

Agenten in Netzwerken

Florian Burka

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Motivation

- Aktuelle Software besteht aus
 - Services
 - Komponenten verschiedener Organisationen
 - Automatischer / Menschlicher Koordination
 - Und ein wenig Adaption
- → Computing as Interaction

Fähigkeiten von Agenten

- Interaktiv
- Kollaborativ
- Autonom
- Lernfähig
- Mobil
- Wahrnehmend

Agenten in der Industrie

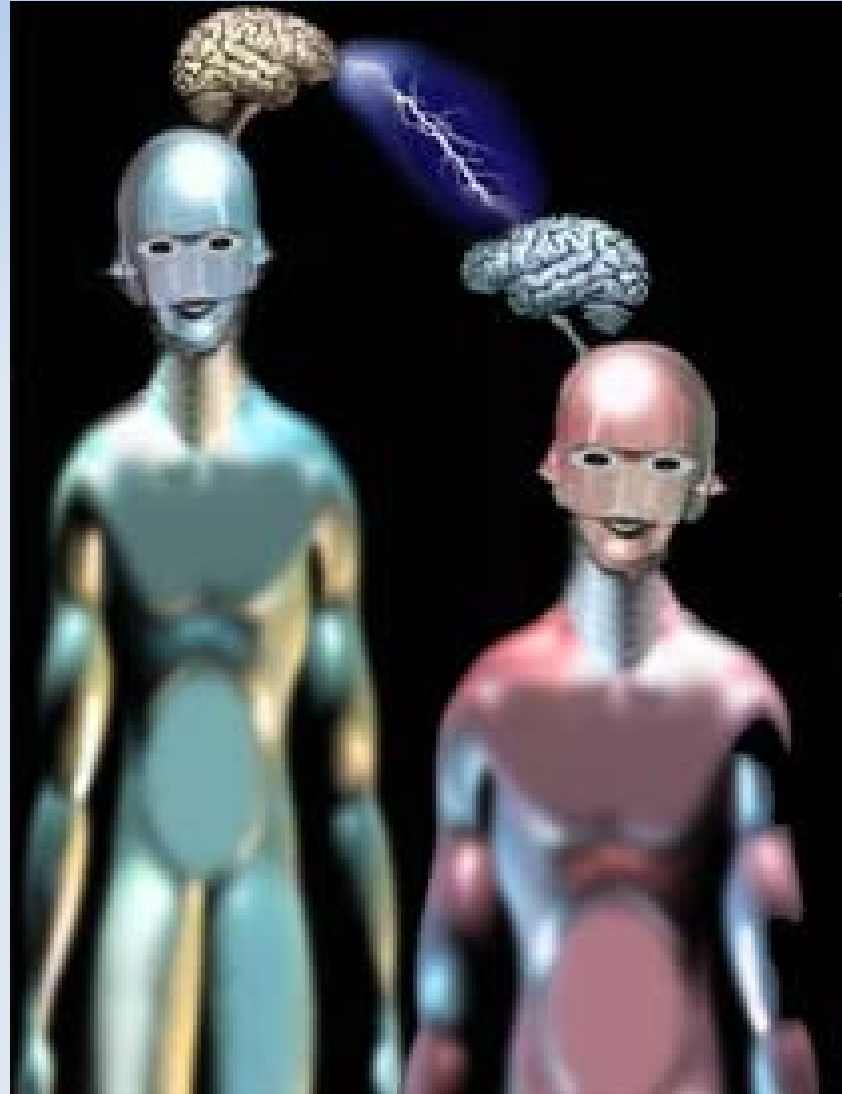


FIPA

- Standardisiert Spezifikationen für heterogene und interagierende Agenten und agentenbasierte Systeme
- IEEE standardisierungs Organisation seit 2005

Frameworks

- JADE
- JACK



JACK

The screenshot displays the JACK software interface, which is used for modeling and simulating systems. The interface is divided into several main sections:

- Project Tree (Left):** A hierarchical view of the project structure. It includes categories like Aircraft, Airport, Feeder, Runway, Capability Types, Plan Types, AssignSlot, FollowApproach, InitialApproach, MonitorAircraft, RequestSlot, RunwayAssign, Documentation, Relevance, Context, Posted Events, Enclosing Interface, Belief Data, Reasoning Method, body, pass, fail, Java, RunwayRequest, Takeoff, TakeoffDiscard, Traffic, Event Types, Named Data, Data Model, Beliefset Types, LandingInfo, RunwayInfo, and Fields.
- Plan Graph (Center):** A graphical representation of a plan. It shows a sequence of actions: an initial state leading to an **if** condition (`runway_info.slotUsed(ev.ATL,ac,eta,booking)`). If true, it executes `System.err.println` and `ev.from, ev.requestla`. If false, it executes `runway_info.add(ev.ATL, ev.aircraft, ev.ETA, ev.booking); System.out.println("Added " + ev.ATL + " " + ev.aircraft + " " + ev.ETA + " " + ev.booking);`. This is followed by a **send** action (`ev.from, ev.confirm(agent.name0, ev.ATL, ev.aircraft0)`) and a final state.
- Design Graph (Right):** A graphical representation of the design. It shows a central **AircraftEvent** node that handles events from **Takeoff** and **RunwayAssign**. **AircraftEvent** sends events to **AssignSlot**, **MonitorAircraft**, **RequestSlot**, and **RunwayRequest**. **AssignSlot** and **RunwayRequest** modify **landing_info (LandingInfo)**. **RequestSlot** modifies **mutex (Semaphore)**. **RunwayRequest** reads **runway_info (RunwayInfo)**. **RunwayAssign** modifies **runway_info (RunwayInfo)**. **Takeoff** sends events to **TakeoffDiscard**.

