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Extracting and Facilitating Architecture in Service-Oriented Software Systems

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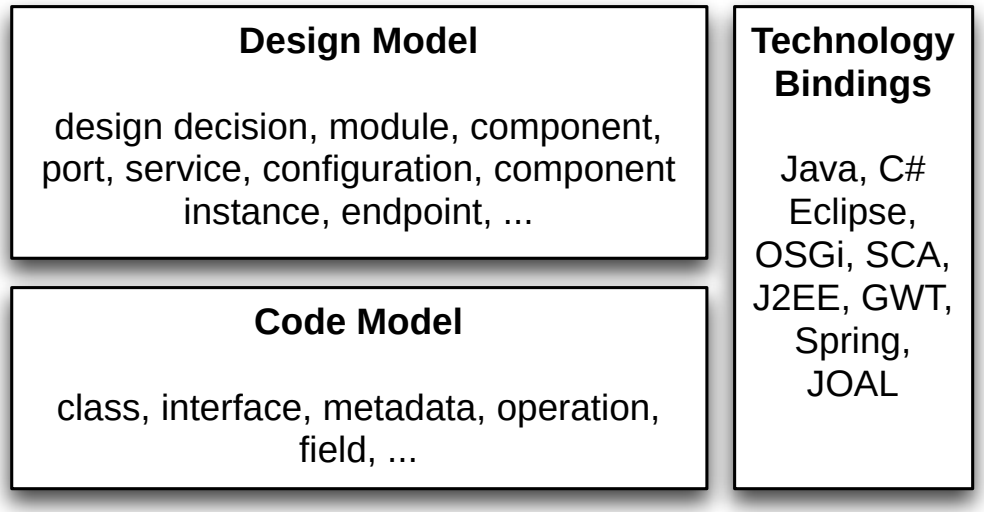
Context

- SOA in the banking domain
  - SOA systems based on Java EE, Web Services, host transactions (CICS), .NET
  - Service development and operation is governed by a service lifecycle
  - Service information is managed in service registries/repositories
  - Stakeholders needing architectural information for SOA management activities
- Problems
  - SOA information managed in different locations and tools
  - Manual maintenance of SOA information
  - Architecture documentation out of date
  - Manual reconstruction from implementation

LISA Model

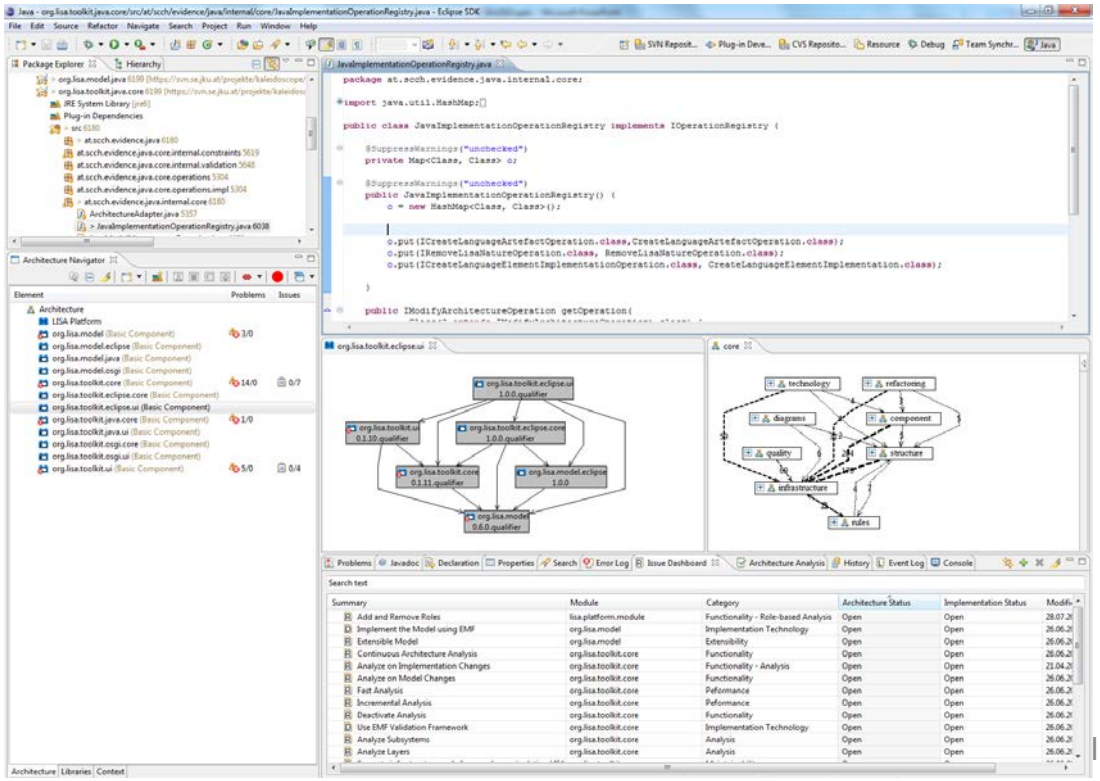
- Provides concepts similar to ADLs (e.g., xADL)
- Includes code model similar to AMTs
- Can be bound to different implementation technologies
- Support for AKM and variability management



LISA Core Models

LISA Toolkit

- Based on LISA Model, integrated in Eclipse IDE
- Views, editors, analysis, continuous synchronization of architecture and implementation



SOA Characteristics and Support

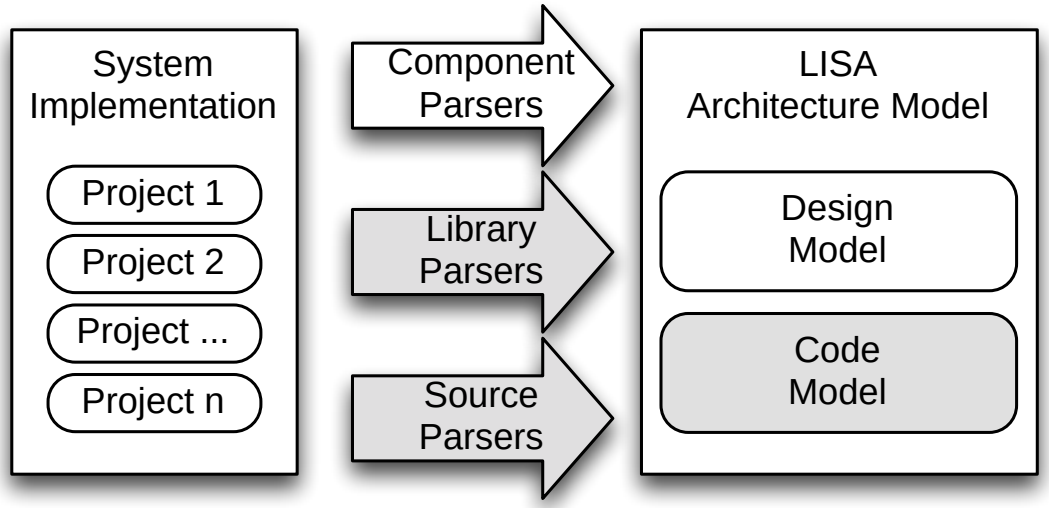
- SOA
  - System of Systems (SoS)
  - Different implementation and access technologies (heterogeneity)
  - Different administrative domains
  - Decoupled subsystems
  - Evolution through reconfiguration and adaptation of subsystems
  - ...
- SOA support in LISA
  - High-level architectural concepts, support for run-time configurations
  - Bindings to different technologies within one architecture model
  - Support for distributing and combining architecture descriptions from different subsystems and administrative domains

