

Regulating and Managing When Everything is in Flux : New Ideas About Resilience

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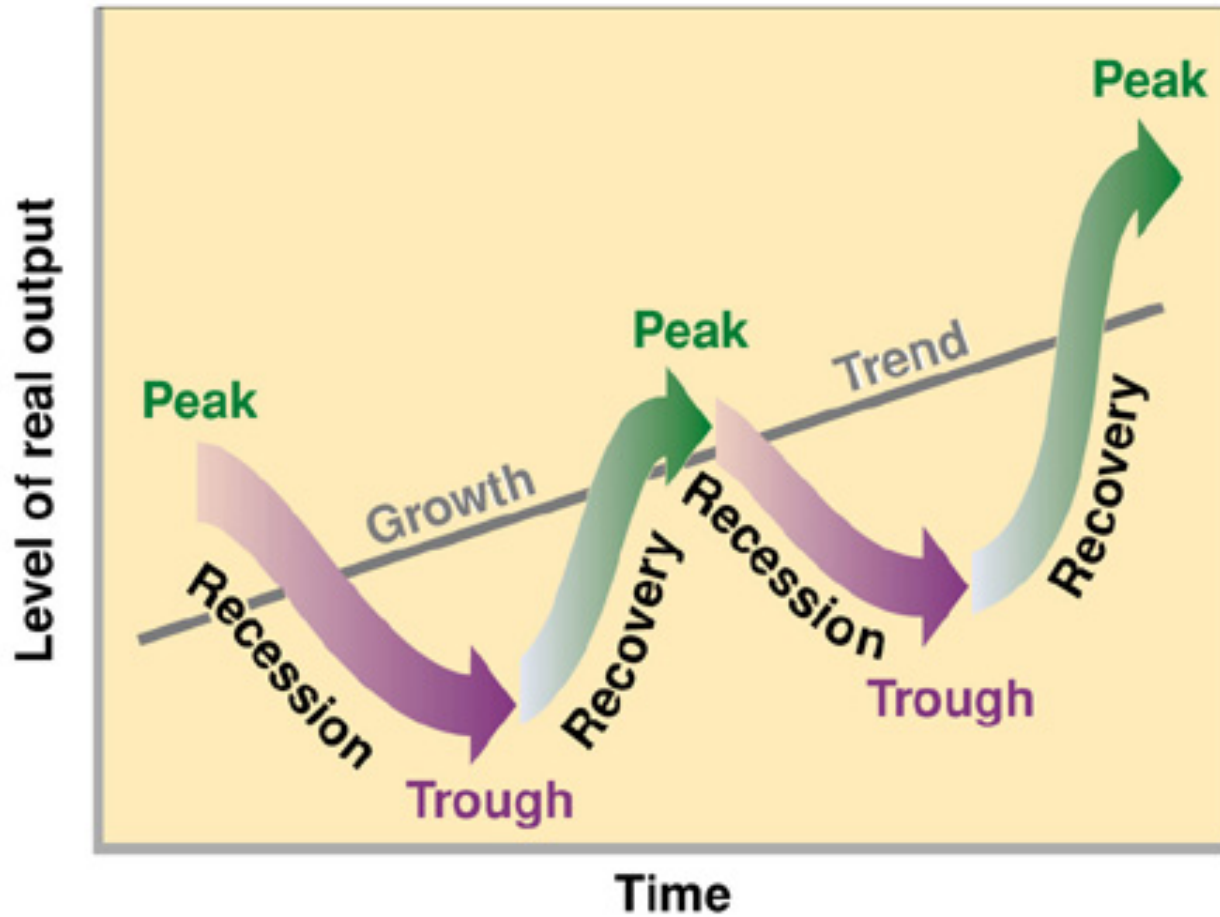
Resilience Planning

- Planning for Surprises (Risk Management)
 - Known
 - Known Unknowns
 - Black Swans
 - Unknown Unknowns (New Surprises)
- Unpredictable environments
 - Complex, nonlinear, adaptive, power laws
 - Local/Global Scales
 - Fast/Slow Time Scales

