

The BizDex Registry

BizDex Technical Review Series – 3 of 4

This is the third in a series of four white papers that explain how BizDex works. This paper addresses the business registry component and in particular the quality, trust and usability features.

Prior to reading this document, readers are encouraged to read the BizDex Technical Overview white paper which is available from the downloads section of the BizDex website:

Website: www.bizdex.com.au

Community Data Management

Imagine a typical city that hosts around 100,000 businesses. Lets assume that there is no such thing as a business directory in this city - specifically there are no yellow pages nor are there any commercial listings in the white pages. Businesses in such a city would have great difficulty finding each other so each business would build it's own directory containing contacts for it's customers and suppliers. If each business maintained 1000 contacts, there would be 100 Million contacts being maintained throughout the business community. Imagine the cost of unnecessary duplicated effort and the potential for errors as contacts change. If all this were not bad enough, imagine how it would be if each business spoke a different language so when you finally get through, you can't understand the message.

B2B communities face a very similar problem. Each community member typically maintains a set of data about each partner (access points, security credentials, interface definitions, etc). Furthermore each member will often impose different business technical requirements on their partners.

The BizDex registry service

The BizDex registry service is the phone directory for the B2B world and is designed to carry all the necessary data to fully describe a business profile. A typical profile includes basic contact data (white pages), classification data (yellow pages), technical interface and access point details (green pages). All the data is machine readable via a web service interface. With BizDex, organisations publish their profile once and can discover any other organisation profile data using a single key such as ABN.

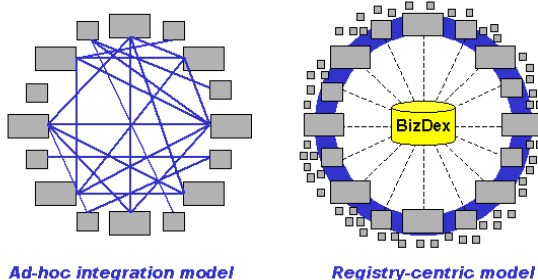


Fig 1 – Registry-Centric Communities

It is important to understand that the BizDex registry is not a transaction hub - actual business messages such as orders & invoices are exchanged directly between partners and do not go through the BizDex registry. The registry serves only to facilitate the discovery of partner profiles and the automated setup of partner integrations. Some key attributes of BizDex are:

- **Standards based.** BizDex is built on an international standard specification of e-Business registries called UDDI (Universal Description, Discovery & Integration). The UDDI interface is well supported by major software vendors so BizDex will be easily accessible by most business systems.
- **Non-Aligned.** BizDex is owned and operated by Government and Standards Australia on a not-for-profit basis. This makes BizDex a trusted, non-aligned service that is free from any anti-competitive interests.

- **Quality controlled.** "Garbage-in, garbage-out" is a term that certainly applies to some public data sources like registry services. A key attribute of BizDex is that it is not just a piece of software with free-for-all access. BizDex applies a governance and data validation layer above the basic UDDI registry service in order to ensure that BizDex data can be trusted.
- **Interoperable.** Although BizDex is positioned as national infrastructure, it will not exist in isolation. There will be other e-Business registries both in Australia and internationally that will need to share data with BizDex. BizDex has been designed with a replication and federation model to ensure interoperability with other registries.
- **Secure.** BizDex provides a security model that controls access to registry information according to the rights assigned to the user. Some data is normally public and available to anyone. Visibility of other data may be limited to members of a specific community. In some cases, data is visible only to trading partners that have specific bilateral agreements.

BizDex as snapshot of community B2B health

Once a central B2B registry is in place and is being used, some new benefits can be realised. For example, the registry provides a snapshot of the state of B2B capability of the community (which business can automate which process, which standards are most prevalent, etc). This aggregate community information is just not available when each organisation "maintains their own phone book" and is invaluable in planning further B2B development for the community.

