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1. Welcome to Market Watch

This issue marks a turning point in our Market Watch approach:

As the first DBE application cases are evolving we will be able to ground this and future Market Watch releases for the first time not in mere speculations on how the DBE *could* be applied but in direct practical experiences on how the DBE *is* applied by software developing SMEs. Within the next years DBE *deployment* will hopefully become an increasingly complex matter with the growing DBE community. In order to increase the transparency of that process and to support the DBE community and the DBE foundation at its core with a strategic basis, Market Watches of the second half of the project intend to contribute to a *roadmap for DBE deployment*.

That is based on the assumption that an optimal alignment of the long term technology directions of the DBE with its emerging deployment directions is a central prerequisite for self-sustainability of the DBE.

It would be impossible to derive a full roadmap for that co-evolution in one step. In addition the current 13 Driver SMEs and their cases provide not enough basis to treat all aspects of the DBE as e.g. scalability demands and network topologies for larger user numbers.

Instead we will focus in each Market Watch – in parallel to the growing base of DBE application cases - on another key aspect of the DBE infrastructure and how it relates to deployment.

At the end of this Market Watch we give already an outlook on possible further key aspects to be covered in future Market Watch releases – within the natural constraints of estimating them in advance. This can also be found in **D34.3** – the list of critical topics for future Market Watch releases

2. Introduction

In this issue we will concentrate on the role of semantics in the DBE. We also want to reformulate that into a roadmap vision¹ that will be achievable, concrete and will meet a definite market need and therefore contribute to a sustainable future for the DBE.

The vision is based on a combination of what is happening in the standards organisations and big-vendor market as well as taking cues from the concrete SME driver responses to the DBE project.

It recognises that there is no single one-true picture as to what the DBE is or what it is for – apart from the rather technical picture of the DBE infrastructure elements. In fact, the SME driver applications indicate to us a demand that is outside the original conceptions of the DBE application domain, which also signifies the DBE infrastructure's flexibility and capability to adapt.

The study also concludes that the most perplexing aspect of the DBE is the BML. It would appear that the consideration of semantics in the system has engendered more misunderstanding than any other area of the DBE. While the SME Drivers have carefully indicated areas of concern about the DBE platform and have openly indicated areas of omission,² the BML has either gone unnoticed^[TRI], ignored, shrugged off or so thoroughly imbued with wrong ideas about its purpose or capability that over-hyped expectations about it have been quite common³. However, it has to be admitted that the Service Factory was released rather late for Driver SME case development such that we can hope that BML will become better integrated in the next round of SME Implementer cases.

It is one purpose of this Market Watch to re-address and re-assess the BML and to indicate how the issue of semantics within the context of the DBE vision should find a place in any roadmap for its future development. The direct conclusion is that semantic representations and solutions should be implemented *bottom up* as various software providers understand to a greater extent how their applications can be enriched with distributed metadata about their client organisations. But

¹ Not an actual roadmap – there could exist several roadmaps (to the detail of committed project plans) that implement a single vision.

² Such as security and identity management

³ For example one Driver SME thought that by defining a BML his software would automatically integrate into and be integrated to by all other DBE compatible software applications that may need to share software services with it.

the BML in its *architecture* (especially with a move toward SBVR) needs to be carefully considered from a *top-down* design perspective.

Concomitant to the discussion on a semantics roadmap is a consideration for what type of semantics the DBE can express. It is the conclusion of this Market Watch that a careful consideration is given between distinguishing data that is best contained *within* the executing applications and those that should be *distributed* amongst the network. This idea is not new, it has been raised many times before at various DBE meetings, but detailed analysis of this issue has never been given. Firstly, the semantics represented across the P2P network (as it is ultimately planned) should be *meta*-semantics. By this, it recognises that the semantics represented in the BML primarily exists for the purpose of software automation and “intelligence” not (principally) for the purpose of direct user consumption.

Specific usage recommendations have not been possible in the Market Watch, although this will be addressed in DBE Work Package 20, where BML M1 Models will be constructed (some from the perspective of existing SME drivers and others as top-down industry based models).

