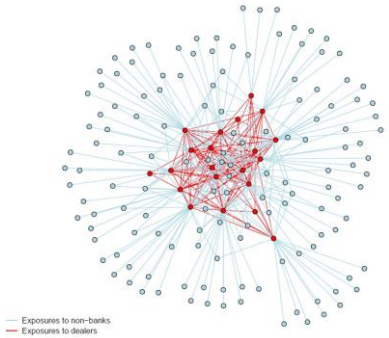
Complexity worldview

and implications for robust and adaptive Risk Management





Theo Kocken

Professor of Risk Management VU

Founder Cardano

June 18th, 2021

Complicated worldview on economics

Rational actors



Equilibrium

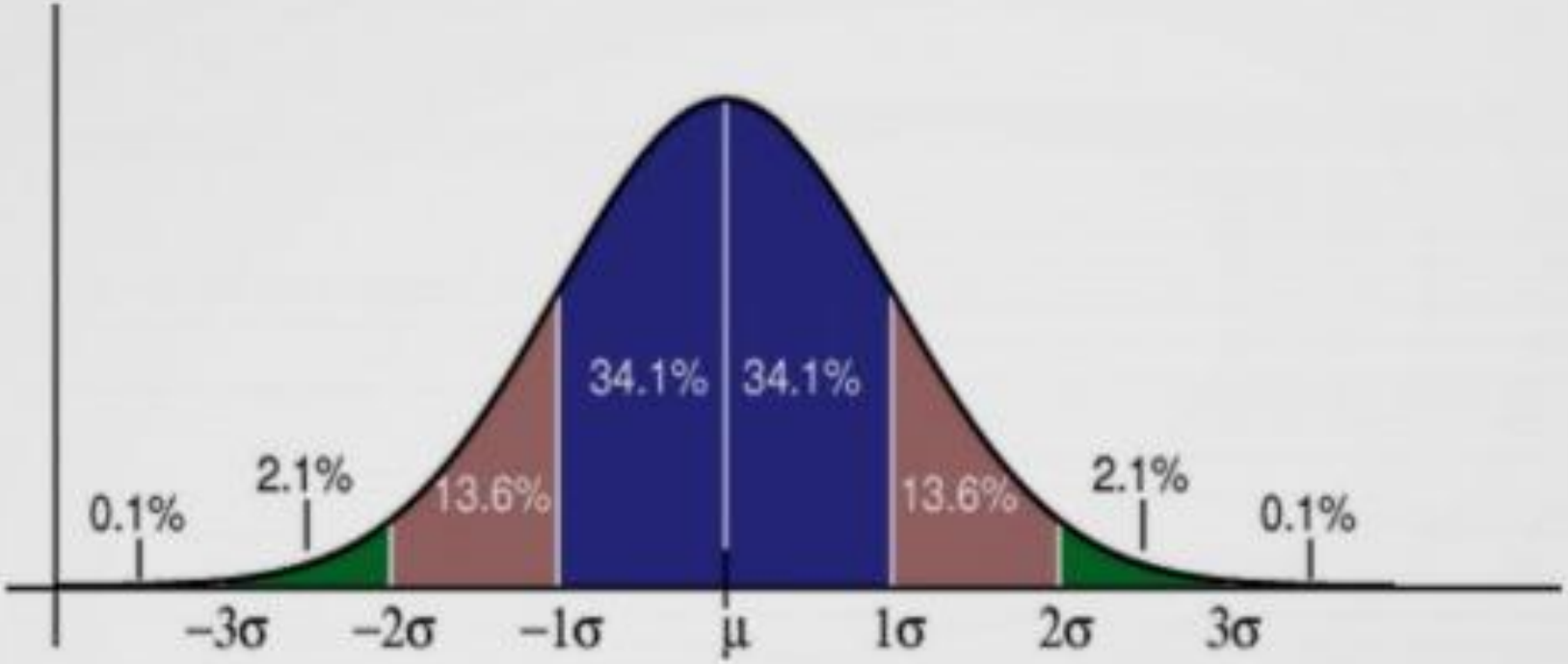
Static Preferences

Guassian statistics

TOOL:

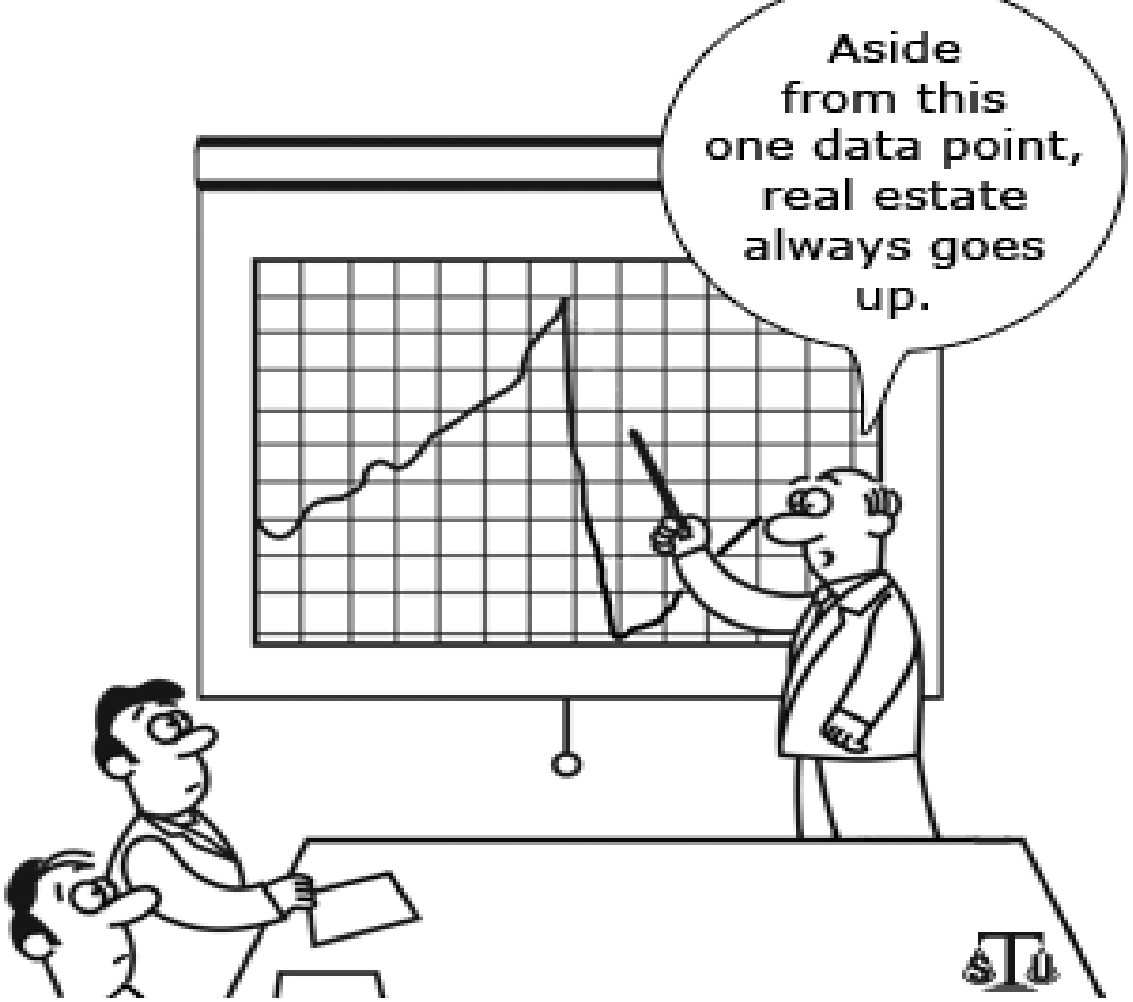
Equilibrium models

I AM RIGHT



ABOUT 95% OF THE TIME

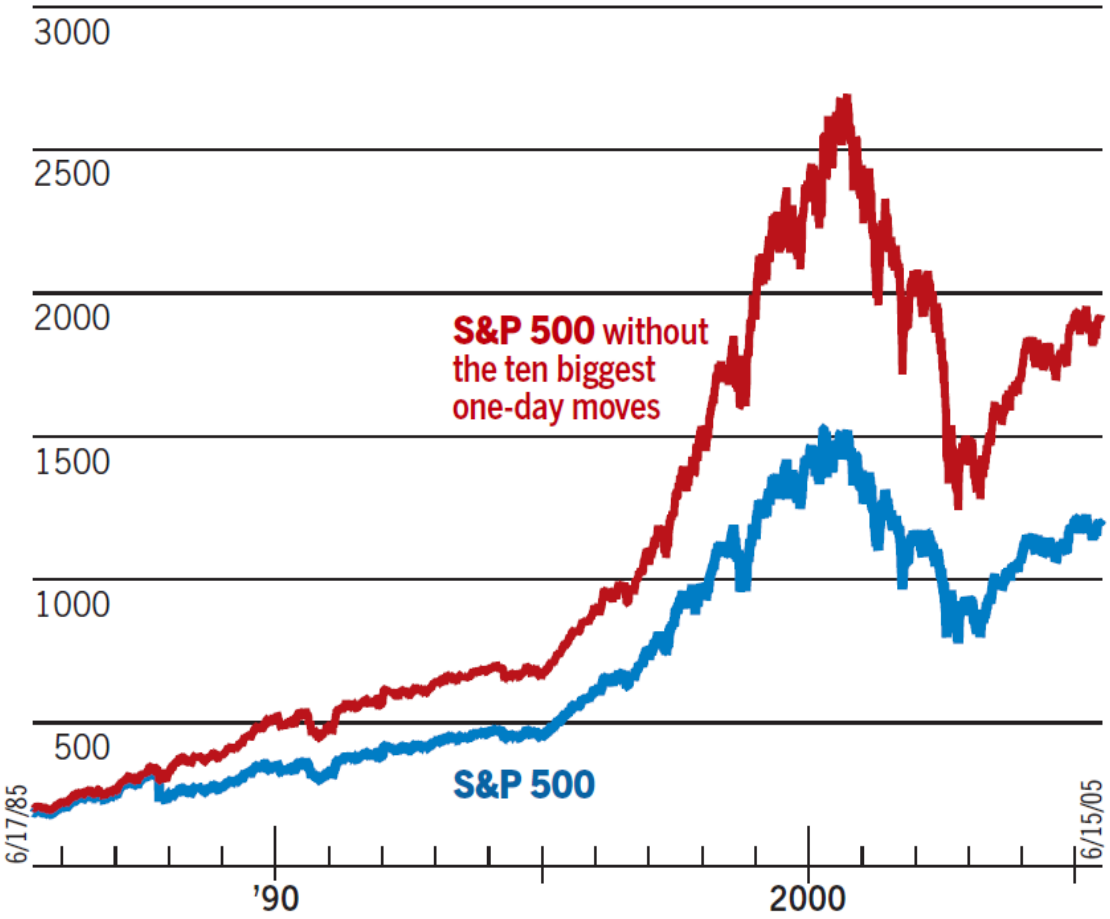
© WORDS & UNWORDS



"Economics has not truly come to grips with the main difficulty,…

*…which is **<u>the inordinate practical importance of a few events</u>**"*

Benoit Mandelbrot

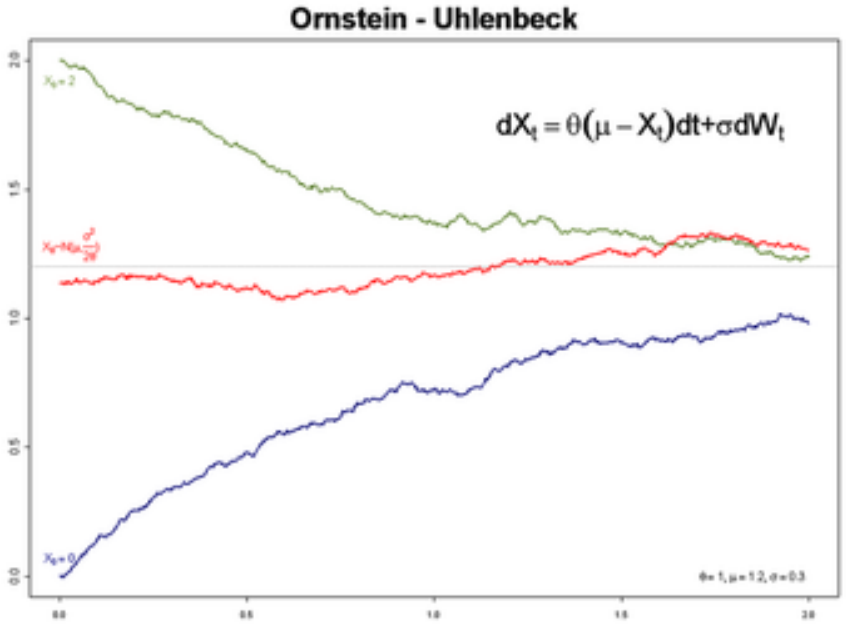