BizDex as a meeting point

As central place to store profiles, the registry is logically also the place to facilitate the negotiation of bilateral partner agreements (effectively the overlap between two profiles). For example, a standard B2B registry will contain the technical interface specifications for two businesses that want to automate a process. However both sides still have to download and examine the specifications in order to establish whether they can natively exchange business messages or whether they need to do some further technical development. BizDex extends the standard registry role by providing a partner manager that automatically examines the two profiles and determines the common technical capabilities. Two businesses can then agree at a business level which processes they want to automate and can add additional commercial or quality of service constraints on their bilateral relationship.

Introduction to UDDI

A UDDI (version 3.0) registry is at the heart of BizDex and it contains:

- **White pages** – Business name, identifiers (eg ABN), address & contact details.
- **Yellow pages** – standard classification structures (eg geography, industry code) that are used to classify business and services.
- **Green pages** – describe the technical interface definition of a service (eg sales order service) and define the access point (eg URL or e-mail) for that service. Green pages point to "tModels" which, in turn, provide the service technical details.
- **Identifiers** – Every BizDex entry carries an ABN and may also be identified by, ACN, DUNS, EAN-GLN or other industry specific identifier.
- **tModel** - is a UDDI entry that is independent of a particular business entity and is designed to describe standard interface definitions that are re-used by many businesses. For example, many businesses might provide a sales order service but all comply with the same EAN.UCC standard that is described by a tModel.
- **Repository Objects** - All the UDDI components described above are meta-data entries. Web Services are described by XML objects such as WSDL (Web Service Description Language) files. Rather like the card index in a library, UDDI describes and points to these objects but does not store the objects, which are located anywhere on the internet. BizDex provides a repository for local storage and lifecycle management of standards.
- **Federation** - UDDI is designed to support a federated architecture where data and queries can be replicated between registries. In a

similar way to the Internet Domain Naming System (DNS), this permits users to access global data through a single UDDI service.

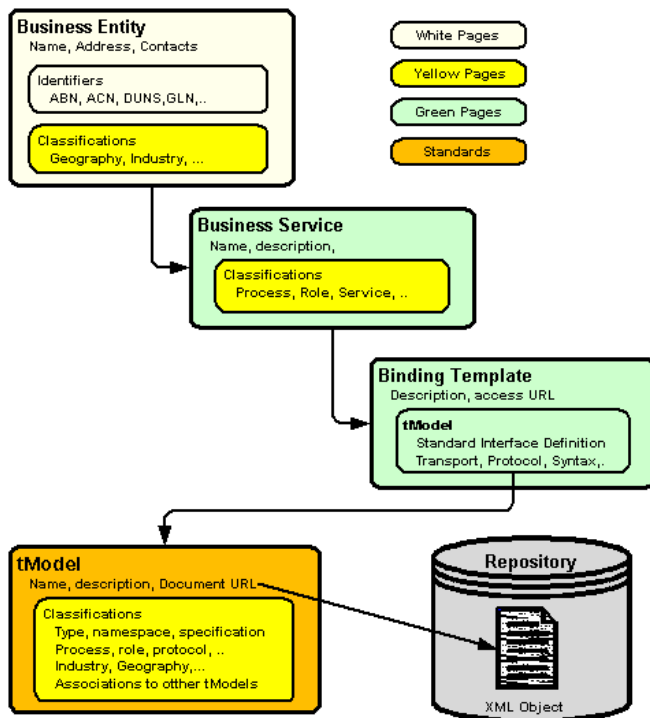


Fig 2 – UDDI Data Model

BizDex Key Requirements

Quality Requirement

“Garbage-in, garbage-out” is a well-known phrase that is especially applicable to registry services. The value of BizDex is directly related to the quality of the data it contains.

- If entries are not classified or are incorrectly classified then they will be lost amongst the millions of records – like trying to find a library book that has been put back on the wrong shelf.
- If service (green pages) data is incomplete or incorrect then partner agreements (TPAs) cannot be created and transactions will fail.
- If classification schemes are not based on well-established standard taxonomies that are used by all UDDI registries then data and queries replicated to cooperating registries will not return useful results.

