

Flexible and responsive service ecosystems

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Will we have self-managing networks?

- In the lower layers, it's not entirely clear...
- ...and maybe this isn't such a bad thing!
- But in the upper layers, of course we will.
- As a matter of fact, we already have them: e.g. P2P overlays are self-managing entities, in the sense that they deal with constraints like churn, broken links etc. by reorganising themselves.
- But for all their resilience, they're not necessarily very smart!



So...

- Isn't a better question: will we have overlays that are any good at managing themselves?
- Or: will P2P networks evolve into something more subtle than the thick-skinned, bandwidth-hogging mass of hardly differentiated cells that they are?
- We sincerely hope so, and not just because they are a serious threat to QoS...
- ...but because we're convinced that they are the best possible design philosophy for the next generation of agile network-based services.



Toward service ecosystems

- There is so much more in the P2P paradigm than decentralised, copyright-blasting distribution of (mostly mediocre) content!
- If it survives its rather troublesome infancy, it could become the key enabler for an entirely new breed of autonomic services, based on ubiquitous collaborative computing, and offering:
 - Seamless deployment and composition
 - Practically unlimited scalability
 - Spontaneous life-cycle management
 - Emergent load-balancing
 - ...
- You don't believe me? Here comes the proof-of-concept...



Embryo

Key features/properties:

- All components have some “intelligent” autonomic capabilities
 - The relationships between them (esp. who is connected to whom in the overlay) are in permanent turmoil
 - Multiple (hopefully modular!) applications coexist within the same service ecosystem
 - Which modules make up which application is constantly revised: new applications appear, others die out, new (old) modules are added to (removed from) existing applications
 - Demand is highly variable and requires “on-the-fly” reallocation of resources
 - There is no common information repository and no control centre can cope with the rate of change in the system
- Can we make it work and how?



Why “Embryo”?

- Because it's not unlike what's happening during the morphogenesis of multicellular organisms.
- It all starts with a handful of identical stem cells, which progressively multiply, specialise and “migrate” (i.e. change relative positions during development).
- Eventually, the process gives rise to a living being, whose existence depends on highly specialised and interdependent organs, each made of many cells belonging to various differentiated types.
- And of course this extraordinarily complex orchestration all happens in the absence of any conductor, through a combination of local mechanisms ranging from cell adhesion to cross-stimulation/inhibition.

