THE TELECOM INDUSTRY EAI NGOSS STANDARD: READY FOR PRIME TIME?

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Abstract
The TeleManagement Forum recently released version 3.5 of its New Generation Operations Systems and Software (NGOSS) EAI standard for telecom management and operations automation. With broad industry support and participation, this integration standard promises to bring much-needed alignment to an often chaotic market for telecomm products, services and software.

To understand how far this standard goes in really providing a model against which EAI product vendors and integrators can develop solutions, the four major facets of the standard will be explained and explored. These four elements: the process, data, architecture and testing standards are reviewed, and the key relationships and interdependencies among them are brought out.

To decide whether the industry attention is just hype, or whether Telecomm EAI plug-and-play just around the corner, a survey of industry adoption of the standard is performed. While the NGOSS program framework holds great promise, EAI and OSS software vendors, and systems integrators will still have gaps to fill to provide a complete EAI solution.

Keywords
EAI, EAI Standards, Best Practices, Telecom EAI Standards, TeleManagement Forum, TMF, Enhanced Telecom Operations Map, eTOM.

A Case for Standards

The jury is out. In September, 2003, the TeleManagement Forum (TMF) officially released version 3.5 of its New Generation Operations Systems and Software (NGOSS) program which is a ground-breaking telecommunications integration standards specification. The industry is holding its breath to see if the new standard will bring the type of alignment among telecom service providers, equipment and software vendors, and systems integrators that can expedite and simplify the deployment of new telecom product and service offerings. But is NGOSS, and its star player, the Enhanced Telecom Operations Map (eTOM) – a holistic business process map – ready for EAI prime time?

The importance of the TMF's NGOSS, eTOM and other initiatives go far beyond the telecom industry. Early this decade, the TMF embarked on a multi-phase, multi-faceted standards strategy with the dream of creating "plug and play" in the telecom BSS/OSS environment. Its success thus far, and its growing relevance within the telecom industry already speaks volumes to other EAI and interface standards organizations which are hoping to realize a similar dream. The widespread adoption of the NGOSS and eTOM models would establish the TMF as a high flyer and visionary among integration standards organizations.

And yet the jury is still out. Whereas NGOSS v. 3.5 is one in a series of releases, it is recognized as the specification which will take telecom industry operating standards from theory to possible reality. Even as the industry holds its breath, there may not even be agreement on what type of changes would be expected in the telecom market with respect to new integration features, products, services or software. This paper will explore the new standard, the drivers for it, and the implications it has for EAI in telecom and beyond.

A Telecom Industry in need of Alignment

Process improvement and reengineering is advisable in any industry, but the gains to be achieved in the telecom industry through process and interface alignment are almost beyond description. Several key truths about the Telecom industry explain the high degree of excitement being experienced as a result of the new NGOSS standards.

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First, many expect that the recovery of the Telecom industry will ride on the growing appetite for value-added services. These services will depend much more on the agile differentiation, combination and manipulation of services – all driven by flexibility in the BSS/OSS market – than on the laying of new network infrastructure. Naturally, standardization on business processes and policies, common data models, and agreement on component interfaces and architectures – the NGOSS core – will enable this flexibility.

Other relatively recent phenomena are also at work in the telecom sector. The nature of the telecom industry has always required that telecom service providers maintain close relationships with their partners – something that has only become more pronounced with the emergence of eBusiness. In addition, however, deregulation of many North American and European telecom markets has led to the need to expose more of one's OSS to regulators and competitors. Again, standardized and secured mechanisms to enable this integration are highly coveted.

With the ever-widening diversification of telecom services, new challenges in the management of the customer relationship continue to emerge. Many legacy telecom systems are product-based. When customers begin subscribing to multiple services, many OSS implementations cannot relate the two customer instances. Beyond the potential frustration of the customer, tactical inefficiencies begin to emerge as, for example, one customer is assigned to multiple sales staff, or the telecom is unable to pair customers with meaningful customer offers. The ability to merge parallel business processes, and align and normalize customer, order, service and other entities would be a boon to almost any telecom.

As was suggested above, the historic growth of the telecom industry has led to many product-based telecom systems. These product-based systems may each have their own ordering, provisioning, billing and other sub-systems. The integration of customer service processes becomes costly and complex. Even were a telecom to try to integrate disparate product-based systems, without a toolkit like the one offered by NGOSS, a consolidation of such systems would still end up as a stovepipe solution in a market as volatile as telecom.

