGY CORP • SEIKO EPSON CORP • SHELL OIL CO
 SHINETSU CHEMICAL CO • TOSHIBA KK • UNILEVER NV • **UNIV CALIFORNIA** • UOP LLC



Sustainability Focused Patents – Problem Focus

Increase

concentration (1469)
cost (1250)
degree (775)
difficult (1413)
effective (1310)
efficiency (1989)
efficient (1778)
energy (986)
expensive (904)
flexibility (777)
heat (701)
level (1426)
material (769)
performance (1021)
period (810)
power (709)
pressure (1634)
rate (1043)
resistance (885)
surface area (767)
temperature (3229)
time (1191)
volume (914)
water (2067)
yield (873)

Decrease

agent (1054)
amount (717)
cost (2448)
damage (923)
diameter (538)
emission (558)
energy (950)
environmental impact (4191)
expensive (1010)
heat (691)
material (1082)
need (1772)
particle (669)
power (628)
pressure (1667)
problem (964)
risk (554)
size (658)
temperature (1118)
time (1258)
viscosity (602)
volume (685)
waste (593)
water (1865)
weight (567)

Change or stabilize

agent (338)
combustion (74)
component (58)
composition (90)
condition (76)
data (71)
database (68)
device (71)
dispersion (62)
emulsion (97)
fluid (71)
liquid (62)
material (78)
mixture (108)
ph (299)
position (75)
pressure (267)
reaction (87)
reaction mixture (78)
reaction temperature (95)
reactor (70)
solution (83)
system (154)
temperature (873)
water (73)



Remove Water from glass

Without touching the glass



Knowledge from all fields

Absorption

Acoustic Cavitation

Acoustic Vibrations

Archimedes' Principle

Bernoulli's Theorem

Boiling

Brush Constructions

Capillary Condensation

Capillary Evaporation

Capillary Pressure

Coanda Effect

Condensation

Coulomb's Law

Deformation

Electrocapillary Effect

Electroosmosis

Electrophoresis

Electrostatic Induction

Ellipse

Evaporation

Ferromagnetism

Force Oscillations

Funnel Effect

Gravity

Inertia

Ionic Exchange

Jet Flow

Lorentz Force

Magnetostriction

Mechanocaloric Effect

Osmosis

Pascal Law

Resonance

Shock Wave

Spiral

Super Thermal Conductivity

Superfluidity

Surface Tension

Thermal Expansion

Thermocapillary Effect

Thermomechanical Effect

Ultrasonic Capillary Effect

Ultrasonic Vibrations

Use of foam

Wetting

**How many ways do you
know
to move a liquid?**



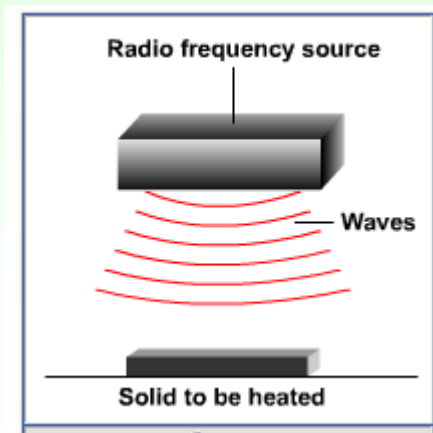
Other Means of Delivering The 'Heat Solid' Function

Radio frequency heating

Function: Heats

State: Solid

It is a process of heating materials through the application of radio waves of high frequency— heating uses electro-magnetic fields with wavelengths of 7.4 to 44.2 metres. This technology is u



www.systematic-innovation.com

Search Function:

Heats

Solid Liquid Gas Field

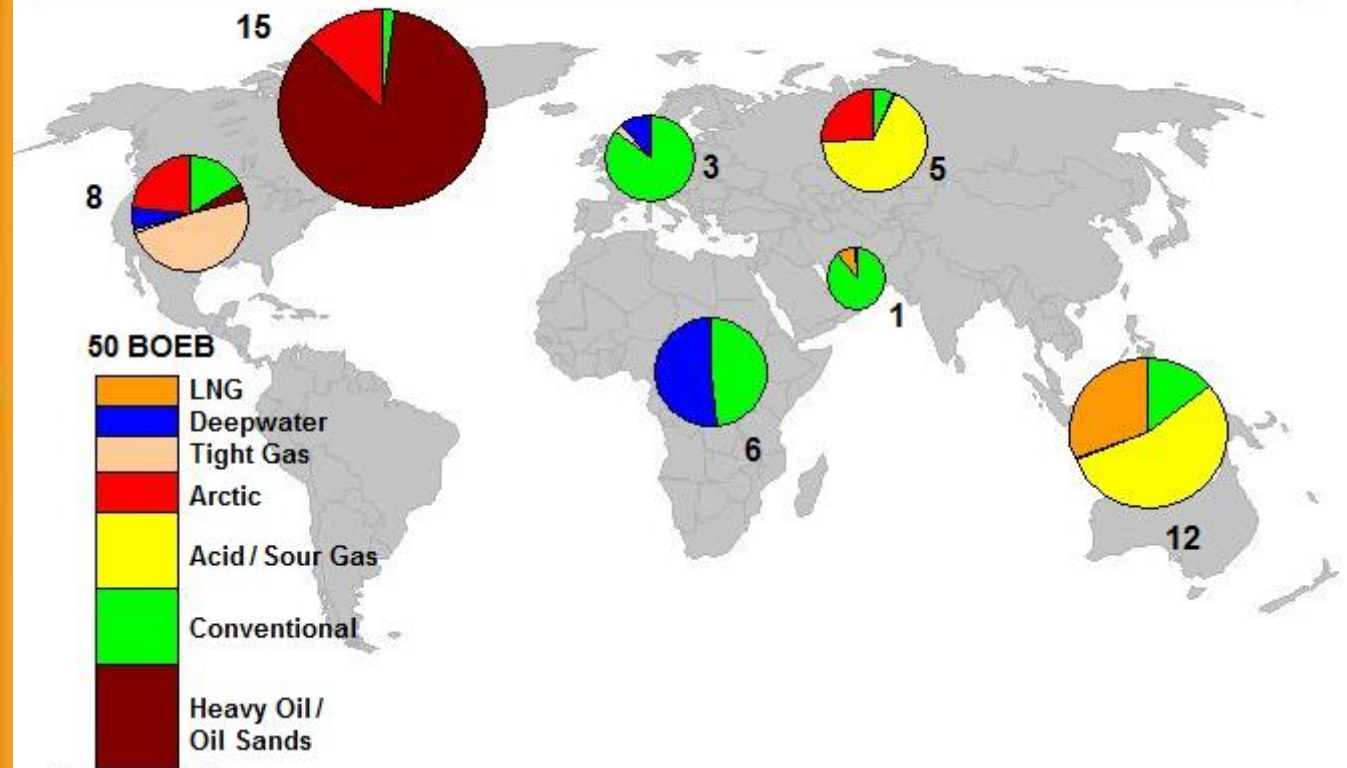
- Search Found 20 Results
- > Air Impingement
 - > Combustion
 - > Condensation Heating
 - > Conduction
 - > Convection
 - > Eddy Current
 - > Exothermic Reactions
 - > Induction heating
 - > Infra red Heating
 - > Laser
 - > Light wave heating
 - > Microwave Radiation
 - > Peltier Effect
 - > Phase Changes
 - > Radiation
 - > Radio frequency heating
 - > Shunt Effect
 - > Solar Energy
 - > Strain Heating
 - > Ultrasonic Heating



Case Studies: Acid/Sour Gas

A good problem...

Diverse Inventory of Undeveloped Opportunities



Case Studies: Acid/Sour Gas

A not so good solution...



