Systematic Innovation in Complex Environments

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74% of staff are not engaged in their jobs. This is not a management problem. This is a complexity problem.
65% of customer interactions are failure demand. This is not a management problem. This is a complexity problem.
97% of Intellectual Property generates no tangible value. This is not a strategy problem. This is a complexity problem.
Innovation: The Performance Disconnect

The real question is what did the companies at the top do that the other didn’t? Then repeat 10M times.

Averages are meaningless in the innovation context.

![Graph showing the relationship between sales growth and indexed R&D-to-sales ratio.](image)

Source: Booz Allen Hamilton Global Innovation 1000

\[ y = 0.0116x + 0.0832 \]
\[ R^2 = 0.0079 \]

(crackpot rigour)
197 Hand offs to discharge a patient

Patient Pathway Trauma
Bolton Hospitals NHS
Insanity?

THE SAME OLD THINKING

THE SAME OLD RESULTS
THE SAME OLD THINKING

THE SAME OLD RESULTS

THE SAME OLD ABSOLUTELY EVERYTHING AROUND ME??
For every complex problem there is an answer that is clear, simple, and wrong.

*H. L. Mencken*
CAUSE and EFFECT relationships are often highly tenuous…
...which means you can’t ‘exclude the trivial’ because it could turn out to be the thing that triggers a non-linear shift.
“fly as close to your neighbours as possible”
f(Z) = Z^2 + C
For every complex problem there are thousands of clear, simple, wrong answers.

For every complex problem there is a clear, simple, right one. If we understand and affect the first principles.
“get away from the falcon”
Cynefin

- Complicated: Knowable, Unfamiliar
- Obvious: Known, Familiar
- Complex: Unknown
- Chaotic: Unknowable
- Disorder

Understanding → Complicated
Standardisation → Obvious
Control → Complex
Loss of control → Chaotic
How was the meal?

Fine, thanks.

The lamb tasted like boot-leather.
Everything's working
Feels good
Clear rules
Clear Direction
(‘Progress’)

Knowledge exists

Routine
Manage-able (Gantt Charts)
Controllable

“Operational Excellence”
(complicated)

Nothing seems to work
Uncomfortable/horrible
Confusion
Find ‘new rules’
Challenge assumptions

Knowledge has to be found

Creativity
Not manage-able
‘Out of control’

Innovation
(complex)
Cynefin

Complex
Unknown unknowns
probe-sense-respond
Emergent Practice

Complicated
Known unknowns
sense-analyse-respond
Good Practice

Chaotic
Unknowable unknowns
act-sense-respond
Novel Practice

Obvious
Known knowns
sense-categorise-respond
Good Practice

READY FIRE AIM
EMPLOYEE HANDBOOK

Our number one goal is to provide outstanding customer service. Set both your personal and professional goals high. We have great confidence in your ability to achieve them, so our employee handbook is very simple. We have only one rule...

NORDSTROM

OUR ONE RULE

Use good judgment in all situations.

Please feel free to ask your department manager, store manager or Human Resources any questions at any time.

Image courtesy of Nordstrom, Inc.
Optimization & Innovation
Optimization & Innovation

Most Industries Today
Hero’s Journey

Act I
Separation

Ordinary World

Call To Adventure

Refusal Of The Call

Meeting The Mentor

Crossing The Threshold

Tests, Allies And Enemies

Approach The Inmost Cave

Act II-A
Descent

Act II-B
Initiation

ORDINARY WORLD

SPECIAL WORLD

Return With Elixir

Resurrection

Road Back

Reward

Act III
Return

Ordinary

SPECIAL

Joseph Campbell

THE HERO WITH A THOUSAND FACES

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Philosophical Coherence – Operational Excellence/Complicated

**Philosophy**

- **UNITY**
- **VALUE**
- **CUSTOMER**
- **CONTINUITY**
- **ELIMINATE VARIATION**

**Method**

- Plan-Do-Study-Act (PDSA)
- Define-Measure-Analyse-Improve-Control (DMAIC)
- Define-Measure-Analyse-Design-Validate (DMADV)

