Complexity in Computer Systems: a Risky Business

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Why do we need Technology at all?

Technology <u>transforms uncertainty into risk</u>.

We 'explain', and thereby swap hopelessness,

for the optimism in a plan of action.

In other words we impose structure in order

to gain a tenuous handle on uncertainty.

(numerical) Algorithms + People

= (systemic) Risk

= Hazard + Opportunity

Managing Uncertainty?

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"Though this be madness,
yet there is method in't"
(Hamlet, Act II, Scene 2)

Method is the first, the last,
the only resort of the mediocre

Definition of a Singularity:

"they had to be lucky all the time, we had to be lucky just once"

(IRA spokesman after the Brighton bombing, when they almost killed Margaret Thatcher)

Goodhart's Law

"any observed

statistical regularity

will tend to collapse

once pressure is placed on it

for control purposes"

Beyond Good and e-Ville

Look toward the observable consequential risks

that occur when computers are integrated

into **Human Activity Systems**

Computers deal with objective

well-structured problems,

with <u>detail.</u>

They cannot cope with

subjective subtlety,

<u>ambiguity and complexity</u>

A good technology platform,
although necessary,
is not sufficient for success.

Success or failure with a technology

will be determined by

unique social, political,

organizational, and particularly

personal factors.

Pablo Picasso

"Computers are useless,

they only give you

Answers!!!!"

BLAST-OFF

"you are at the top of

6 million parts,

all made by the lowest bidder!"

Michael Collins

The Price:

is here and now

The Cost:

accrues from here to eternity

A System
or
an Installation?

A **System** is what it becomes,
what it will become,
NOT what it is intended to be.

Systems misbehave!

Installations are linear,
systems are intrinsically non-linear

In a linear world,
the consequences of an Action
stop with a Reaction;

in the non-linear world of practice,
unforeseen consequences **feed back**
as a result of the inevitable complexity

Systemic Risk
Hazard or Opportunity?

Negative Feedback: reinforces stability
or Positive Feedback: the seed of Chaos

the Butterfly Effect

Complexity increases to a point

where utility becomes reliance,

reliance becomes dependence,

and the Law of Diminishing Returns

precipitates a galloping descent

into Nightmare

The first step fallacy

"they think they are reaching for the moon,

but all they've done is climb the nearest tree"

Herbert Dreyfus

President Pompidou:

There are three Roads to Ruin,

Women, Gambling and Technology!

Women are the most Pleasurable,

Gambling is the Quickest,

but Technology is the most Certain!

Priest:

"do you renounce the devil

and all his works?"

Niccolo Machiavelli:

"This is no time

to be making enemies"

The Buck stops There

Defensive use of e-mails

Responsibility

versus

Authority

The Shell oil reserves scandal

The van de Vijver e-mail:
"I am becoming sick and tired
about lying about the
extent of our reserves"

Shell fined $120 million by the SEC,
and £17 million by the FSA.

"Every revolution evaporates and leaves behind only the slime of a new bureaucracy"

Franz Kafka

the 'Glass-Cockpit Syndrome'

omnipresent computer screens distract,

causing confusion and errors of judgement

1) end users rely entirely on the system

without exercising any judgement.

2) ensuing information overload results

in users ignoring many pieces of

(sometimes very important) information.

Bureaucracy

'normal' versus 'singular'

Discretion or
self-referential certainty?

Dennis Healey:

"When you're in a hole,

STOP DIGGING!!!!"

Optimistic rationality

Moondog:

What I say, I say now,
I say without condition,

that science is but
the latest, greatest
superstition

Alan M. Eddison:

"New Technology

owes Ecology

an Apology!"

Friedrich Nietzsche:

"Madness is something rare in individuals, but in groups, parties, peoples, ages it is the rule."

The Madness of Control Freaks

Human thought is mere calculation;
we are biological analogue computers.

Their Hidden Agenda:

1) a number can be a meaningful representation
   of human experience; and

2) arithmetic operations on such representations,
   implemented on a computer, can produce
   'rational decisions' about, and can control
   the human condition.

The Uncertainty Principle

There's no point in measuring something

if it changes the moment it is measured,

as a direct result of being measured.

Profiling?

Peter Principle of Computerization

Individuals and Computers are

promoted to the level of their

INCOMPETENCE.

But worse .....

computers magnify and amplify

the incompetence of all those around

The figures don't lie?