The interface also includes a menu bar (File, Edit, View, Entity, Trace, Tools, Window, Help), a toolbar with various icons, and a status bar at the bottom showing the current design and plan.

Agenten in Netzwerken

- **Netzwerkbildung durch Agenten**
 - Soziale Netzwerke
 - Teams
- **Netzwerkmanagement durch Agenten**
 - Routing von oder durch Agenten
- **Netzwerknutzung durch Agenten**
 - Monitoring / Sensing

Eigenschaften von Agentennetzwerken

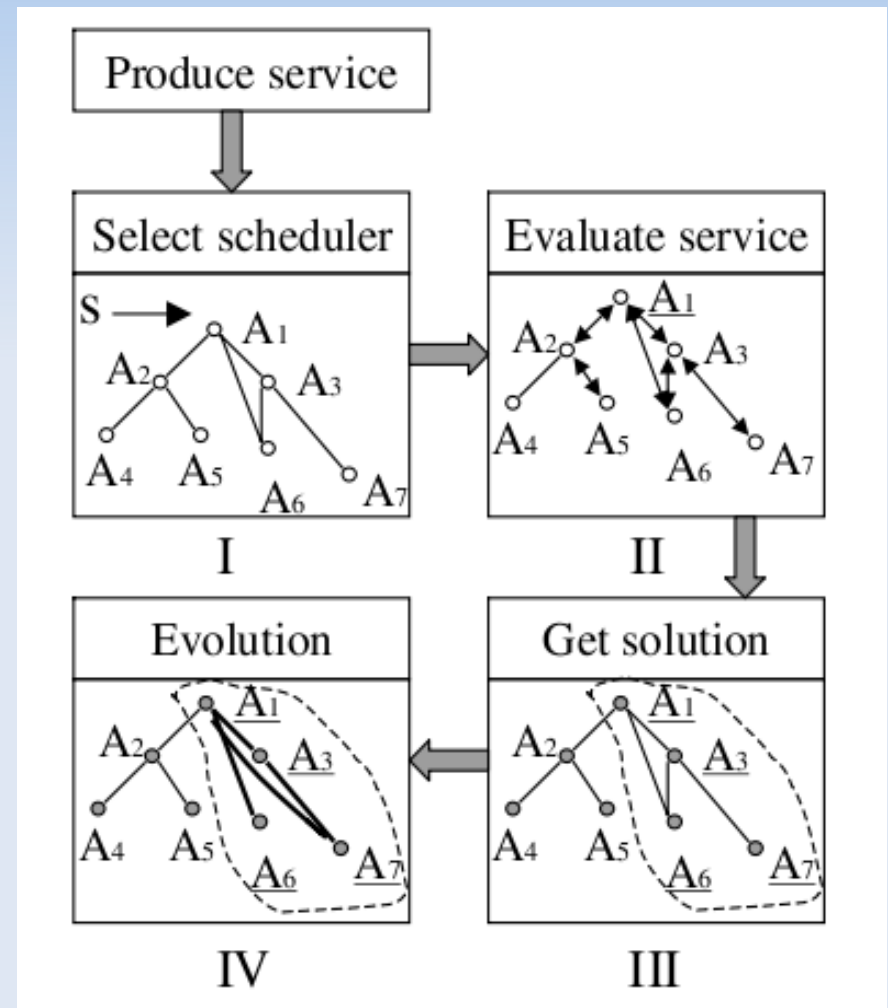
- Small World
- High Clustering
- Scale Free

Fähigkeiten von Agenten in Netzwerken

- Messaging
- Migration
 - Strong: Code, Data, States
 - Weak: Code, Data
- Network Aware
- Ambient Intelligence