3. The original vision of semantics in the DBE

One principle vision of the DBE is to express sufficient semantics and syntax of the business and aspects of its technical infrastructure to enable the process of business service discovery and information technology service discovery to support the business service requirements and to automate the technical interfaces to those software services to enable contract compliant transactional exchange between the organisations engaged.

Of equal importance to the realisation of this vision is that the DBE must:

- ⇒ Provide a simple method to achieve b2b connection
- ⇒ Be affordable to SMEs
- ⇒ And be more attractive than competing approaches.

The roadmap vision presented in this Market Watch also stresses:

- ⇒ What is practical
- ⇒ What can be achieved with the DBE computing stream deliverables (i.e. with what the DBE actually is in terms of what has been delivered or planned to be delivered in the foreseeable future)
- ⇒ The demand for the DBE, in both business and technical areas, from the SME software company drivers and their clients.

In addressing the practical possibilities and opportunities for the DBE, it will examine case-studies from the regional catalysts. Already a broad range of

application possibilities have been identified by them although it will be shown that misunderstandings resulting from ambiguities over the role of the BML are creating difficulties in pursuing the DBE beyond simple semantically weak scenarios.⁴

The primary goal of the Market Watch is, therefore, to express a roadmap vision that sees the DBE as a platform to provide an affordable and achievable means to allow SME software companies and business organisations to provide software services to a distributed environment that implements at least some form of e-business services (in the sense that “transactions” of some sort are exchanged between partners in the network) in a simple way and affordable to SMEs. At the same time, it will establish this roadmap from the perspective of alternative approaches currently available to software implementers.

4. Semantics in first Driver SME cases

Each of the three SME catalyst regions have recruited SME drivers who have sufficient need, software, clients and interest to undertake porting aspects of their existing software offering to the DBE.

The most common application type amongst the DBE Driver SMEs is *network enabling existing applications*. This simply appears to be where attractive quick gains can be identified and understood by the SMEs. For the first drivers that sort of applications were the only ones possible as the Service Factory tools had not yet been released when they started working with DBE.

The environment in which the SME Drivers began their implementations was highly technical, the dialogue between them and the DBE computing stream has been rather productive; providing a more stable and function rich execution environment for the DBE. It is the business cases underlying the SME Driver adoptions that are of particular interest to the Market Watch. Information about this can be obtained from the various Blogs and regional catalyst presentations on their SME driver applications.

It should be observed that the DBE has not been an application looking for a use – but the SME drivers have, on the whole, being organisations looking for particular solutions that have been seen to be commensurate with the DBE. Several of them have stated that they were already looking for an equivalent technical solution prior to knowing of the DBE. However, there have been a few issues and problems encountered by Driver SMEs in getting the DBE working.

⁴ From this comment, it is not meant to imply any weakness in the current SME driver implementations. The DBE implementation is, like SAP, at the start of the business eco-system roadmap and such implementations will be shown to be highly vital for the progressive emergence of the DBE platform deployment.

We summarise these in this paragraph before turning to the SME drivers themselves.

The most prevalent issues facing the Driver SMEs have been problems with system stability and the complexities in getting the DBE executable environment and DBE studio software installed, working and models saved. While a degree of confusion has often accompanied these problems and their resolution, the computing team have addressed issues very promptly and effectively. It is clear that the project has considerable commitment to achieving a stable environment with as much functionality as possible throughout the early parts of the Driver activities.

Of a more serious nature are the calls for more automation and an explanation of the purpose of the BML and its relationship to the MDA architecture of the DBE. Many SMEs have indicated disappointment in the lack of code generation, but again this has been taken on board by the computing stream people who have made commitments to address this issue. The DBE will evolve through time as an open source foundation and one should recognise the impossibility of solving every requirement within the project life time.

A second documented issue relates to the DBE handling security, identity and remote procedure calls. Integratum, another SME driver from Tampere had the following to say:

“Our plan was to integrate some of the Centraview services to DBE, like contracts. But after I found out that there is no identification or authentication and not possible to make remote calls ^[TR2]it sees unwise to implement those services to DBE”.

On the one hand that was a clear learning effect as the compatibility problems of DBE with remote calls had previously not been recognized. On the other hand that is a typical example of a somewhat underrated functionality – even though already in scope by Trinity – that has quickly moved up the priority list of implementation features in the context of the first DBE application cases.. In the following we will look in more detail at some selected cases to indicate the range of applications being ported to the DBE, to further understand the circumstances motivating their participation and report on the documented strengths and weaknesses of the DBE from the SME driver perspective. The case studies are from the Tampere, West Midlands and Aragon region.