0.2% data = 60% result

5000 observations

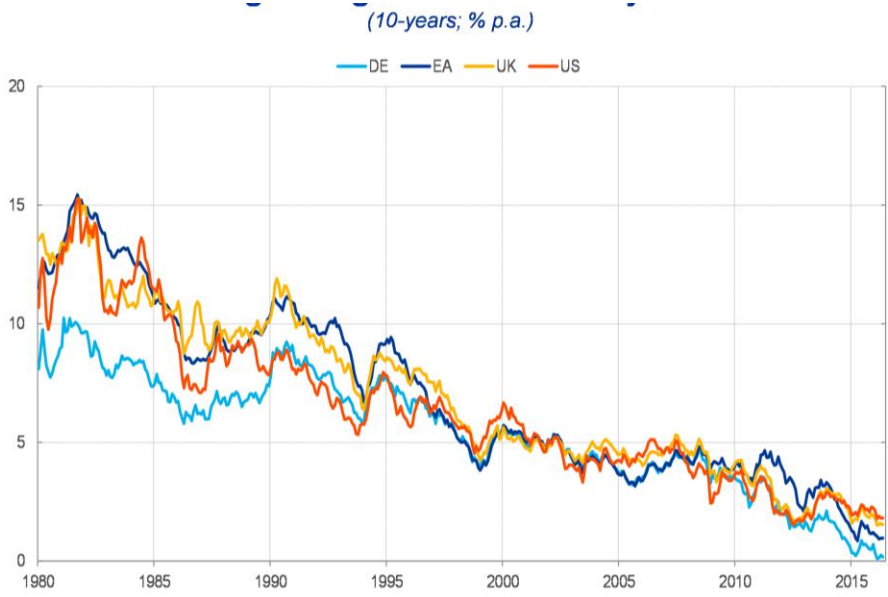
4990 observations

Ideology
of
Mean Reverting interest rates



COMPLICATED:
System behavior =
known "stochastics"

COMPLEX:
System behavior =
Fundamentally uncertain



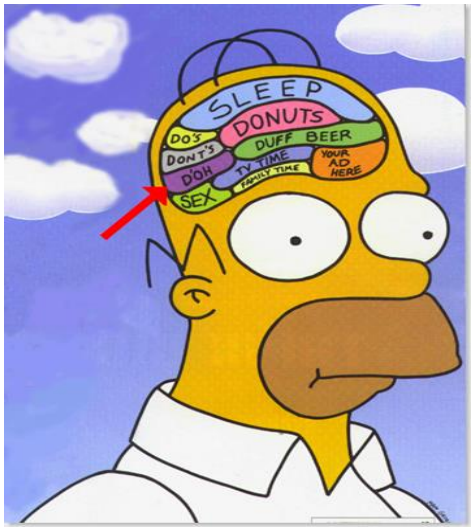
Facts: interest rates went down of 30+ years in a row

