



IFM
PROJECT
INTEROPERABLE FARE MANAGEMENT

Existing Trust Models and Comparison to Published Best Practice in Other Relevant Business Sectors

Deliverable 1.2

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0 Executive Summary

The first Work Package (WP1) for IFM has the objective to understand the trust between players within an IFM and recommend the common methodology of an EU IFM Trust Model for existing members. This report, which is the second deliverable, is concerned with collating data about Best Practise Trust Models in other business sectors and detailing the relevance to an EU IFM. The initial task for WP1 was to identify the different ways in which the consortium members approach trust and to determine their level of agreement (results are compiled in Deliverable D1.1). This could then lead into the subsequent task for this deliverable, which is to compare existing Best Practice from other business sectors with the findings from consortium and to establish further recommendations for a Trust Model methodology.

To obtain the results documented in this deliverable, a literature review was carried out in order to identify the Best Practise from other business sectors and to identify the most relevant for this project. Each of the case studies used in this report have been chosen for that very reason and so, the case studies are analysed in three stages: firstly, to ascertain the level of trust; secondly, the relevant features; and thirdly, the possible impact for an EU IFM Trust Model. This procedure has highlighted once again that there are no Trust Models that fully meet the needs of this project; however, it has provided some valuable insight into the development of the methodology and the key issues relating to all players, such as, customers, operators, schemes, etc., that should be considered in the follow on workshop. This workshop is designed for scheme owners and the other WPs, and will be used to begin the methodology design process which is vital for the follow-on deliverables (D1.3 and D1.4).

1 Introduction

An IFM scheme between different countries and participating companies brings about new challenges to enable data and/or money to be exchanged, and services or infrastructure to be shared. To understand and highlight the challenges and resulting risks to all players within the IFM, a Trust Model is necessary. Deliverable D1.1 demonstrated that none of the participating consortium members have an existing Trust Model that meet the requirements of an EU IFM; however, elements of the members' licences, contracts, membership rules, risk models, among other things, are relevant and could be considered for inclusion within a Trust Model. To come to this conclusion a questionnaire was circulated and the response given suggested that there was a difference in opinion of the definition of a Trust model. As a result, a workshop was held with the consortium to fully understand the commercial decisions made within each scheme about Trust and the existence of their Trust Models. This resulted in the common definition of a Trust Model and the conclusion that there are currently no Trust Models. Therefore, WP1 must define the methodology and outline of a Trust Model that will meet the needs of an EU IFM, facilitating unity and data sharing.

The purpose of this report is to consider the Best Practice in other relevant business sectors and to compare this with the results from Deliverable D1.1. The case studies documented have been chosen as they demonstrate existing Trust Models that allow data sharing on a B to B and B to C level and, therefore, may provide some valuable insight into the aspects of an IFM Trust Model which will help to develop the methodology requirements for Deliverables D1.3 and D1.4.

The report will start by summarising the existing IFM Trust Models within the consortium, it will then introduce the four case studies and the relevant standards, and highlight throughout each the relevance and potential impact to an IFM. The implementation plan for the remaining tasks of WP1 will be discussed as will the additional work required. The deliverable ends with key conclusions to take forward into the next stage of this work.

2 Existing IFM Consortium Trust Models

Following the review of the questionnaires and the initial workshop it has become apparent that at present there are no IFM Trust Models from which to compare Best Practise in other business sectors to. Despite this, there are relevant features within each of the case studies selected that facilitate a comparison and also highlight aspects which should be considered for inclusion in a future IFM Trust Model.

Deliverable D1.1 found from the Questionnaire and the Workshop that although the members of the consortium do not have any Trust Models, they do have the following:

- Contracts
- Licenses
- Membership rules
- Risk Models

It is likely that aspects of the above may feature in an EU IFM Trust Model and therefore, there is still a benefit to analysing other Best Practise Trust Models and select procedures and methods which could form the Trust Model.

Within deliverable D1.1 it was suggested that generic Trust Models operate at a number of levels within a scheme and an IFM Trust Model is no exception although the levels are subject to final definitions of IFM resulting from the activities of the other working parties. The following are examples of these levels (and this is not meant to be an exhaustive list);

- End user expectations (customer proposition)
- Scheme to scheme
- Operators (and other players)
 - o Operational
 - o Human Machine Interface
 - o Transactions/data
- IFM organisation itself
- Status providers

Three case studies have been chosen as they are seen to be relevant to this project and the aims of IFM, and for each study the applicable levels from the above list have been identified. The case studies are: Sales of Integrated Ticketing for Air and Rail; Identity and Access Management for Local Government; and online transactions looking first at e-Commerce and then at Internet Banking.