4.1 Nemein's OpenPsa

OpenPsa is a project management software application provide by Nemein of Tampere, Finland. The traditional perspective taken by project management software is that of a stand-alone application. While it has been traditionally

possible to share documents⁵ the OpenPsa approach with the DBE is to automate real-time connections between project partners using the OpenPsa software. The rationale for providing a connected network environment for the project management tool is to address the issue of enabling collaboration across business partners given the increasing instances of outsourcing (and joint (virtual) and organisational collaboration).

This was the need faced by Nemein with OpenPsa. Their solution was to connect project management applications of partner companies through the DBE network. The solution is rather elegant because it provides a simple way of connecting together existing and new entrance clients who engage in distributed work and need a distributed project management application. Using the DBE means that the focus of software development needed to make the software distributed is in the application itself (enabling real-time connection between application instances) and not in the networking infrastructure.

The DBE also provides additional benefits. New users of the application connecting to the same communities will become instantly visible. This visibility forms a vital aspect to the eco-system because it enables other organisations to engage with the new user and share integrated elements of the project plan. More difficult is the significance of the BML to the OpenPsa application. It is recognised throughout the DBE consortium that the BML represents vital glue bonding the various elements or components of the DBE together⁶. But at the practical level it is less certain at this stage how the BML will help organisations like Nemein with the OpenPsa software. The plan of Nemein is to create a project brokering application that will utilise the Service Factory tools to enable a project manager to query the DBE network for potential subcontractors based on the business requirements of a proposed project. The Project Broker automatically publishes the availability and other characteristics of the participating companies in the DBE network using a project ontology and model co-operation with the task *C60 Creation and Enrichment on the BML and DBE* of the Tampere University of Technology.

Another suggestion for an application such as OpenPsa is to use the BML to describe business processes and business rules in such a way that organisations engaging in common projects can centralise the rule and process definitions and

⁵ This is of course is difficult to do given that project software documents typically contain large numbers of tasks assigned to numerous resources. An approach external to a DBE type environment that might work is to provide macros that would extract out relevant project task items applicable to a resource and export these (via email, say) to the other party who would reverse this with an import. Many problems exist with this approach, in particular, it is not real-time and retaining data integrity would be very difficult. Additionally, a truly P2P network environment would not exist, making the whole connection process highly manual.

⁶ Email from Paolo Dini to the DBE consortium 17th December 2005.

processing. Thus defined, the rules and processes become available to members of the project, other projects and most importantly, other DBE distributed project management tools developed to take advantage of this distributed semantics⁷. Thus the semantics become an important eco-system enabler, although to be successful and attractive to other SME partners or potential partners, models need to be very carefully designed.

The BML will not provide magic solutions that can exist independently of the application software and therefore outside the consideration of application designers. Application designers will need to make a careful consideration of the possibilities available to the application and then in turn to existing semantic standards or existing DBE models.

From a consideration of this and other case studies, it is suggested that application designers *consider wherever possible and appropriate moving semantics from the applications into the BML*. Nemein are committed to seeing what opportunities the BML can offer their application, although this will be done over time.

4. 2 Integratum

Integratum develop and market a CRM application called CentraView. It is an open source application, which is also available from Integratum as a hosted service. The principle service provided to the DBE is importing and exporting contact data using XML files.

The main problems encountered by Integratum in porting their application service to the DBE are:

- Lack of identity and security management⁸
- Support for remote references in remote procedure calls missing

Integratum have not at this stage provided BML details for clients using the application. Their future plans include using the BML tools to enable trading and exchanging contact information between organisations. However, similar situation exists for this application as others. What specific BML information at an M0 level would enhance the application and business ecology around its use? These are important issues that need to be addressed in the coming months within the DBE project.

⁷ It is important to recognise that what is meant by this centralisation is not that each SME user will define its rules and processes, but that the SMEs will together contract an agreed definition that will work across the partnerships (although it needs to be sufficiently expressive to describe exceptions between certain SMEs.