Aims

- Provide architectural information that is consistent and up-to-date
  - Automatically extract architecture
  - Synchronize with EA and SOA management tools
- Support architecture reviews, design and evolution
  - Provide support for architecture visualization, browsing, and review
- Extend and validate LISA approach for supporting SOA-based software systems

Architecture Extraction

- Different parsers, extract and map to LISA models
- Differ in information source, supported abstraction level, supported technology
- Incremental extraction



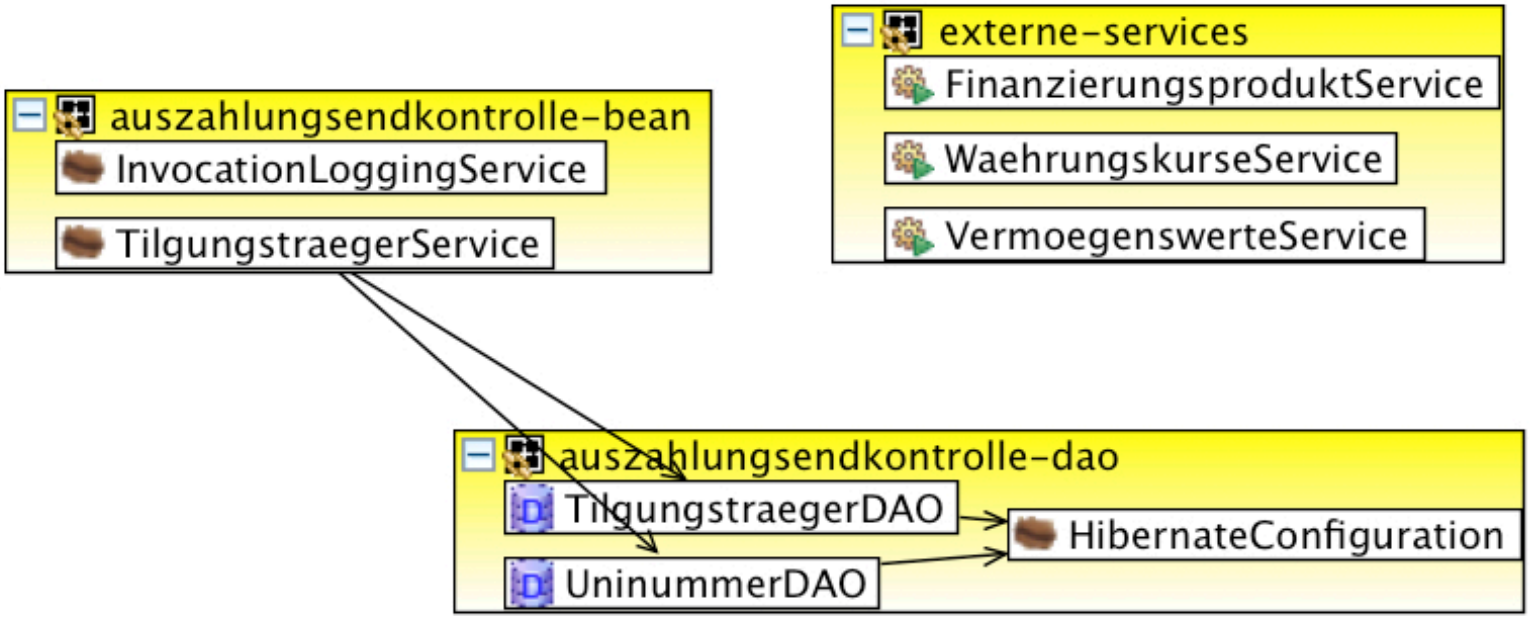
Example: XML-Service Configuration

1. Create component (and service) definitions
   - Component types
     - Java Bean
     - CICS
     - DAO
     - HAO
   - Protocol bindings
     - Web Services
     - EJB/IIOP