In compiling the literature required for this review of Best Practice in other business sectors, these case studies are seen to be good examples that could provide valuable insight for the basis of development for an EU IFM Trust Model. However, it has become obvious that the majority of trust schemes or papers refer to trust in terms of security of e-data, for example, PKI implementations, rather than the trust between scheme players or operations within a scheme. Whilst the e-data security aspect is relevant to an IFM Trust Model (as defined by the other WPs), the scope of the IFM Trust Model is much wider and must consider a wider commercial based scheme. This confirms the belief that WP1 must develop the EU IFM methodology from scratch taking vital elements from published Best Practice, where appropriate. In addition, and more importantly, WP1 will need to engage with the scheme providers involved in the project, who have the practical experience of scheme operation, both through the consortium and the Forum. Exposing these players to

the Trust Model will ensure that the Model methodology is both practical, useable and meets their day to day needs.

3 Case Study 1 - Integrated Ticketing for Air and Rail

3.1 Synopsis

The paper referenced for this case study is a request for public consultation on integrated ticketing for air and rail transport (pre consultation). Following the 2001 EC white paper, which stated the wish to place “users at the heart of transport policy”, integrated ticketing between transport operators and different modes of travel has been greatly encouraged, which is highly relevant to the aims of the IFM project; to facilitate the easy movement of travellers around Europe. This consultation paper explores the integration of ticketing for air and rail and the inherent issues. Within each case study the levels of trust that are relevant to an IFM are described, followed by the relevant features. Each of these relevant features will be looked at in turn to discuss why they are in fact relevant to an EU IFM Trust Model.

3.2 Levels of trust

- Customer to scheme
- Operator to operator
- Scheme to scheme

3.3 Relevant features

Within the pre-integration schemes there exist elements where the players must either trust or monitor;

For Air this is in the form of International Air Transport Association (IATA) rules which:

- Lay down procedures for mutual acceptance
- Provide rules for attribution of income
- Set of rules for responsibilities with respect to passengers and luggage

For Rail this is in the form of an ERA (European Rail Agency) contract which defines the telematics for customers.

The EU commission envisage an extension to the rules which again must be trusted or monitored. These are;

- Obligation to share data
- Conditions of entry into scheme
- Negotiations to determine fees (commissions)
- Mutual acceptance of tickets and subsequent reimbursement

3.4 Impact on IFM

As defined in deliverable D1.1, a set of rules for IFM players needs to be defined, accepted and trusted by all parties involved. It is also implied in D1.1 that a Trust Model includes a set of procedures; this case study confirms this analogy as all parties must accept the procedures laid out in the Trust Model. In addition to this it also discusses the rules needed for attribution of income. At present the levels of transaction discussed for this IFM project do not extend to the need for schemes to exchange money and therefore this is not within the scope of the project. However, it is important to future-proof the methodology of the EU IFM Trust Model as it is anticipated that in future schemes may wish to sell another's products; therefore, it is important to ensure that all eventualities, within our capability to identify, are considered and included where relevant and upon consultation with the schemes and other WPs in the planned WP1 workshops.

Another aspect of the set of rules is the responsibility with respect to passengers (and luggage). This is important within an EU IFM and requires each scheme to trust that, firstly, another scheme will provide the same level of customer care that the original scheme would provide, and secondly, that IFM, in terms of technology, will work, for example, enabling customers to retain their profile and obtain discounts where necessary or providing the information they require in their language and/or an easy to understand format. This extends to the rail telematics for customers as it is envisaged that IFM will be available via the internet and therefore the telematics must be able to deal with the customer requests, ideally in their chosen language. Thus, schemes within the IFM must again trust that their customers will be looked after and dealt with properly in the digital interface.

The potential extensions to the rules are also of interest as they are areas that have been discussed but potentially take it a step further. For example, it has been assumed that schemes will need to share data but it has not been considered until now whether an *obligation* to supply this data is required and what the implication of this may be on trust. It has been agreed that new schemes may wish and should be able to join the EU IFM, however, the conditions and again the implication of trust on these conditions must be considered. Each of these points raised may suggest the need for some sort of Registrar to organise and monitor such issues. Again, this will require a level of trust from each of the players.

