

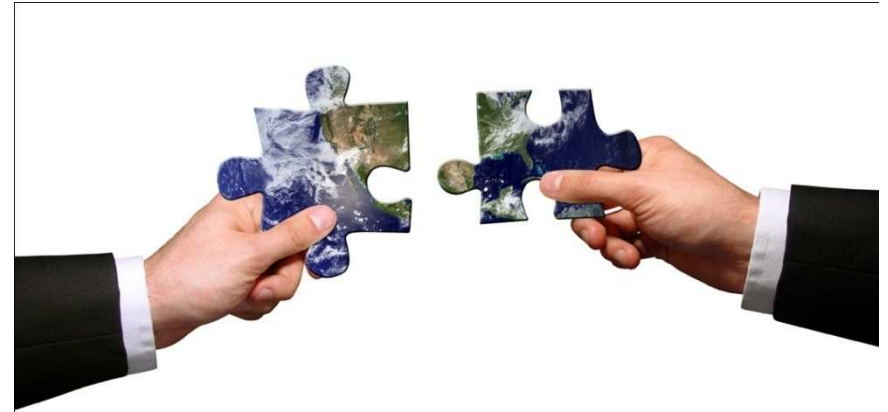
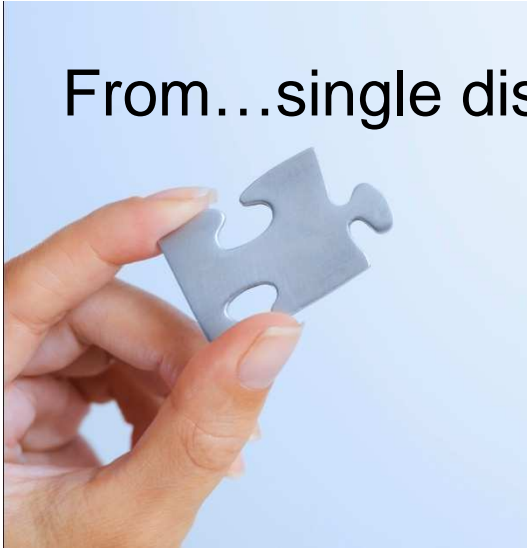
Services on Demand

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Services need holistic, multi-discipline thinking...

From...single discipline



To...complementary knowledge and expertise



To...seeing the whole picture

The Centre for Service Research:

Supports organisations in their service provisioning to help them succeed in:

- Strategy and Innovation.
- Design, control and improve service.
- Develop an holistic view of services.
- Deliver services more effectively and efficiently.



Via

- Service Innovation
- Service Marketing
- Service Operations
- Service System Design
- Socio-technical Design
- Emerging Service Skills
- Information Management
- Service Provision/Sectors