⁸ We understand this is being addressed by Trinity.

4.3 Domain Solutions

Domain Solutions is a West Midlands based software company specialising in applications generated using MDA. They have a tool called CodeGenie that generates software based on models developed by application designers using the MDA approach.

Domain solutions are using the DBE to trial an application for hotel resource booking. Their aim (in which first test have realised very simple versions of this) is to generate the DBE services from UML models using their CodeGenie tool. The demonstrated service is very simple and illustrative of the feasibility of generating a DBE compliant component using MDA. They have, however, specified a number of use cases applicable to their application. They include:

- Brochure request
- Check availability and price
- Make operator booking
- Make postal booking
- Change booking
- Cancel booking
- Refund money
- Payment

The application is different to the previous two cases, where there exists a community of users who are connected to the same piece of software (which is exchanging data between the partners). Domain Solutions have agreed to an in-depth discussion of the use of BML in this application for DBE work package 20.

4.4 Barrabés

Barrabes.com is one of Spain's pioneers in the e-commerce industry which has taken its mountain-climbing equipment store from a small village in the Pyrenees Mountains to a worldwide online store which has penetrated such strong markets as the United States, Britain and Scandinavia. Five years ago, overwhelmed by questions from European SMEs, Barrabés launched their own consulting firm, dedicated to help Spanish companies develop their businesses around the world. One of the main areas of expertise, due to their location, is the tourism industry. Barrabés has acted as a communication link between IT developers and tourism businesses.⁹

Barrabés have provided some interesting responses to the DBE. On the technical side there have been issues of software bugs and the difficulties in getting models into the system and having them stay there. They consider

⁹ <http://www.ita.es/dbe/#>

Eclipse environment to be very complex and requires a considerable learning curve.¹⁰

The business side is more interesting. Luis from Barrabés is competent at describing and modeling business processes and other aspects of the business, but cannot see what benefit would be gained from modeling such things in the DBE. All the different types of models seem difficult to match in terms of the benefits and software usages (what would the models be used for). Barrabés are in effect asking the “So What” question regarding BML modelling. The technical help for the BML modeler is quite good, but they are very much lacking coaching on how the BML could be applied in their DBE case.

One final interesting feedback was made by Barrabés with regard to semantics. As an SME software company they are frequently under a lot of pressure to build and deploy systems that would make it difficult to undertake such high front end modelling resources. Now they are fully aware of the importance of program design and documentation, but any effort to extract out logic from an application into a central repository based on a BML design would need to be very efficient and worth while.

¹⁰ We should recognize the importance of Eclipse because it contains the code input and code generation parts of the BML and SSL etc.

5 The Marriage of Syntax and Semantics

5.1 The case for combining Syntax and Semantics

Right at the outset the DBE vision recognised the importance of adding semantics to the syntactical expressions of business and technical service descriptions.

The need for semantics is understood with a typical “survey” of current techniques

- ⇒ Large silo applications that are difficult to integrate (internally, let alone cross organisations)
- ⇒ Incompatibility across platforms
- ⇒ Integration by file transfer (fundamentally what EDI is)
- ⇒ Integration by proprietary APIs (names and parameters)
- ⇒ Proprietary (and where standards exist, incompatible) standards for the representation of documents (invoices, orders, payment schedules, delivery notes and so on).

The arrival of *web-services* is an attempt to overcome the limitations imposed by these restrictive factors. Web-services will create a technology environment where smaller software components can integrate to form compositional software services. This approach is more flexible to organisations needing to change their business models and processes in ever increasing frequency.

But web-services *alone* will not solve the problem of:

- ⇒ Proprietary or competing definitions of business documents
- ⇒ Incompatible naming standards for method execution and parameter lists
- ⇒ Integrating with the current legacy applications that organisations have already invested substantial sums of money and cannot therefore afford to radically change their core operating software
- ⇒ Providing trust in the new paradigm of small compositional software components (especially if the software composed is aggregated from a large number of independent and possibly unknown software vendors)

Significant for this study is the fact that *web-services standards on their own do not provide the marriage of syntax and semantics that is required for the DBE vision*. Semantics is required to:

- ⇒ Enable service identification and location (both technical and business)