4 Case Study 2 - Local Government (New York State)

4.1 Synopsis

This case study has been taken from the Chief Information Officer New York State's Identity and Access Management (IAM) Trust Model (2007). It provides a Best Practice Guideline for an IAM Trust Model, and is the result of many businesses and individuals requiring remote access to government information and services.

The purpose of the Trust Model is to provide a solution to data sharing across any government agencies and state entities who choose to participate by creating a 'framework and rules that allow for identity credentials to be trusted across organisations'. The level of trust required depends upon two elements: the level of classification for the requested information; the action which will be performed on the information.

4.2 *Levels of trust*

- End User to scheme
- Operator to scheme

4.3 *Relevant features*

Again within the procedure defined in this case study there exist elements that must be considered for the IFM Trust Model in the form of;

Credentials:

- One credential issuer is to be recognised by all participants, rather than each and every department (or country), to accredit the customer;
- The processes and levels of proof needed to accredit the customer.

Levels of trust matrix generated by:

- Differing levels of accreditation;
- The impact of authentication errors on operators

4.4 *Impact on IFM*

Although much of this case study represents areas outside of the current project scope, again it provides extra range for discussion at the workshops to be held by WP1 and will ensure that all avenues are considered, thus preventing at this stage any barriers to future progress creeping into the Trust Model. For example, the issues regarding crediting and accreditors is not a direct challenge for the current IFM project, however, it is important to consider the ultimate goal for an EU IFM and the way in which it may develop, and to facilitate this development from this early stage.

Despite this, the data sharing aspect of this case study is clearly relevant to the IFM project which is proposing to enable the profiling of customers and the enabling entitlement across the EU IFM. Thus, much of the procedure laid out in this model can be adopted and adapted for an IFM Trust Model.

The level of trust required for different transactions is an issue which has been raised during the consultation process for this deliverable and the impact of errors depending on the risk is an important element. For example, if a user is forging a concessionary profile this is more of an issue if the user is then able to get a high discount from an expensive product. Conversely, it may not be such a problem if the user is only saving a small amount of money in which case the scheme may question the level of security required to prevent if a few customers from being able to authenticate a fictitious date of birth. Therefore, creating, in essence, a matrix of risk versus the impact to the players will enable the *level of trust* required by players to be identified.

5 Case Study 3a - E-Commerce

5.1 Synopsis

Case studies 3a and 3b both deal with the Digital Economy and the impact that websites and online transactions can impact upon the company's relationship with their customers. The paper used in this case study, 3a, addresses customer trust and the way in which this can impact upon design and implementation of e-commerce in South Africa. The paper offers an evaluation of the factors which influence customers and suggests a procedure for enabling sufficient trust for customers.

5.2 Levels of trust

- Customer to scheme
- Human Machine Interface

5.3 Relevant features

The paper provides an interesting hypothesis on the structure of the web portals and as this is a way in which many customers will be exposed to and engage with an EU IFM the following are areas to investigate and learn from;

Branding:

- Details of the company and what it does
- Links to supporting companies which will generate a positive feeling

Site Design:

- Clear design
- Clear process and active proof that something has happened
- How to get help during the transaction and afterwards

5.4 Impact on IFM

The way that the customer relates to IFM is likely to be predominantly through the internet and therefore the design and the effectiveness of the site will greatly impact upon the trust the customer feels towards both the transactions they may do on the site and the actual brand. Therefore, clear designs, step by step guide for transactions, including confirmations of actions, and effective help during transactions are all ways to ensure that the website is trusted by the customer. The impact of this will be in the form of C to B (as opposed to B to C) as the customer will dictate online developments. Once an understanding of what the customer offering/proposition will be, it will enable the definition of what the required level of Trust is for the customer in terms of branding and the relationship to IFM through the web.

Branding of IFM will be an area that will impact not only upon the customer but also upon the schemes within the IFM as they will not want to be associated to a negative brand. They must trust that the brand will be looked after properly as the way in which IFM is used and marketed will impact upon how popular and trusted the brand is. This again may suggest the need for some sort of management body to deal with the both internal matters and the external face of IFM. As noted in the paper, providing links to other "loved" brands can have a positive impact and is a way of promoting the success of the project. Perhaps in the case of IFM this is the home country transport operators.