COMPLEXITY WORLDVIEW

Bounded Rationality

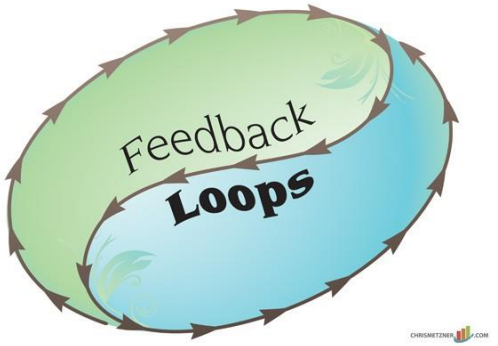
Human Biases

Innovations



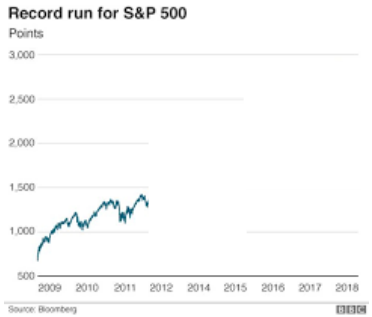
Changing interconnectivity

Time-varying preferences



Small changes on local level…
…complex outcomes macro level

Social feedback loop





Social feedback loop

Changing behaviour …

…changes markets



Changing markets …

… change affect … and behaviour

Social feedback loop

Changing behaviour …

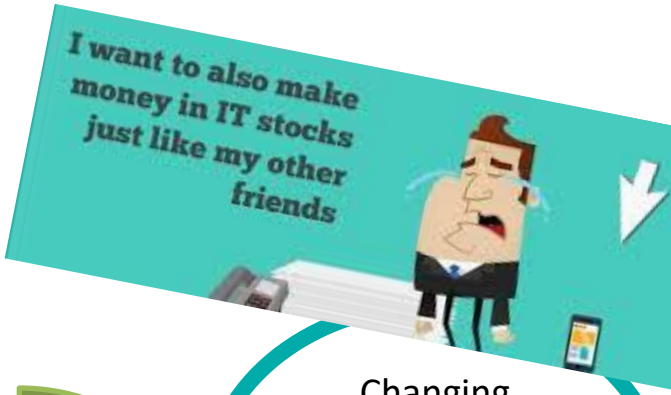
…changes markets

Greed



Affect heuristic

Overconfidence



Changing markets …

… change affect
… and behaviour

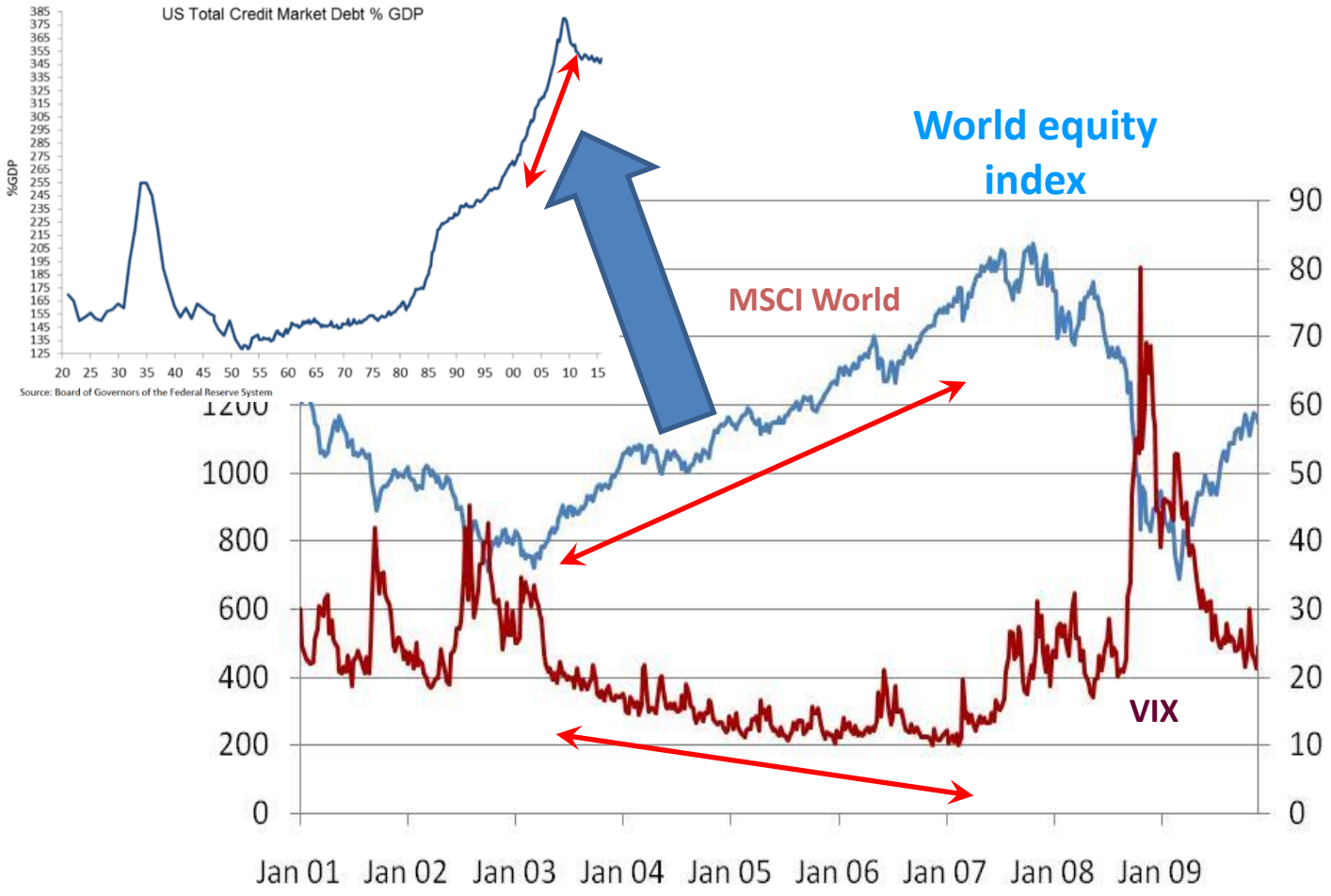
Confirmation bias

Fear

In practice:

Multiple feedback loops … increase complexity

COLLECTIVE IRRATIONALITY
Risk highest,
Perception of risk all time low



IMPLIED VOLATILITY

[market perception of risk]

Feedback Loops in economics:

BOOM BUST BOOM

www.2doc.nl



Top down

No Feedback loops



Components/Agents have
fully determined responses

COMPLICATED:
System behavior =
known “stochastics”

Agents have latitude of
responses
Changing preferences
System changes (innovations)
etc

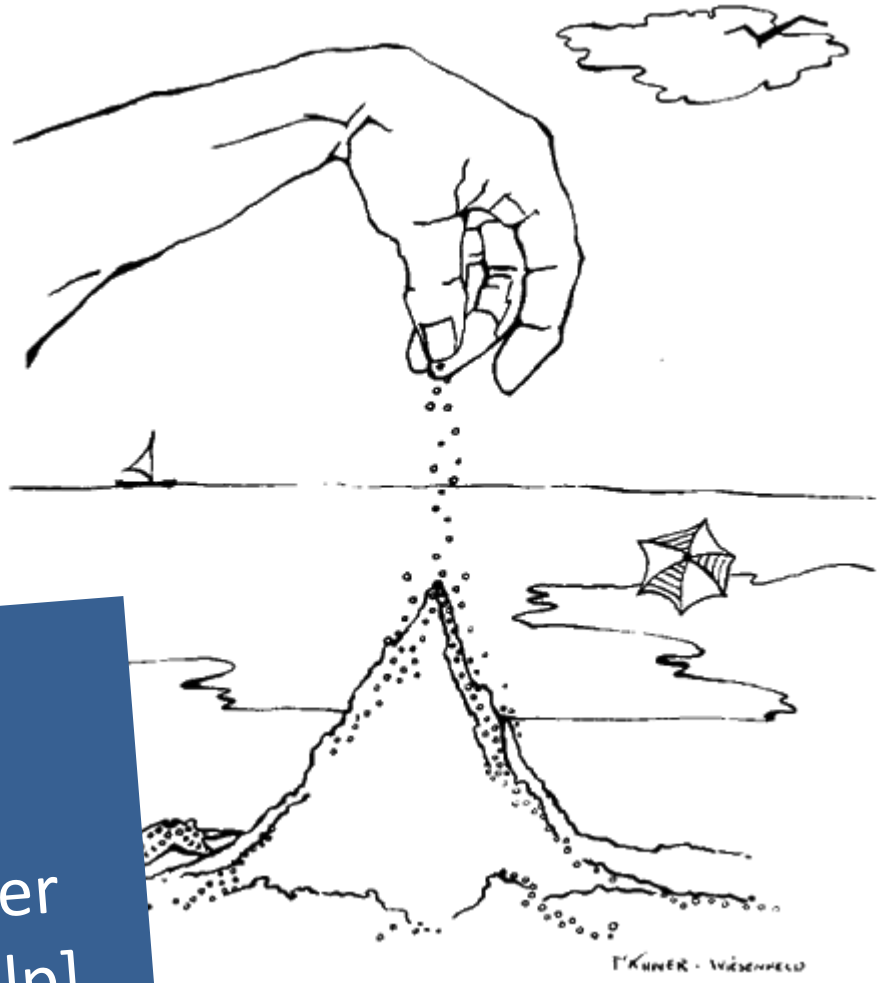
COMPLEX:
System behavior =
Fundamentally uncertain

