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## **ANSA Phase III**

# **Progress in Gateway Design**

**Ben Crawford**

### **Abstract**

Prototyping work on gateway construction has been done to explore the problems encountered when building gateways between different platforms and applications. These have progressed our understanding of gateway design issues, and improved our architectural understanding of interception. A number of recommendations can now be made about approaches to gateway design and development.

This presentation briefly describes the prototyping work which has been done, describes the prototypes and introduces a demonstration and documentation of the results (APM.1303).

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APM.1498.02

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# Progress in Gateway Design

Work in progress report

ANSA Technical Committee

26/5/95

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## Overview

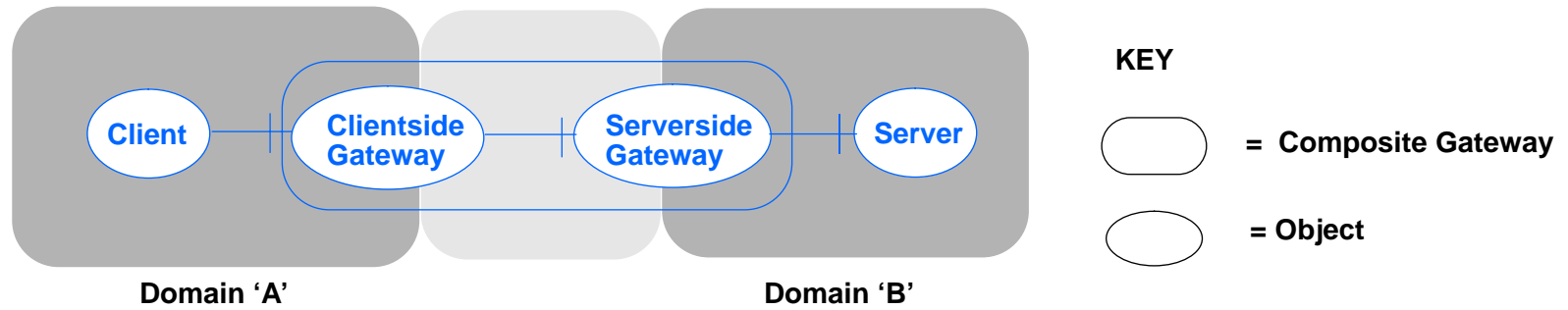
- Prototyping goals.
- Overview of design.
- Description of prototypes.
- Examples of differences bridged by prototypes.
- Conclusions from prototyping work.
- Demonstration.



## Prototyping Goals

- To understand gateway design issues, prototyping has investigated:
  - Bridging between different platforms (application independent gateways).
  - Bridging between related but incompatible applications (application specific gateways).
  - Gateway management.
  - Monitoring of gateways.
  - Reuse of gateway software.
  - Automating gateway construction.