6 Case Study 3b - Internet Banking

6.1 Synopsis

As illustrated in case study 3a, the Digital Economy has had a big impact upon companies and particularly their relationship with their customers. This case looks more specifically at the banking industry as internet banking has enabled customers to do nearly all their retail banking online, increasing convenience as they no longer need to visit their local branch regularly. However, in order for customers to use internet banking services, a reliable trust model is required as the internet is generally seen as a fairly insecure environment. Mukherjee, et al, state in their 2003 paper that the customer's perceived security as a key issue for online banking as there are monetary transactions taking place, and therefore, trust can depend upon many factors including the customers' experience of using the internet and communication. The research found that reputation of the bank and shared values, in particular on security and privacy issues, are important for customers and can have a large impact upon trust.

6.2 Levels of trust

- End user to scheme
- Human Machine Interface

6.3 Relevant features

The relevant features for the internet banking case study are similar to those stated in case study 3a, however the following features are also mentioned as key to trust in internet banking;

Branding:

- Reputation
- Fostering shared values between the company and customer

Trusted transactions allowing:

- Security
- Privacy

6.4 Impact on IFM

The paper states that reputation is a large factor for customers; therefore, investing in branding and achieving endorsements from trusted third parties can have a big impact on customer trust. This also extends to the significance of striving to achieve shared values. In the case of Internet banking it is important to note the significance of privacy for customers and the effect it can have on trust. Fostering shared values, in terms of security, privacy and ethics, in IFM from an early stage is likely to have a positive impact upon customer trust (B to C) and trust between schemes (B to B). Particularly the privacy research being carried out in WP 2 will be useful for feeding into this area. Findings from the existing IFM privacy model will be addressed in terms of the impact on trust for the customer and the B to C issues required for inclusion in the Trust Model.

As with case study 3a, security again is a big issue, however, it is important to maintain a balance of security; enough to allow safe transactions but not too much that it inhibits the transactions and the site is no longer user-friendly.

7 Standardisation

In addition to the case studies noted above it is also of great importance to note the various standards which impact upon a project of this sort and therefore the Trust Model. Standard EN ISO 24014-1:2007, Public transport - Interoperable fare management system - Part 1: Architecture, was referenced in deliverable D1.1 as it is the basis for a multi-operator, multi-service interoperable platform, defining the conceptual framework for the extension of existing IFM schemes and interoperability of electronic ticketing. It states, among other things, the players involved and demonstrates the multiple use cases of data flow, etc., which were used to formulate the WP1 questionnaire used to deliver deliverable D1.1.

This standard does not cover technical elements, such as the medium, the interface between the medium and the access device, and the exchange of data. Other standards are able to fill in some of these gaps and so are also useful for inclusion and reference in this report and mainly relate to the security of information:

- ISO/IEC 15420:2000; Information technology - Automatic identification and data capture techniques - Bar code symbology
- ISO/IEC 17799:2005; Information technology - Security techniques - Code of practice for information security management
- ISO/IEC 15408-1:2005; Information technology - Security techniques - Evaluation criteria for IT security - Part 1: Introduction and general model
- ISO/IEC 27001:2005; Information technology - Security techniques - Information security management systems - Requirements
- ISO/IEC 27005:2008; Information technology - Security techniques - Information security risk management
- ISO/IEC 13335-1:2004; Information technology - Security techniques - Management of information and communications technology security - Part 1: Concepts and models for information and communications technology security management

8 Work Package 1 Implementation Plan

The deliverables, as defined in the original IFM Project brief, which follow this report (deliverable D1.2) are:

- 1.3 Report on the follow-up workshop to explain and disseminate the agreed Common Methodology for preparing a Trust Management Model
- 1.4 Report on the common requirements for an EU-SAM to support the Trust Management Model

There are elements of these deliverables which have changed as a result of this report and the output of the other WPs as the overall objectives have been more clearly defined.