Soziale Agentennetzwerke

- Arbeiten gegen Bezahlung
- Ressourcen gegen Bezahlung
- Gemeinschaften

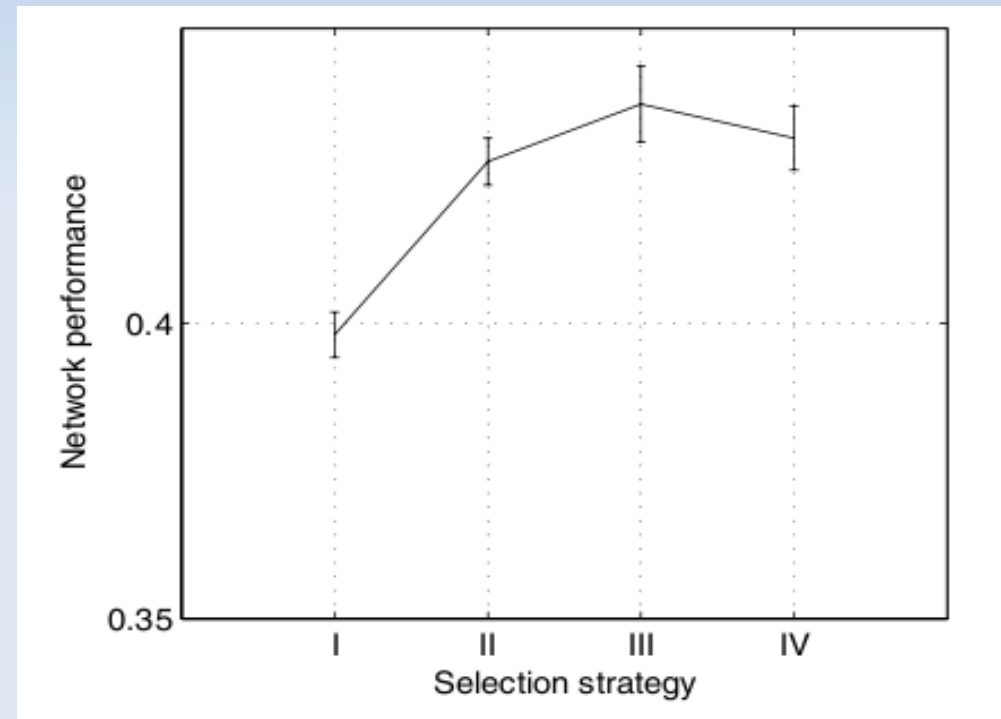


Soziale Agentennetzwerke

- Wissensverbreitung
 - Epidemic propagation
 - Rumor spreading
 - Information searching
- Bewertung der Beziehungen
 - Fähigkeiten
 - Gemeinsamer Profit
 - Kooperationsgrad
 - Partnerschaftsgrad