The need for a comprehensive specification like that offered by the TMF's NGOSS is only too obvious. It is no wonder that there is so much activity and interest surrounding the recent NGOSS release.

The TeleManagement Forum: An Integration Standards Powerhouse

Established initially in 1988, the TMF exists as an organization to provide leadership, strategic guidance, and practical solutions for the management and operation of telecom services. Currently at over 340 members, the organization includes service providers (i.e. telecoms), telecom network equipment and software suppliers, software solution providers, and telecom services customers. One of its first important deliverables was the Telecom Operations Map (TOM), introduced in 1994, which defined an interaction model for operations management which was well received in the telecom industry. More recently, however, it was recognized that this model did not incorporate key aspects of eBusiness, and customer, and supplier/partner relationships, nor the convergence of IT and telecom services.

As a result, in November, 2000, the TMF began a new set of initiatives as part of the NGOSS program. This launched a new era for the TMF, which resulted in an intense period of telecom management and operations analysis by forum members, and a phased, multi-year release of increasingly detailed standards. Now, three years later, industry players are developing product and service integration strategies oriented around these strong, new standards.

The TMF has strengthened the industry support of its NGOSS program through several creative strategies. On the one hand, it has often adopted existing standards – whether industry or vendor standards – and incorporated them either partially or fully into its own portfolio of standards (e.g. integrating the work of RosettNet and the UN CEFACT ebXML group into its eTOM extension for B2B interactions.) Secondly, it has often taken the time to map from existing models, to the new TMF models (e.g. SID data model mapping.) Finally, it has reached out to other important telecom industry standards organizations to try to stem standards competition. One of the most important of these initiatives was the recent (August, 2003) partnership which the TMF established with the International Telecommunications Union's Standardization Sector (ITU-T.) The first standards to be submitted to the ITU were, in fact, portions of the NGOSS specification.

Overview of the NGOSS Integration and Process Standard

The approach, and eventual degree of industry acceptance of the TMF integration and process standards will provide lessons to EAI organizations and solution providers for years to come. The TMF is just one of many industry-vertical standards organizations that is trying to create a workable, and adoptable, standard for industry integration and business process management. Nevertheless, the efforts of the TMF stand out from those of many other industry-vertical integration standards organizations, both in their ambitiousness, and in their comprehensiveness.

A diagram similar to that in Figure 1 is often used to provide an overview of the NGOSS initiatives, and how they fit together. NGOSS is considered the overarching initiative, containing four program pillars, which each support and complement one another. NGOSS is intended to provide a "toolkit to guide the definition, development, procurement and deployment of OSS/BSS solutions while also defining a strategic direction for a more standardized OSS marketplace." (TeleManagement Forum, 2003).

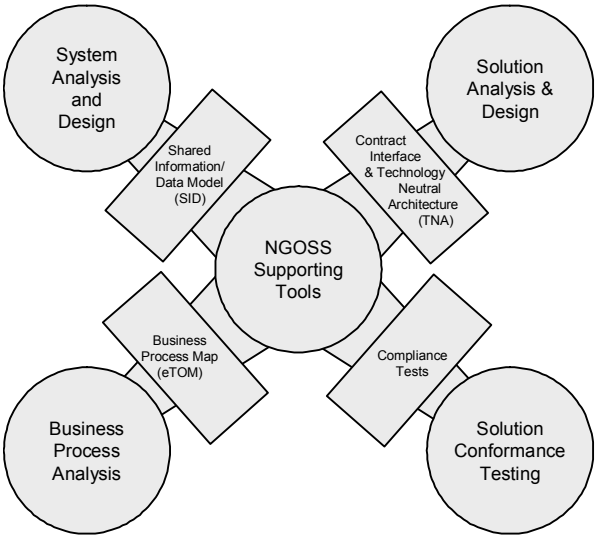

Fig. 1 Overview of the TMF NGOSS

Although the diagram itself does not seem to emphasize a hierarchy, it is clearly best to think of the program as a business process-based solution. This is true for two reasons. First, a key driver of all telecom industry IT investment is the automation of operational processes, especially provisioning processes. Beginning with the TOM in the 1990's, the TMF has always emphasized the goal of maximizing automation of telecom processes. Secondly, although the other pillars of the NGOSS initiative have intrinsic value of themselves, the NGOSS documents make frequent allusions to a focal relationship with the eTOM.

