FORM

IST-1999-10357

Engineering a Co-operative Inter-Enterprise Management Framework Supporting Dynamic Federated Organisations Management

Document Number:	IST-1999-10357/LMD/WP4/0522_AnnexA
Title of Deliverable:	Deliverable 11 Final Inter-Enterprise Management System Model **Annex A, F-IES System Model**
Deliverable Type: (P/R/L/I)*	P
Nature of the Deliverable: (P/R/S/T/O)**	R
Contractual Date of Delivery to the CEC:	28 February 2002
Actual Date of Delivery to the CEC:	28 February 2002

Workpackage responsible for the Deliverable:	WP4
Editor:	Anders Olesen (UHC)
Contributor(s):	
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ABSTRACT

This Annex to FORM Deliverable 11 presents the final inter-enterprise management system model for the Fulfilment-IES Provider.

KEYWORDS

Inter Enterprise Service, SLA, Business Model, System model, Analysis Model, Building Block, Contract specification

* Type: P:Public, R-Restricted, L-Limited, I-Internal

** Nature: P-Prototype, R-Report, S-Specification, T-Tool, O-Other

IST-1999-10357

FORM

Deliverable D11

Final Inter-Enterprise Management System Model

Annex A, F-IES System Model

Editor : **Anders Olesen**

Status – Version : Final
Date : **28 February 2002 (of document release)**
Distribution : Public
Code : IST-1999-10357/LMD/WP4/0522_AnnexA

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1 Introduction

This document presents the final system model done in FORM within the Fulfilment IES (Inter Enterprise Service) Business Process Area. It demonstrates how the FORM methodology is applied to the problem of providing a fulfilment service. However, it should be noted that only key functionality is handled. The system models can be regarded as the result of the first system development iteration.

The FORM methodology "Building Block Development Guideline" [FORM D12] is applied to the Fulfilment IES Domain in the following way:

FORM D12 Building Block Development Guideline – Workflows:	FORM D11 - FORM methodology applied in Sections:
1.Perform Business Modelling Workflow	Section 2 Business Model 2.1 Business Use Case Model 2.2 Business Object Model
2. Define Reference Architecture Workflow	2.3 Reference Architecture
3. Define Requirements Analysis Workflow	Section 3 System Model 3.1 Use case Model
4. Develop Analysis Models Workflow	3.2 Analysis Model
5. Re-organise Analysis Models Workflow	3.3 Re-organise Analysis Model and Group to Building Blocks 3.4 Building Block Specification

Table 1-1 Mapping between FORM Methodology and Fulfilment System Models

The Fulfilment IES Business Model in Section 2 sets the context for the system model by presenting the business use cases and business object model. The reference architecture is also presented.

The Fulfilment IES Provider System Model is presented in Section 3. System modeling involves the identification of the functionality necessary to support the system and the design of the software components necessary to provide that functionality.

First use cases and actors are identified and explained in Section 3.1. Then analysis objects that implement the use cases are identified and the interactions documented in Section 3.2. Having identified the analysis object the next step is to group these object into Building Blocks and specify their contracts, this is shown in Section 3.3 and 3.4. The complete set of contract specifications can be found in the on-line contract catalogue at the FORM website [FORM Contracts].

2 Fulfilment-IES Business Model

This section describes the business context of the Fulfilment-IES System Model.

2.1 Business Use case Model

Figure 2-1 Business Use case Diagram for Fulfilment-Billing

The Fulfilment-IES business use case is based on one-stop shopping. The Inter-Enterprise Service Provider (IESP) offers a package of services from various service providers and maintains the relationship with the customer on behalf of these service providers. The services offered by the IESP in this business use case are a VPN service from a VPN service provider and an Information Retrieval Service from an ASP. The IESP has already negotiated service contracts with the VPN service provider and the ASP and so is in a position to offer these services as a package to customers. The IESP informs the VPN service provider and the ASP about any new customer wishing to use a service they offer and also provide any necessary information, such as addressing information for the VPN service provider. This is the Fulfilment part of the business use case.