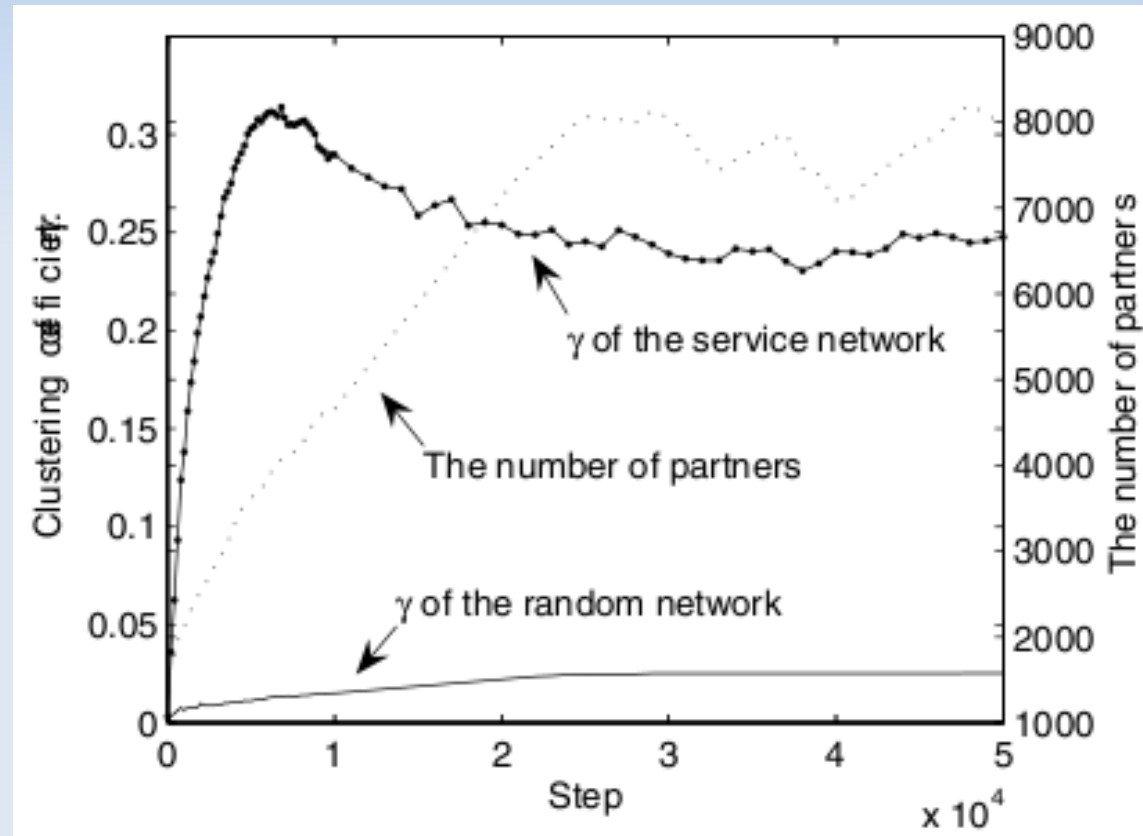
Soziale Agentennetzwerke

- Bevorzugung von Beziehungen anhand des
 - der Fähigkeiten
 - des maximalen gemeinschaftlichen Profits
 - des Kooperationsgrades
 - des Partnerschaftsgrades



