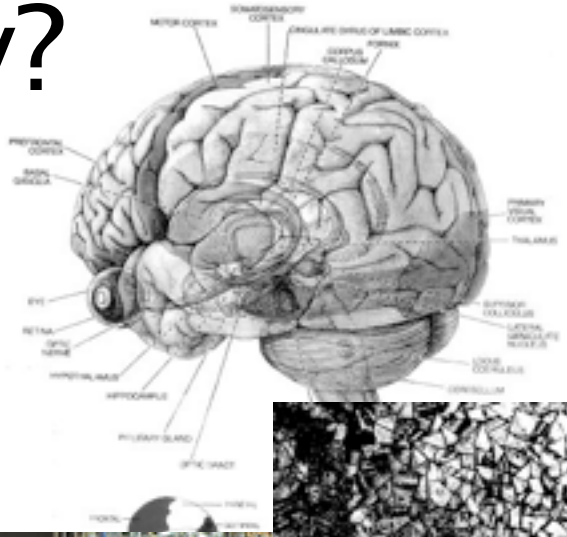
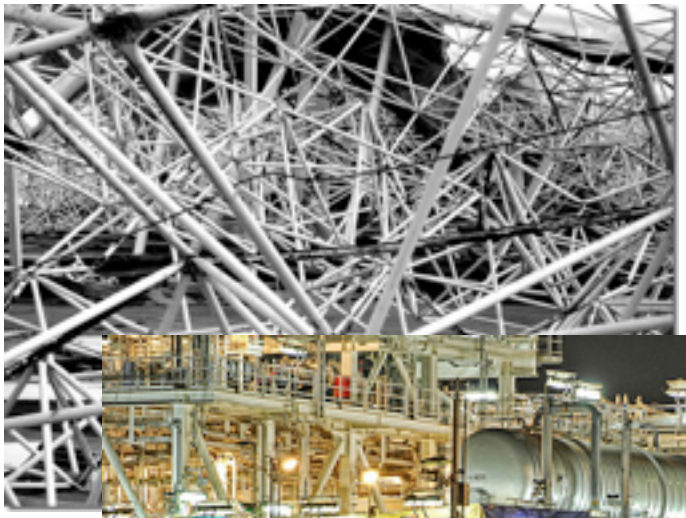
Complexity

a personal view

Geoff Huston

What is Complexity?





Complexity

"many parts in intricate arrangement"

- mechanical systems
- industrial processes
- computer systems
- networks

The Good

- Complex systems can encompass complex behaviours
  - self reflection
  - dynamic adaptation
  - self healing
  - multiple state outcomes

The Good, the Bad

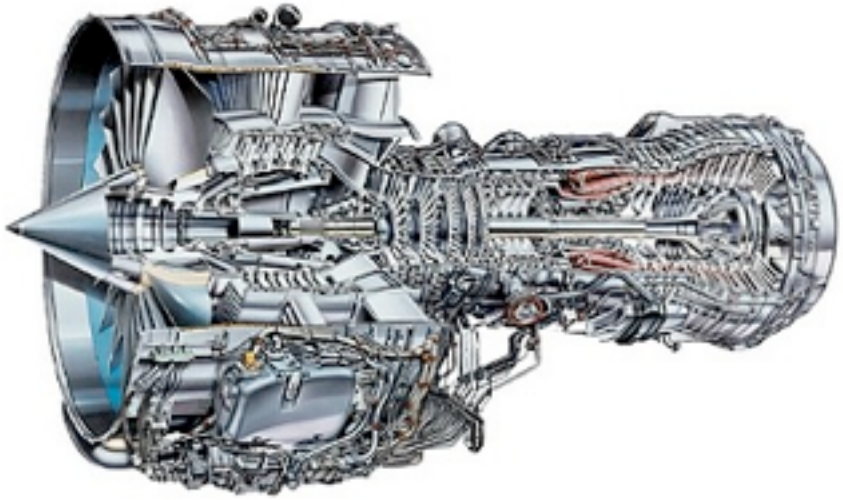
Complex systems impose additional overheads

- increased operational costs
- higher specialization
- reduced flexibility

The Good, the Bad, and the Ugly

Complex systems have complex interactions

- hidden vulnerabilities can caus catastrophic failure



The IP Dream

- Simple network
  - hop-by-hop stateless datagram forwarding
  - cheap, flexible, cheap, scaleable, cheap
  - shift complexity out of the network
- Smart “edges”
  - push rendezvous, flow control, traffic integrity off the network and into end systems and applications
  - push complexity to a decentralized edge

The IP Reality

- Complex Networks
  - Switched MPLS fabric creates multiple layers
  - Fast re-switch AND fast re-route
  - Multi-response networks, dynamic flow control, active resource management
  - Security sensitive responses
- Complex Edges
  - rendezvous, flow control, traffic integrity, security, multi-protocol

Complexity

- It's easy to base a business on generating complexity!
  (ask any telco!)
- It's actually quite hard to base a business on simplicity and minimalism
  (hard to find minimalist businesses that are still thriving today!)