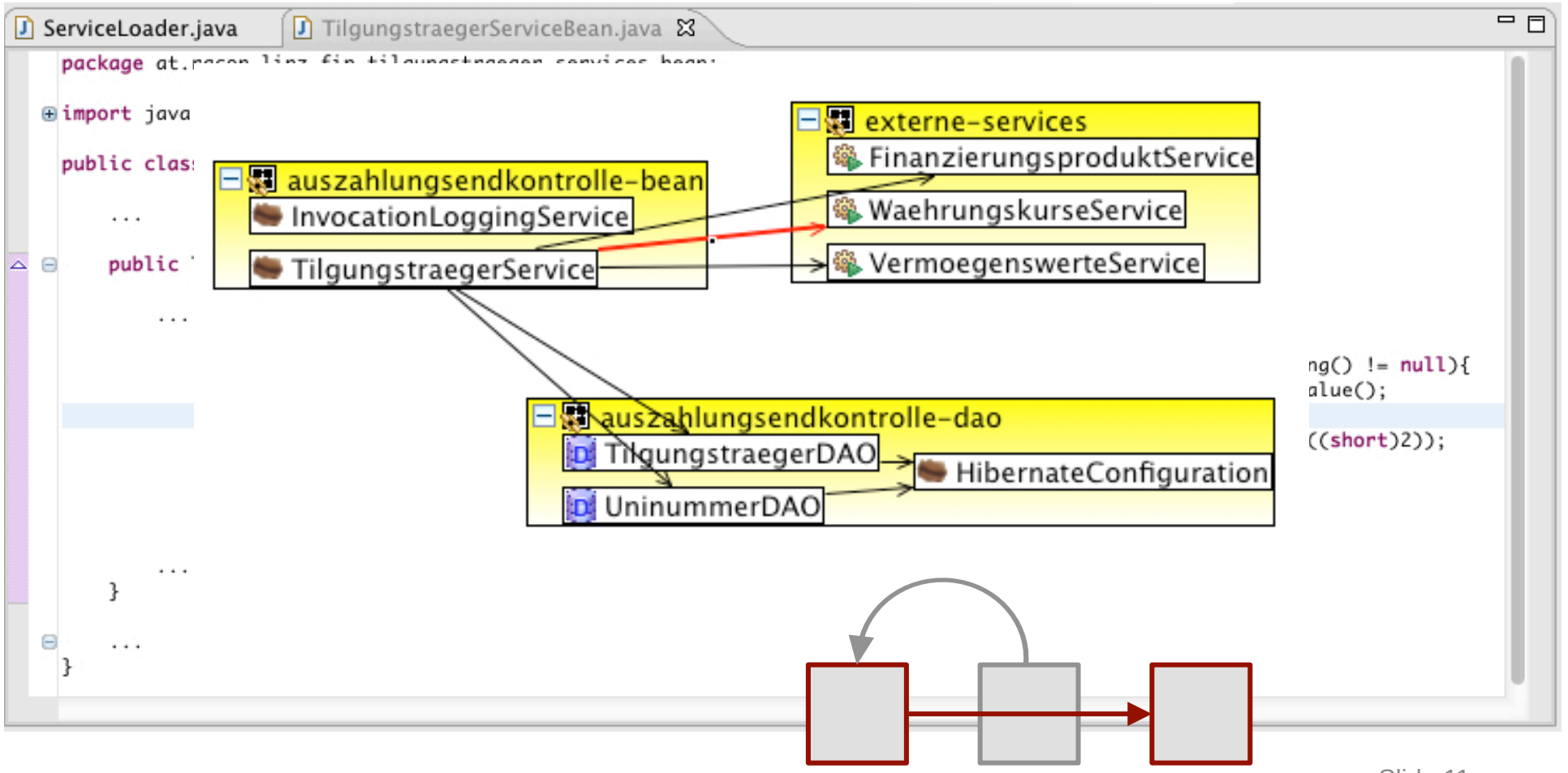
```
<joal:service>
    <joal:service-name>TilgungstraegerService</joal:service-name>
    <joal:service-type>JavaBean</joal:service-type>
    <bean:binding>
        <bean:service-interface>[redacted]tilgungstraeger.se
                                .TilgungstraegerService</bean:se
        <bean:service-implementation>[redacted]tilgungstraeg
                                .bean.TilgungstraegerServiceBean
        <bean:reference name="tilgungstraegerDAO">TilgungstraegerDAO
        <bean:reference name="uninummerDAO">UninummerDAO</bean:refer
    </bean:binding>
</joal:service>
```

2. Create configurations
   - Service and component instances
3. Create connections

Example: Resulting Configuration



Example: Extract connections from code



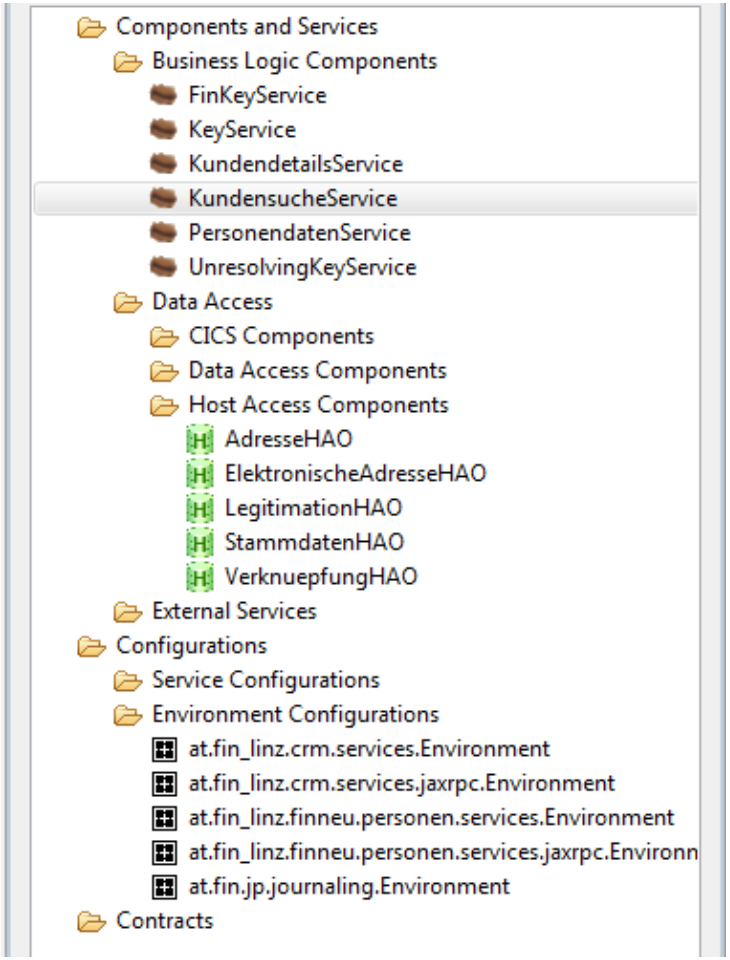
Stakeholders

- Software architect
  - Establish company-wide reference architectures and standards, ensure conformance to these standards
  - Interested in system overview and standards conformance
- Solution architect
  - Design and evolve a specific solution within a SOA over time
  - Requires more detailed information used for future design activities
- Application and component designer
  - Detailed component and interface design
  - Requires information on design of internal services
  - Is responsible for managing information in service registries