Bottom up

Feedback loops



Sandpiles, disorder and self-organised criticality



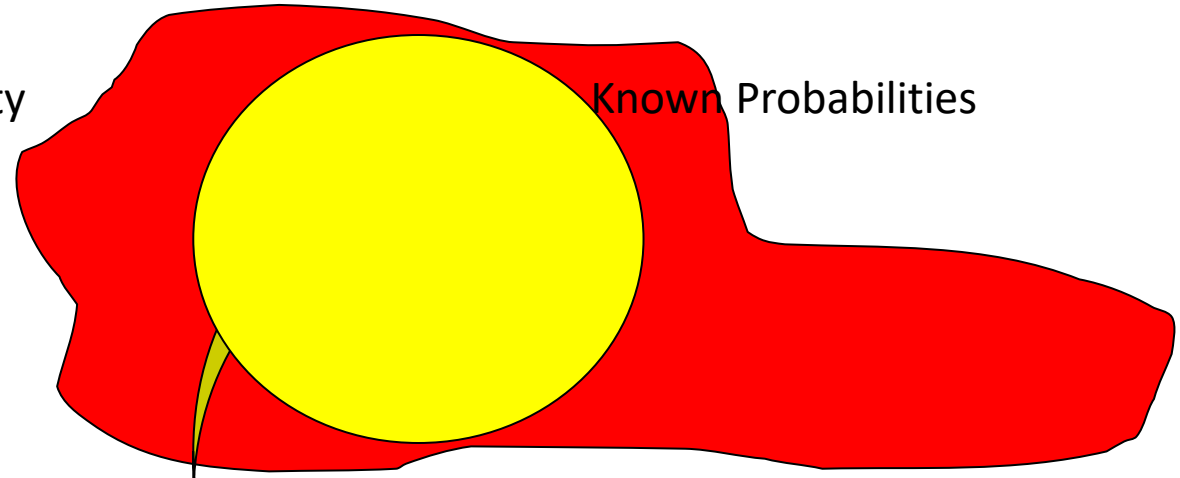
Predicting is impossible

[more data and faster computers won't help]