BizDex requires a mechanism to guarantee the quality of published data.

Usability Requirement

BizDex is targeted at the non-technical user and should be correspondingly easy to use. However in order to populate a UDDI registry in accordance with the strict BizDex quality rules, the user would normally require a detailed technical knowledge of UDDI. BizDex requires a mechanism to remove this complexity from the user.

Trust Requirement

BizDex data must be trustworthy. For example, users must be assured that they are not sending orders, invoices & payments to someone masquerading as the partner they know & trust. This means that BizDex must provide a mechanism to:

- Authenticate that users are who they say they are.
- Verify that the user is authorised to act on behalf of the company they claim to represent.

The BizDex Approach

The quality & usability requirements are met through an additional layer built above the core UDDI product that automates the profile publishing step. The trust requirement is met through use of ABN-DSC certificates to control the authority to publish. ABN-DSC is an Australian national trust (PKI) framework. For more information on ABN-DSC, please visit <http://www.verisign.com.au/gatekeeper/>.

The approach is to request as little information as possible from the user and instead automatically generate as much data as possible from reference schema or other sources. This approach is shown in the diagram below:

Start with quality reference schema

The quality process starts with the creation of the schema that define the community standard “public process”:

- WSDL objects to describe standard interfaces
- XSD schema to describe standard information exchange
- BPEL objects to describe standard business processes
- WS-Policy objects to describe standard quality and security rules
- Template partner agreements (WS-Policy or ebXML CPA)

These schema are created by the standards body or industry working group that is responsible to define the information and process models that constitute the “public process”. Quality & consistency of these schema is assured via:

- A certification & approval process that checks the schema before publishing to BizDex.
- Consistency of naming & design rules through automatic generation of schema from model data or from legacy standards such as EDIFACT.

These quality control processes are part of the BizLib service and are compliant with UN/CEFACT standards (BCF model & core components).

The last step in creating the reference standards is to publish BizDex registry entries (as UDDI tModels) that represent the standard schema. The BizDex service provides an automation interface that extracts data from the schema to generate consistent and reliable meta-data. The interface implements and extends the standard wsdl-uddi mapping defined by OASIS:

<http://www.oasis-open.org/committees/uddi-spec/doc/tn/uddi-spec-tc-tn-wsdl-v200-20030627.pdf>

At this point, the BizDex registry is populated with “public process” standards.

Seed with valid business names and identifiers

The next step is to seed the BizDex registry with Australian company names and key identifiers. BizDex is synchronised with the ASIC (Australian Securities & Exchange Commission) database of company trading names and identifiers (ABN & ACN). This ensures that BizDex only contains valid Australian business entities. Business users must locate their seed entry and add further details rather than creating entries from scratch.

Auto-generate business profile data

The next step is to generate the detailed BizDex entry for a business with as much automation as possible and as little input as possible from the business user. In order to achieve this goal, the BizDex service provides:

- An authorisation model that prevents business users from creating tModels. In normal circumstances a business can only create a service that points to a standard interface definition tModel but cannot create the tModel itself. This approach is fine for the vast majority of small and medium sized businesses. Large corporations that have already created a de-facto standard interface may create tModels by specific request to the BizDex administrator.
- A mapping from the standard interface definitions represented by tModel to business service entries for compliant businesses. The

mapping is supported by a registry service that generates appropriate businessService and bindingTemplate entries when a business declares compliance with specific public processes.

- A mechanism for businesses to easily determine which “public processes” they comply with. Businesses are able to identify their back office application and then be presented with a list of public processes with which they can comply (because the relevant private process schema have been previously loaded into the registry). Also, registration invitation e-mails from community hubs will carry a link that automatically directs the small business to the relevant public process standard

With these additional services in operation, a small or medium business can create a high quality registry entry simply by:

- Locating their seed entry via ABN, ACN or name search.
- Adding basic address & contact information
- Selecting their back-office application from a list
- Verifying and accepting the automatically generated profile data

published in the registry. Some middleware systems (eg BizLink) are able to automatically load the private process schema whilst others will need manual intervention.