The business use case description in terms of the service provided to the customer is as follows:

1. The customer wishes to order a service package offered by the IESP consisting of a VPN service and an IRS service. The customer selects on-line a variety of Class of Service (CoS) parameters, negotiates the SLA for this service package with the IESP and agrees a particular SLA for the service package. The customer orders this service package and the order for the service package is accepted by the IESP.
2. The IESP provisions the service for the customer so that the customer can start using the service. This requires information about the customer and the negotiated details of the services ordered by the customer to be stored.
3. The IESP sends the necessary information to the VPN service provider with the request to create the appropriate service instance for the IESP customer. The VPN service provider sends a connection request to the GQIPS provider to guarantee the QoS of the connection.

2.2 Business Object Model

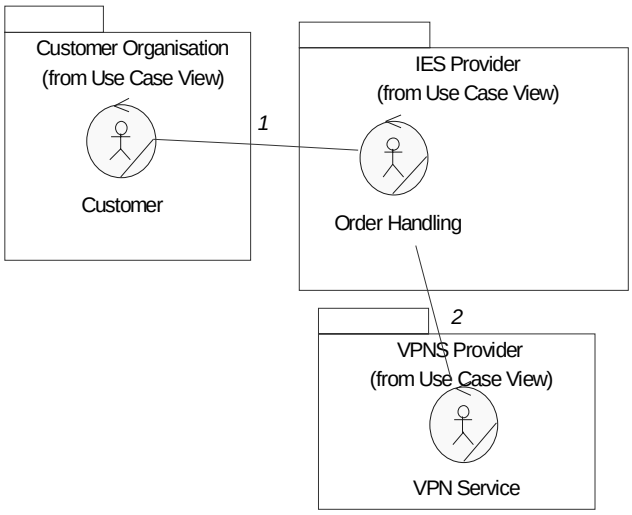

Figure 2-2 Business Object Model for Fulfilment-EIS

As shown in the figure, the following business relationships exist:

1. The IES Customer negotiates and buys a service package from the IES Provider based on a VPN. A SLA is negotiated and a contract with details of the service ordered is concluded between the IES Customer and the IES Provider. The relationship between the IES Provider and the IES Customer is concerned with the customer relationship management processes, which in this business use case are Order Handling.
2. The VPN Service Provider is providing a VPN service to the IES Provider and a contract, including a SLA, has been signed between them to this effect. The relationship between the IES Provider and the VPN Service Provider is concerned with providing enough information about the new customer/service so that it can create a service instance for the IES Customer.

2.3 Reference Architecture

The Reference Architecture figure below presents the Business Processes involved in each domain as well as the reference points defined between Business Processes over different domains.

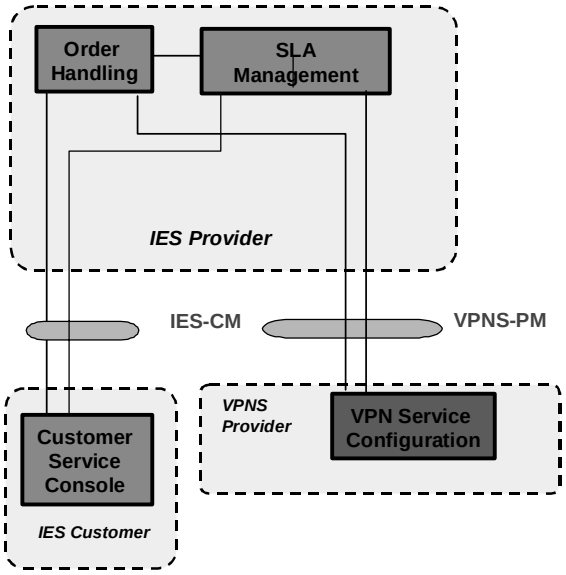

Figure 2-3 The Fulfilment-IES Reference Architecture

2.3.1 IES-CM

This reference point is located between the IES Provider and the IES Customer. It represents a business-to-customer relationship between the IES Provider and the IES Customer for order handling and SLA management. It is used by the IES Customer to negotiate a service with the IES Provider.

2.3.2 VPNS-PM

This reference point is located between the IES Provider Domain and the VPNS Provider Domain. It is used by the IES Provider to configure a VPN service provided by the VPN Service Provider.