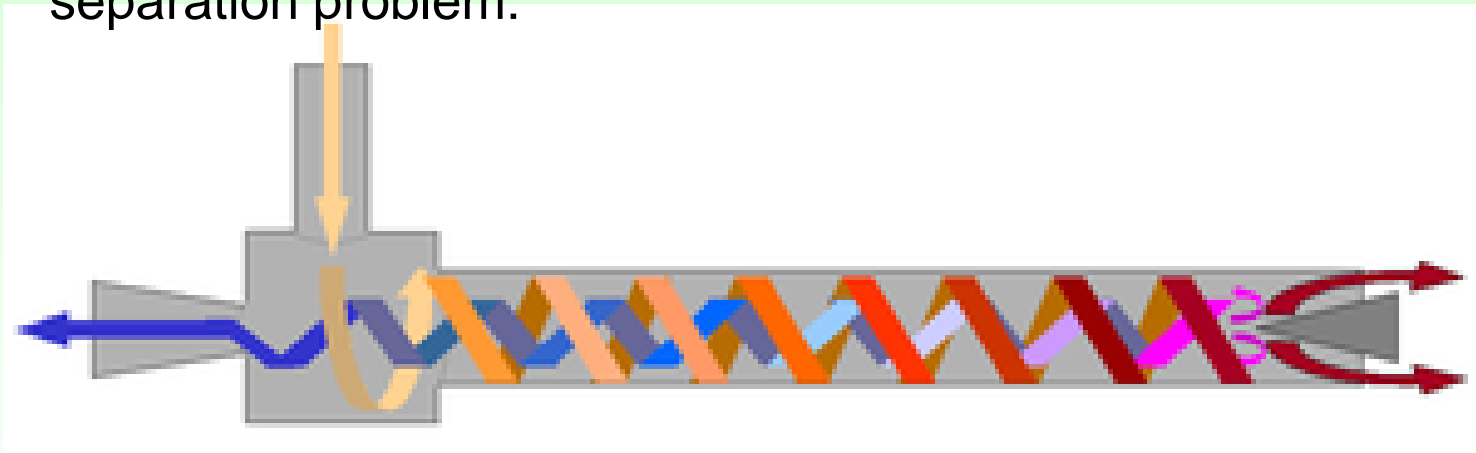
Shell: 480m and 600 kilotons deadweight

Oct 2009: Shell awarded a contract to a consortium of France's Technip SA and Korea's Samsung Heavy Industries Co. to build the floating LNG ship and has an option to order nine more over the next 15 years



How Would A Non-Chemist Solve The Problem?

- 1) re-formulate the problem: it's not CO₂ and CH₄ its 'separate gas with density 44 from gas with density 16'
- 2) Go find people who have solved this density-difference separation problem:

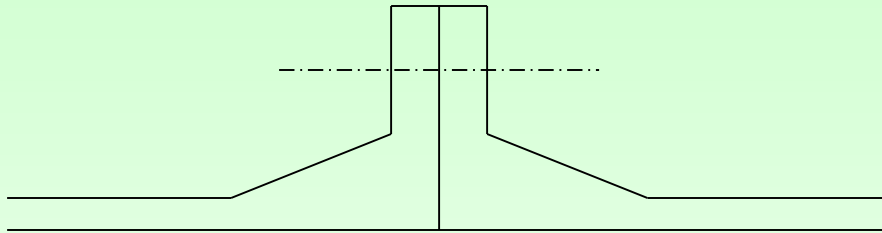


- 3) Adapt this solution to the specific problem (which in this case means installing a device within the well, separating the useful methane at source and leaving the unwanted CO₂ where it is)

**OUTCOME: \$50M reduced to <100K capital cost
100+M tonnes of CO₂ reduction p.a.**



Question: How do you re-design a leaking flange joint?