Find business partners and negotiate agreements

Once two parties have published accurate profiles then they are in a position to discover each other and determine whether they have compatible technical profiles that permit them to exchange e-business messages. The common capabilities are computed by BizDex and agreed between two parties in the form of a “Trading Partner Agreement” (TPA). Depending on the technology requirements of the partner profiles, BizDex can create a TPA in the form of an ebXML CPA or a WS-Policy document. The CPA/WS-Policy document can be used to automatically configure partner middleware.

The key reason for implementing the quality controls described in previous sections is so that registry meta-data is accurate enough to compute the TPA.

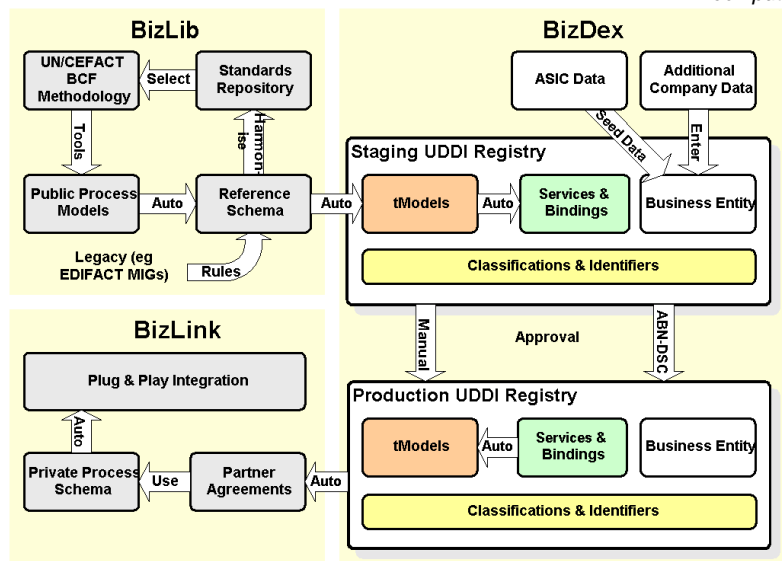


Fig 3 - BizDex quality & trust process

Make sure that the data is trustworthy

The last step in the profile publishing process is to make sure that the publisher is the legitimate owner of the profile being published. Previous sections have addressed the quality & usability requirements. This step addresses the trust requirement. The BizDex Service:

- Provides a staging registry service where all new data is published. Data in staging must be approved before it can be published to the productions service. This means that data is not visible to the community of users until it has been approved.
- Approves business profile data automatically but requires the business to present an ABN-DSC digital certificate. ABN-DSC certificates are issued after in-person validation (at Australia Post offices) of the identity of the certificate holder and that he/she is an authorised representative of the company identified by the ABN in the certificate.

After this step, business profiles visible in the production registry contain only quality, trustworthy data.

Connect back-office systems

In almost all cases business systems will not natively speak the “public process” standard. BizDex maintains a library of “private process” schema (transformations etc) that permit specific enterprise systems to comply with the public process standards. BizDex also provides the BizLink connector for those organisations that do not already have their own middleware solution.

BizDex will send the necessary private process schema to the organisation according to the instructions for the organisation

A template TPA (ebxml CPA or WS-Policy) document is published together with the public process schema. A registry based agreement calculation and negotiation service then uses profile meta-data only to derive the necessary information to update the template TPA to become a partner specific TPA. Using registry meta-data for computing partner agreements means that public processes described with Web Services schema can be deployed using ebXML protocols and vice-versa.

The key reason for using registry meta-data for partner profiles & agreements is to support interoperability between different technology standards such as web-services and ebxml.

Do e-business!