Goals

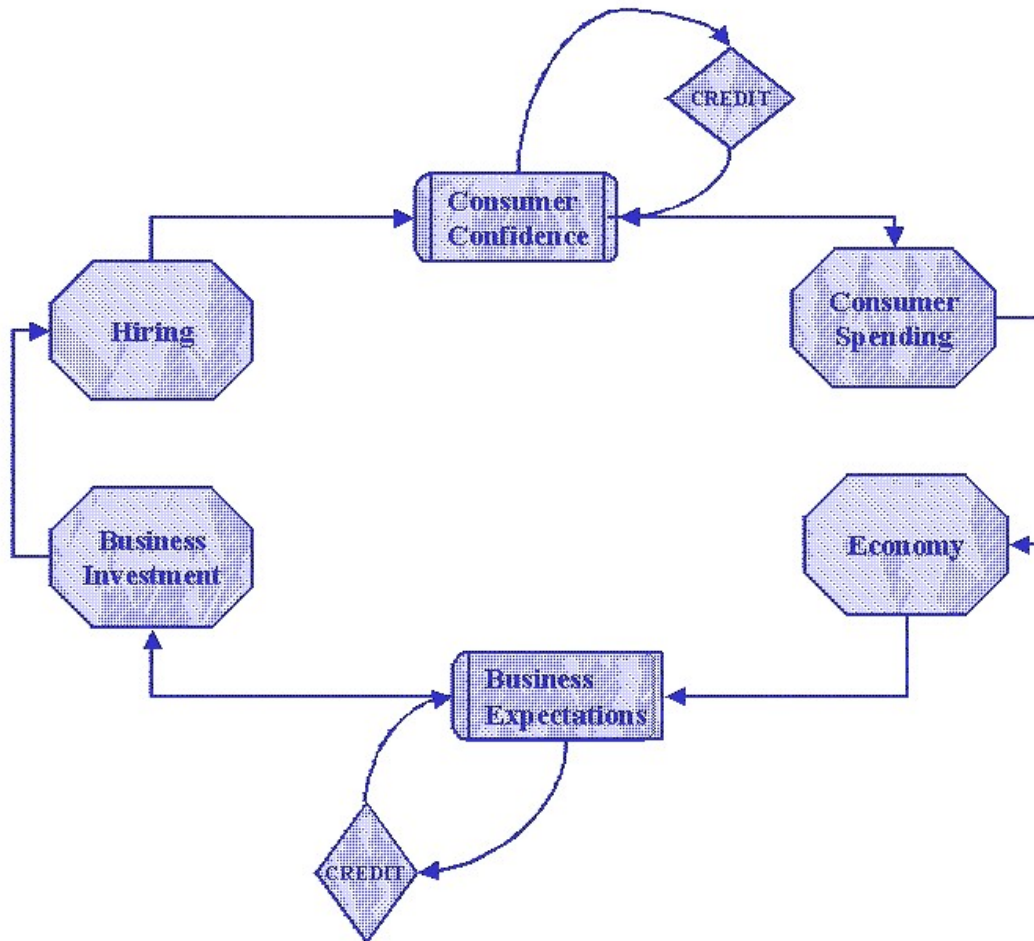
- For predictable systems:
 - Development of facts, reproducibility, risk elimination (**resistance**)
- For known unknowns:
 - Cyclical systems and unpredictable emergence
 - Development of “odds”; risk mitigation (**resilience**)
- For unpredictable systems:
 - Development of acceptable parameters; nudging and learning (**resilience**)

And this is...