The eTOM, in the SW corner of the diagram, provides a highly detailed hierarchical decomposition of business process elements across process verticals (e.g. service fulfillment, service assurance, service billing, etc.) This decomposition, at its most granular level, contains literally hundreds of process elements. The current NGOSS specification actually provides sample mappings of certain common telecom processes across eTOM process elements.

The Shared Information Data Model (SID), in the NW corner of the diagram, defines telecom business entities and their attributes, and organizes them into broad business domains (e.g. customer, product, service, resource, etc.) according to data affinity concepts. These non-redundant data definitions provided by the SID should be the basis for the business data artefacts managed by eTOM-based automated business processes.

The NGOSS Technology Neutral Architecture (TNA), in the NE corner of the diagram, is a broad collection of technology standards which qualify the requirements of an NGOSS solution. These standards define "component-based, distributed systems architecture and an associated critical set of system services that this architecture requires." (TeleManagement Forum, 2003). The TNA standards address software component standards, security standards, interface standards, architecture standards, and many other related areas, while keeping the specification implementation-independent (i.e. technology neutral.)

Finally, the compliance standards, in the SE corner of the diagram, specify a series of tests that can be used to validate adherence to the standards laid out in the other three pillars of the program. Component compliance to NGOSS can be assessed against the eTOM, the SID, or the TNA, or a combination thereof.

A Laboratory for Industry EAI Initiatives

Prior to launching into a more detailed review of the NGOSS integration standard, it is constructive to discuss the implications that this industry-specific

standard may have on the broader EAI and EAI-standards communities. Given the breadth of this standard, from business process, to data model, to component architecture standards, it is sure to hold lessons for EAI standards creation for other industry verticals.

First, the NGOSS standard is a process-centric standard, and the industry acceptance of this standard will validate the TMF's emphasis on a process-oriented architecture. As a company grows its business, and seeks best-practices solutions, it is easy for the enterprise operations to become dominated by application-centric solutions, function-centric, or product-centric solutions. Applying a process-centric view, which will inevitably crosscut applications and functions, imposes a higher standard for solutions on all industry players. Generally, process-oriented architectures focus on the challenges of implementing corporate processes, and not on the IT solution implementations of these processes. The fact that the NGOSS standard attempts both is a trump in its favour, but also possibly an obstacle to its widespread acceptance.

What about the complexity of the NGOSS standard? The NGOSS approach to integration standards development is broad, far-reaching and detail-oriented, as it must be, to satisfy the needs of a highly complex industry. How far must EAI standards go to create a functioning integration standard? Other process-centric standards (e.g. Supply Chain's SCOR Framework) have not gone as far as the TMF's NGOSS in specifying implementation specifics. How must the need for implementation specifics, to allow for verified standards-based designs, be balanced with the need to keep the standard manageable? The degree, and methods, of adoption of NGOSS standards will speak volumes on this issue.

Another open question with a standard like the NGOSS program relates to its longevity, and true ROI. The telecom industry is dynamic, and volatile, and will continually require extensions and adaptations to any standard like NGOSS. By the time an industry player manages to implement portions of the model, will the implementation, or the need to tie in to this implementation, be a drag to his overall agility and flexibility? Although better solution ROI may be observed in less dynamic areas of the business, these parts of the business usually already have entrenched legacy solutions, whose ROI is already playing out. Will proprietary solution providers always have the upper hand when it comes to bringing services to market competitively?

The NGOSS adoption process will also provide a laboratory for true, standards-based enterprise integration of processes rooted in functional silos. When telecom services providers begin to piece together NGOSS solutions, will they find that new enterprise middleware teams – with special cross-training needs – must be established and maintained? It will also be interesting to observe whether service providers must establish formal mechanisms to share and retain process knowledge within their organizations.

Finally, the process and methods of adoption of the NGOSS program in the telecom sector will say much about which players have the advantage in industry standards implementation. Independent EAI vendors have often considered industry-vertical solutions to be at the top of their EAI value chain. Will these vendors be able to fill this space, or will they be shouldered out by application vendors (e.g. SAP, Siebel)? As well, it is quite likely that certain portions of the NGOSS standard will be adopted much more fully, and more quickly than others. Equipment vendors are likely to focus on the low-hanging fruit of the NGOSS data models, while EAI vendors struggle with NGOSS business process solutions. Indeed, it is possible that certain elements of the standard will become mere academic models, if the barriers to successful implementation are too high.