All activities up to this point have been focussed on automating the set-up of a B2B relationship. The last step is to exchange actual business transactions. The TPA created in the last section is signed and sent to each partner according to the instructions for that partner in the registry. Some middleware systems can process TPA's automatically and so they would be sent to a Web Service – others require configuration by human administrators so the TPA would be sent to an administrator via e-mail.

Once middleware systems have been configured (manually or automatically) via the TPA then trading partners can start exchanging business documents – directly between enterprise systems. Security is assured through message level digital signatures using ABN-DSC certificates.

Meta-Data mapping

The automation described in the previous section delivers a very simple way for end users to publish their profile then discover & bind with their trading partners. However the automation depends on the existence of well-defined mappings between layers of e-business standards:

- Mappings that precisely define how model data maps to Web Services schema. This work has commenced at UN/CEFACT but is not yet complete.
- Mappings that define how web services schema map to registry meta-data. This has been done by OASIS (wsdl-uddi TN2) for simple web services but the mappings are inadequate for real B2B scenarios.
- Mappings that define how to create technology specific (eg web services, ebxml, ediint, etc) bindings from registry meta-data.

The standards community has started to address this problem. OASIS wsdl-uddi technical note v2.0 defines some basic mappings between wsdl elements and corresponding uddi meta-data. UN/CEFACT has started to define naming and design rules to create

web services schema from BCF models. Unfortunately these efforts tend to be fragmented and unrelated.

BizDex takes a holistic view of the entire standards framework and provides an integrated set of mappings & design rules aimed at automating B2B processes. Just as the WS-I BP1.0 (Web Services Interoperability Basic Profile 1.0) provides a set of rules to improve interoperability between deployments of basic web services standards (soap, wsdl, uddi), so BizDex provides a very similar set of rules to facilitate interoperability between deployments of the extended web services stack. The following paragraphs examine these rules in more detail with reference to fig 4.

What meta-data elements do we need?

Before considering the mapping rules at each step in the process, we need to understand what meta-data will be needed in the uddi registry in order to adequately describe a business profile and to negotiate partner agreements. These are listed in table 1.

Profile element	Expressed as	Description
Business Profile (Service)		
Business process (BP)	Universal resource name (urn).	Uniquely identifies the common process and information model (eg RosettaNet PIP3A4).
Role (Role)	Local name within BP urn – taken from UN/CEFACT role taxonomy	Uniquely identifies one party in the collaborative business process (eg buyer)
Technology Profile (Binding)		
Information syntax	urn of syntax library	Uniquely identifies the format of the information exchange (eg edifact, xml).
Messaging framework	urn of messaging standard	Uniquely identifies the messaging protocol (eg ediint as2)
Security Framework	Urn of trust domain	Uniquely identifies the trust domain (eg ABN-DSC)
Transport	urn of transport standard	Identifies the transport (usually http or smtp)

Table 1 – meta-data of a business profile

A business process definition created using the UN/CEFACT modelling methodology defines all the semantics of the business process collaboration including:

- The process context (classifications)
- The role of each party involved in the process
- The main and exception process flows as sequenced activities
- The information exchanged at each activity in the flow
- The quality of service attributes for each activity (non-repudiation, reliability, time to perform, etc)

If each process definition is uniquely identified and fully described then an organisation need only specify that they comply with a specific role in the process definition to determine all the semantics of the collaboration.

In addition to specifying the business semantics of an interface, an organisation also needs to describe the technologies or implementation frameworks that they support in order for a perfect match to be determined. The key technology data elements are:

- **Syntax** – the process definition describes only the semantics of the interchange but does not dictate the format of the message

that will contain the semantics. Typically, a process information model will be mapped to either an EDI or XML syntax urn.

- **Messaging protocol** – quality attributes like non-repudiation, reliable delivery, etc are implemented by messaging standards such as WS-RM, ebXML-TRP, EDIINT, etc. In most cases, the abstract quality attributes defined at the model level can be mapped to physical attributes of a specific messaging protocol.
- **Trust domain** – partners must share a common trust domain in order to authenticate each other. For BizDex phase1, the trust domain is ABN-DSC.
- **Transport** – at the lowest level the technology profile must indicate which transport is used. Normally the transport will be http or smtp but may include others such as MQ.