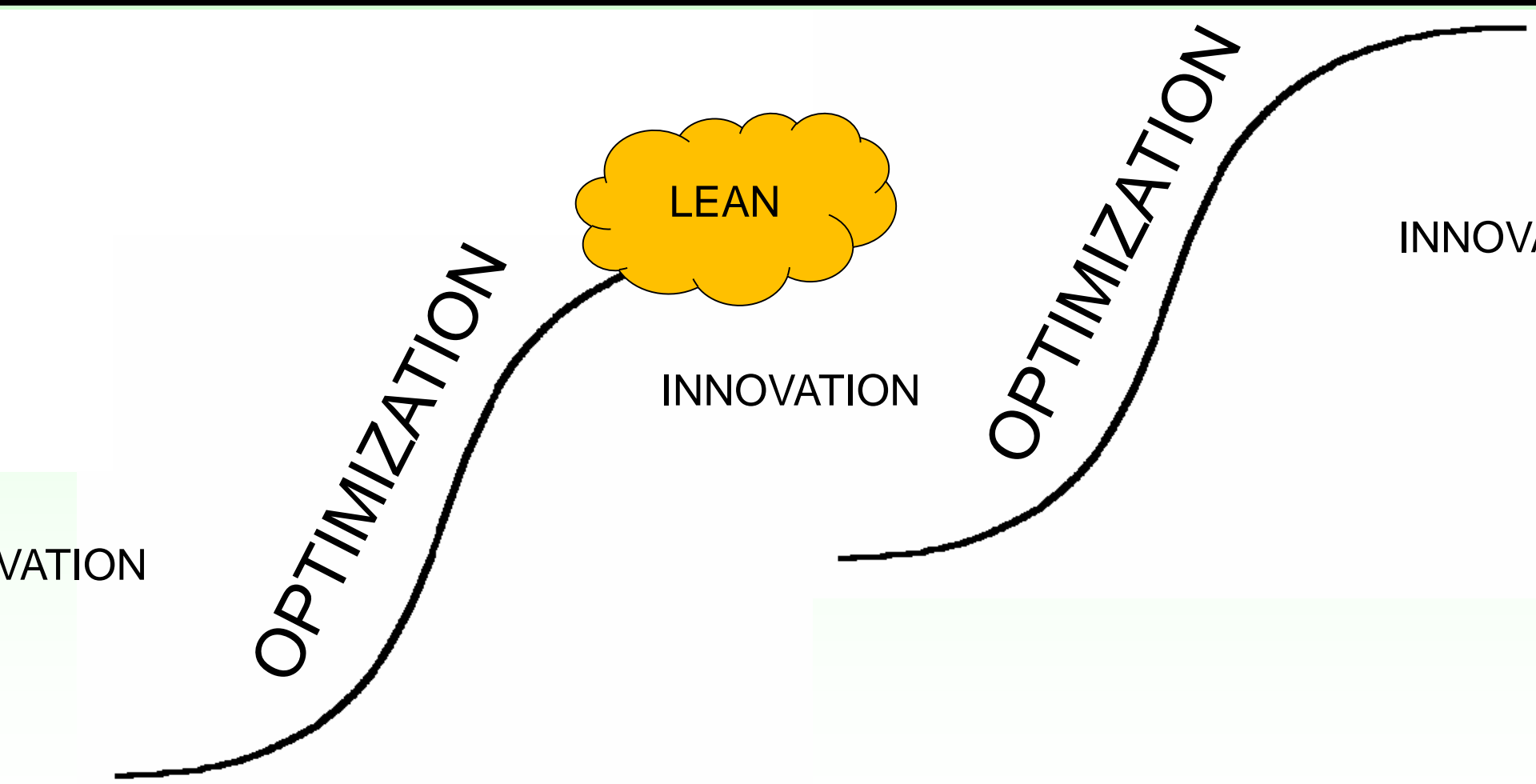
Inventive Principle 17 'Another Dimension'



- A. *If an object contains or moves in a straight line, consider use of dimensions or movement outside the line.*
- B. *If an object contains or moves in a plane, consider use of dimensions or movement outside the current plane.*
- C. *Use a multi-storey arrangement of objects instead of a single-storey arrangement.*
- D. *Tilt or re-orient the object, lay it on its side.*
- E. *Use 'another side' of a given area.*