Clearly, experiences with the NGOSS standards will provide lessons to EAI standards and standards organizations well beyond the scope of the telecommunications industry.

A Holistic Industry Solution

So what does it take to create a management and operations solution for a complete industry? The NGOSS standard is defined in literally dozens of documents available on the TMF Website, so it is no small task to boil that content down to a few cogent paragraphs. Nevertheless, the following subsections will describe certain salient aspects and elements of the NGOSS program pillars.

The Enhanced Telecommunications Operations Map (eTOM)

Many versions of the diagram shown in Figure 2 exist, each one emphasizing certain elements of the model. The current discussion will seek to describe how the

eTOM model is structured, and how integration solution engineers can leverage it.

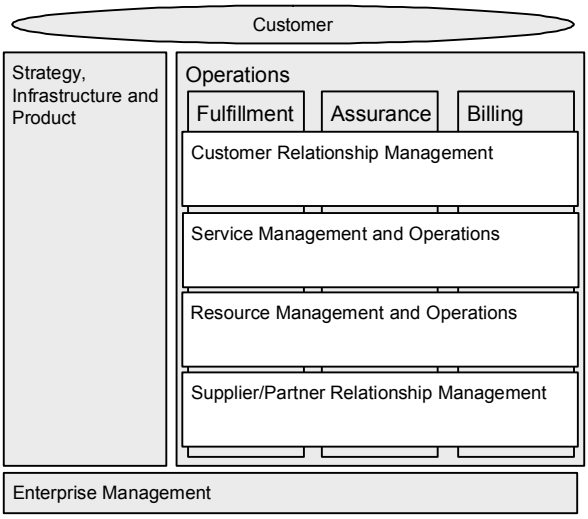

Fig. 2 eTOM Level 0, with focus on Operations

The basic model reflects three major groupings of telecom industry processes: 1) strategy, infrastructure and product; 2) operations; and 3) enterprise management. The operations portion of the eTOM, containing the fulfillment, assurance, and billing (FAB) verticals (considered "end-to-end" operations), is considered the "heart" of eTOM. Again, focusing on the Operations grouping, one sees four horizontal ("functional") groupings: Customer Relationship Management (CRM); Service Management and Operations; Resource Management and Operations; and Supplier/Partner Relationship Management.

The eTOM specification provides a very structured and hierarchical decomposition of "process elements," generally going to three levels below that shown in Figure 2. The decomposition of CRM processes across operations is shown in Figure 3, revealing nine process elements – described as its "Level 2" decomposition. Each of these elements, in turn, is further decomposed under the eTOM specification into additional process elements – the "Level 3" decomposition. For example, Order Handling, in Figure 3, is further decomposed into five additional process elements: 1) determine preorder feasibility; 2) authorize credit; 3) receive purchase order and issue orders; 4) track order and manage jeopardy; and 5) complete order.

Naturally, for example, when providing CRM functions in the telecom context, concerns with fulfillment, assurance, and billing can all arise. Conversely, for instance, when carrying out fulfillment operations, each of the four horizontal functional groupings may be involved. Finally, when defining end-to-end telecom business processes (e.g. a DSL Fulfillment process), literally dozens of process elements could be involved.