## Overview of Design



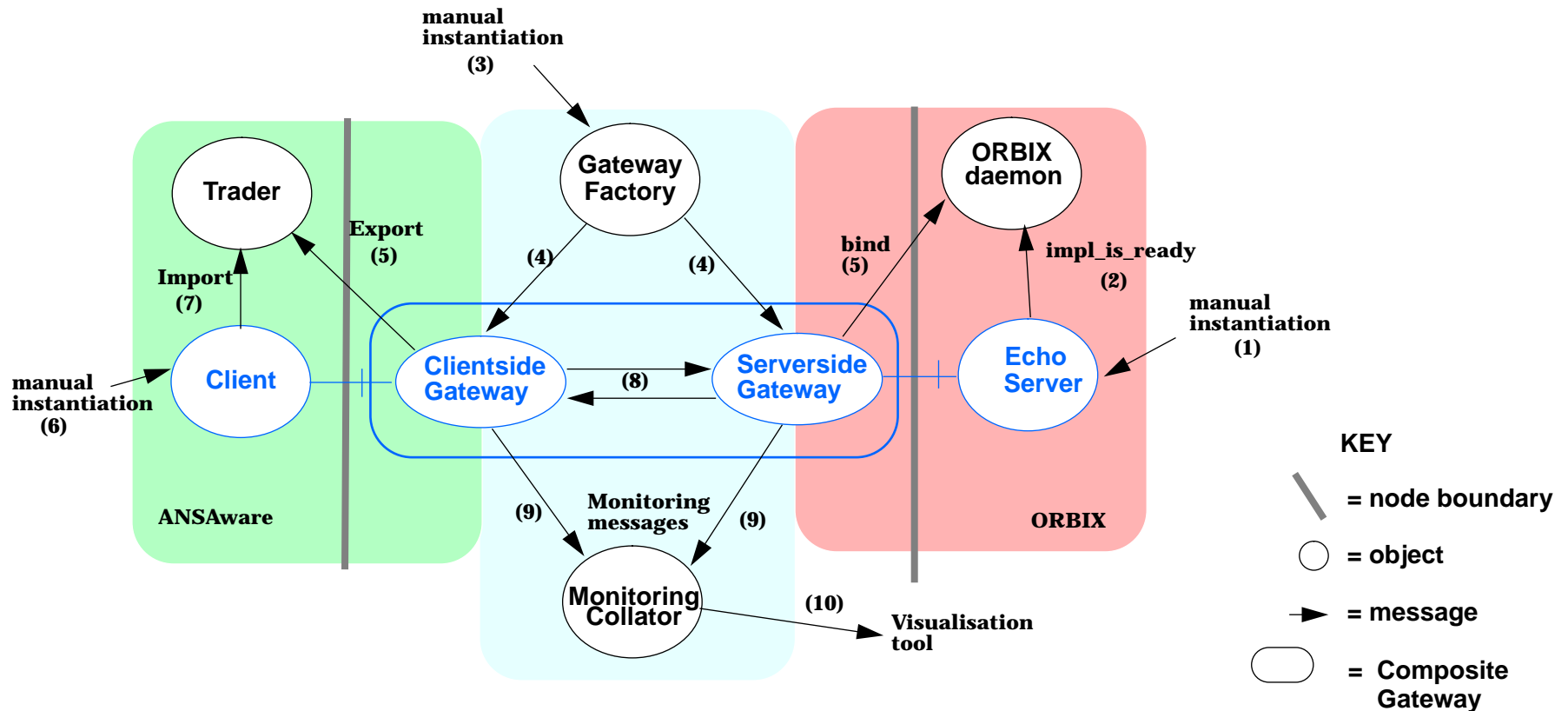
- **Each domain is an area of similarity in some characteristic(s)**
  - E.g. platform, application semantics, administration, management policy, RPC representation, security.
- **Composition of gateways:**
  - Decouples different characteristics.
  - Preserves domain management autonomy.



## Echo Gateway Prototype (I)

- Bridges in both directions between ORBIX and ANSAware for the Echo service.
- Application differences minimal.
- Primarily investigated platform differences.
- Centralised gateway factory in unix.
- Monitoring facilities using Lamport clocks for ordering monitoring messages.