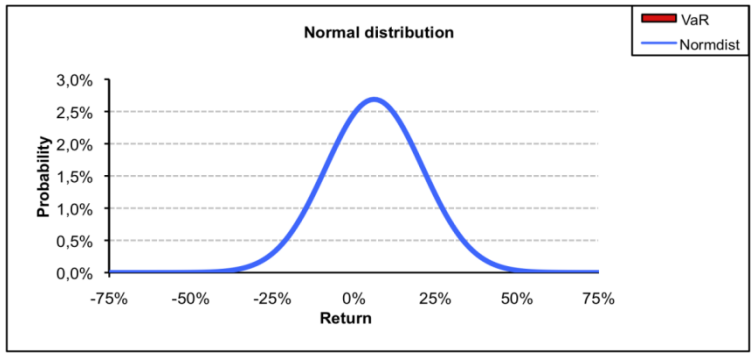
Uncertainty, Probability, Risk

Uncertainty

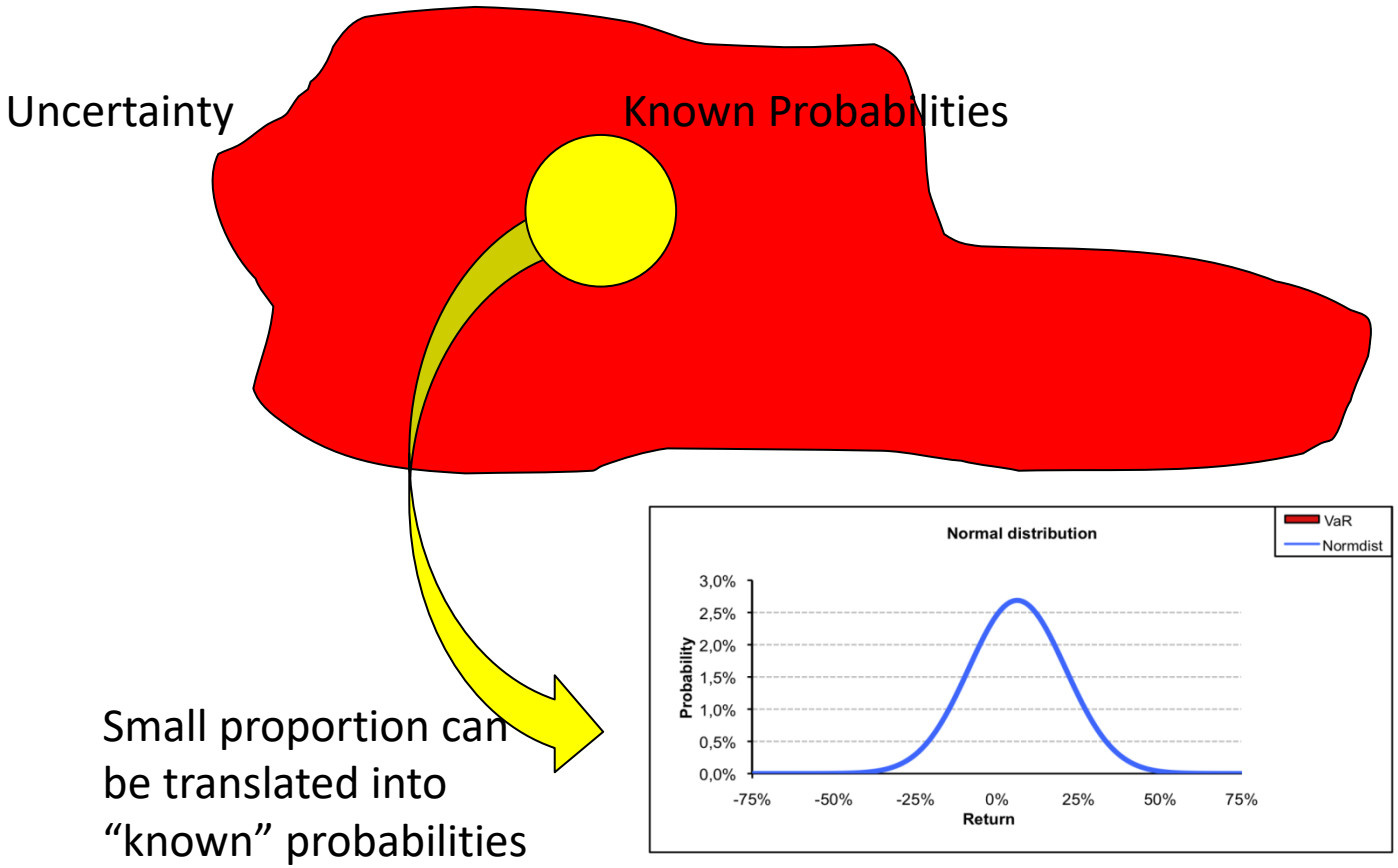
Known Probabilities



Small proportion can be translated into "known" probabilities



Uncertainty, Probability, Risk



Pursuing Complicated Models in a Complex world

“Modelling under the streetlight”



Descartian culture

Ambiguity aversion

How to deal effectively with fundamental uncertainty & complexity?