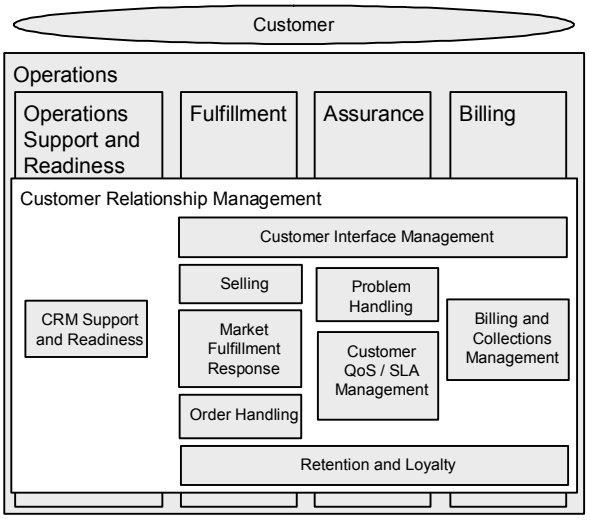

Fig. 3 eTOM Level 2 Decomposition of CRM

It is important to note that while the eTOM defines process elements, it does not define process models. The eTOM documents dismiss the possibility that a generic process model could be defined, suggesting instead that every telecom will require a distinct process implementation. Any hardcore business process engineer might be disappointed by this revelation. However, the issue of synthesizing business processes from the eTOM lies not in guessing at industry-generic process models, but in providing a way to dynamically define process implementations among architecture components. Not surprisingly, this is one of the key capabilities provided via the NGOSS Technology Neutral Architecture (TNA.)

Once a telecom service provider has an established end-to-end business process, it is necessary to define the business data that must be available to that process, and its representation. This is one of the key areas where the NGOSS Shared Information Data Model (SID) comes into play. In fact, the NGOSS program establishes a defined association between eTOM "Level 2" process elements, and the SID business entities.

The eTOM intends to include every process activity used by the telecom enterprise. As a result, every telecom business activity must have an unambiguous mapping onto a process element. Great care has been taken to ensure that the process elements can be used to describe all products, services and channels that a telecom may support. Finally, as suggested above with mention of the SID, process elements will each have an associated input, an output, and an implicit set of business rules.

The Shared Information/Data Model (SID)

The SID can be understood as a very comprehensive data model for the telecom enterprise. Ultimately, the SID is concerned with defining generic telecom business entities, their attributes, and their relationships with other business entities.

The SID is organized along eight business domains, as shown in Figure 4. The NGOSS 3.5 specification only details the entities within about half these domains. Within each business domain, a number of aggregate business entities ("Level 1" ABEs) are specified, as shown for the Customer domain in Figure 4. Each business domain can be further broken down into service domain "Level 2" ABEs, and even "Level 3" ABEs.

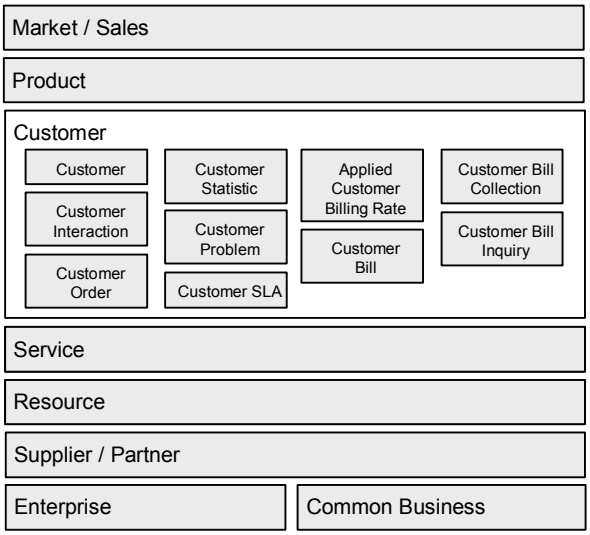

Fig. 4 SID, with ABE detail on the Customer Domain

In order to achieve a uniformity of content and structure across the SID domains, there are about ten telecom usage "categories" that are considered. Naturally, some are dictated by simple data modelling concepts, while others flow from the nature of the telecom business. These ABE categories include the obvious ones (e.g. managed entities, interaction with managed entities, etc.), as well as more the studied ones flowing from telecom realities (e.g. performance, usage, test, etc.)

As mentioned in the eTOM description, the SID specification associates ABEs with Level 2 eTOM processes. Preferably, each Level 1 ABE is coupled with only one Level 2 eTOM process. For example, the "Customer Order" ABE has the eTOM "Order Handling" process element assigned to it as a "primary." When implemented, this eTOM Level 2 process element would be expected to have operations which both read and write to the SID ABE. Associations between one SID ABE and multiple eTOM process elements are also possible.

To its strong credit, for those domains which are complete, the SID defines the relationships among its ABEs – no small task as it applies to an entire industry. Understandably, the SID entities are highly normalized, to make them as generically applicable as possible. In fact, as defined in the SID, many entities will contain only one or two attributes. This is when the DBAs among us throw up there hands. However, as with the eTOM, the key to the SID lies not in guessing at a single telecom data model implementation, but rather at implementing extensions to it via the mechanics provided through the TNA.