Gemeinschaftsbildung

- Clustering in Sozialen Netzen sehr hoch

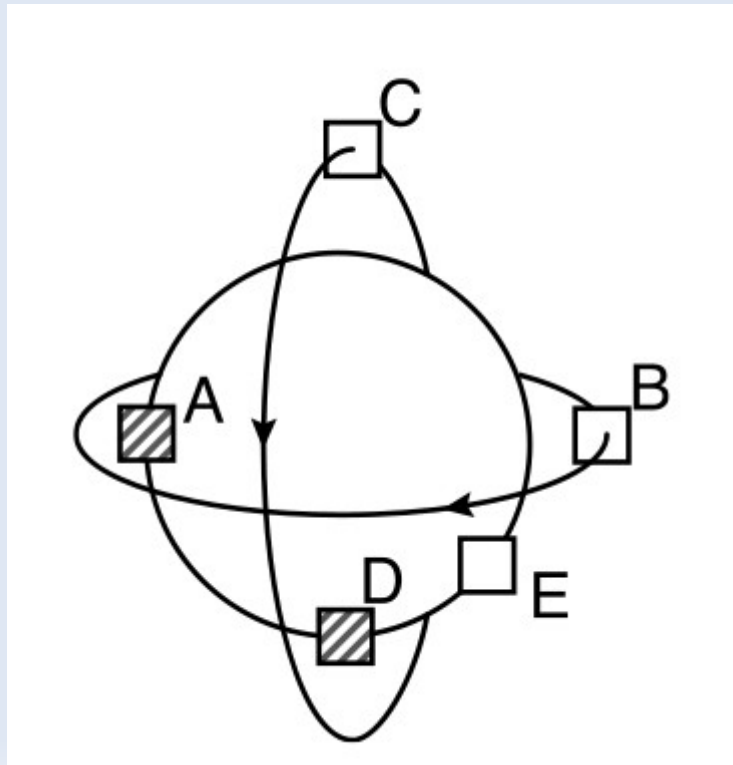


Agentennetzwerke

- Netzbildung durch Agenten
 - Als Paketvermittler
 - Als Paket

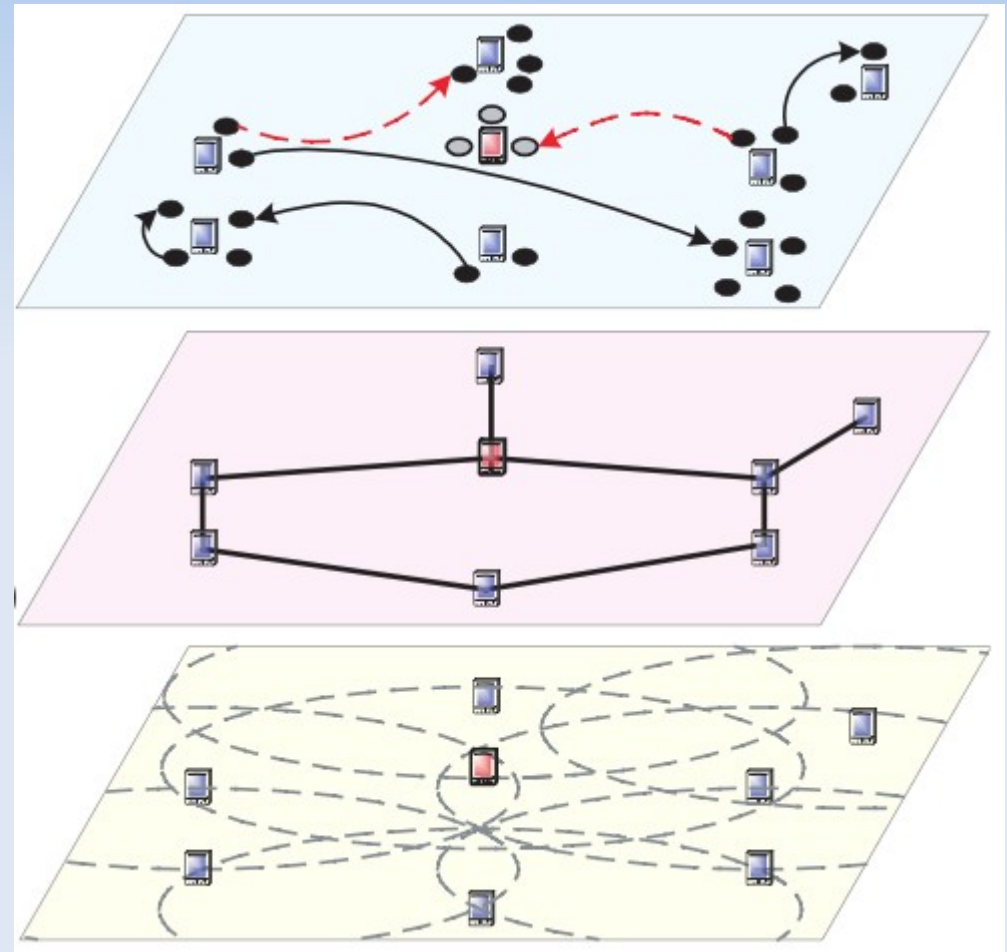
Agenten als Postboten

- Ob Interplanetar oder MANET
 - Unsichere Konnektivität
 - Netzwerkschicht löst diese Probleme nicht



Agenten als Router

- Agenten routen Pakete
- Agenten reisen umher und optimieren adaptiv die Routen



Vorteile

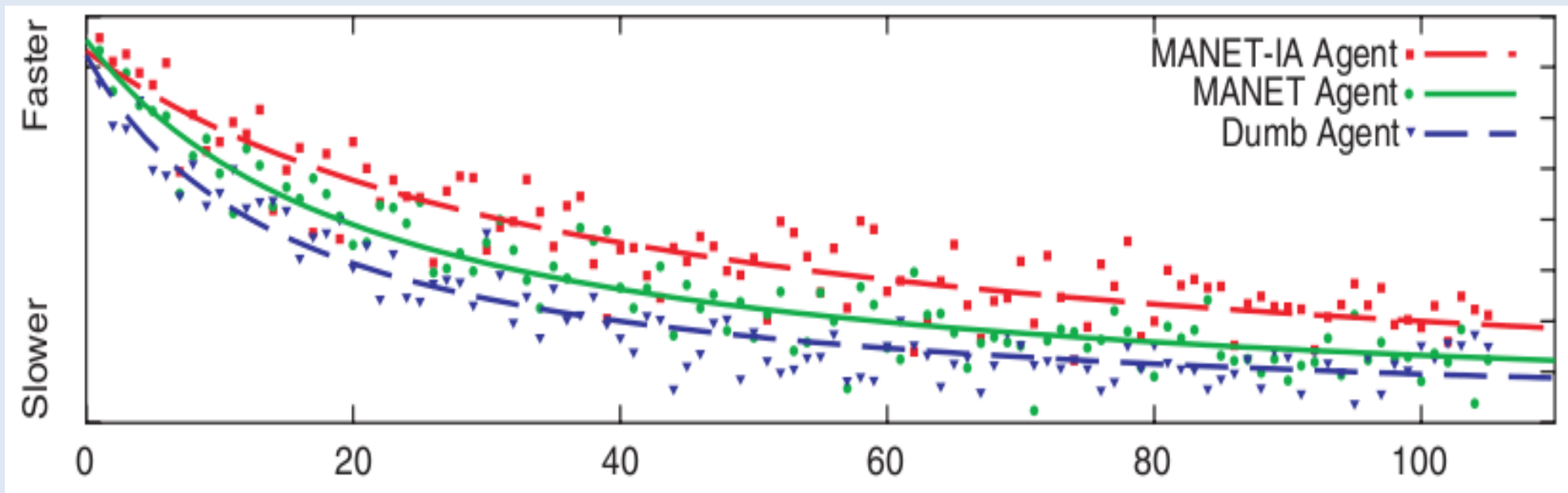
- Robustheit
- Skalierbarkeit
- Adaptionstfähigkeit
- Verfügbarkeit
- Kostenreduzierung