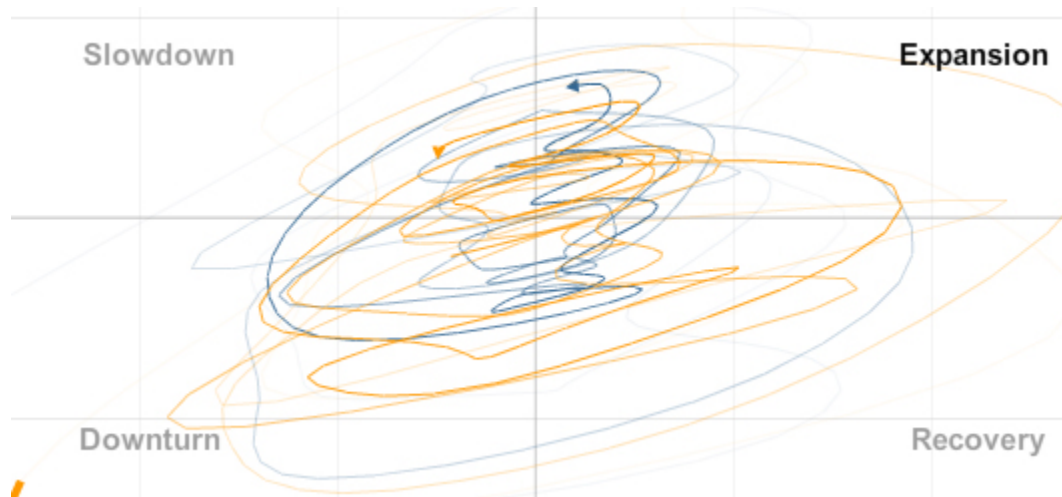


Another view

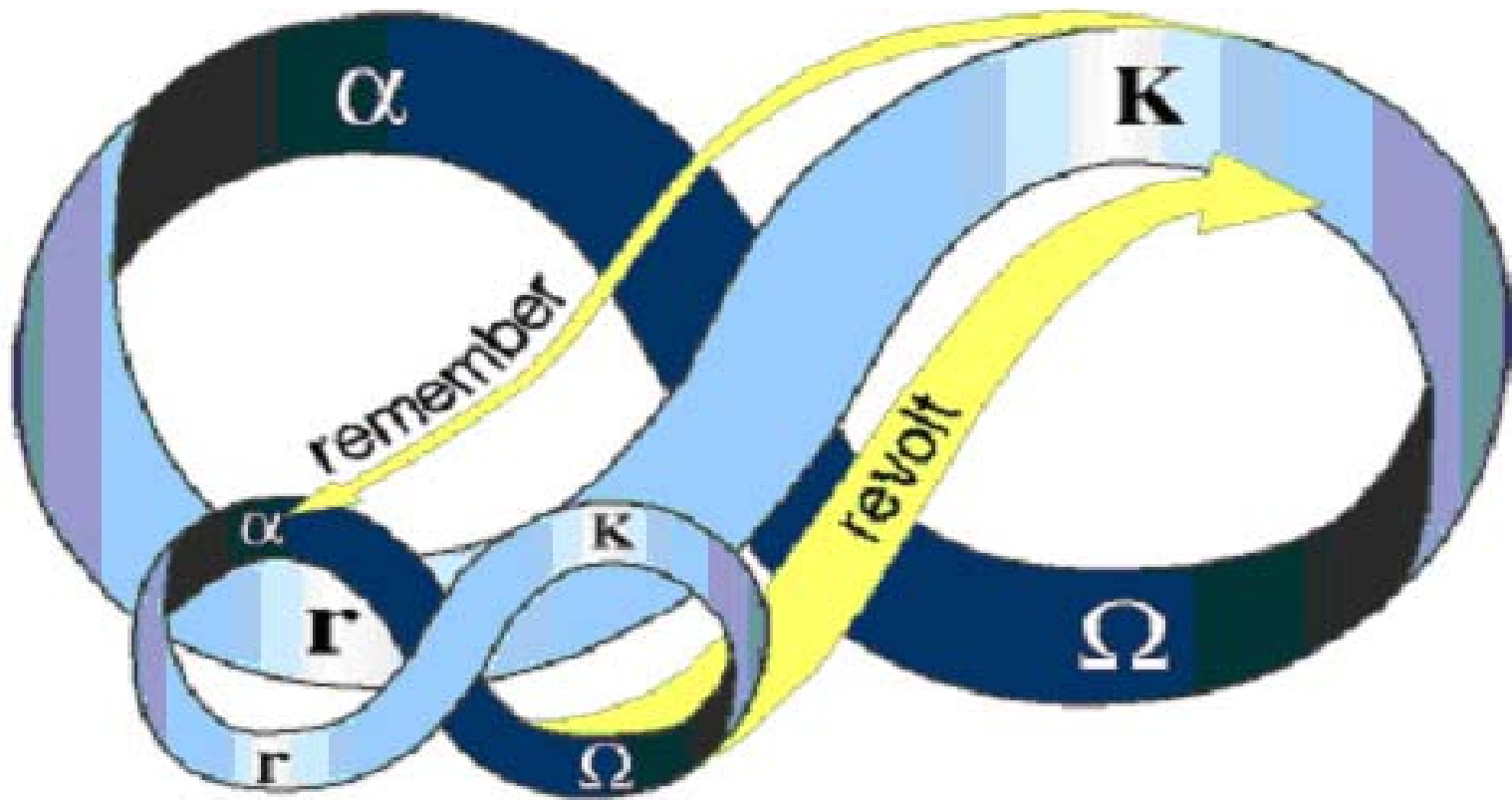