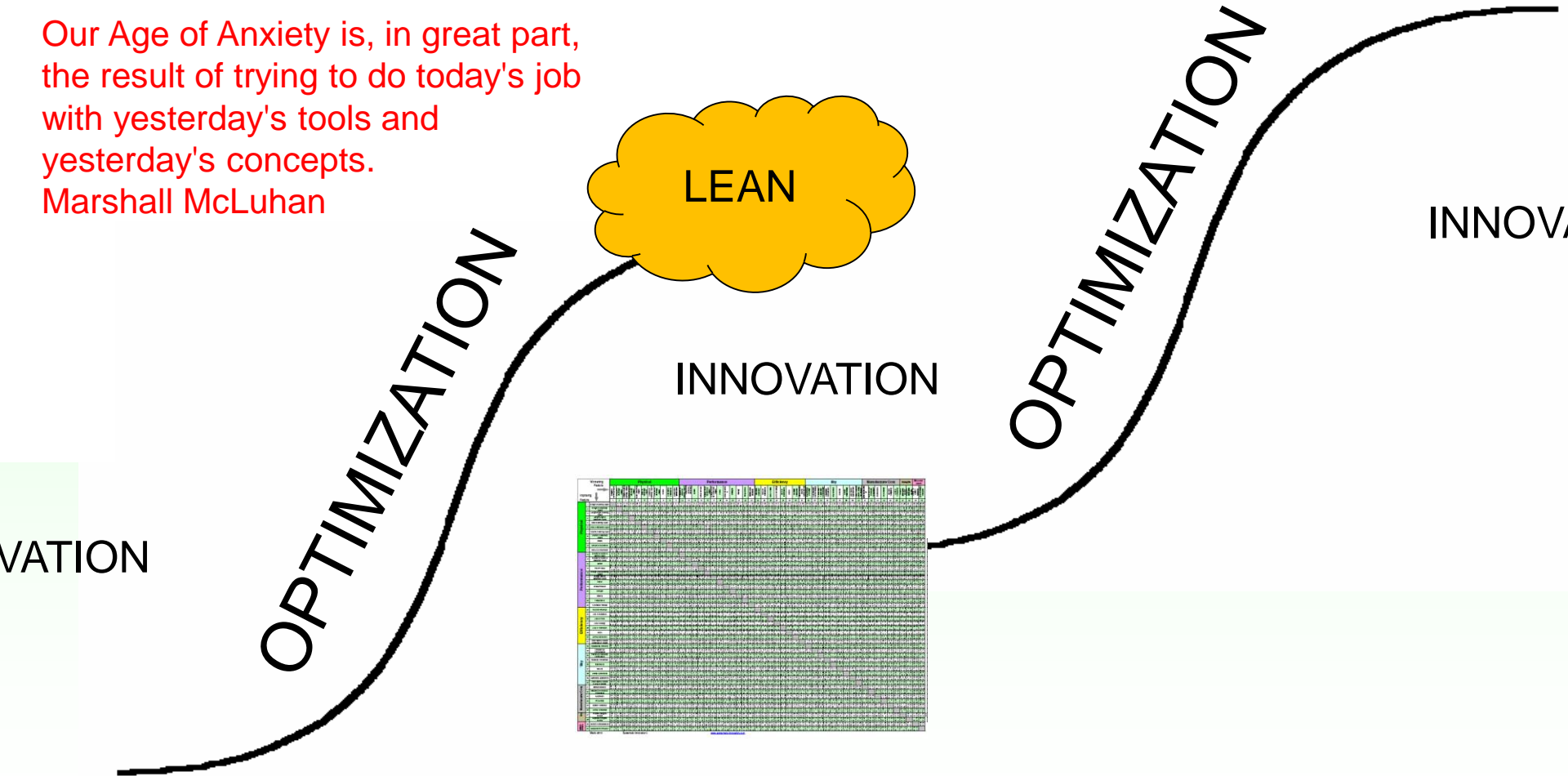


Time For A Jump?



Time For A Jump?

Our Age of Anxiety is, in great part, the result of trying to do today's job with yesterday's tools and yesterday's concepts.
Marshall McLuhan



Find The Contradictions; Solve Them

Innovation... Most Difficult Game In The World?



darrell.mann@systematic-innovation.com