Typical questions

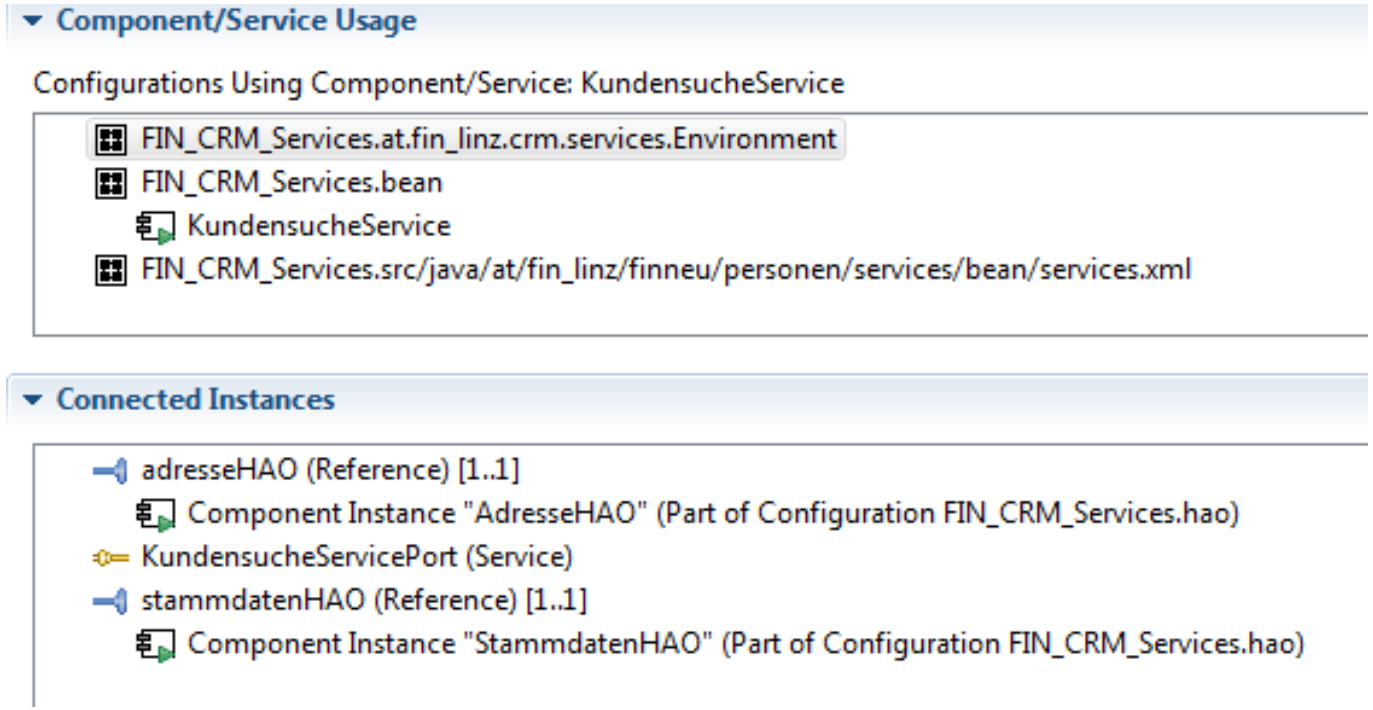
- System overview
  - Available services
  - System configuration
- Detailed analysis
  - Service relationships
  - Host transactions
  - Conformance to reference architectures

Available Services

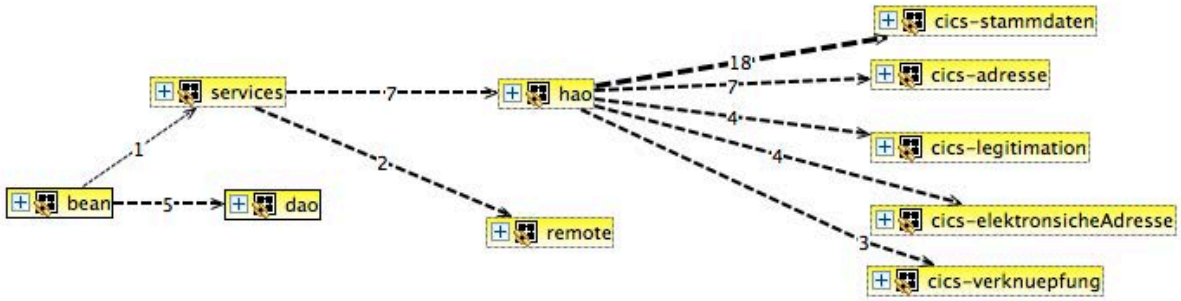


- External Services
- Components
  - BLOs
  - CICS
  - HAOs
  - DAOs
- Configurations

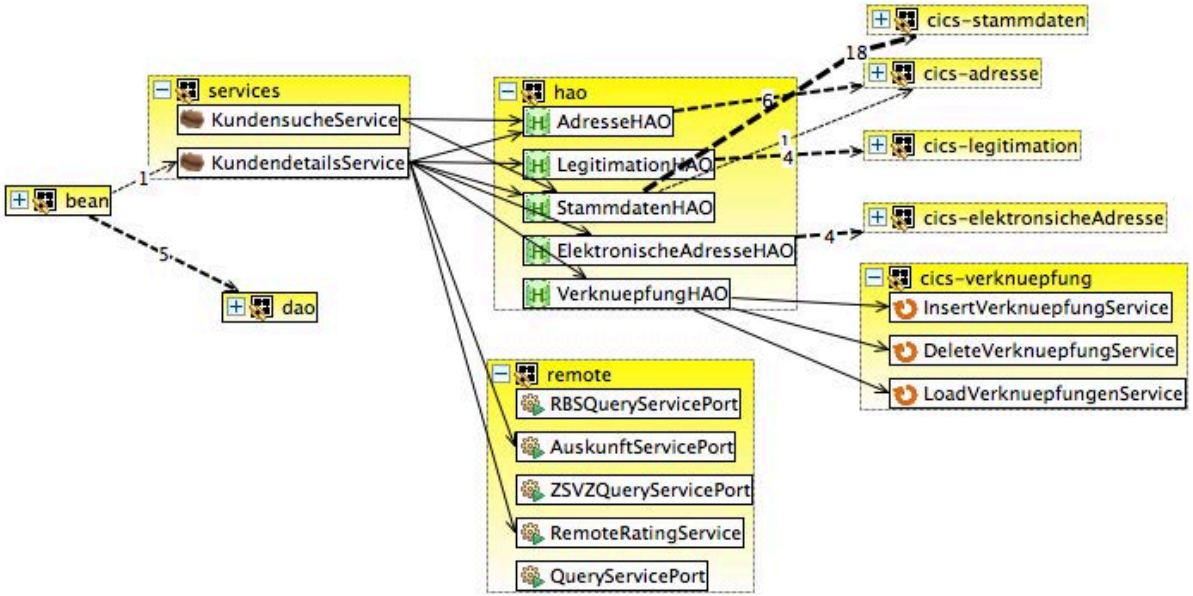
Component/Service Usage



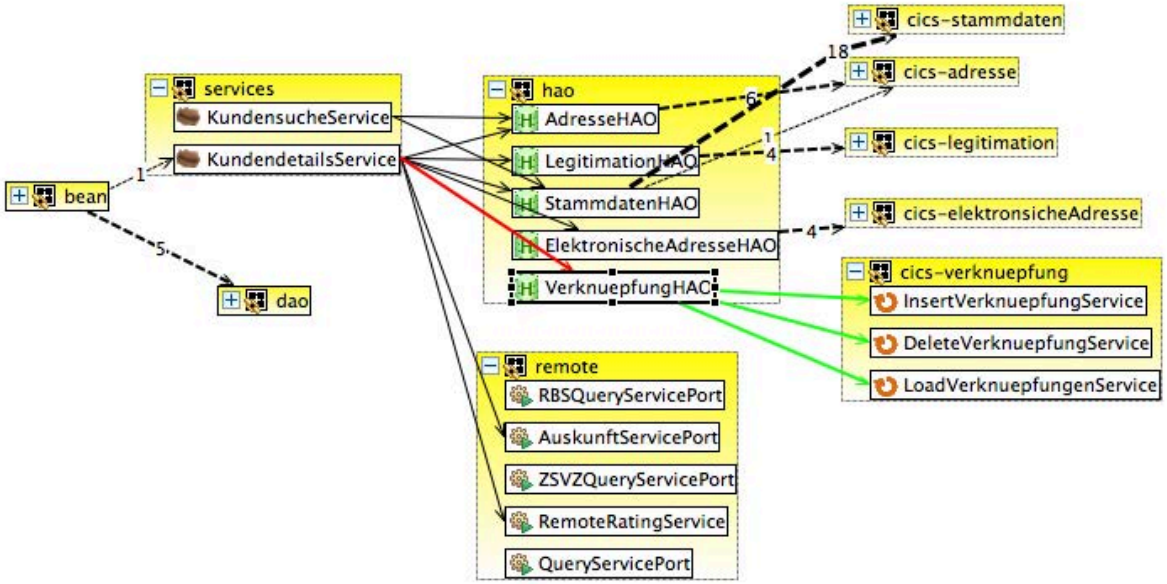
System Configuration – Overview (1)