- ⇒ Provide a means to automate the connection to the software services executing the required business service
- ⇒ Deploy “workflow” in accordance with the agreements made between parties engaging in distributed transaction exchange. For example, ensuring that transactions are sequenced in the order agreed to by the parties in the engagement
- ⇒ Provide a standards identification facility to map the consumer with supplier interfaces (and potentially allow for the translation between different (but compatible) standards
- ⇒ Enabling complex forms of system integration and service composition (possibly on-demand)

The web-services community are addressing the concerns of semantics by the following technologies:

- ⇒ Core to the web-services community is UDDI (Universal Description, Discovery and Integration) which is a “platform independent way to describe services, discovering businesses, and integrating business services using the Internet as well as operational registry”¹¹ – i.e. meeting some of the semantic requirements mentioned above.
- ⇒ Linking with the Semantic Web community.¹² The semantic web technologies provide a means to represent semantic information, including that required for adding semantics to web-services. The principle tool in the semantic web tradition is the ontology. There has already been much discussion about the use of ontologies to represent the BML in the DBE.

Combining semantics and syntax is one of the primary research goals in the business software market. This was also expressed by Prof. Dr. Lutz Heuser – head of SAP Research. In a presentation entitled “Enterprise Services Architecture & Semantic Web Services” he explains that the goal of merging semantics and syntax is to provide a “composition platform” to enable “flexible business processes” which in turn will enable “a huge ecosystem develops around it”.¹³ These ideas look very reminiscent of the DBE vision.

The most significant contribution in Heuser’s paper is his direction and goal map, which not only indicates where SAP is headed in their web services vision, but where they demarcate the only areas of sensible development. It provides an actual tool for comparison of corporate market trends with the status of the DBE. Heuser’s starting point is static web services in a closed and trusted environment using single, private, implicit ontologies. This means that the semantics driving e-

¹¹ Walsh xvii

¹² See Alesso and Smith

¹³ Quotes from the presentation

business engagements are hard-coded to the parties involved. In such an environment it is not possible to create an eco-system in the manner envisaged by organisations such as SAP and projects such as TrustCom where dynamic organisational configuration and therefore on-demand ERP software integration is essential.

Interestingly while Heuser draws areas he labels “useless area” where extremes or unbalanced combinations of syntax and semantics fail to deliver relevant support for flexible business processes, the area of high syntax with no semantics he labels “meaningless”. This is a scenario where sophisticated “on the fly” compositional web services in an open environment are provided within single, private and implicit ontologies. We learn from this that the role of semantic description within the DBE needs to address a balance of semantic and syntactical richness, but a roadmap should recognise that this balance is also time-bound. Starting from simpler services and working towards a more integrated and powerful environment is sensible and standard, even if to recognise the huge challenges in semantic specification that integrates with the syntax of computational services.¹⁴

5.2 Syntax and Semantics within the DBE

The DBE environment is composed of the following components:

- Service Factory environment
- Execution environment
- Evolutionary environment

It is in the service factory environment that an SME describes the business and technical interfaces. The Business Modelling Language (BML) provides a meta-model for creating Business Organisational Models (BOM) and Semantic Services Language models. The Semantic Services Model defines the services that need to be implemented to perform a technical implementation of a business service that is defined in the BML. These are both computational independent models, so do not express interfaces in a technical way.

The relationship between the BML and the SSL is of major concern to software implementers. It was shown previously that comments to this effect have been made by various Driver SMEs.

¹⁴ The challenge is massive, which is why no implementations are available on the market today. For example, the semantic models may need to be intensional and not extensional. The logic built into it non-classical (in many ways) and potentially non-representational implementation models (such as connectionist models) may be required. In other words, the current semantic web view of ontologies and knowledge representation may be too weak to drive the type of eco-system contained in the DBE vision.

The SSL is then represented in a platform independent model called the Services Description Language (SDL). SDL is a technical interface specification conforming to MOF (as is the BML and SSL) and can be automatically generated from the SSL, although the current DBE implementation will provide for a skeleton generation.¹⁵ The Platform Specific Language (PSM) is generated from the SDL into Java code. This PSM is still very platform independent because Java is a platform independent language.