3 Fulfilment-IES Provider System Model

3.1 Use Case Model

3.1.1 Actors

Actor Name	Role Taken
IES Customer	Uses the IESP services
VPN Service Provider	Provides the VPN service to the IESP

Table 3-1 IES Actors

3.1.2 Use case diagram

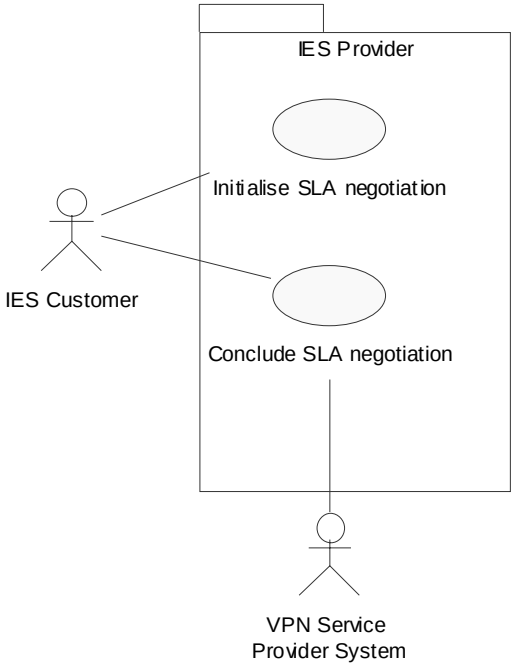

Figure 3-1 Use case diagram for Fulfilment -IESP

The specified business processes are intended to be automated, we therefore identify candidate system use cases. The system use cases are identified for each organisation in the business object model e.g. the IES Provider should automate the SLA negotiation.

Use case Name	Initialise SLA Negotiation
Summary	This use case represents the initial phase of SLA negotiation and comprises the activities of the end customer requesting and receiving an SLA proposal from the IESP
Actors	IES Customer IES Provider
Begins When	When an IES Customer starts negotiating a service
Steps	The customer sends a request for a service proposal and receives a SLA proposal from the IESP
Ends when	The customer receives a SLA proposal
Traceability	Requirements: EC-II.03, QA-II.07, QA-II.08, EC-II.02, EC-II.07, EC-III.01, SC-II.08, SC-II.09

Table 3-2 Use case description of "Initialise SLA Negotiation"

Use case Name	Conclude SLA Negotiation
Summary	This use case covers the process of the IES Customer and completes the proposed SLA by adding customer details and returning the SLA to the IES provider as an indication that the SLA has been accepted.
Actors	IES Customer IES Provider VPN Provider
Pre-Conditions	The customer has received a SLA proposal from the IESP
Begins When	The customer receives a SLA proposal from the IESP
Steps	The customer adds customer details and returns the SLA to indicate the SLA has been accepted
Ends when	The IESP receives the SLA with customer details
Traceability	Requirements EC-II.03, QA-II.07, QA-II.08, EC-II.02, EC-II.07, EC-III.01, SC-II.08, SC-II.09

Table 3-3 Use case description of "Conclude SLA Negotiation"

3.2 Analysis Model

From the use cases the analysis objects needed to support the processes are identified.

3.2.1 Boundary Objects

Boundary Objects	Responsibility
IES Customer Interface	A Customer GUI

Table 3-4 Boundary Objects

3.2.2 Entity Objects

Entity Objects	Responsibility
SLA_Request	This object contains an initial request from a prospective IES Customer to the IES Provider for a quote. Service level parameters are specified; these are called service level objectives (SLO). The contact details of the prospective IES Customer are optional so that an anonymous request can be accommodated here.
SLA_Proposal	The SLA_Proposal has a more complete SLO specification than the SLA_Request such as tariffs, actual activation times, penalties, etc.
SLA_Customer_Confirmation	This object contains a confirmation that a prospective IES Customer accepts one of the SLA proposals offered by the IES Order Handling system. This confirmation contains the contact details of the prospective IES Customer, which are compulsory here.
SLA_Provider_Confimation	This is a confirmation from the IES Order Handling system that details the SLA established in its final form. This SLA forms a legally binding document between the two parties.
SLA	The final negotiated SLA
VPN SLA	VNP specific SLA information

Table 3-5 Entity Objects

3.2.3 Control Objects

Control Objects	Responsibility
SLA Negotiation	Responsible for negotiating SLAs
SLA Repository	Responsible for storing SLAs
SLA Propagation	Responsible for propagating SLA information to VPNP

Table 3-6 Control Objects

The analysis objects and their relation can be seen in the following diagram.