The Technology Neutral Architecture (TNA)

Of the four NGOSS pillars, the TNA is the most difficult one to describe succinctly. As suggested by its name, the TNA provides implementation requirements, without suggesting an implementation technology. Only a technology-blind approach like that taken by the TNA would enable the creation of solutions which can be applicable industry-wide.

As an environment specification for the other NGOSS elements, it is not surprising that the TNA specification lags somewhat behind the eTOM and the SID. This is true for two reasons: 1) there has been more historical focus, and greater market value associated with the development of industry process and data models, and 2) the requirements of the implementation environment only become more clear as the eTOM and SID begin to grow meat.

Parts of the TNA read much like an enterprise architecture standards document. There are guidelines on component scope, interface definitions, distribution transparency, naming, directory services, security and many other similar concepts. A review of specifics of these standards goes beyond the scope of this paper. As it relates to the eTOM and SID, however, there are several key points to make:

- The TNA includes a "Metamodel" specification [TMF053D], whose purpose is to extend the UML metamodel in two key categories: new model elements, and new information entities and data types. For interoperability between the eTOM, SID and NGOSS TNA components, certain new metamodel constructs were required, and have been defined in draft form. Thus, there is a clear mechanism for the declaration of metadata that may be required for future NGOSS evolution.

- In addition to an emphasis on process implementation capabilities, as distinct from component implementation capabilities, the TNA requires that business processes provide a policy management overlay. With respect to tools evolution, policy management has matured more slowly than process management, but holds great promise in telecom, especially as it relates to policy across the entire lifecycle of a component or process. This is key innovative capability offered through NGOSS.

- Some parts of the TNA have not yet been issued in draft form for TMF member evaluation. Notably, the Process Management Specification [TMF053M], the Policy Specification [TMF053P], and the Distributed Transparency Services Specification [TMF053F] have yet to be issued. While great portions (and building blocks) of the TNA are available in highly detailed form, these remaining elements are probably still essential to be able to leverage the full value of the eTOM and SID.

While the TNA in its current form reflects a herculean effort at defining architecture elements and the way they must interact, the degree of abstraction required for a "true" TNA can be somewhat intimidating. The complexity of defining such a non-presumptive architecture leads us to two final points: 1) How has the TMF tried to address the daunting reality of implementing NGOSS-compliant systems; and looking further ahead, 2) How might we expect to see the industry adopt the NGOSS standards in the months ahead?

Catalyst Projects: Making the Dream More Real

Beyond the four pillars described above, a key factor in the promotion of the NGOSS program as a reliable standard is the use of "Catalyst Projects." To emphasize the real world focus of the standard, the TMF wanted to continually demonstrate the possibility of practical industry implementations. This is the purpose of the Catalyst Projects, which are typically showcased at each of the TMF's semi-annual Telemanagement World tradeshows.

Catalyst Projects are designed to both demonstrate the concepts of the NGOSS program, and provide a feedback loop for the ongoing strengthening of the standard. Ideally, the projects should align themselves with pressing industry operational and interoperability challenges. The Catalyst Program includes three types of projects: proof-of-concept, interoperability testing, and catalyst-developed products. Proof-of-concept projects should demonstrate the feasibility of a concept, and should ideally be able to feed into one of the other types of catalyst projects. Interoperability testing projects should actually implement NGOSS-based solutions on live hardware and software in a multi-vendor environment. Finally, catalyst-developed project should result in a commercially available, multi-vendor solution.

The Look and Feel of Industry Adoption

So as we await the verdict, what decision might we reasonably expect from the telecom industry? A "ready" or "not ready" verdict is too simplistic. There are probably many potential signs that the industry is responding favourably to the new NGOSS v. 3.5 program.

The TMF has indeed transformed the industry dialog with its successive EAI standards deliverables. In a survey conducted by the TMF in 2002, in answer to the question, "To what extent are your OSS/BSS decisions influenced by the TMF's NGOSS principles," over 70 percent reported "Some Influence." (TeleManagement Forum, 2002). Beyond this anecdotal proof that the

standard is taking root, however, there are several other signs.

First, there are a number of architecture tools which have incorporated the NGOSS standards into their repositories. Popkin Software's Enterprise Architect modeling tool is now available with the eTOM, SID and SID framework loaded into its repository. Casewise Corporate Modeler can be purchased with a similar repository of NGOSS tools and components. Because NGOSS 3.5 provided a cross-reference between the eTOM and the SID, such tools can accelerate the analysis and design of standards-based telecom process flows and CRUD matrices.