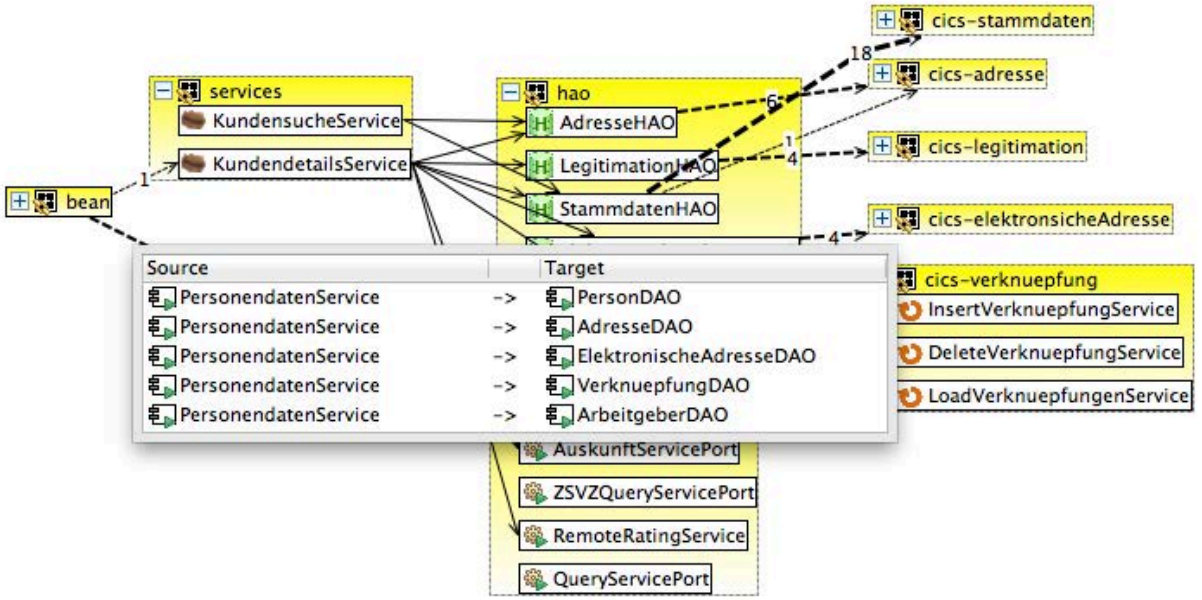
System Configuration – Overview (2)



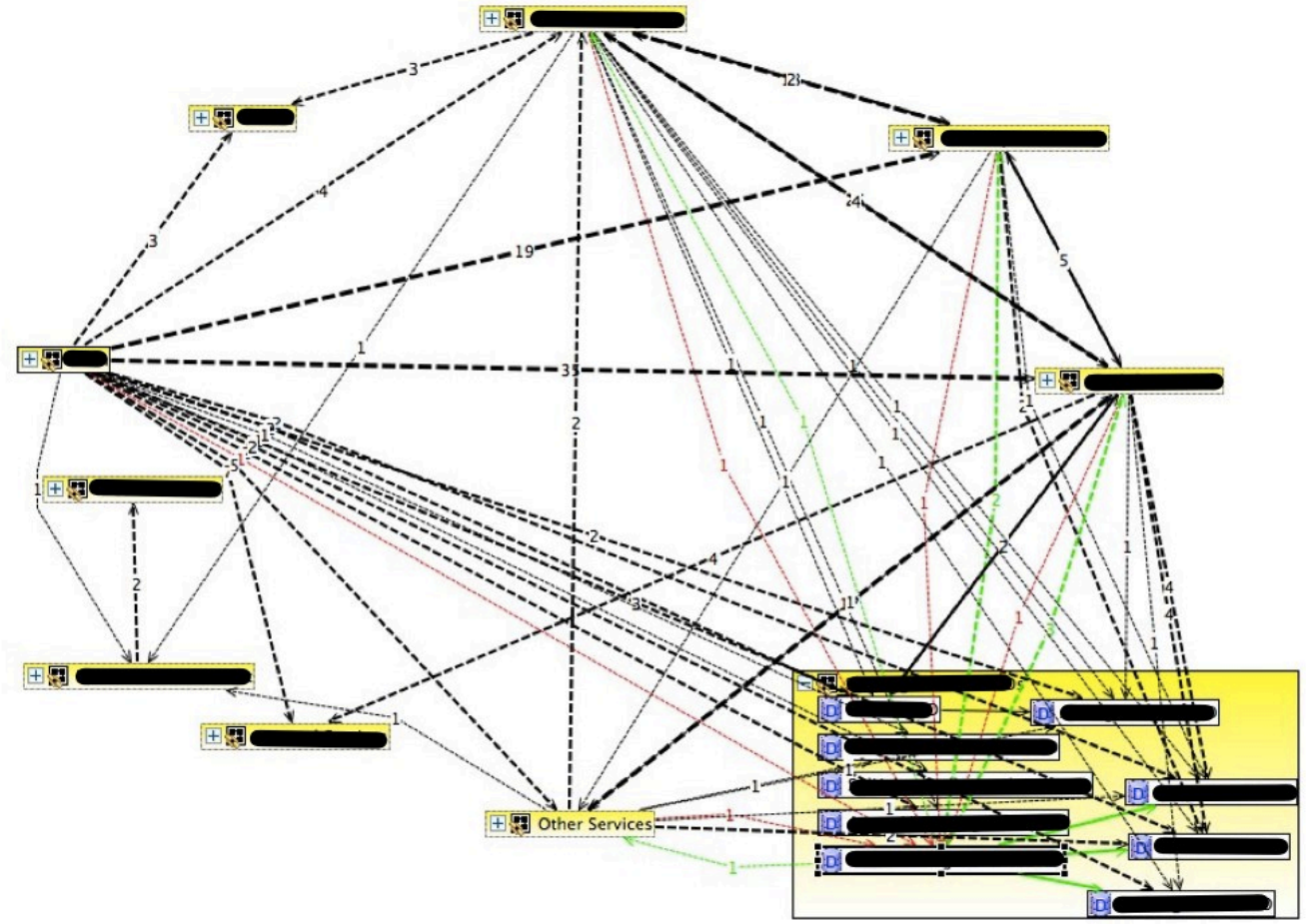
System Configuration – Overview (3)