Deliverable D1.3 will require WP1 to shadow each of the other WPs to understand their output and its effect on the Trust Model. It is also obvious that the trust model may well drive some of the work. Possibly the best example of this is the design of the HMI for the web portal and working closely with the other WPs will enable the dissemination of this information. Following this a workshop will be organised to begin the design process for a common EU IFM Trust Model methodology. This will begin the definition for a set of rules and introduce the idea of 'trust or monitor'. A subsequent workshop will disseminate, test and agree the Common Methodology.

Deliverable D1.4 will depend upon the system architecture as defined by WPs 3 and 4. WP1 will await the outcome of these discussions and redefine the deliverable, if necessary.

9 Additional work

There are further deliverables/tools which have become apparent as a result of the tasks carried out for this deliverable. Although not within the scope of this IFM project, it is worth noting at this stage recommendations for additional work. These are:

- The creation of a comprehensive risk register for emerging IFMs;
- An entry level requirement for a scheme's risk/trust acknowledgement when joining the EU IFM;
- Definition of the trust requirements for the interchange of money between players;
- Definition of the trust requirements for interoperable products; and
- Definition of the trust requirements for common payment criteria.

In addition to the list above it is also recommended that a review of the progress in the Trust Model for Road Tolling (DG INFOS Road Telematics Project) is carried out once this is complete as there are obvious links between the two areas through, for example, travel, privacy, risk, etc.

10 Conclusion

Although from other business sectors, the case studies used in this deliverable (D1.2) have highlighted the wide variety of elements to be considered for inclusion in an EU IFM Trust Model; Each of the case studies have demonstrated keys trust levels and requirements, and are reiterated below.

The first case study looked at the integration of ticketing for air and rail and confirmed the need define a set of rules for IFM players to accepted and trust by all parties involved. These rules not only present procedures to enable trust for B to B transactions but also the responsibility with respect to passengers (B to C) and passenger trust. In deliverable D1.1 the definition if trust was taken from the project Initiation document as: "A statement of residual risks that need to be accepted between system operators."

Most schemes seem to have a set of rules and, therefore, players must either trust other players to adhere to these rules or they must monitor those rules, either electronically by controls and/or manual auditing. This has ramifications for this project as the definition of the trust model must be extended to include the scheme rules and infrastructure associated with those rules, particularly if a registrar is required to organise and monitor activities within the IFM.

The case study also presented the issues of data sharing, it has been assumed that schemes will need to share data but it has not been considered until now whether an *obligation* to supply this data is required and what the implication of this may be on trust. It was finally suggested that it is important to future-proof the methodology of the EU IFM Trust Model by considering elements which are currently out of scope of this project, for example, the exchange of money between schemes or the conditions for new schemes to join the IFM.

The second case study was taken from a Local Government Identity and Access Management Trust Model, which stated that the level of trust required depends upon two elements: the level of classification for the requested information; the action which will be performed on the information. Key to understanding this is the creation of a matrix of risk versus the impact to the players, enabling the *level of trust* required by players to be identified. In this case the interface between the schemes is the card and differing levels of trust depend upon the transaction and the impact of error.

The third case study concentrates on internet transactions and looks firstly at e-commerce and secondly at internet banking, both of which highlight the way to obtain customer trust online. The way that IFM customers relate to the scheme is likely to be predominantly through the internet and therefore the design and the effectiveness of the site will greatly impact upon the trust the customer feels towards both the transactions they may do on the site and the actual brand. Branding of IFM will be an area that will impact not only upon the customer but also upon the schemes within the IFM as they will not want to be associated to a negative brand. They must trust that the brand will be looked after properly and highlights the possible need for a brand and online manager who will protect the IFM reputation. Reputation is a large factor for customers; therefore, investing in branding and achieving endorsements from trusted third parties can have a big impact on customer trust. This also extends to the significance of striving to achieve shared values, it is particularly important to note the significance of privacy for customers and the effect it can have on trust.

WP1 Deliverable D1.1 found that none of the consortium has a Trust Model that meets the needs of an EU IFM. This deliverable D1.2 has demonstrated the wealth of knowledge in

other business sectors, however, once again there are no models that completely meet the needs of this project and therefore WP1 must design the methodology from scratch.

In order to progress the Trust Model research for this WP, participatory design workshops will be used to tease out the key issues for scheme owners, both within the consortium and the IFM forum, who have the day-to-day expertise and knowledge of running an IFM. This will begin the design process for the common methodology, ensuring that the Trust Model will fully meet the needs of the end players.

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