Inter-operating Co-opeting Entities

A Peer-to-Peer Approach to Cooperation between Competitors

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I hold a PhD in computer science (1992, EPFL, Switzerland) and a MSc in Mathematics from Neuchâtel University. After leading the Operating systems lab ad interim for one year and teaching at EPFL, I was CIO of the Swiss Federal Bureau of Agriculture and CTO of the Swiss Federal Dept. of the Economy's Computing Centre until 2000. I started my own business in 2000 and have lead over 30 innovation projects since then.

My interests are distributed systems and information systems design and development; the management of innovation as a strategic resource; the role of scale and complexity in innovation strategy; complex systems architectures; transdisciplinary technology transfer; information systems for managing biodiversity; agronomics and the sustainable management of food, water and energy.

I have been teaching at several higher education institutions in Switzerland since 1995 (University of Neuchâtel, EPFL, Geneva University Hospital) and I am the author of several peer-reviewed publications on innovative contributions in my project works.

Introduction: horizontal cooperation

Situation where economic actors are both
- competing to gain market share and increase revenues, and
- cooperating to improve their productivity and decrease costs

Examples:
- in logistics of retail business of global brands
- subcontractors in the mechanical watch-making industry

Requires a well defined cooperation function and finely tuned coordination between the co-opetitors

IT-dilemma

If the cooperation function and coordination are to be automated and supported by IT, either

- the actors must give in some control on their strategic information processing infrastructure, or
- some central « coordinator » implements cooperation

Example: SWIFT central coordinator for bank transfers

- banks compete aggressively to manage individuals assets
- but cooperate to reduce costs and speed-up customers money transfers
- SWIFT (a Belgian cooperative) plays the role of (transactional) referee

Illustration

Separate legal entities (possibly operating in foreign legal environments) must keep complete control over their strategic IT infrastructure.
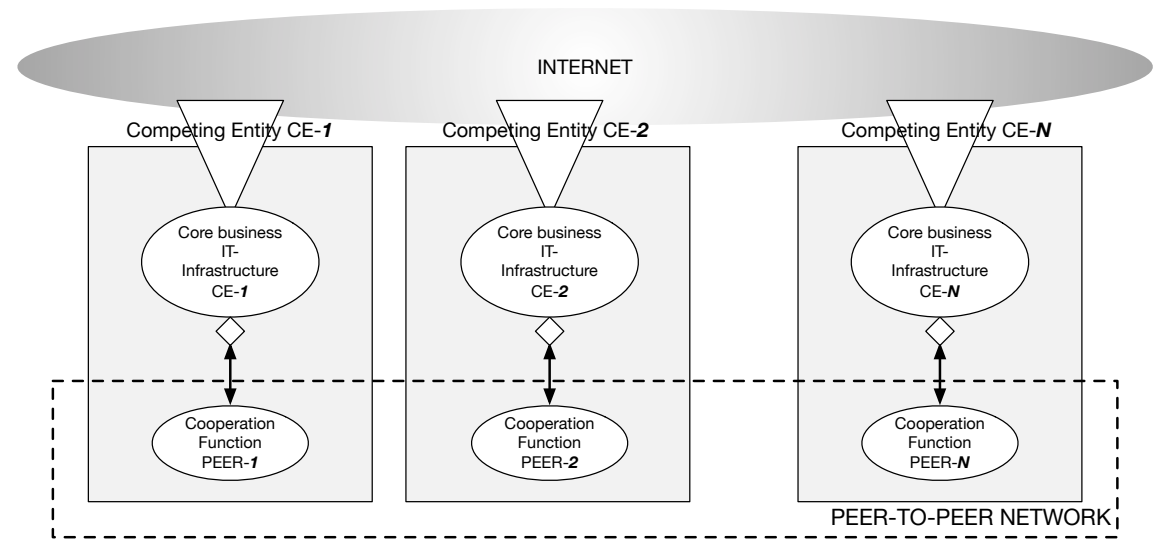
In this case competitors are de facto PEERS: peer-to-peer principles may apply very well to the situation
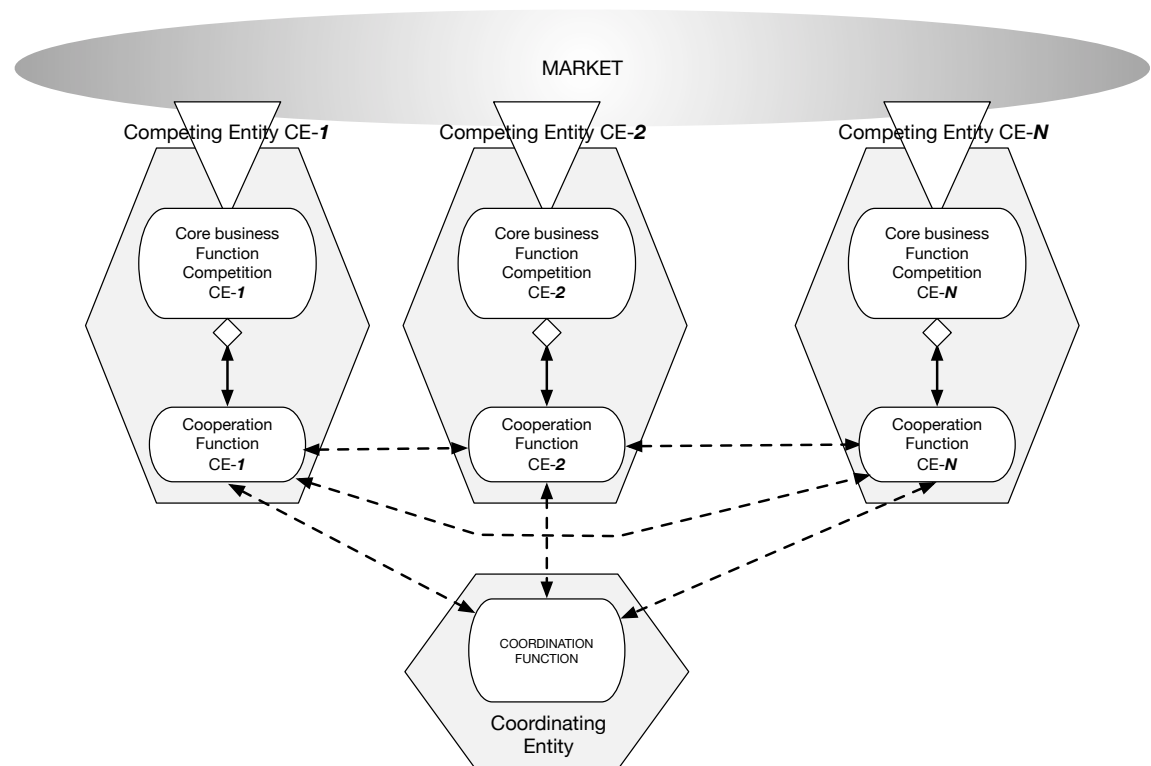
Truly distributed cooperation function

