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Introduction

The OMG Finance Domain Task Force, which had been virtually inactive for a number of years, has come to life with some important new activities, led by its Electronic Payments Working Group.

The background for the new energy is the coming order-of-magnitude increase in the volume and variety of electronic payments, and the recent coordinated move by the major finance standards groups and the major banks of the world to define a new suite of XML-based electronic payment messages called the IST Electronic Payment Message Kernel.[1] The standards groups in the IST consortium are SWIFT, IFX, TWIST, and OAGi.

Straight-Through Processing of Electronic Payments

The purveyors of these electronic payment standards and technologies envision a world where straight-through processing of electronic payments introduces powerful new efficiencies.

For example, imagine that, on a business trip, you pay for expenses using the corporate payment credit card that your company issued to you, and that the remittance information flows through to your company's ERP system, updating your expense report automatically and sending you emails or SMS messages when you have or are in danger of violating an expense rule that could jeopardize your reimbursement.

Why Message Formats Are Not Sufficient

However, merely defining a modern set of XML-based electronic payment messages is not sufficient to make these kinds of scenarios possible. There are two basic problems that the publication of the IST messages does not address.

The Cost of Changing to New Formats is Too High

One problem is that it will take many years for payment networks to change over to using those messages. The myriad legacy formats will persist for a long time, because the potential for extremely costly disruption when making wholesale changes is great. If ERP systems expect IST messages to simply show up at

[1] http://www.openapplications.org/wg/PaymentHarmonization/200311107-Gartner/Background.htm

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the doorstep so that they can proceed with straight-through processing, they will be disappointed. Thus, mappings of the legacy formats to the IST messages are needed, and mappings of the IST messages to the legacy formats are needed for processing in the other direction.

Lack of Well-Understood Semantics Causes Costly Errors

The other problem not addressed by IST is that a lot of costly errors occur at boundary points within payment networks where transformations from one format to another occur. A credit card authorization today flows from the credit card device at the merchant's location, to a point of sale server under the ultimate authority of the merchant's bank (this bank is called the acquirer), to a credit card network such as VisaNet, to a system under the authority of the bank that issued the credit card, and then flows back again to the credit card network, to the acquirer, and finally back to the merchant.

The boundaries between these zones of authority are the points where the transformations occur. The absence of a common, rich semantic model of payment information, and of mappings from the legacy formats to such a semantic model, means that decisions about transformations from one legacy format to another are made by programmers who sometimes are not really sure what a data field represents. This problem is serious although within the range of manageability today, but insiders fear that it will spiral out of control with the coming huge increase in the volume and variety of electronic payments.

The IST kernel could be the basis for the needed semantic model, but the XML messages really are about a format and not much about semantics. IST has a lot of senior, knowledgeable banking people involved in the discussions that lead to the specification of the message formats, but the normative XML messages capture and make public only a small fraction of this knowledge.

Interestingly, IST actually is deriving the message formats from UML models that SWIFT developed. The message formats are derived via a UML-XML mapping, for the most part. The mapping is defined in ISO 20022, a standard that SWIFT spearheaded. SWIFT has not yet released the models along with the XML messages. The UML models could serve as the basis for a common semantic model, particularly if the XML messages are tightly aligned with the UML models.

The OMG Electronic Payments Working Group (EPWG)

The OMG Electronic Payments Working Group (EPWG), an arm of the Finance Domain Task Force, has set about to produce a real semantic model of the IST message payloads, hopefully building on the SWIFT UML models. The EPWG also intends to define mappings between the semantically-enhanced IST messages on the one hand, and the major formats currently in use for electronic payments today on the other hand. These mappings would be the fulcrum, to prevent n-squared point-to-point mapping explosion, and to provide traceability between all of the formats and the semantic model.

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So, if S is the semantic model and T1 and T2 are specific concrete technical formats, you would construct a T1 ->T2 mapping by composing a pair of mappings, namely the T1 ->S and S ->T2 mappings; this "star" configuration is a common technique used by data integration engines, but their "S" is usually semantically thin and defined via proprietary mechanisms.

The EPWG could jump start the definition of the semantic model either by reverse-engineering the IST XML formats, or, preferably, by using the SWIFT UML models as a point of departure.

Visa International spearheaded the effort to start this work in the OMG because Model-Driven Architecture® (MDA®) makes the OMG a leader in standardizing semantic models and mappings of such models to specific technical formats and systems.