Charting the service landscape

A service can be generated and supplied in different ways

- Human to Human
- IT - Human Interaction
- IT to IT

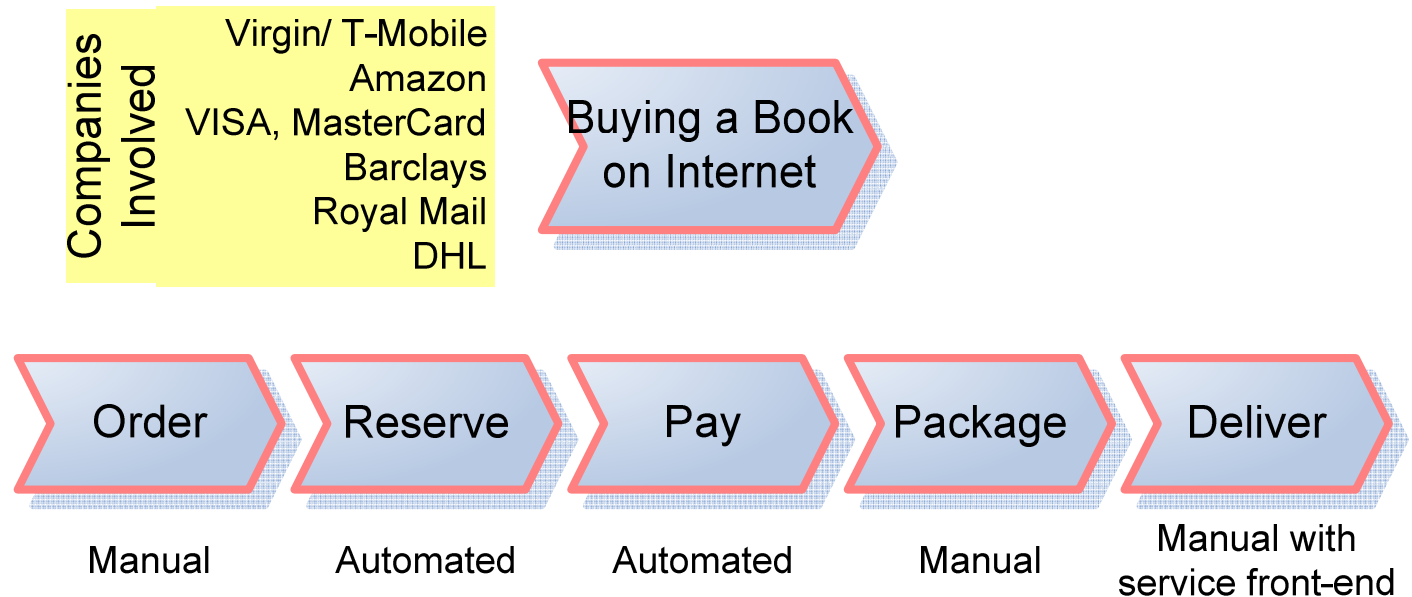


People, physical artefacts or symbols can be transformed by service processes

What about software services?

The difference is no longer clear-cut:

Imagine an iPhone App providing a “purchase book” service



This overlap provides focal themes for the Centre for Service Research

- Using IT to Design Innovative Services
- Designing Better Software using ideas from Org. Services

It all started back in 1995...

DiCE

(BT + the Pennine Group)

The Future of Software:

1. How will software be used?
2. How will software behave?
3. How will software be developed?



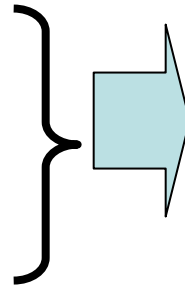
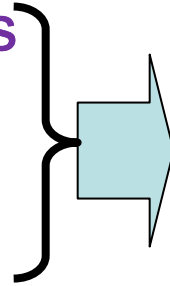
Key needs are for:

- Meeting **necessary & sufficient requirements**
- **Personalisation**
- **Self-adaptation**
- Software that is **fine-grained**, linked by rich communication structures
- **Transparent** operation

Software as a Service - the vision:

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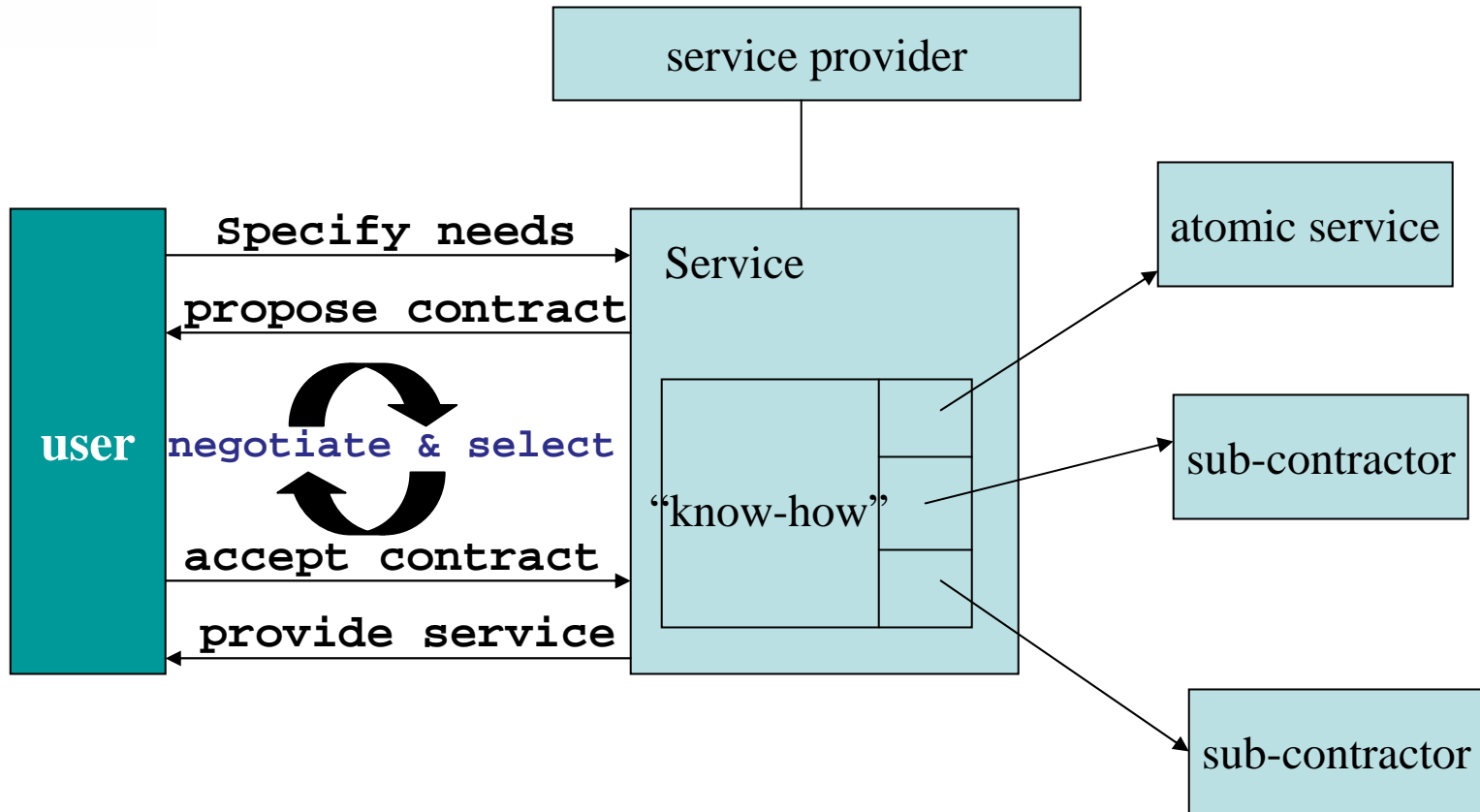
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Met by services that:

- Are configured to meet a specific set of **needs at a point in time**, executed and disengaged (bind once, execute once)
- Are composed out of smaller ones, procured and paid for **on demand**

Generic Service Provision Model (2002)