It is possible to design and implement a peer-to-peer network that guarantees good security conditions to the competing entities:

- each peer fully controls every operation that runs under its responsibility
- all operations are fully traced and securely logged (at the peer)
- peers that behave can prove « no wrong-doing »

INTERNET

Competing Entity CE-*1*

Core business
IT-
Infrastructure
CE-*1*

Cooperation
Function
PEER-*1*

Competing Entity CE-*2*

Core business
IT-
Infrastructure
CE-*2*

Cooperation
Function
PEER-*2*

Competing Entity CE-*N*

Core business
IT-
Infrastructure
CE-*N*

Cooperation
Function
PEER-*N*

PEER-TO-PEER NETWORK

- peers that would misbehave cannot prove « no wrong-doing »

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Middleware with cooperation function

The peer-to-peer platform is built as a middleware to which each peer connects

- locally (a peer's stub is implemented and operated by the peer)
- that provides the services specific to the application domain and cooperation function
- that is *fully distributed* (no central point of control), adaptable, and scalable


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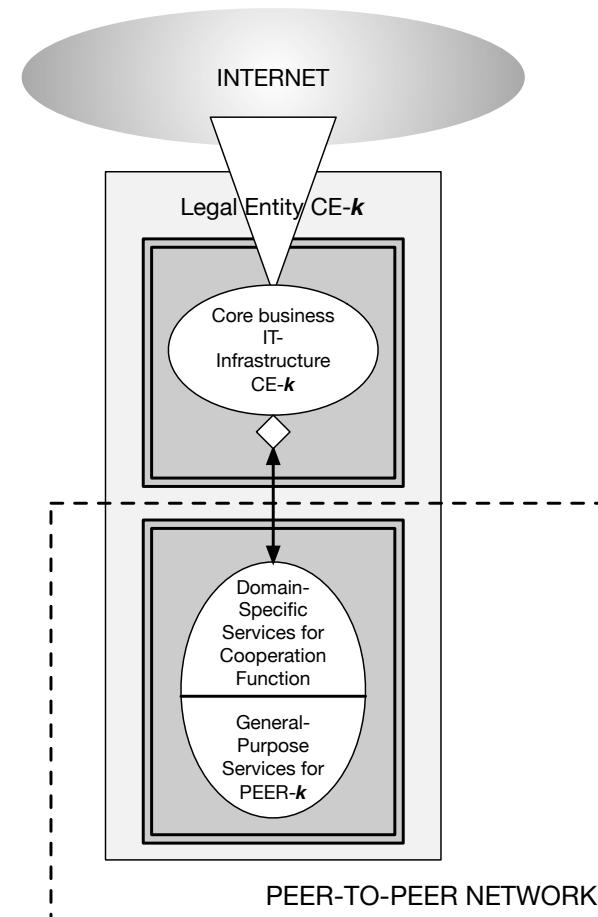
Locus of interaction between peers

Peers *communicate* through one dedicated communication service with an instance operated at each peer.

Interaction is implemented above this service in a stack-wise layered manner.

Implementation:

- middleware implemented in kubernetes
- RPC from core IT over gRPC
- additionally: distributed ledger (HLF) for consensus and order *only if and where necessary* (application dependent)
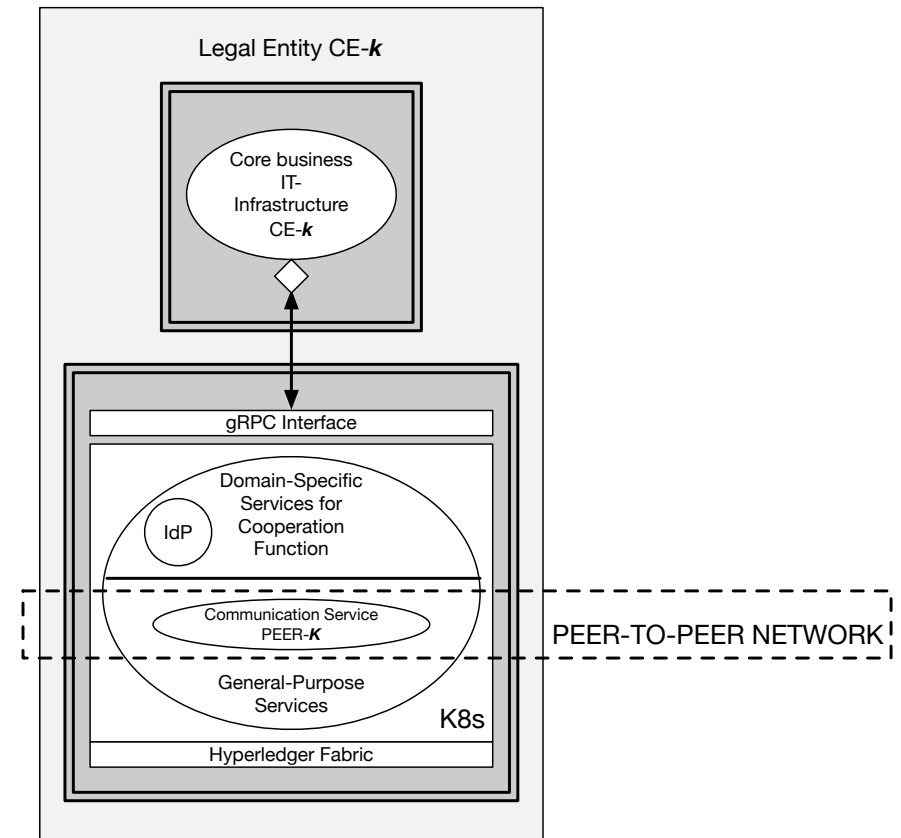
Applications (use cases)

- Sectors with complicated, possibly archaic, logistic structures (milk sector)

- Management of patient medical information in conformity with regulation (GDPR)

- Tightly networked supply chains in industry

- Distributed implementation of sectorial regulatory control

- Commercial banking and distributed stock trading

- Etc…

Conclusion

- IT vendors favour « enterprise architecture » concepts

- Interactions with external entities (over ERP, through webservices) is a master-slave relationship

- Co-opetition requires a peer-to-peer approach that is …

  … transparent and secure (open-source, certification of middleware) …

  … fully distributed …

  … within the limits provided by the laws of distributed systems and consensus, i.e. *qualified majorities may decide* …
  … but each entity is free to participate or not.