The specifications defined in the BML, SDL and the instances (actual models for an SME) are compiled into an XMI document called the service manifest. This is then published into the DBE P2P environment and made available to the network (applications accessing the DBE implementation).¹⁶

The service factory environment confirms to the MDA approach to software development (part of the OMG standards). A comment is necessary here, because the relationship to MDA has created great confusion amongst SME drivers and DBE consortium members alike. The MDA as conceived by the OMG is a software specification and development environment for business applications. Production code is generated through the models defined in the MDA.

The service factory is a *specification* environment, not an *application code production* environment. But the metaphor is strong and sound, because the specification coding required for an e-business interface conforming to the DBE vision would require a considerable degree of manual design, specification, implementation and coding.

The DBE does address an automation process from BML modelling through to WSDL implementation of the interface specifications in the manner of the MDA approach (and it conforms to MOF, the Meta Object Facility standard defined for MDA). But the DBE does not generate application code that is designed to form the software implementation of business services exposed on the DBE – software companies or development teams writing software that will be exposed to the DBE develop this software using the methods and approaches of their choice, independently of the service manifest models (although if writing software specifically to interface to the DBE means that the software project would be informed by the DBE capabilities and the use to be made of it).

¹⁵ This is because the SDL is not computationally independent and the DBE policy of avoiding particular standards is being adhered to here. Actual SDL descriptions will need to conform to industry or implemented standards, hence specified above the skeleton code generated from the SSL.

¹⁶ It should be noted that the models and model instances for the PIM are developed within the modelling design product produced by the DBE consortium called the DBE Studio, which works as add-ins to Eclipse. The DBE studio is not discussed in this Market Watch because it has little influence in the main vision presented here.

The most important aspects of the service factory environment for discussion in this Market Watch are:

- The use made of the semantic models (BML)
- The relationship between the BML and the SSL
- The current degree of model and code generation automation and future possibilities for automation

These issues are related. It has already been observed that more attention is to be given to the use of BML in the DBE and an informal working group across all the work-streams are committed to this work. The various ways in which the BML can be used in the DBE also reflect the relationships between the BML and SSL. BML generated to SSL does not necessarily indicate that the BML model, once “compiled” is no longer of use to the DBE.

It is likely that application software will use the BML for many different semantic services. The linkage down to WSDL via SSL is certainly one of translation. The interpretation of business requirements in the BML can be translated to technical interfaces to actual transaction (message) instances at run time using WSDL. In other words, it does not seem viable that the platform depended layer will contain sufficient semantics to fully enable software composition or service execution.

6 Semantics in the DBE implementation

6.1 Original vision for DBE software platform

This section provides a context for the role of semantics in the DBE architecture. It describes some of the key points from the architectural requirements for the DBE and makes comments on the selection of features considered important for the DBE roadmap from the business domain perspective.

What level of business interactions is the DBE to serve? This is answered in the “DBE architecture requirements” document. On page 8 a model of business interaction is presented (based on the OMG “Levels of Information Exchange”).

LEVEL	Name of Level	Example
1	Intra-System	A billing system
2	Inter-system, intra-enterprise	Level 1 systems communicating, an ERP system
3	Inter-enterprise, Intra EBC	Level 2 systems communicating, ERP with SRM with Finance... (depending on context)
4	Inter-Community	Level 3 systems communicating

Here, a level 2 system is described as a sophisticated linkage of applications based around business processes and business rules (not a simple “list” of standalone application). As an example of a level 2 application, stock level changes trigger material and stock replenishment; stock level changes are triggered by manufacturing processes triggered by customer orders.

Level 3 is described as a completely different ball game where “a whole new set of problems *is* to be described and modeled: the cost of a machine, the volume discount policy, rules and parameters by which potential suppliers are admitted, payment methods, contract duration, maintenance contracts, warranty, import/export rules and limitations, liability, etc. The nature of the problem has changed because the user has changed; it is an “outside-in” view rather than the “inside-out” view of Level 2. The information system is referenced to external entities that share no common assumptions. Everything is meta-model and meta-data.”¹⁷

The requirements document continues by stipulating that “Level 3 is the right starting point for the DBE: the main scope is Level-3, where the meta-modeling concept is fundamental and where the resolution is coarse. The DBE **initial goal *is to model business processes and transactions in order to obtain interface specifications (declarative code)***. The imperative code and the Level-2 services will follow in later phases of the project. In the first phase of the project it seems unlikely that the self-evolving features of the DBE will apply at Level 3 since there must be a strict control over the integration of the process, which cannot be stochastic. Semantics will also play a limited role, with some variation in different cases.”¹⁸

In the requirements specification, the DBE is described as a portal. SME suppliers register themselves in the DBE and then describe their organisations and business using the Business Modelling Language (BML). A supplier models their business from a consumer perspective, providing sufficient and meaningful information for that perspective¹⁹.