"It's not the figures lying,
it's theliars figuring"
Mark Twain

Atomism

Similarity = Sameness

False Opposites:

Pretend to be serious then

Pretend to be funny

Friedrich Nietzsche:

"capricious division and

fragmentation"

Shakespeare

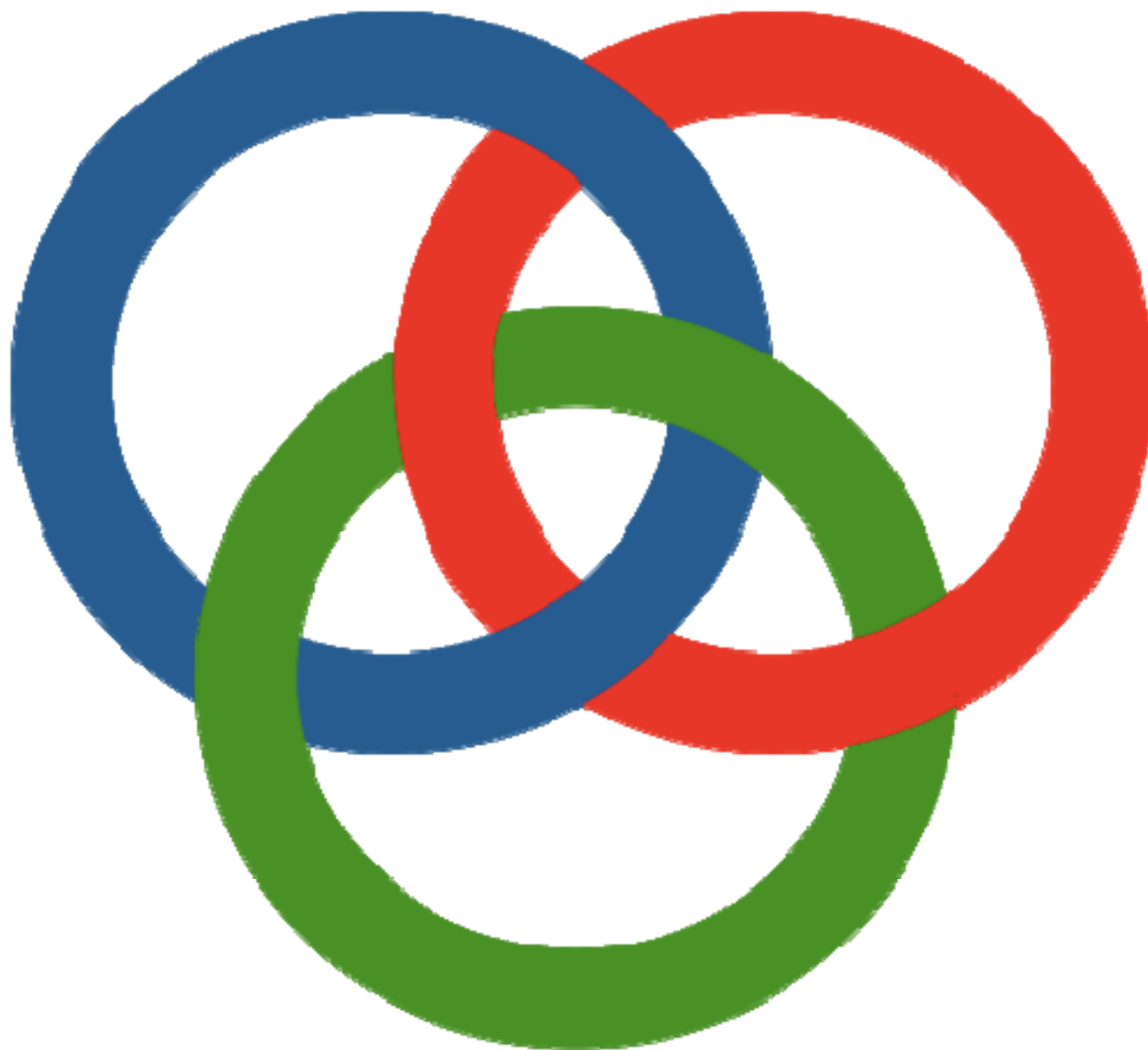"The fault, dear Brutus, lies not

 in our stars, but in ourselves ..."

Niklas Luhmann

The Fallacy of the Residual Category

Niklas Luhmann:

"The concept of the environment should not be misunderstood as a kind of residual category. Instead, relationship to the environment is constitutive in system formation."

Structural Coupling

The Borromean Rings

the two artificially separated parts
continue to operate (and interrelate)
as the unobservable whole.
Because of this asymmetry
(between the world as it is,
and as it is observed),
all observation is conditional,
but those conditions are necessarily
unobservable, unappreciable, uncertain.

Those truncated structural couplings,

so casually discarded by observation,

stay on as uncertainties

and thus, as risks to the observer

in any further observations,

and they can reassert themselves

in the most inconvenient ways.

The nine most terrifying words
in the English language:
"I'm from the government.
I'm here to help you"
President Ronald Reagan

"Our society is run by insane people for insane objectives.
I think we're being run by maniacs for maniacal ends ..."
John Lennon