Great (Economic) Wheel of Life



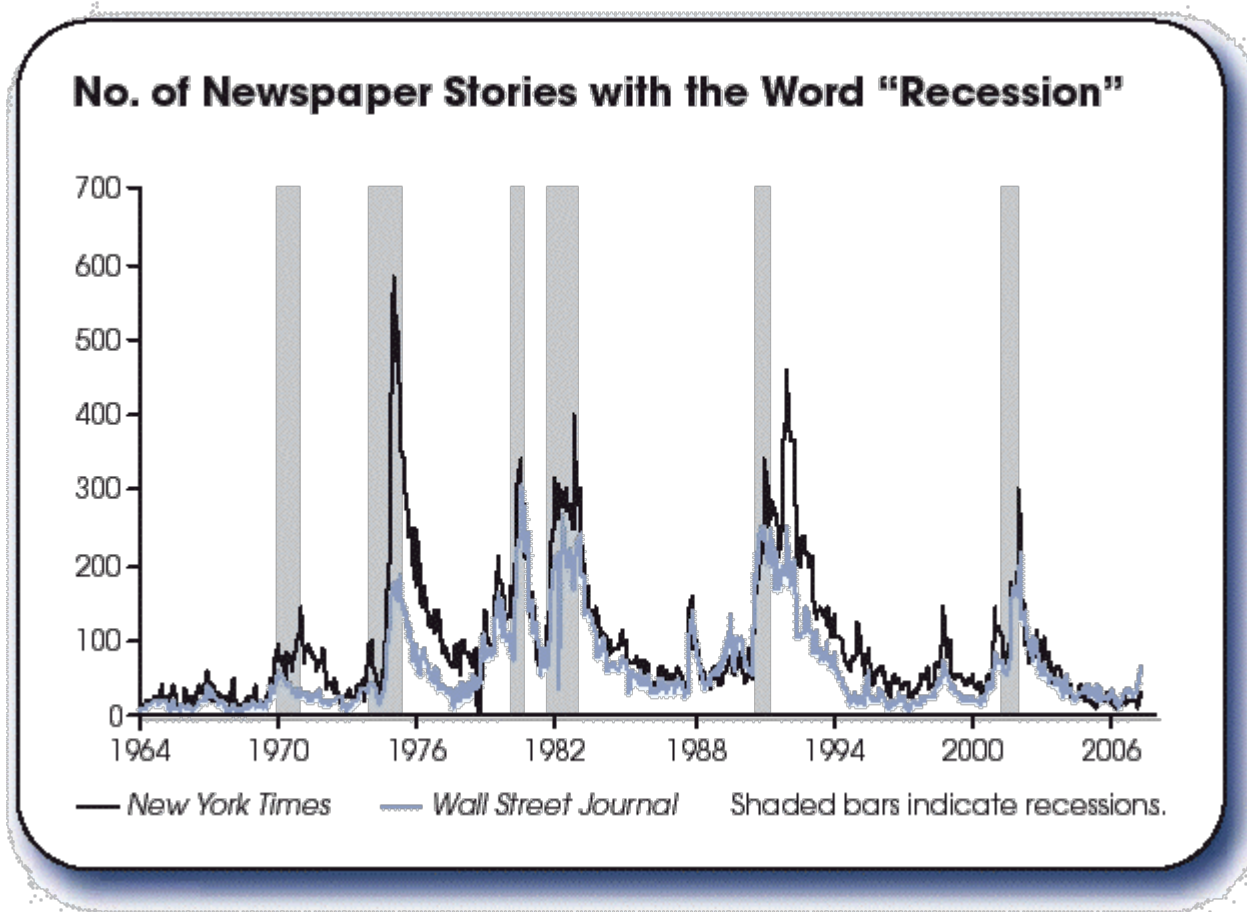
And another (NYT July 2009)