BML models are created using a BML editor. The editor requires the expertise of a UML experienced analyst. The BML Wizard (*has this been implemented yet*) is designed enable business people without UML knowledge to create model instances based on model “templates”.

A highly simplified example given in the requirements specification of the type of data registered in the BML for a hotel is:

- Name of the hotel

¹⁷ Italic “is” added by author

¹⁸ Italic “is” and bold added by author

¹⁹ This level of explanation is far to general and vague to be of much use in establishing the rationale for the BML, but this problem has plagued many of the DBE descriptions of the BML.

- The address
- The hotel services
- The number of rooms
- The pricing policy

A consuming organisation (travel booking agent) would supply parameter data such as:

- Personal data
- Check in date
- Check out date
- How many rooms to book
- How many people occupying each room

And so on.

But in addition to the BML it is necessary to provide a service description (using the Service Description Language (SDL) from a computational but platform independent perspective. The requirements specification provides for three options:

1. Computational interface
2. Yellow page
3. Interaction form (where the SME provides a basic GUI via the DBE)

The second option was considered by Drivers to be of minor interest and hence is not used in any of the Driver SME application cases. This type of advertising board is already widely available in every European region and we expect that adding to its number, apart from undermining the real capabilities of the DBE, would not be welcome amongst SME businesses²⁰. There is certainly an interest for the third GUI based services option but that needs to clearly distinguish itself from what is already possible through the uncountable regional or sector specific web portals with standard functionalities such as order processing, shop browsing, supplier aggregation, auctions etc.

In the current deployment by Driver SMEs and representative in this Market Watch issue, the real interest is in the computational interface.

Another feature of the DBE is what is known as the Basic Services. These are standard services provided by the “shipped” DBE application that are common to most if not all transaction engagements within the DBE.

The original list of Basic Services envisaged for the DBE is:

- Payment

²⁰ The DBE would have to be regarded as the most expensive “Yellow Page” system ever conceived.

- Invoicing
- Information Carrier
- Secure Identification

These services integrate into the DBE as any other software service (BML, SDL etc.). The intention was to engage SME drivers to provide these services to the DBE. From the perspective of the current SME driver requirements and the way the DBE roadmap is envisaged such general central services as payment and invoicing are of little relevance.²¹ However, they might become more relevant in the context of application services charged on use time.

To sum up, the definitions contained in the BML and SDL will need to be realistic, meaningful and useful for the applications running in the DBE.

6.2 BML Implementation

Insufficient resources were available for this Market Watch to undertake a detailed description of the execution environment other than to remark on comments made by the SME drivers²². A significant amount of effort has been put into the execution environment and it has matured at a rate too fast to provide a detailed discussion here²³.

The current services available represent a significant reduction from the original DBE vision, but the argument presented here is that from this concrete starting point and some further integration of semantics and syntax, the DBE provides significant benefits to SME software developers and application users over existing mechanisms to integrate digital commerce, but at present, there exists no standards to formalise this and much of the standards work is still immature in terms of generating the type of digital eco-system envisaged by the DBE. This also shows the difficulty of involving SMEs in a large research project where the technology is developed at the same time it is deployed by the SMEs. The services would be very different if they could have been developed using all the tools that have been and *will be* developed in the project.

In principle, the use of semantics to provide service discovery needs to be supplemented with a significant amount of detailed additional semantic information to provide automated contracting and transaction processing in accordance with agreed (via the automated contract) processes and procedures and compatible with document definition standards and this augmented semantic information needs to be automatically generated from higher level definitions. If

²¹ The primary reason is the preference to the computational interface. Realistically, even in relatively simple industry situations, there exist diverse formats and standards even for an invoice definition.