After about a year of preparatory work, including the issuance of a Request for Information (RFI) through the OMG that elicited some interesting responses, the OMG issued two RFPs at the meeting of its Technology Committee in Atlanta in September. One RFP, written by Mark Eisner of FireStar Software, calls for submission of a common semantic model based on IST, along with mappings to the common model for the following pre-existing formats:

- TWIST payment messages
- SWIFT FIN payment messages
- IFX payment messages
- ISO 8583 payment authorization messages
- VisaNet TCR clearing transactions

The other RFP, written by David Frankel of SAP Labs, calls for proposals to align the ISO 20022 UML-XML mapping and the OMG's XMI (see the March issue of MDA Journal where I explained how this alignment could be accomplished).

In order to move ahead with this work, the OMG is establishing a formal liaison relationship with TC 68, the ISO committee that has jurisdiction over ISO 20022. It also intends to set up a liaison relationship with the IST, and probably with the constituent standards groups that make up the IST consortium. In essence, the EPWG wants to use the IST work as a point of departure, and "MDA-ize" that work in the OMG. SWIFT and a number of the key players in the finance industry have indicated that they are prepared to collaborate in preparing submissions that produce the semantic model, mappings, and alignments that the RFPs call for.

Farsighted Words

I would be remiss if I did not share with you the fascinating talk that Joe Bugajski, who owns global data interoperability for Visa International, and who has led

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Visa's efforts at the OMG, gave at the Boston EPWG meeting in June. Here were his main points:

- There is a need to match remittance information—what was bought or sold, how the transaction occurred (card swipe, cash register, PDA, and so forth)—with financial data, so that ERP systems can post to general ledger (GL). One credit card entry might have a number of pieces of remittance info.

  Currently enough information carries forward to clear and settle, but not enough for detailed matching of remittance information, such as determining that the single credit card transaction for a hotel bill has x amt for meals, y amt for room charges, and so on, each of which goes into a different GL acct or at least has to be totaled separately.

- In a typical scenario that illustrates one of the problems in the electronic payment food chain, the acquirer (the merchant's bank) sends an airline transaction through VisaNet to the credit card issuer (also a bank). Remittance information must fit in a 30-character field. The last 10 characters are used for the ticket number (yes, it's really that bad). The issuer receives the airline transaction, but has only 20 characters for the corresponding field, so the ticket number is irretrievably lost. Changing to a 30-character field for issuers would cost $20 billion worldwide. The solution is to build auxiliary systems to carry additional information—an additional message. This is a non-invasive solution, and thus is much cheaper. Losing the remittance information affects integration of remittance information with ERP and GL. The RFPs call for the specification of mappings that use such mechanisms for "lossless" format conversions where necessary.

- Today, most if not all of the transformations that occur as payment transaction messages cross system boundaries are hand coded. Hand coding at system boundaries doesn't scale.

- Issuing new data formats is not enough—it is too expensive to adopt the new formats. It is not about the formats. It is about making the meaning and function of transaction data consistent and understood everywhere.

- The goal is to achieve a smooth flow of information: Sourcing -> Ordering/Invoicing -> Payment/Settlement -> Reconciliation -> Reporting/ERP/GL

- Visa estimates that straight-through processing of electronic payments could add 3% to the global annual GDP of $31 trillion.

- Demand is increasing for commercial payment transparency. Companies will find themselves with their backs against the wall screaming "what data do I have, where is it, where does it move, how does it change,

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how do we secure it," and so on. Without efficient metadata management, such as provided by semantic models and mappings to technical formats that actually convey data, these questions can't be answered.

Mark Eisner of FireStar also gave an erudite talk describing practical approaches for dealing with loss of information at system boundaries, such as in the airline ticket number example. His knowledge is sure to be applied in submissions against the RFPs.

Conclusion

The coming dramatic increase in the volume and variety of electronic payment transactions will strain current approaches based on message formats sans semantic models. The goal of straight-through processing of electronic payments cannot be achieved simply by defining new message formats. An MDA approach to the problem of interoperability between the multiple message formats that flow in an electronic payment transaction can help make the problems more tractable, by anchoring all the major formats in use today to a common, rich semantic model, and using the common model to "nail down" how the various formats translate from one to the other.

MDA's role is complementary to the role that the financial standards groups that define message formats play. The players are coming together to put the standards in place needed to support the deployment of comprehensive straight-through electronic payment processing systems. These actors have decided that these standards are crucial in order to grow the electronic payments industry to its full potential.