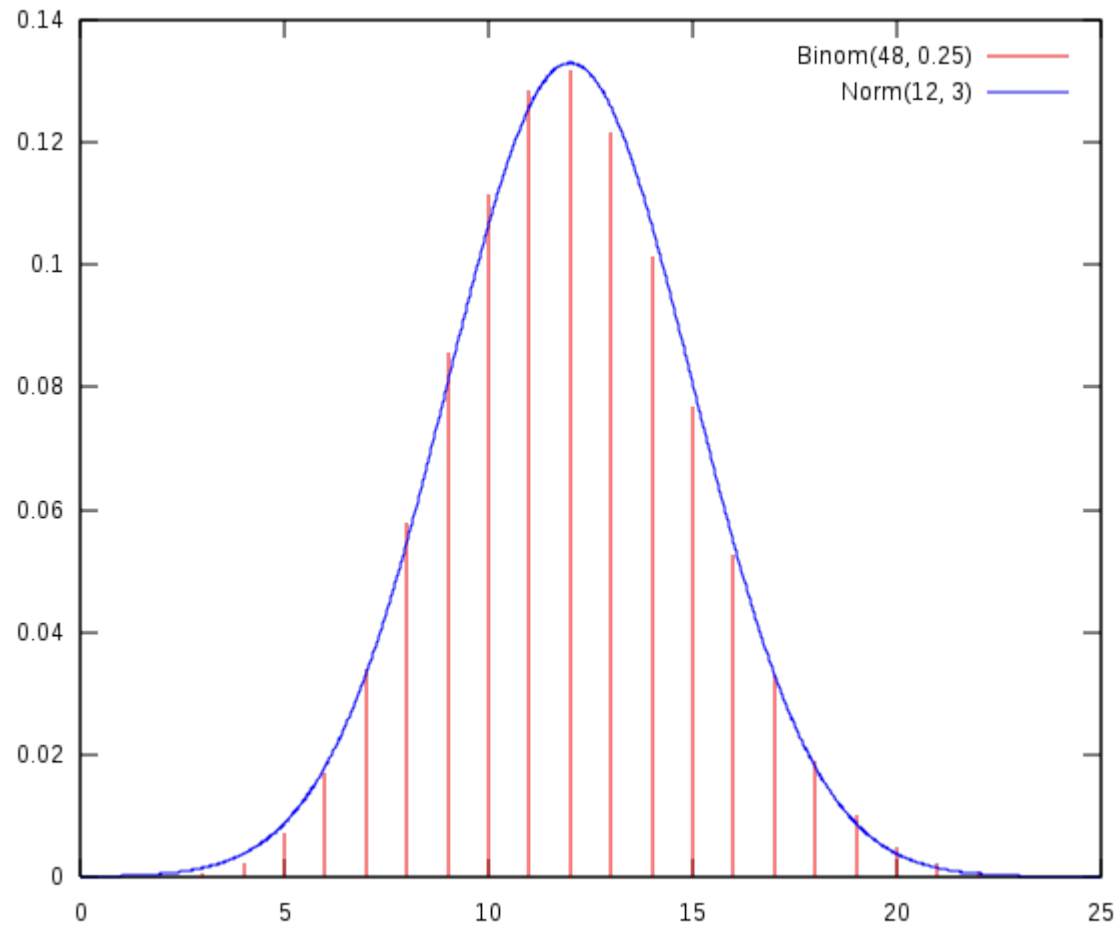
Panarchy



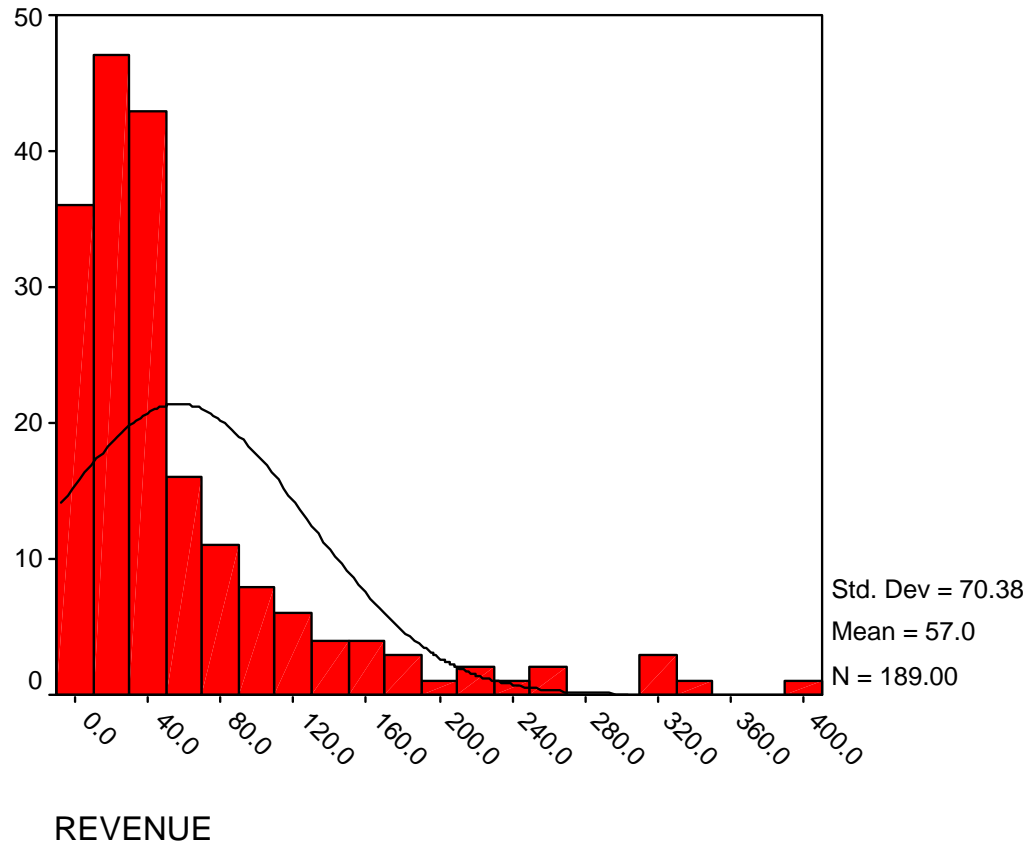
When do we know the cycle is changing?



Gaussian Curves – Normal Distribution



Power Laws – Unpredictable systems, Scale-free Networks, and Long Tails



Resilience Planning

Resistance (stop Surprise)

walls, detection & response,

Resilience (bounce back from Surprise)

- *Engineering resilience* (bounce back to system specifications)
- *Ecological resilience* (bounce back to same function but evolved to new realities).

Resilience Planning

- Resilience usually increases with:
 - Diversity
 - Loose Coupling
 - Lowest scale intervention
- Efficiency is the enemy of Resilience

Strategies for Resilience

1. Acknowledge unpredictability and expand time scale for measuring success
2. Ban the Blame Game in short term
3. Don't make system go faster than you can respond to surprises
4. To develop new things: Throw many seeds

Strategies for Resilience

5. Have diverse links (including many weak ones) to many resources
6. Important functions should have redundancy (it's not efficient!)
7. Stay in touch with slow and fast parts of the system – Fast proposes but Slow disposes.
8. http://pirp.harvard.edu/pubs_pdf/longsta/longsta-p05-3.pdf