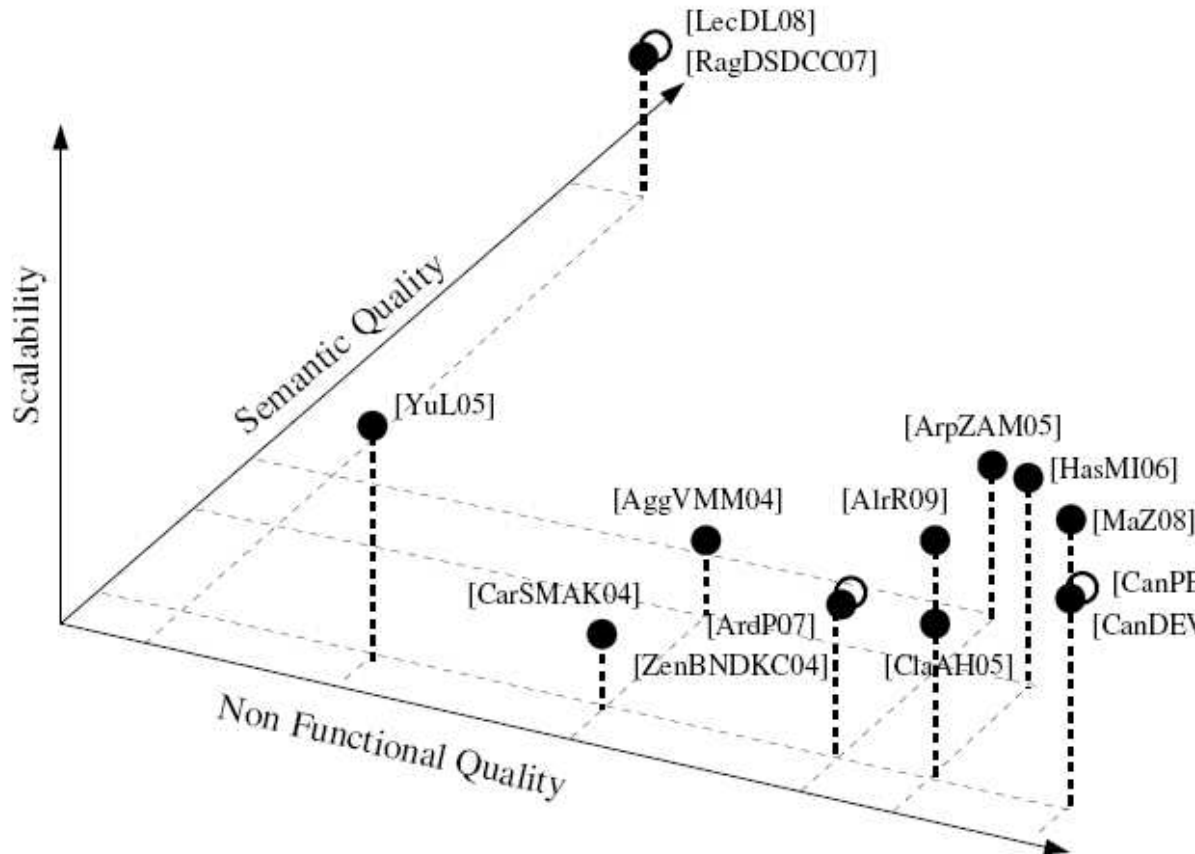
Consequences from the model

1. No need for maintenance – always binds the latest
 - But we need
 - Ultra-late binding
 - User-oriented requirements specification tools
2. What is the *overall quality* of the solution delivered to you?
3. Link with MAS– *role of “intelligent” agents*
4. Business-based model – borrow ideas from VO formation
 - “Hiding behind the contract” delegation leads to increased transaction costs
 - *Adaptation of supplier ecosystems*

Optimising overall quality

Most of State-of-the-Art approaches focus on optimization w.r.t:

- Either functional qualities(semantic connections);
- Or Quality of Service (QoS)



[AggVMM04] R.Aggarwal, K.Verma, J.A. Miller and W.Milnor. Constraint Driven Web Service Composition in METEOR-S. In Proceeding of International Conference on Services Computing, 2004, pages 23–30, 2004.

[AlrR09] M.Alrifai and T.Risse. Combining global optimization with local selection for efficient QoS-aware service composition. In Proceeding of World Wide Web, pages 881-890, 2009.

[ArpZAM05] I.B.Arpinar, R.Zhang, B.Aleman-Meza, and A.Maduko. Ontology-driven web services composition platform. Inf. Syst. EBusiness Management, 3(2):175–199, 2005.

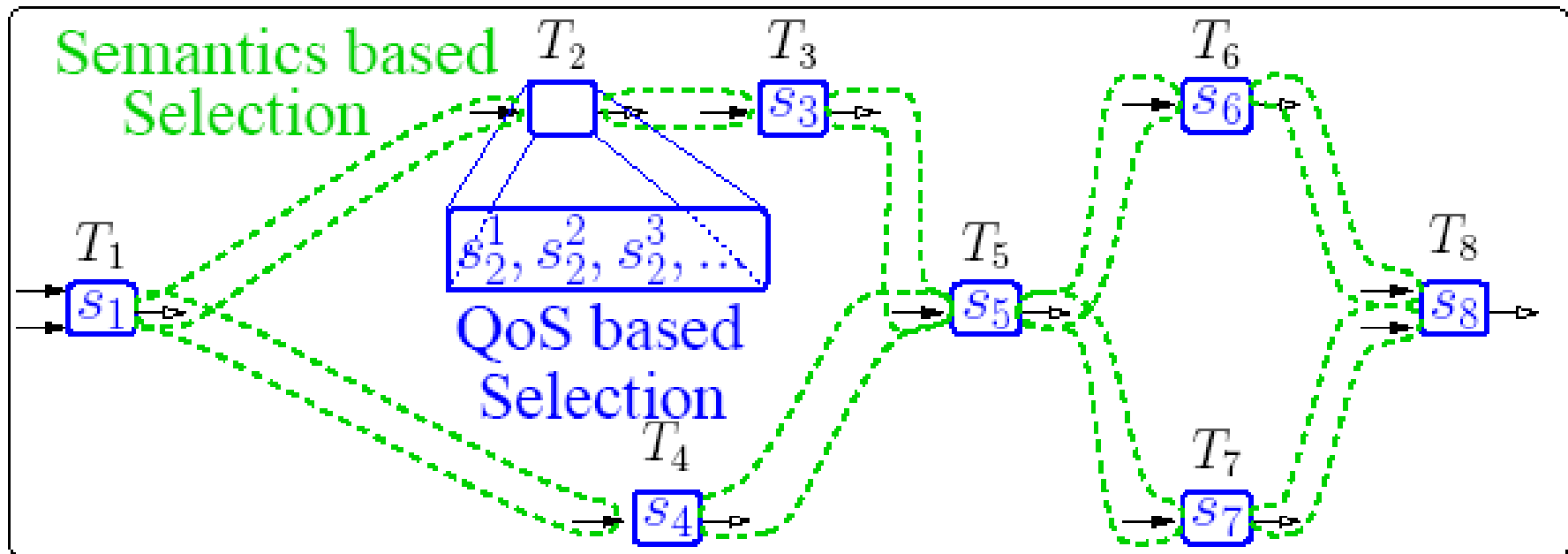
[CanDEV08] G.Canfora and M.Di Penta and R.Esposito and M.L.Villani. A framework for QoS-aware binding and rebinding of composite web services In Journal of Systems and Software, 81(10):1754-1769, 2008.