# Echo Gateway Prototype (II)



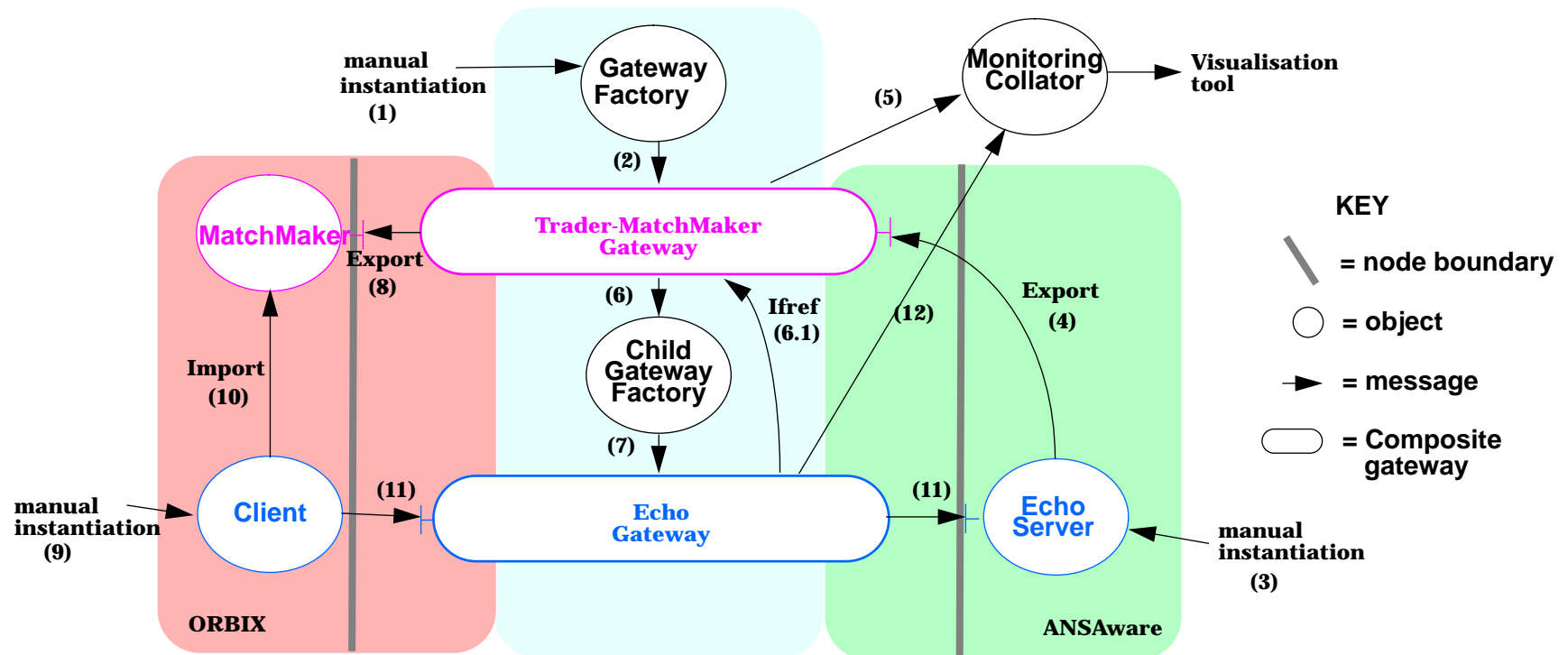




## Trader - MatchMaker Gateway Prototype (I)

- Provides a Trader-like ANSAware interface to the ORBIX MatchMaker.
- Platform bridging as in Echo prototype.
- Investigated application differences
  - Although the Trader and the MatchMaker perform a similar function, there are sufficient differences to make bridging difficult.
- Immediate resolution of interface references
  - Automatic creation of child gateways as interface references pass through the gateway.
- Combined monitoring of parent and child gateways.

# Trader - MatchMaker Gateway Prototype (II)





## Sample Platform Bridging Solutions

- These are example design solutions to platform level problems.
- A common private protocol was defined for use between gateways, to overcome the incompatibility of the two RPC mechanisms
  - Implemented using IPC in our prototypes.
  - It is now possible to use UNO (OMG's Universal Networked Objects).
- Immediate resolution of interface references was used to avoid modification of the platforms
  - Deferred resolution is another option.
- A library of functionality common to gateways in both ANSAware and ORBIX was written in C++ and used via a C wrapper in ANSAware, to achieve cross-platform reuse.



## Sample Application Bridging Solutions

- **These are example design solutions to application specific problems.**
- **Offer Naming**
  - **The MatchMaker uses unique offerID to name offers, whereas the Trader uses Ifref and properties. The only general solution is for the gateway to hold a map between the two names.**
- **Naming Context**
  - **The Trader supports a context hierarchy for managing offers; the arbitrary user-defined properties provided by the MatchMaker cannot fully simulate it. The gateway must do additional filtering of offers returned by MM searches.**
- **Proxy Resolution**
  - **The MatchMaker search facility does not resolve proxy offers; the Trader does; consequently the gateway should explicitly resolve proxy offers.**



## Conclusions of work

- Detailed discussion in paper [APM.1303].
- Input into Interception Model.
- Some key points have emerged:
  - Once a bridge between two platforms has been developed, production of application independent gateways (which link identical interfaces) can be automated using IDL.
  - Once DSI interfaces are available, it will be possible to write generic application independent gateways between platforms.
  - Development of application specific gateways can be extremely difficult, and it seems unlikely to be automated.
  - Application specific gateways are difficult to maintain: changes to the interfaces they bridge cause changes in mappings which can have a large impact on gateway design.
  - The question of whether a gateway will need to hold state is critical.



## Demonstration

- **Come and see a demonstration.**
- **It shows:**
  - **The Trader-MatchMaker gateway.**
  - **Dynamic creation of application specific gateways as interface references pass between ORBIX and ANSAware (immediate resolution).**
  - **Use of heritage management functionality (Offer Manager) to manage a new application (the MatchMaker) via gateway technology.**
  - **Ordered visualisation of the whole scenario with the DEMON tool.**