Software

- Sensornetzwerke
- Netzwerkmanagement
- Service Orchestration

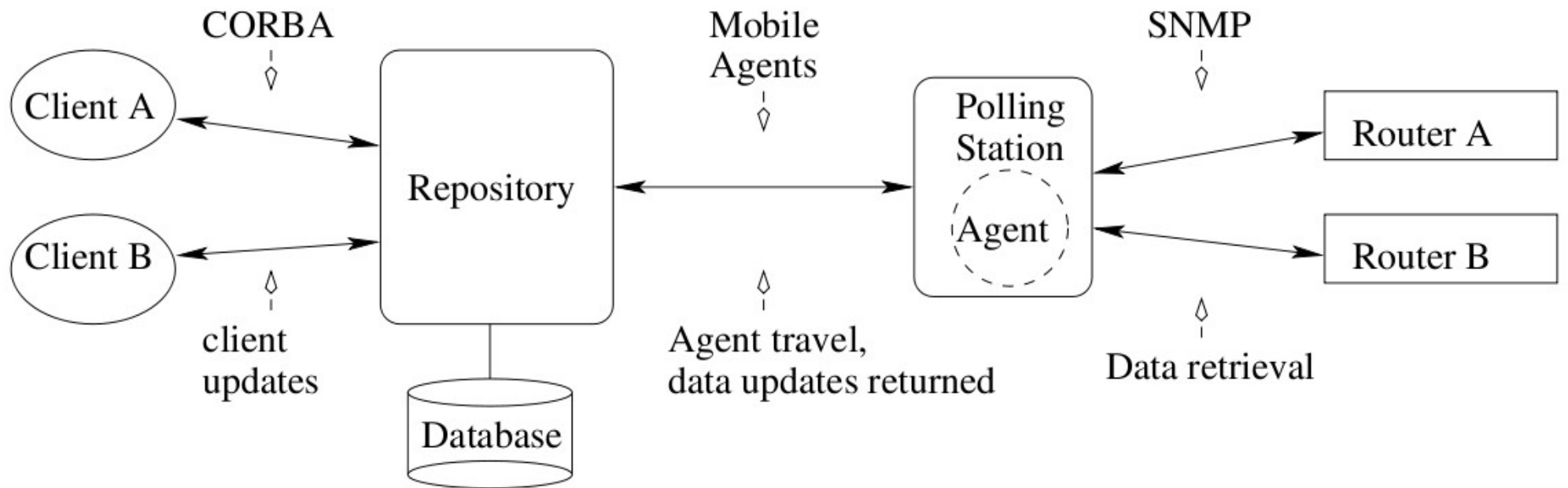
Sensornetzwerke

- Intelligente Agenten in fehlerbehafteten Sensornetzwerken



Netzwerkmanagement

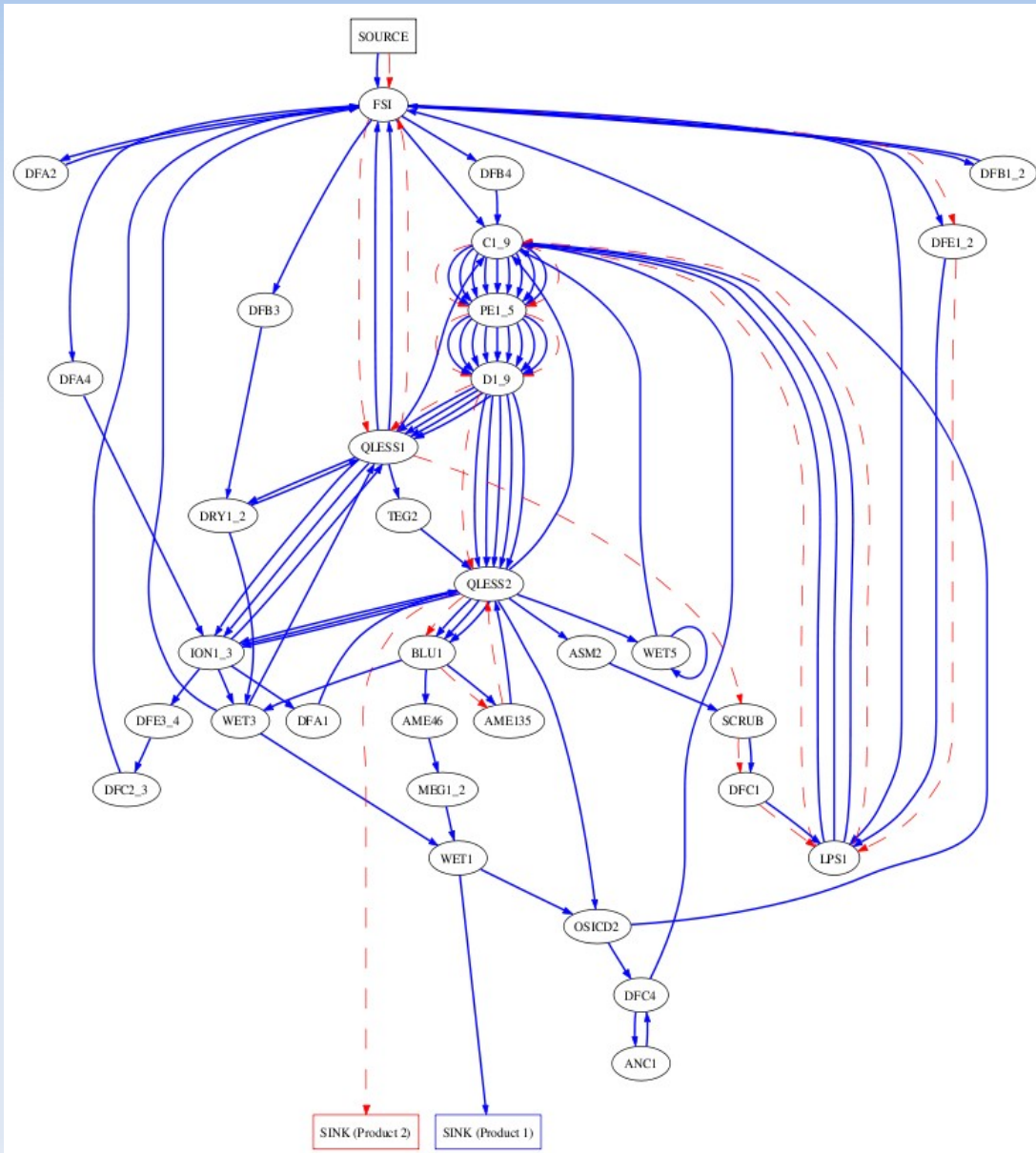
- DOORS



Netzwerkmanagement - IDS

- IDS
 - Widerstandsfähigkeit
 - Angriffsmuster Erkennung
 - Wiederherstellung