²² See section **Fehler! Verweisquelle konnte nicht gefunden werden.** for examples

²³ It is planned in a future Market Watch dedicated to technology comparisons.

the lower level semantics cannot be generated from more general descriptions then the facilities of automation are merely apparent and not actual. Further work is required, therefore, on identifying useful relationships between the BML and SSL and some form of mapping defined.

In addition to the service discovery element therefore, the emphasis for the BML as it is delivered must be to take certain elements of the logic involved in e-business into a central location away from the individual application programs that implement the services. In doing this, the applications that can interrogate the BML can provide “intelligent” services more flexibly.

But to do this, the BML repository needs to implement common model definitions that are used by trading partners and recorded in the DBE as representing those agreements.

7 Outline of a Roadmap

This section concludes this Market Watch study with a set of recommendations for first elements of a DBE deployment roadmap.

Some important principles are emerging from the early DBE usage. These are:

- The current series of BML code camps have been good for getting users up to speed with using the software. But this is insufficient. We recommend that further effort be placed in understanding each software driver’s contribution to the DBE and work together to understand ways to introduce semantics into their environment (by way of BML) to increase the flexibility and viability of the use to which they expect their software in the DBE to be put (a BML think tank camp!)²⁴
- The DBE enables networked business opportunities that are easier to implement than what current web services or semantic web technologies allow.²⁵ One of the key aspects of this is the P2P environment, which enables business connectivity that is considerably easier to implement than would be without the DBE infrastructure. The other is the service factory, which potentially provides a very rich combination of syntax and semantics to serve business opportunity discovery and transaction configuration and execution. These enabling factors should form a critical guide to any roadmap.

²⁴ I have become aware at the time of writing that Tampere has already undertaken to do such a “camp”.

²⁵ A subsequent Market Watch will examine these technologies in more detail making a comparison with the DBE

- The DBE is open source and while it requires considerable technical expertise to use, the huge pool of SME software specialists in Europe who are well capable of working with and extending the DBE application will ensure the DBEs future. The establishment of an open source foundation for the DBE will be a vital part of its success and a degree of marketing to software communities will be required to ensure that the foundation is adequately supported during the early phases of its independent existence.
- Industry trends indicate that both semantic and syntactic principles are critical success factors in future e-business software integration, especially to support the expected growth in complex virtual organisations and distributed work. The development of BML is therefore an essential aspect of the DBE roadmap. Consideration has already been given to the adoption of SBVR as an alternative to the version 1 BML, but whichever path the project chooses, the importance of providing both ontological information and rules based information about both the syntax and semantics of the business rules and their automated implementation in software are key factors to consider.
- As time progresses the DBE will be used to implement increasingly mature e-business transaction processing. In terms of DBE vision, this requires two considerations. One is to enable common rules, technical interface and document structure definitions across multiple organisations. The current BML is too locked into individual organisations. For while it is possible to use pre-defined M1 models and base these models on agreed ontologies, they are still hard-linked to the individual organisation defining them. In the future, it should be possible to use common definitions defined between contracting parties that are also based on common standards and made available to other organisations²⁶. The other consideration is further penetration of automated code generation of the BML and SSL declarations. It is likely that more thought will need to be put into the basic architecture in order to accomplish this. In particular, the BML and SSL are a little separated and it is uncertain whether it is possible to fully integrate them in their current form.
- Security and identity need to be addressed and included in subsequent versions²⁷.

²⁶ The implication here is that the BML must enable a declaration of one or more shared BML models that are linked to the organisations that are agreeing to comply with them. This is a little more sophisticated than might at first seem, because it implies a many to many relationship between each organisation and BML models and other organisations.

²⁷ We understand that Trinity are providing certain identity and security management services. These will be detailed in the more technical version of this Market Watch.

- The typical early adopter applications should be kept simple and focus on simple networked applications and simple e-business applications.
- An early example of software service = real world service should also be found, particularly if this can be integrated into the existing Driver SME applications. There was a potential early application of this type from the Tampere region. The software would convert multi-media file formats and therefore represented an interesting alternative to the existing SME driver software. This type of software will be important to the future of the DBE, particularly for the purpose of software component composition.