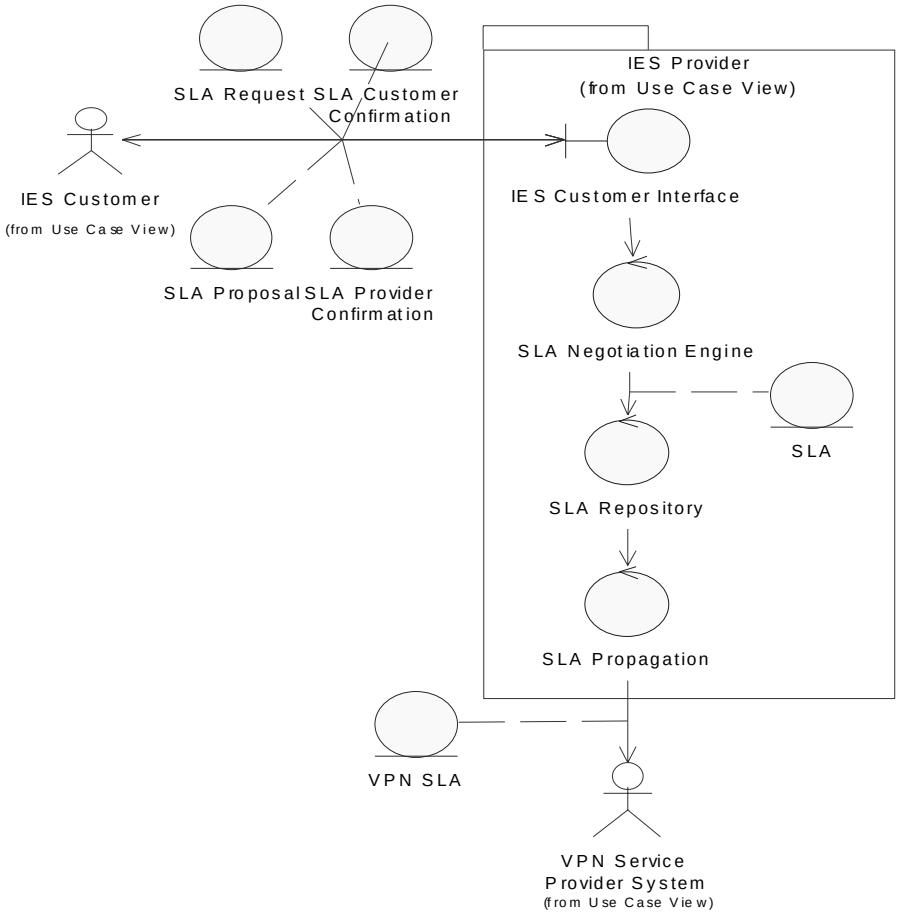

Figure 3-2 Object diagram showing the analysis object that implement the use cases for F-IES

3.3 Re-organise Analysis Models and Group to Building Blocks

Now the analysis objects are grouped onto building blocks.

The following building blocks needed to support the analysis objects are identified:

SLA Handling Service BB (SHS)

This building block implements the IES Customer interface to the IES Provider. It has a GUI showing the SLA negotiation parameters in a presentable way and allows the IES Customer to easily manoeuvre through the SLA negotiation process. It is also responsible for the security (encryption and user validation) between the IES Customer and the IES provider during the negotiation. The actual SLA negotiation is handled by the SLA Negotiation Engine (see below).

SLA Negotiation Engine BB (SNE)

This building block implements the SLA Negotiation control object. It is responsible for the complete SLA negotiation process and it insures that negotiated SLA parameters are within pre-configured bounds. When a SLA has been negotiated it is stored in the SLA Repository (see below).

SLA Repository BB (SLAR)

This building block implements the SLA Repository and the SLA propagation control objects. The purpose of the SLA Repository is to store and make available the negotiated SLA to other systems. It also propagates the VPN specific SLA information to the VPN Service Provider to initiate the configuration of the VPN.

The building blocks and their contracts can be seen in the following diagram.