"Complicated" stable world

Single

IDEOLOGY



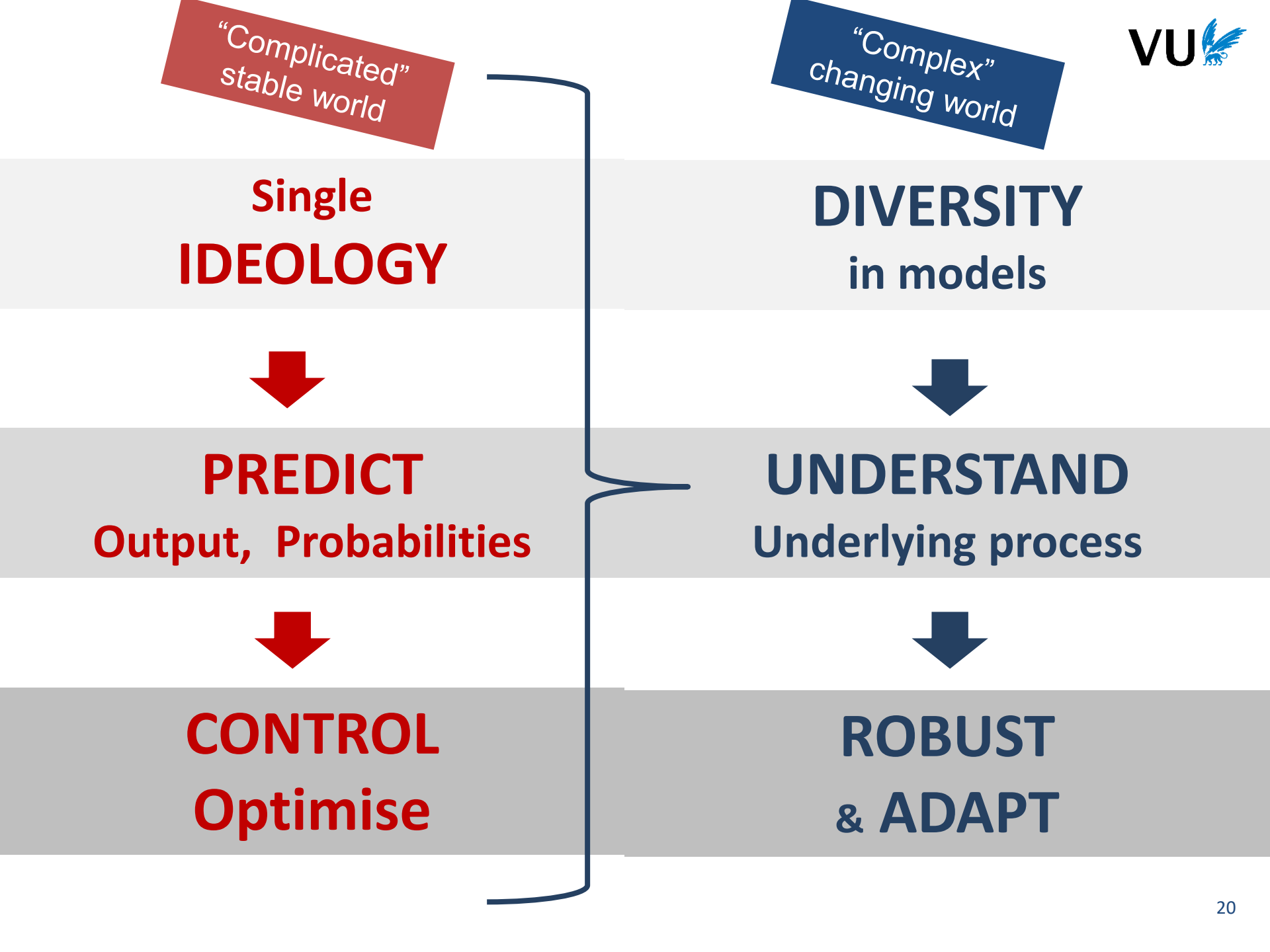
PREDICT

Output, Probabilities



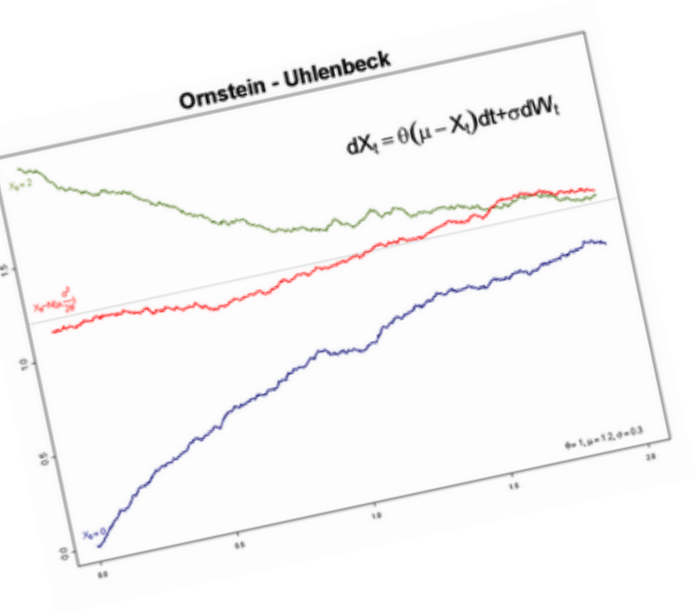
CONTROL

Optimise


"Complicated" stable world
"Complex" changing world
Single
IDEOLOGY
DIVERSITY
in models
PREDICT
Output, Probabilities
UNDERSTAND
Underlying process
CONTROL
Optimise
ROBUST
& ADAPT