 - Kein zentraler Angriffspunkt

Agenten in Fabrikstraßen

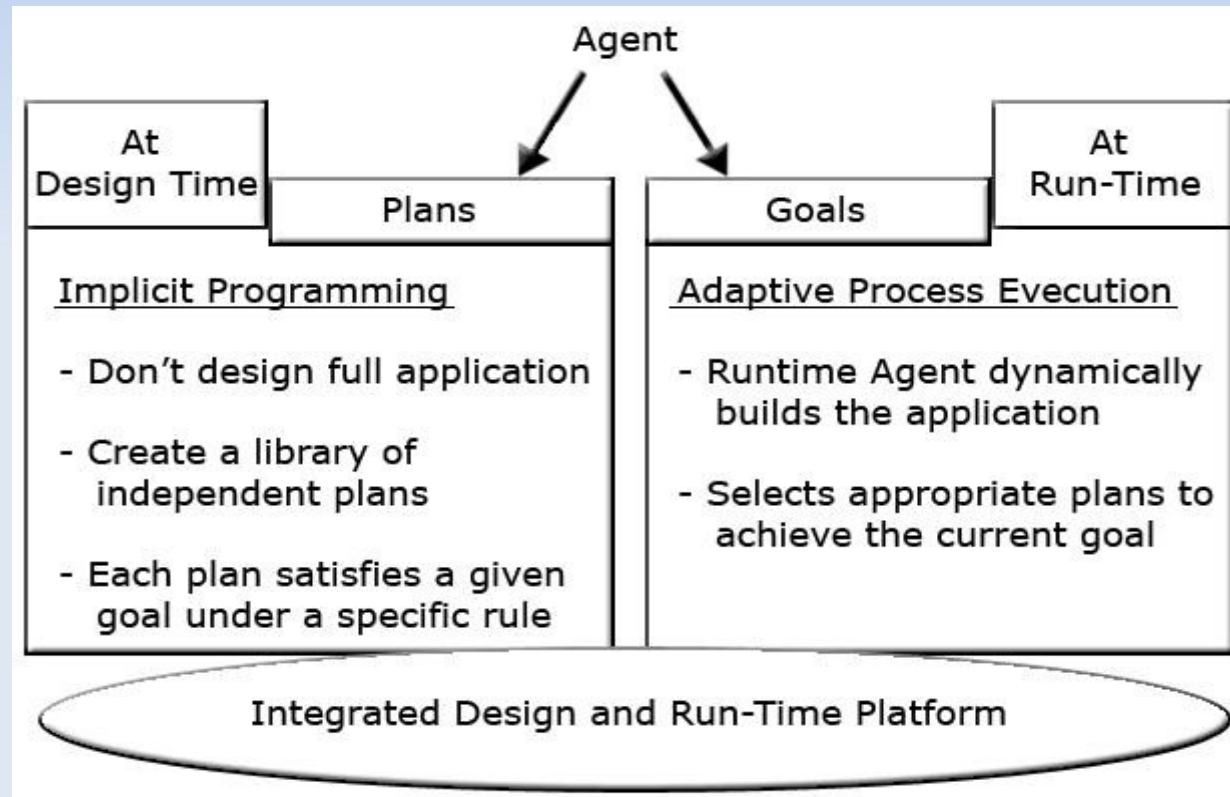


- CABS –
Coordination for
Avoiding
Bottleneck
Starvation

Agentcities

- Das Internet bietet
 - Standards
 - Open Source
 - Open Access
 - Shared Resources
- Und für die Agenten brauchen wir dazu
 - FIPA compatible Agentenserver
 - Ontologie Services
 - Verzeichnisdienste
 - Gateways