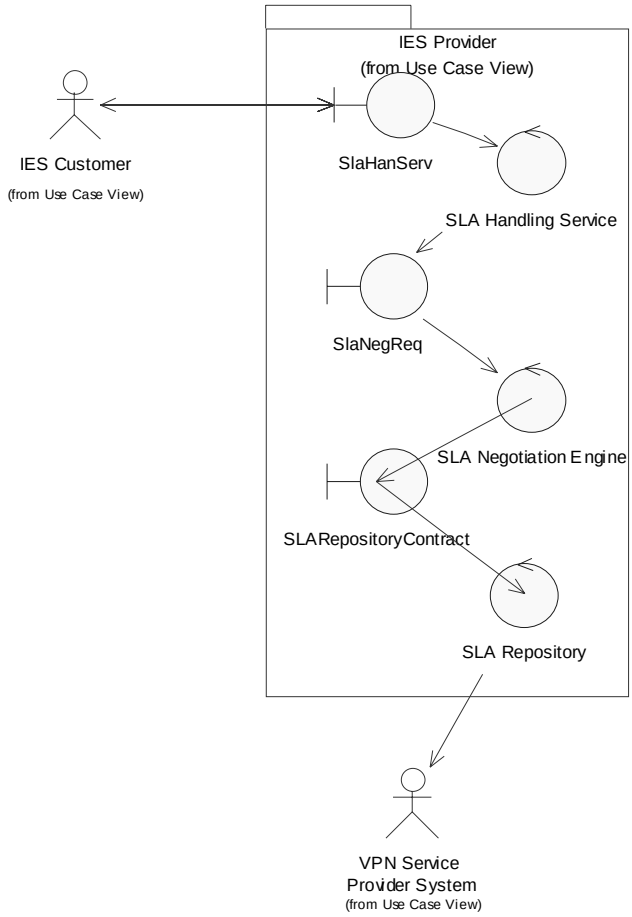

Figure 3-3 Collaboration diagram – Building Blocks and Building Block Contracts

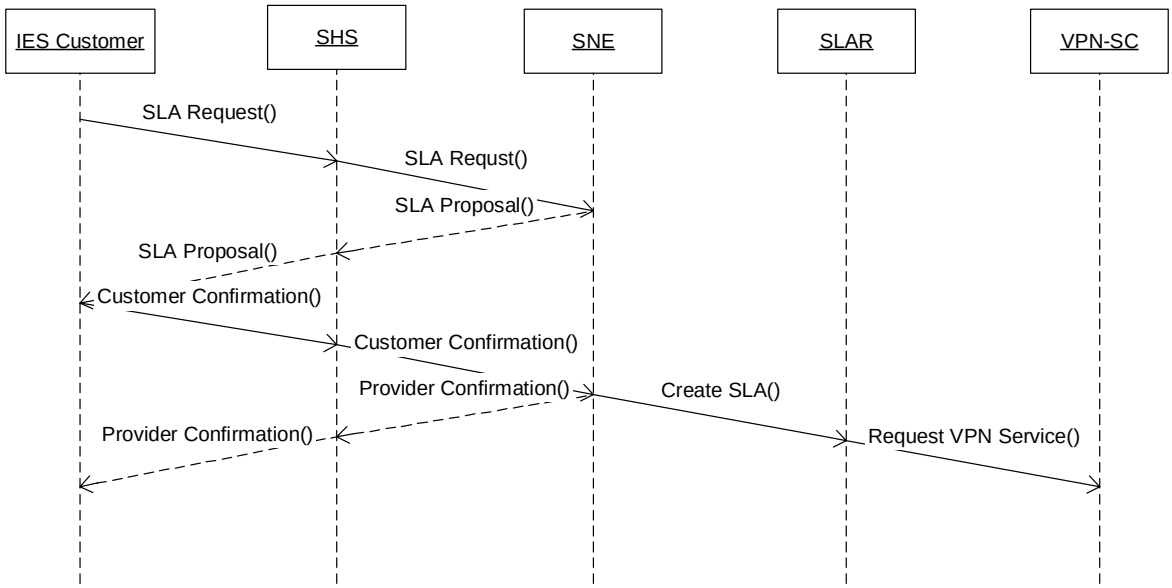

Figure 3-4 Interaction diagram showing the use of BB

3.4 BB Contract specification

The following diagram is an example of part of the BB contract specification for a SLA. The complete contract catalogue for F-IES can be found at: [FORM Contracts].