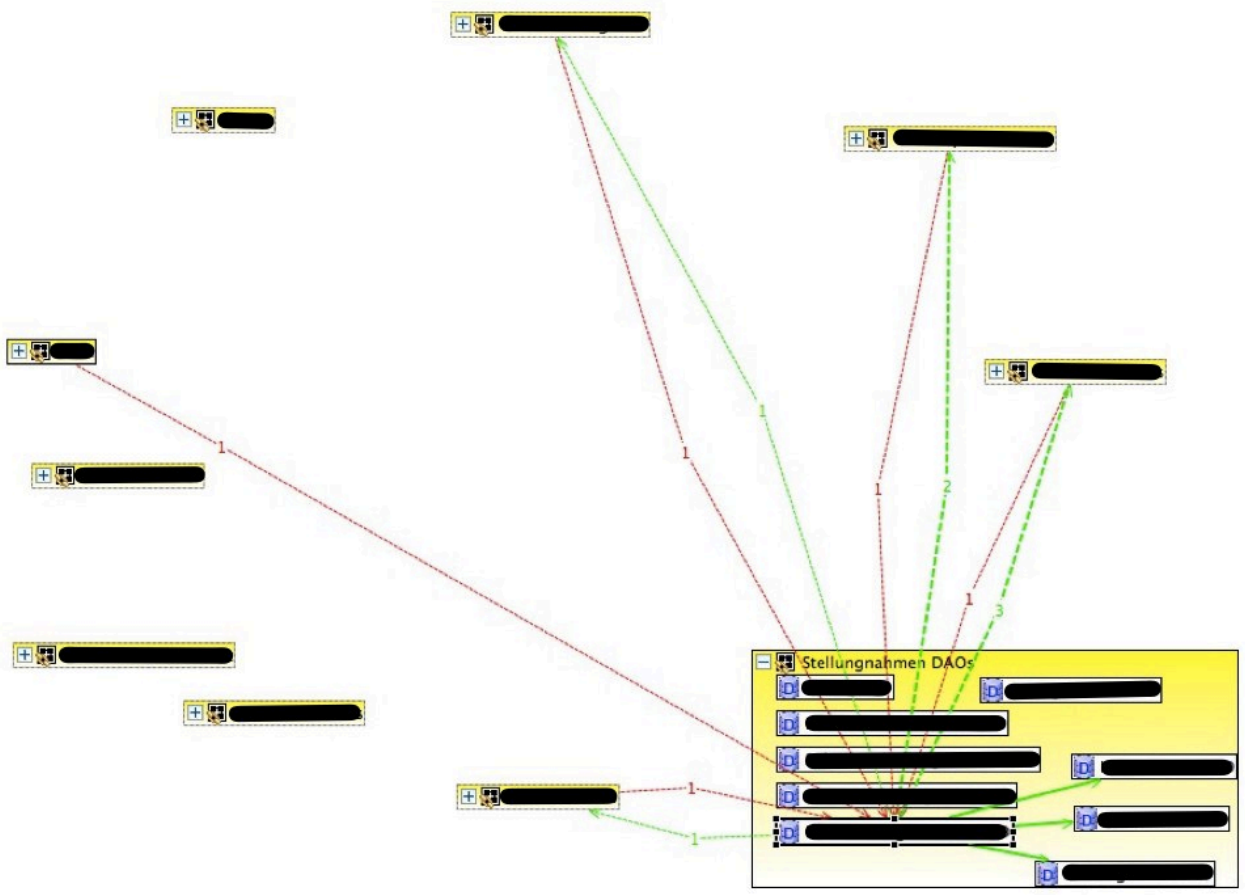
System Configuration – Overview (4)



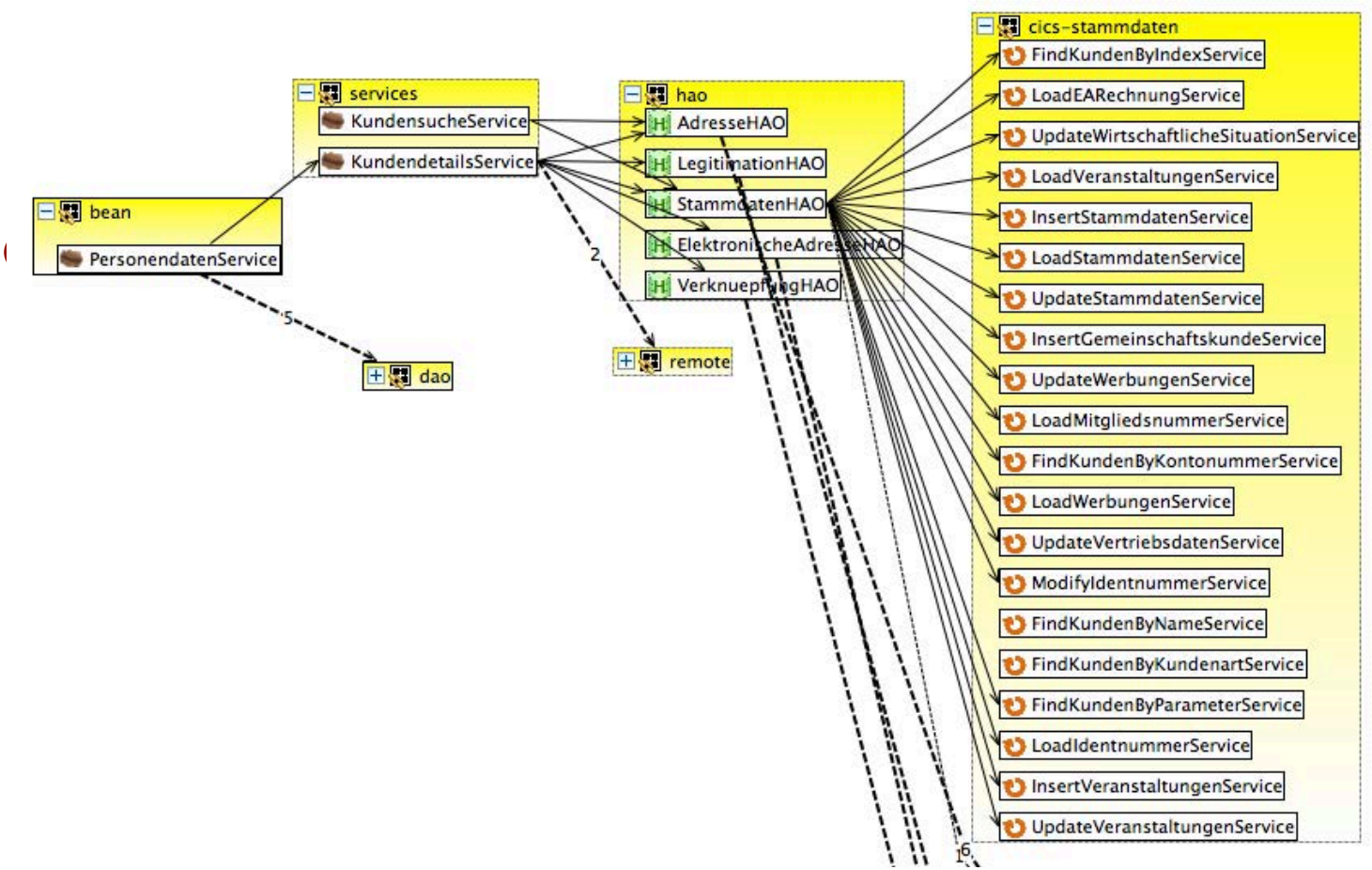
System Configuration – Focus Mode (1)