Industry Interest in the eTOM

To be fair, the designers of certain elements of the NGOSS standard are not expecting big bang implementations by major telecoms. Instead, many components of this integration standard provide intrinsic value by serving as a basis for discussion. In describing the benefits of the using eTOM, the TMF states:

> - eTOM makes available a standard structure, terminology and classification scheme for describing business processes and their constituent building blocks.
> - eTOM supplies a foundation for applying enterprise-wide discipline to the development of business processes.
> - eTOM provides a basis for understanding and managing portfolios of IT applications in terms of business process requirements.

(TeleManagement Forum, 2003). Nevertheless, there are signs that industry players are attacking the tip of the iceberg. At the TeleManagement World conference in Dallas, in November, 2003, the TMF claimed that over 50 companies, including service providers, systems integrators, and software vendors, reported using the eTOM standard in some way. This same presentation also mentioned the development of eTOM users groups, and eTOM translation work, to make the standard available in Chinese, French and Spanish.

Beyond adoption by certain telecom industry players, the eTOM has become the basis for an innovative movement called the "OSS through Java Initiative" (OSS/J.) This initiative, driven by an industry consortium (including Sun Mirosystems and several other telecom industry players) has begun to develop a Java API which focuses on the flow through service management functions suggested by the eTOM.

Even EAI tool vendors have taken a crack at the new NGOSS standards. Vitria Technology, Inc., with a historic strength in the telecom market, has been a leader on this front. Vitria has already had several Catalyst solutions "NGOSS-Powered" certified, and has also already used some of the eTOM standards as part of its telecom Collaborative Applications solutions.

In the business process management (BPM) arena, EAI tool vendors, and business process solutions vendors may find that there are significant barriers to bringing an eTOM-based solution to market. Given that the eTOM is such an all-encompassing standard, EAI tool vendors must make difficult choices about where to focus their efforts (although in the telecom business, IOM and SLM provide a good starting point.) In addition, for the very reason that the eTOM defines process elements, and not process models, business process solutions vendors will need to incorporate levels of abstraction into process implementations in order to make solutions viable across the market.

Adoption of the SID

Naturally, the SID provides more low-hanging fruit than the eTOM and the TNF. Metasolv and Intelliden, two leading providers of OSS software solutions, are making the SID the basis for their current and future product enhancements. British Telecom and Telestra, two service providers, have also found ways to start incorporating the SID (and other NGOSS components) into their OSS evolution initiatives.

For EAI toolkit vendors, and application solutions providers, the SID creates may opportunities. Having a single data model, and potentially entire APIs (like OSS/J) written to it, will open many doors for pre-packaged connectivity and process solutions.

As a comprehensive data model for the telecom industry, the SID has gotten lots of attention. However, as opposed to the eTOM – which is recognized as the industry premier operations model – the SID remains only one in a class of industry data models. The TMF must push for additional data model consolidation in the telecom market to promote greater industry adoption of the SID, and stimulate the creation of more products based on the SID.

The Future of the TNA

The adoption of the TNA is a little bit more tenuous than the other NGOSS pillars. As Matt Izzo of Agilent Technologies wrote for Telemanagement World in November, 2003, "[You] can't build a standard contract interface without the standard specification." Izzo also pointed out that, although the TNA provides a technology neutral architecture, it is impossible to have a technology neutral product. As a result, the TNA may need to think about providing more technology-specific guidelines on NGOSS solutions. (Izzo, 2003).

Ready for Prime Time?

The telecom industry has always been one to struggle with change. Adoption of promising new standards will take time, and will be done gradually, as telecoms expand their BSS/OSS, and find opportunities to upgrade and consolidate legacy OSS infrastructure. It is only natural that the NGOSS standards are being brought into the telecom market in bits and pieces. In fact, this is the best approach for both the stability of telecom players, as well as the careful refinement of the NGOSS standards. Regardless of the verdict, the EAI community has much to learn from the strategies, and success of the TMF and its NGOSS standard. In fact, maybe it's not yet time to say whether NGOSS is ready for prime time. But with NGOSS v. 4.0 slated for release in 2004, the EAI community had better continue to keep its eyes on this EAI standards juggernaut.

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