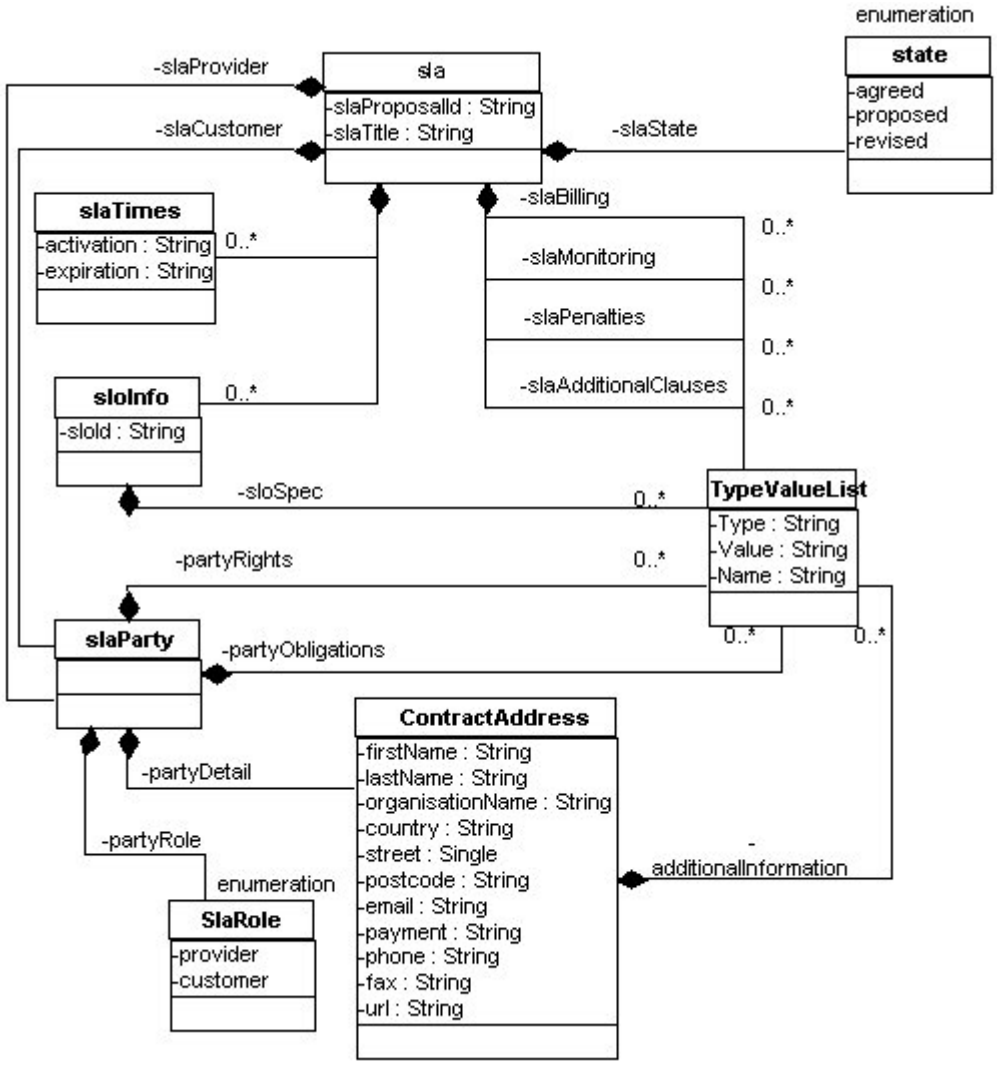

Figure 3-5 UML diagram representing the SLA information

4 Conclusion

The purpose of this annex has been to demonstrate the application of the FORM methodology guidelines on the Fulfilment IES system. It shows how the Business Object Model can be broken into Use Case Models and how these can be used to identify analysis object before finally grouping to building blocks for implementation. An example of parts of a building block contract has been included.

5 References

[FORM Contracts] Entrance to the Contract catalogue:
http://www.cs.ucl.ac.uk/research/form/models/ContractCatalogue/

[FORM D12] Wade, Vincent, "D12: Guidelines for Co-operative Inter-Enterprise Management", IST-1999-1057/TCD/WP3/012, February 2002.