Single
IDEOLOGY

EQUILIBRIUM
MODELS
risk = measurable



DIVERSITY
in models

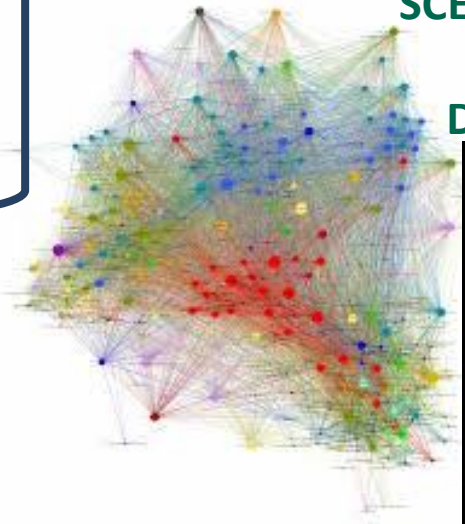
STATISTICAL (Equil.) MODELS

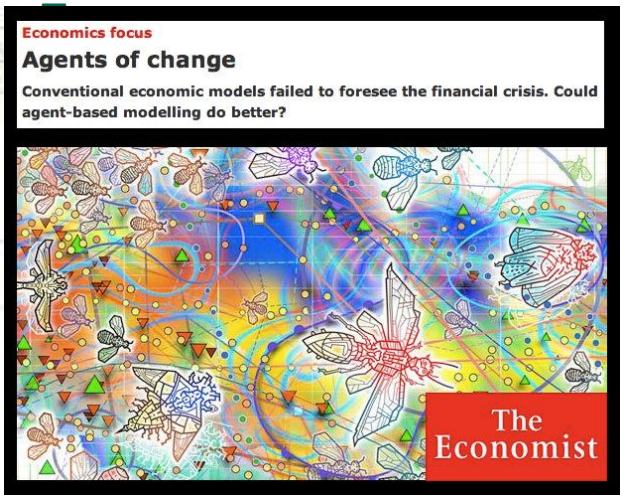
INSTABILITY theory

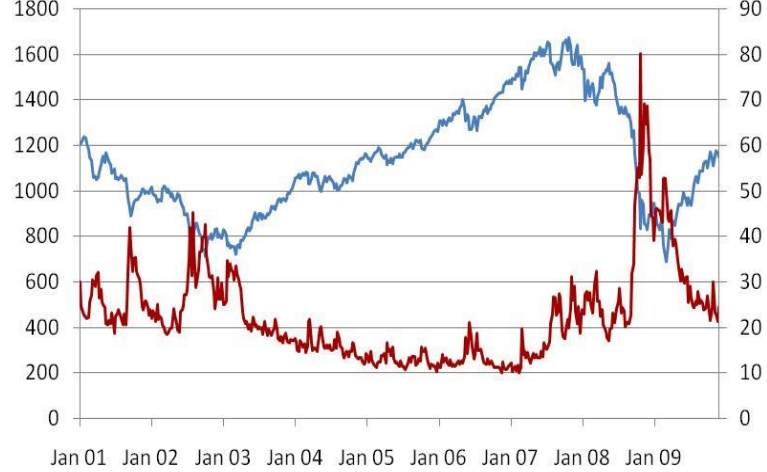
NETWORK models

AGENT BASED models

SCENARIO ANALYSIS
&
DE_BIAS TOOLS







PREDICT

Known Probabilities

OUTPUT is analysed

Output misleading

UNDERSTAND

Uncertainty

Underlying PROCESS

Process makes you understand changes

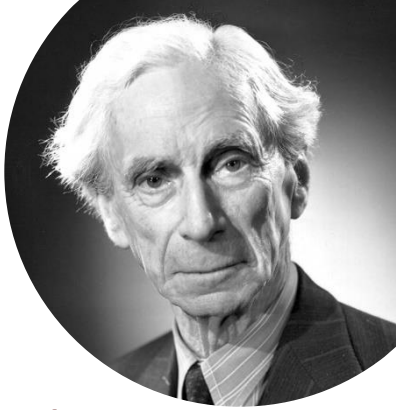
Be prepared, not surprised

Statistics
(Value at Risk etc)
=
Number

Not only WRONG …
… also makes you UNPREPARED

<u>Design prefers efficiency, specialisation, top down etc</u>

CONTROL



"Science tells us what we can know,

but what we can know is little,

and if we forget how much we cannot know

*we become **insensitive** to many things of very great importance."*

Bertrand Russell

Statistics
(Value at Risk etc)
=
Number

Not only WRONG …
… also makes you UNPREPARED

Design prefers efficiency, specialisation, top down etc

CONTROL

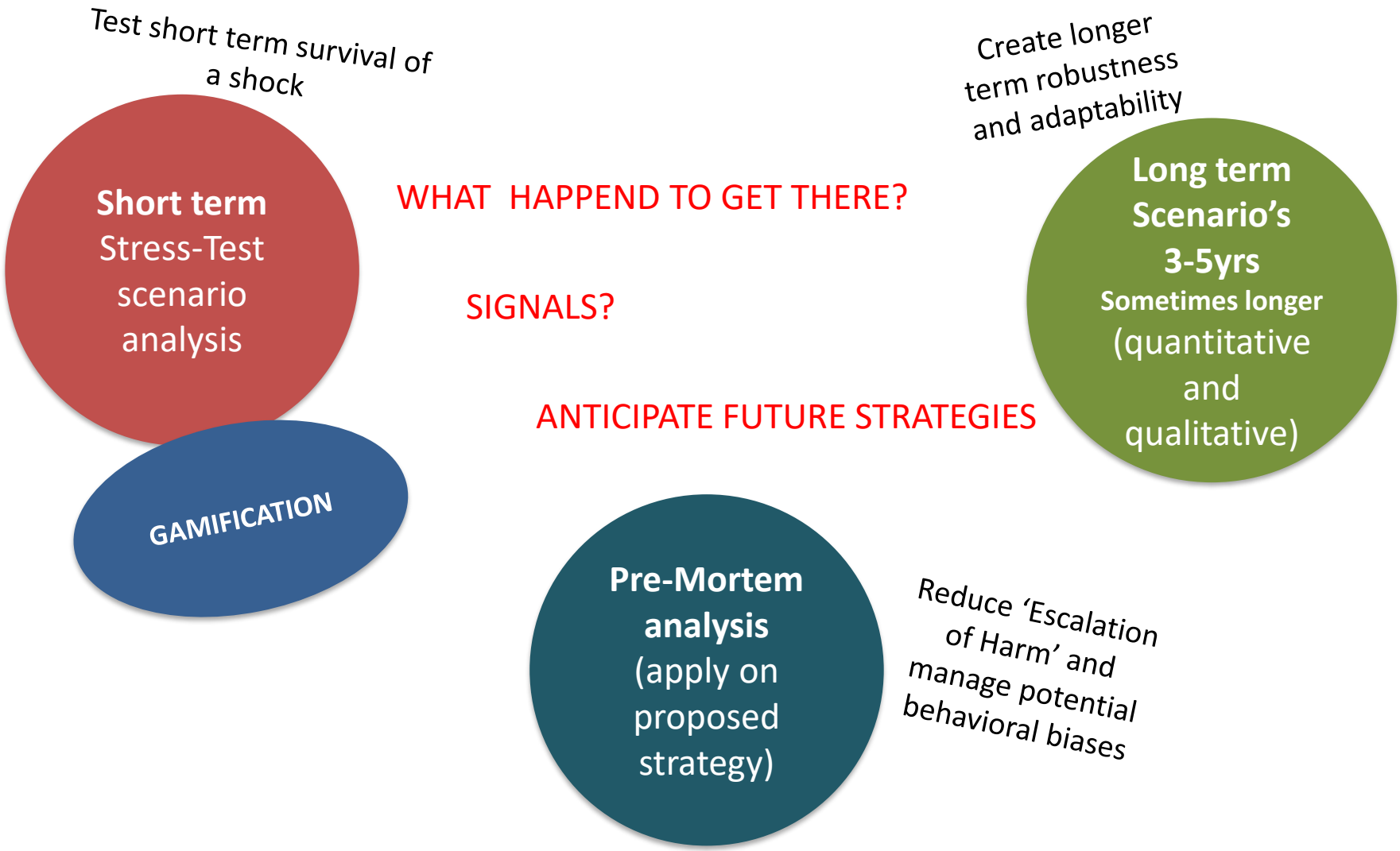
Scenario Thinking
And
De-bias tools

How to act per scenario

Design prefers flexibility, autonomy, real options etc

ROBUST
& ADAPTIVE

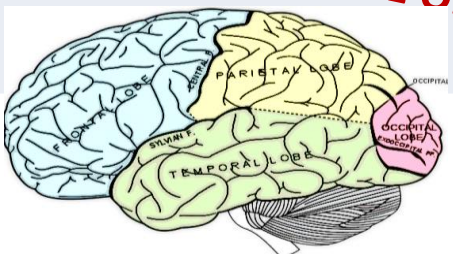
Diversity in scenario tools

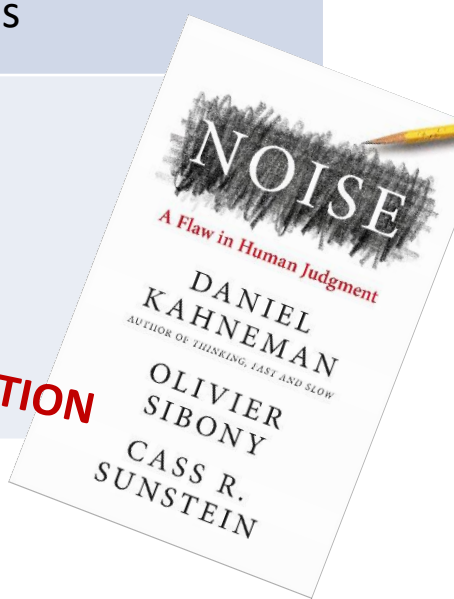


Many tools exist to improve process
Contingent on the problem at hand …

TOOL		APPLICATION
Delphi methode		Reveal broad (different) “beliefs” in a group
Devil’s advocate		Challenging a view …. Only when view is authentic
Triangulation		Structural approach towards opposing views
Pre-Mortem		High-impact complex decision; improve or decline
Pre-commitment		Avoid omission commission bias in crisis
Group Compostion … Consider more options Blind Choices ……. ETCETERA		

REDUCE BIASES
REDUCE NOISE
IMPROVE USE OF INFORMATION





The process matters more than the analysis

Chip & Dan Heath, book ‘Decisive’:

Process matters more than analysis/content by a factor of 6

Tetlock & Gardner book ‘superforecasting’

Groups of amateurs with thorough process beat professionals consistently

Summary:

How to live without certainty and yet without being paralysed by hesitation

Complex world = fundamentally uncertain

Don’t bet on refuted ideologies,
only because they give you comfort

Embrace different models of the world

Broaden your worldview

Use scenarios and de-bias tools