[ZenBNDKC04] L.Zeng, B.Benatallah, A.H. H. Ngu, M.Dumas, J.Kalagnanam, and H.Chang. QoS-aware middleware for web services composition. IEEE Trans. Software Eng., 30(5):311–327, 2004.

Optimising overall quality (cont.)

A Composition Optimization component should address:

- Optimization of (any) service composition;
- with respect to both QoS and functional qualities.



The Need for a Holistic Approach

Combining both the non-functional qualities (also known as QoS) of the composition, and the quality of semantic fit between services (i.e., data flow) aims to consider:

- both the user perspective to desired qualities (e.g., price, availability),
- and the composition perspective of costs involved in inter-service alignment within the composition. This metric is required to estimate the effort required to ensure seamless compositions;

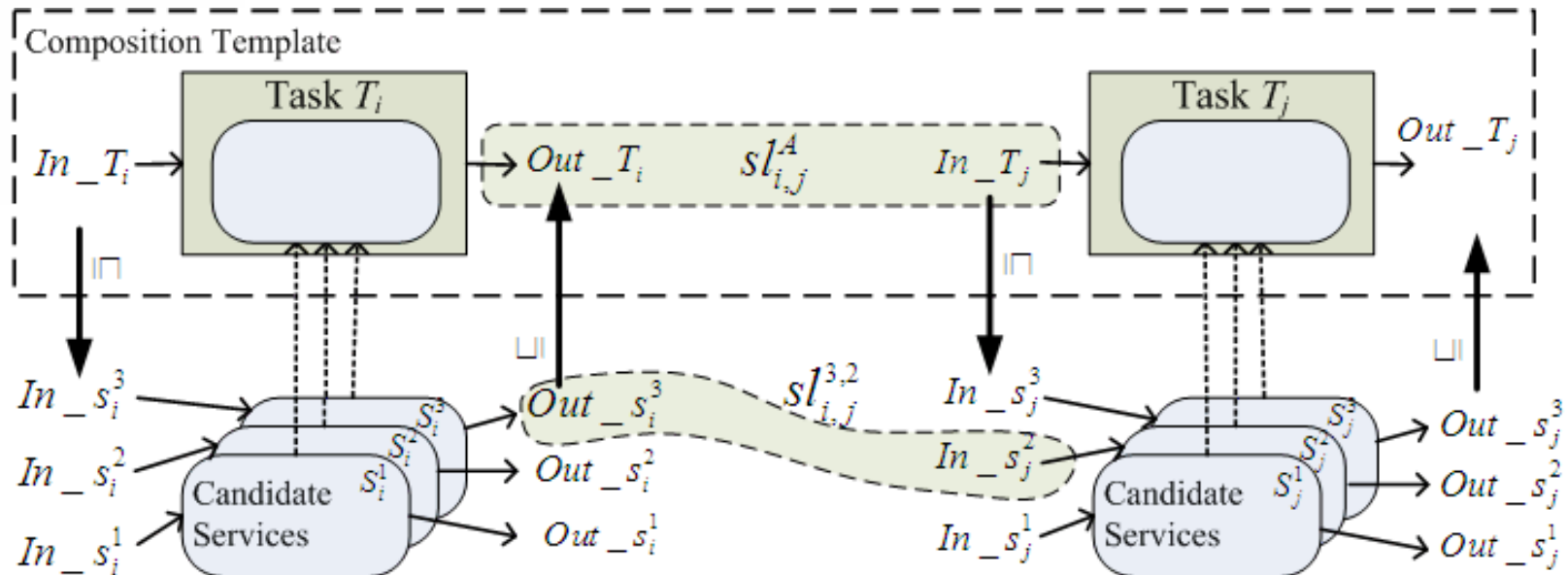
The Role of “Intelligent Agents”