An interface for a B2B process can be defined by a “fingerprint” consisting of as little as 6 key identifiers. The next challenge is to define how to accurately populate a registry with the business profile and then to use this registry data to enable plug & play integrations.

Mapping step 1 - model -> schema.

The UN/CEFACT business collaboration framework (BCF) is a business process methodology built upon UML that provides a sound framework for the development of business process & information models. Modeling tools that support BCF (as a set of predefined UML stereotypes) will permit business users to define their process & information requirements in a visual environment. A detailed discussion of the modeling framework is provided in the BizLib white paper. For our purposes we need only understand that the BCF is a top down framework that guides a business analyst through four model layers from the high level Business Domain View (BDV) through the Business Requirements View (BRV) to the detailed Business Transaction View (BTV) and Business Service View (BSV) that carry the information needed to create the following web services schema.

- One interface definition WSDL file for each role in the business process. The WSDL portType maps to a service. The WSDL files also define one or more bindings for each BSV service. The bindings connect the abstract model to a specific deployment technology / protocol.
- One BPEL process schema for each role in the process. These are required because the WSDL files define the web service only as a collection of interfaces without defining the orchestration of those interfaces into a process.

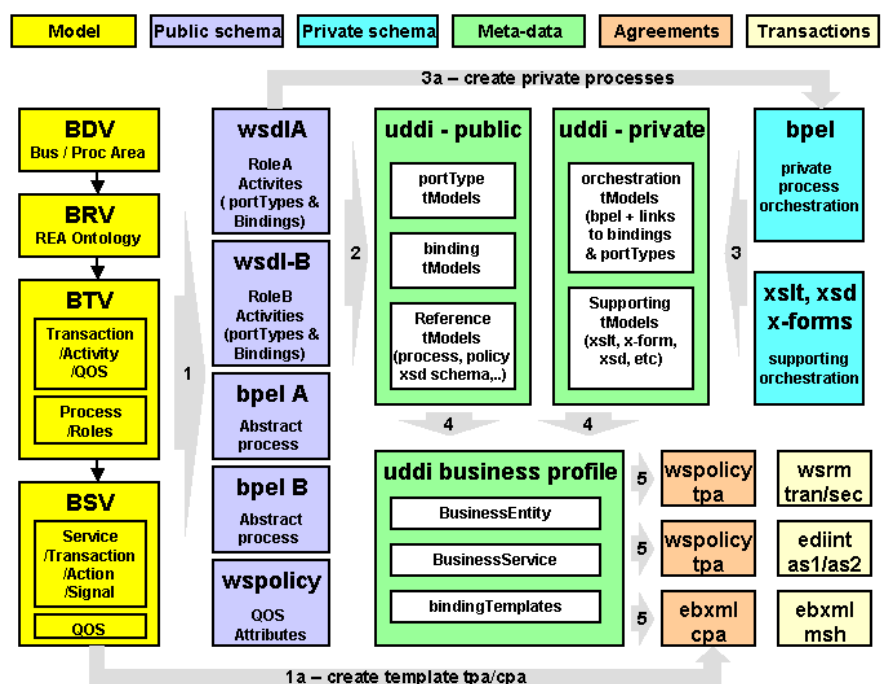


Fig 4 – Detailed mapping steps

- The WS-Policy schema that carry all the Quality of Service (QOS) attributes for each service in the BSV model. Both the BPEL and WS-Policy schema are linked to the WSDL through the WSDL extensions methodology.

Step 1a creates “template” agreement profiles – one for each business collaboration and deployment technology combination. The template agreement syntax for ebXML deployments is a CPA whilst all other deployments will use the WS-Policy schema. These template partner agreements are stored in the BizDex Registry and will eventually be used to create actual agreements between trading partners by substituting partner specific data from registry meta-data (step 5).