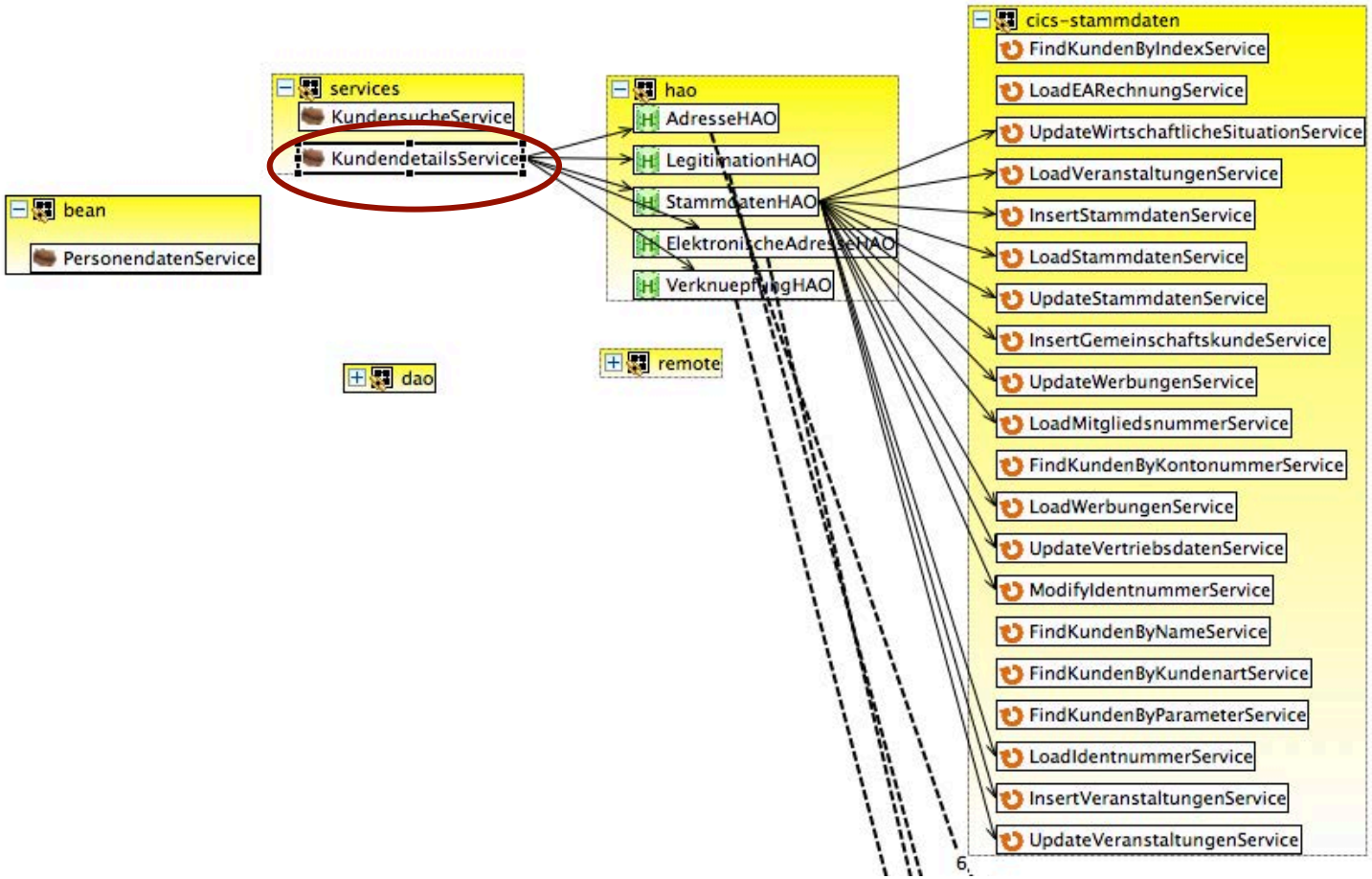
System Configuration – Focus Mode (2)