**Tool**

- Pareto Analysis (Taguchi)
- Fishbone Diagrams (TRIZ)
- SPC (QFD)
- MGP (FMEA)
- Process Mapping

**Lean Toolbox**

- Toyota Production System and equivalents

**Philosophical Coherence**

- **6σ**
- **Lean**

- **UNITY**
- **VALUE**
- **CUSTOMER**
- **FLOW/PULL**
- **PERFECTION**
- **ELIMINATE WASTE**
Wrong Place, Wrong Time

Reduce Waste
Reduce Variation
Philosophical Coherence – Innovation/Complex

Excellence
- Ideality
- Resource
- Functionality
- Contradiction
- Space/Time/Interface

Method
- ARIZ
- Systematic Innovation Method (SIM)
- Define-Select-Generate-Evaluate

Tool
- Inventive Principles
- Contradiction Matrix
- Trends
- Knowledge/Effects
- Subversion Analysis
- Resources
- Separation Principles

Philosophy
- Complexity
- Contradiction
- Rapid Learning
- Customer Empathy

Design Thinking
- Empathize-Define-Ideate-Prototype-Test
  (Divergence-Convergence)
(a million-and-one templates)

TRIZ
- Exemplary Principles

Project Management.com
...establish where you’re heading...

...map stakeholder outcome needs...

...establish ‘yes, but’ barriers...

...identify available resources...

...generate solution clues...

...establish how well solutions match need and deployment capabilities, then iterate as appropriate...
COBRA - Compass

Everything Heads Towards An ‘Ideal’

Ideality = Perceived (Benefits) (Cost + Harm)

Ideal = Free, Perfect, Now
Compass Example: Education

Today

Home-School

School

MOOC

IFR

‘children educate themselves’

Achieve the FUNCTION with zero cost or harm
Free, Perfect, Now

& NASDAC:
Embracing Complexity: Cycles

- Virtuous Cycle
- Vicious Cycle

PULSE RATE
Embracing Complexity: The Ultimate Winner-Takes-All Cycle

The Virtuous Cycle of Data

- Better data
- Faster, more focused, product innovation
- Better products
- Better customer engagement
- More willingness to share data

Learning Algorithm beats ‘domain expert’ after 100K training cases… radiologist to loss-adjuster
China’s Big Complexity Management Advantage:

DATA

100Ms of O2O transactions daily

The meta-data never lies (but it does speak a different language)
Tencent’s WeChat & Complexity

Unsecured loans of up to £30,000
App assesses a person’s trustworthiness and likelihood of paying based on thousands of automatically gathered criteria:
- remaining battery-life
- how quickly you typed your date-of-birth
Culminating In: Social Credit System

- 23 million ‘discredited’ citizens
- 17 million barred from flying
- 5.5 million barred from rail travel
- 3.5 million social credit tax sanctions

Virtuous Cycle

Vicious Cycle
Most Industries Today

Virtuous Cycle

Vicious Cycle

Whack a mole!

Quality

Cost

Delivery

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Complex Systems + TRIZ

BUT

IDEALLY

we innovate faster

Need to manage the ‘operational excellence’
Complex Systems + TRIZ

BUT

IDEALLY

we innovate faster

need to manage the ‘operational excellence’

solutions already found by others
Contradiction Solvers… 
And Not… 

What made Napoleon so successful?… … and then not?
What made Napoleon so successful?... and then not?

“Austerlitz, Jena, Eylau, Friedland, Wagram

“critical mass at the critical point”
Back To Operational Excellence…

Theory:

- ACT
- PLAN
- STUDY
- DO

Reality:

- PLAN
- DO
- FIREFIGHT
- BLAME
Better (PM) Questions

‘Ideal’ Compass
Vicious/Virtuous Cycle Pulse Rates
Contradictions
‘Critical Mass & Critical Point’