SOA Service Orchestration with BDI Agents

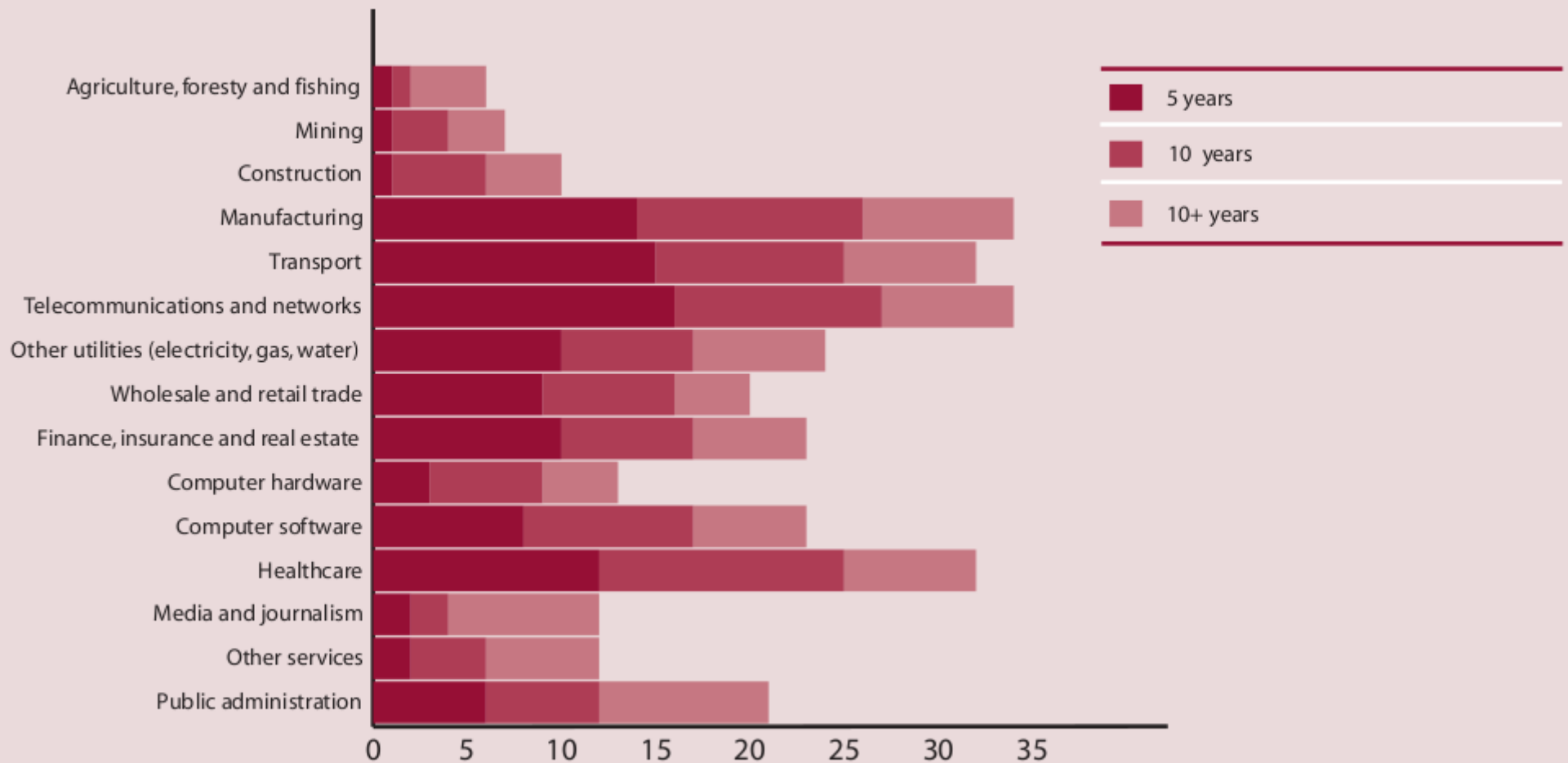


SOA Service Orchestration with BDI Agents

- GDO will remove the roadblock of service orchestration, allowing SOAs to realize their potential, giving business faster time-to-market times, greater ROI, and demonstrable value from SOA initiatives.

Verbreitung von Agententechnologie

Figure 6.1: Manufacturing, transport, telecoms and healthcare will encourage agent deployment



Fazit

An Multi-Agent-System enhances overall system performance, specifically along the dimensions of computational efficiency, reliability, extensibility, robustness, maintainability, responsiveness, flexibility, and reuse.

[<http://www.cs.cmu.edu/~softagents/multi.html>]

Quellen

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- Agentcities: A Worldwide Open Agent Network [Willmott, Dale, Burg, Charlton, O'Brien -]

Agenten in der HAW

- Semantik durch Agentennetzwerke
- iFlat – Interaktion und Informationen dezentralisieren
- Ambient Assisted Living

Fragen?

Anmerkungen?

**Vielen Dank für Ihre
Aufmerksamkeit**

Shut up, he glyphs at his unruly herd of agents;
I can't even hear myself think!

[Stokes – Accelerando 2005]