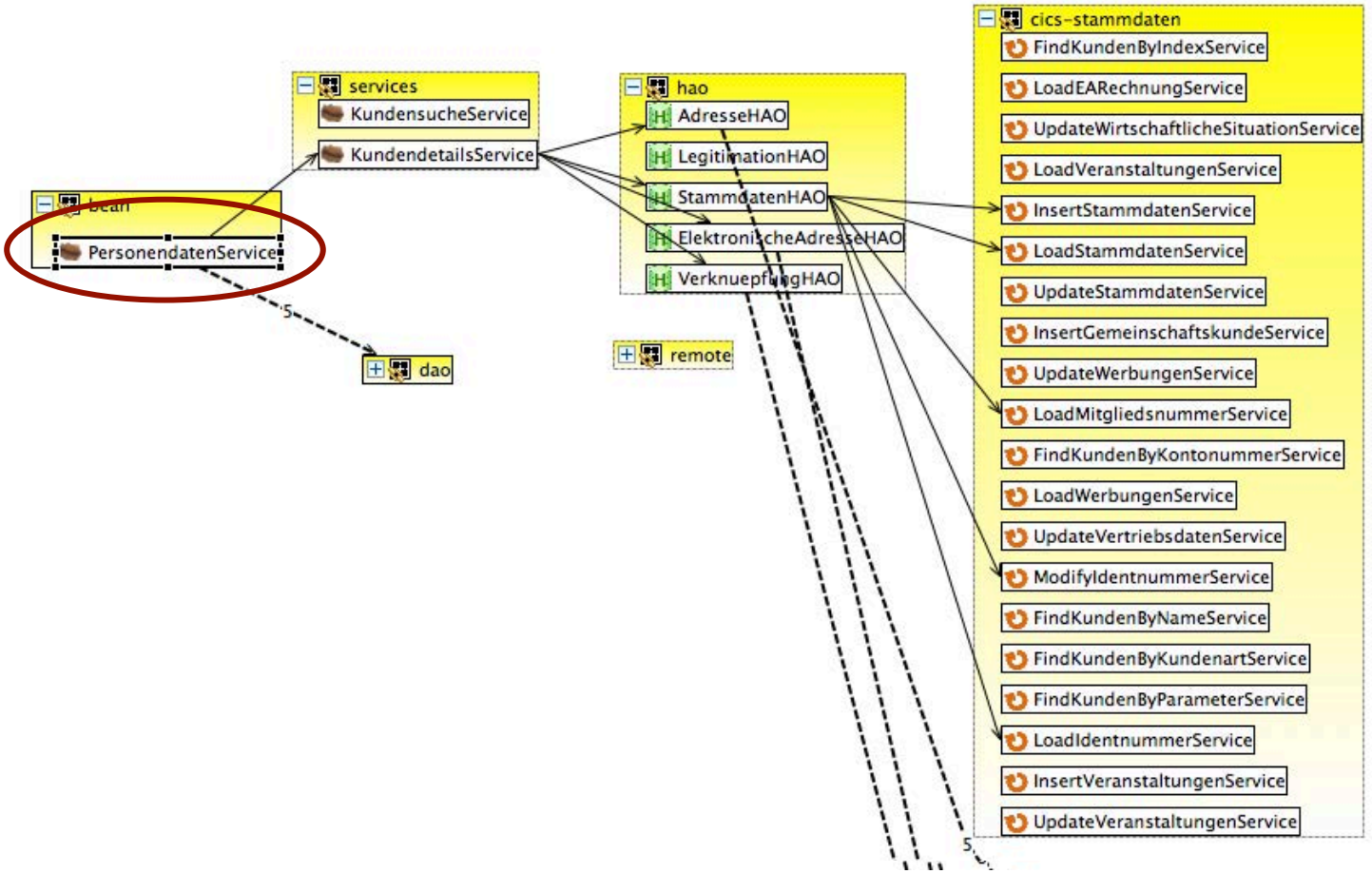
Method Invocation Analysis (1)



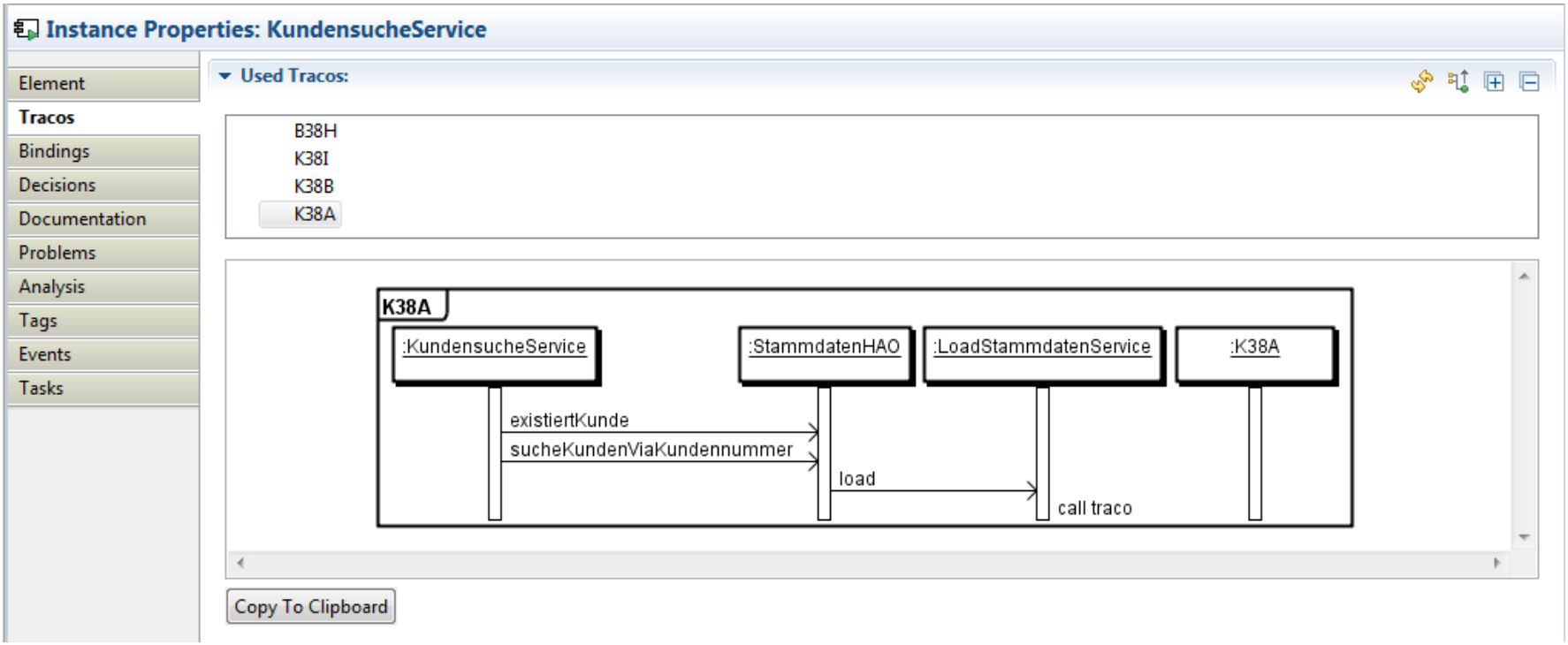
Method Invocation Analysis (2)



Method Invocation Analysis (3)



Host Transactions



Experiences

- Continuous adaptation and refinement of approach (action research) with company stakeholders
- Applied approach to several different SOA subsystems, developed by different teams
- Decided to use approach as part of EAM effort spanning whole banking group
- Want to include client architecture and architecture of back-end software (host)
- Decided to provide architectural information in a standardized way to restrict diversity

Current and Future Work

- Provide additional views
- Synchronization with SOA registry/repository
- (Synchronization with EAM tools)
- Export to UML tools for further design activities
- Automatic analysis of conformance to reference architectures
- Enhanced review support through facilitation of AKM and context information
- …


תודה
Dankie
Gracias
Спасибо
شكراً
Merci
Takk
Köszönjük
Terima kasih
Grazie
Dziękujemy
Dėkojame
Ďakujeme
Vielen Dank
Paldies
Kiitos
Täname teid
谢谢
Thank You
Tak
感謝您
Obrigado
Teşekkür Ederiz
감사합니다
Σας Ευχαριστούμ
ขอบคุณ
Bedankt
Děkujeme vám
ありがとうございます
Tack