“Design for Tussle”
- beyond technology issues

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technology issues with today's networks

- self-defence (DDoS), robustness, availability
  - systems architecture as well as network architecture
  - embedded security functions *not* required (ideally)
- intrinsic roaming support
  - hooks for higher level authentication
- multi-sender group formation
  - eg. for global sensor nets
  - incl. anti-jamming
- fast-start, hi-speed, internetworked resource control
  - link technology agnostic, incl. radio, photonics
  - secure when differentiated
- security without crypto
  - strategy-proof systems
- designed for provability
  - strong theoretical foundations required

beyond networking technology issues

- design choices cause major socio-economic outcomes
  - open v. closed – computing industry wins v. network industry wins
  - natural star v. mesh topology – natural monopoly v. community net
  - virtualisation v. vertically integrated – competitive retailing structure
  - anonymity v. traceability – evolution of new IPR models?
  - confidentiality v. key escrow – evolution of non-national controls?
- open architecture?
  - network operators violate it — result: gridlock
- closed architecture?
  - application developers violate it — result: gridlock
- solution: design for open *and* closed – interworking together
  - Internet *and* NGN
  - society/economy determine outcomes at run-time, not design time
  - “Design for Tussle”

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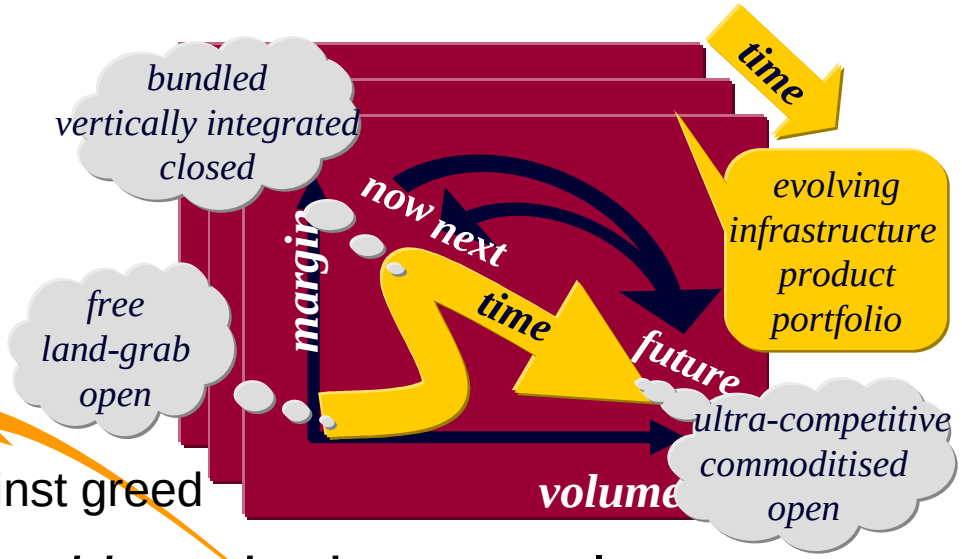
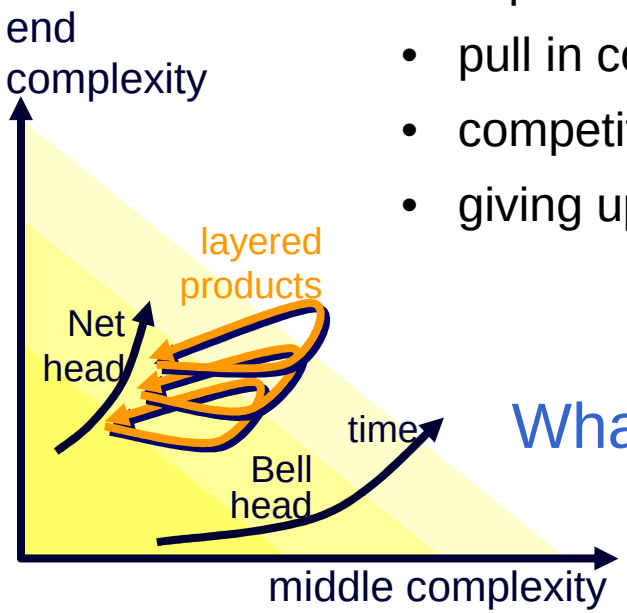
open by design
closed by policy



Net-head heart
Bell-head skins

- design *as if* open
  - include proofing against greed
- design edge control *with* endpoint control
- example life cycle of a service
  - capture market share with free, open service
  - pull in control from ends to edge
  - competition gradually commoditises
  - giving up control stimulates new innovation
    - layer under next product



What controls where the control is?

- competition, regulation

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impact on the world?

- discourage project-specific architecture
  - must articulate differences from others & incremental deployment
  - except for conscious thought experiments
    - e.g. GENI/FIND (US NSF)

- encourage *true* cross-disciplinary collaboration
- encourage Far-East/Americas collaboration
- penalise “only here for the funding” partners
  - funding conditional on investing 6month collaborative effort?
  - industrial funding depends on collaborative record (e.g. 30%-70%)?
- collaboration ad hoc as required: far more fruitful
  - example: www.CommunicationsResearch.Net (CRN)

summary

- “Design for Tussle”
  - very hard
  - requires cross-disciplinary expertise
    - economics, business, regulation, technology
  - the future: *Internet and NGN*

more info

- designing for tussle – case studies in control over control

  <www.cs.ucl.ac.uk/staff/B.Briscoe/present.html#0406pgnet>

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