Current Role of Service Providers in Service Composition

- Currently these are only found in service quality and contracts.
- This position is justified for small and cheap services,
- but is sub-optimal when considering complex and evolving assemblies.

Agents: Service Providers and a Service Composer

- The Service Composer selects or creates a Composition Template and advertises it on a notice-board
- Service Providers watch the notice-boards of interest and bid to provide services which instantiate tasks from the composition template
- The aim is to negotiate optimal quality of semantic connections between services

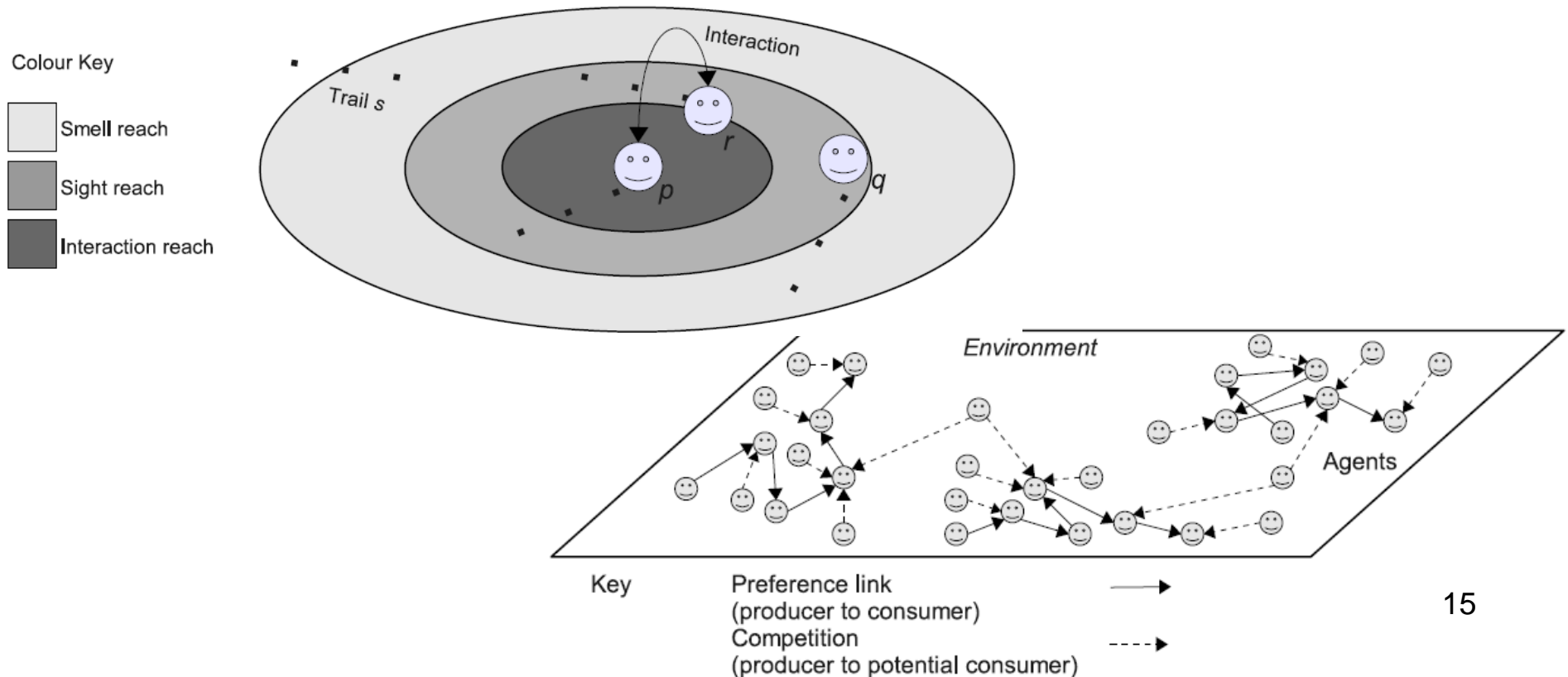


A composer agent instantiates three-phase negotiation protocol with the set of eligible “service provider agents”:

- 1st phase is “for free”, using differences in specifications between a task and its candidate services.
- 2nd phase presumes additional services (and usage fees) are needed but no modifications.
- 3rd phase assumes adapting services against payment.

Adaptation of supplier ecosystems

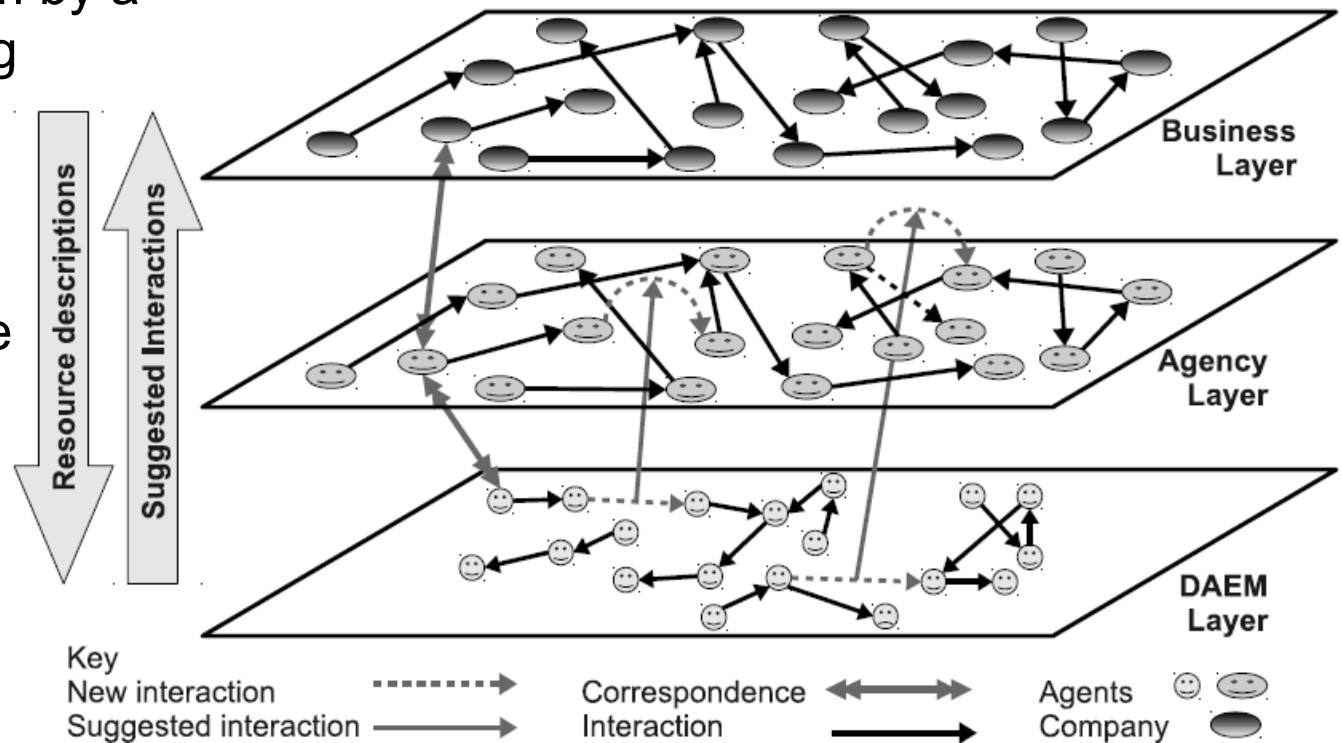
- Services are seen as resources within an ecosystem
- Service suppliers (cf producers) and consumers are mapped to a virtual environment where the ecosystem dynamics are played out