Step 2 – create & publish UDDI public tModels

The next auto-generation step (step 2 in the diagram) is to create registry meta-data entries from the standard reference schema in the form of UDDI tModels. The meta-data does not contain all the data that exists in the standard reference schema but rather the objective is for the meta-data:

- To contain the key “fingerprint” elements described in table 1 so that business profiles can be fully defined via meta-data and, most importantly, so that partner agreements can be developed.
- To contain links to all relevant detailed schema (WSDL, BPEL, WS-Policy, etc).
- To include all necessary classifications and associations.

Each WSDL portType (which in turn maps to a BSV service) is represented as a portType tModel. Also each WSDLBinding (which represents a technology protocol binding for a specific portType) is represented as a binding tModel.

Step 3 – create & publish UDDI private tModels

Step 3 in the diagram is the critical step that leads to “plug & play” integration capability for end-point organisations.

- In step 3a, a software vendor or service organisation creates “private process” schema that permit specific back-office applications to comply with specific “public process” standards.
- In step 3, the private process schema are published to registry meta-data. The key meta-data elements are a set of associations that define a list of binding tModels (generated in step 2) that the private process supports. The orchestration tModel also defines a list of applications (back-office & middleware) that it supports.

Step 4 – create a business profile

Automation step 4 in the diagram creates a business profile. Organisations will extend the basic ASIC business entity data with address & contact and then simply select their back-office application from a classification scheme. The BizDex profile service will then search for available private process orchestration schema and present the user with a list of the associated public processes & roles. When process / roles are selected, the detailed businessService & bindingTemplate entries can be created by keying from the binding tmodel list in the private process orchestration tModel entry created in step 3. The business user need only add the access point (URL or e-mail) entry to the generated profile.

Step 5 – create specific agreement file

The agreement is selected from the overlap between two profiles (confirmed and signed by both parties). The agreements are expressed as XML schema that can drive automatic configuration of end-point message handlers. In the case of ebXML message handlers, the agreement syntax is the ebXML CPA. For all other message handlers, the syntax would be a WS-Policy assertion. A “template” agreement has already been created at step 1. The “template” agreement will already contain process, role, syntax, protocol, transport, and default quality of service attributes. The agreement calculator service will update the template with partner specific data to create a final WS-Policy or ebXML CPA schema. The schema is then sent to both partners for automatic or manual processing.

Roles & Tools

It is useful to understand who performs each of steps 1 to 5 in Fig 4 and what tools they use to do it.

Step	Description	Who does this?	With what tools?
1	Create reference WS schema from models.	Standards community workgroup	BCF compliant modeling tool
1a	Create template agreements from model	Standards community workgroup	BCF compliant modeling tool
2	Create registry meta-data from public process schema	Standards community (approved by BizDex admin)	Registry based meta-data extraction service.
3a	Create private process schema to support public process.	Integration company or software vendor	Visual XML development environment.
3	Public private process schema to registry	Accredited Integration company	Registry based service.
4	Generate business profile	Business User (auto approved via ABN-DSC)	Registry based service.
5	Compute partner agreements and generate TPA	Two business partners (both sign with ABN-DSC)	Registry based service.

Table 2 – BizDex roles & tools

References

1	BizDex website & other whitepapers	www.bizdex.com.au
2	Introduction to web services	www-106.ibm.com/developerworks/webservices/newto/
3	ebXML Reference	www.ebxml.org
4	UDDI v3.0 standard	www.oasis-open.org/committees/uddi-spec/doc/tcspecs.htm#uddiv3
5	WS-I basic profile	www.ws-i.org/Profiles/Basic/2003-08/BasicProfile-1.0a.html
6	UN/CEFACT BCF methodology	www.unbcf.org
7	Gatekeeper introduction (ABN-DSC)	www.verisign.com.au/gatekeeper

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