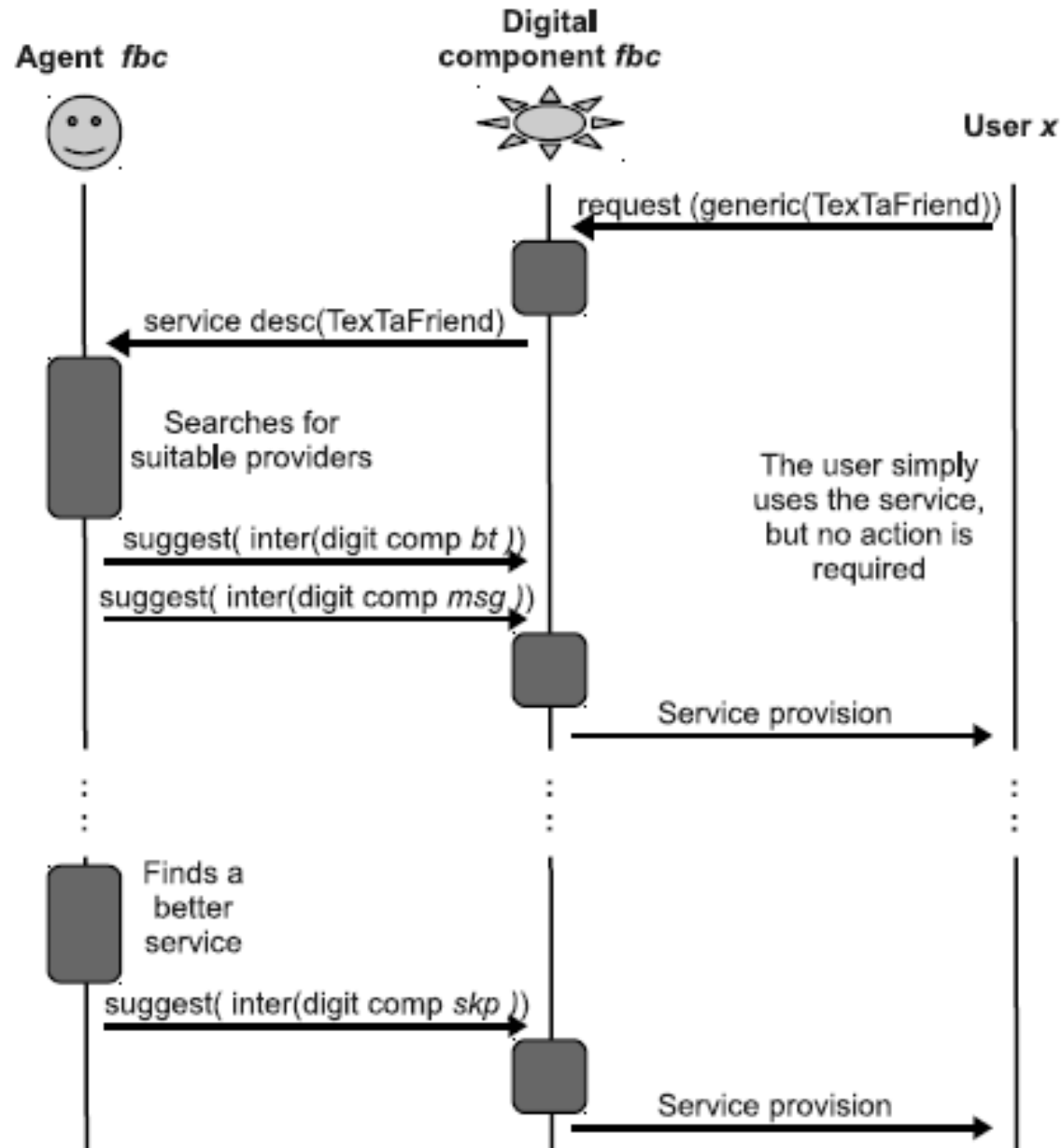
Relationship between layers

The ecosystem layer supports the service layer

- Service descriptions and updates are sent to the ecosystem layer
- Disturbances and changes are detected there, and the ecosystem dynamically adapts to them by a self-organising mechanism
- Interaction suggestions are sent to the supported service layer



Better services are incorporated seamlessly



The Centre for Service Research

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In conclusion,

Blurring the boundaries between software services and the “conventional” ones (the “software as a service” vision) can bring about many interesting and fruitful ideas, showing examples of research systems applied to adaptation and optimisation.

Thank you for listening
Questions are welcome