

# **The Role Directories Will Play in the Coming Digital Economy**

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# The Role Directories Will Play in the Coming Digital Economy

## Objective:

This whitepaper attempts to provide background and perspective on how the quickly evolving technologies of the internet, along with more traditional telephony technologies such as messaging and directory service, can be brought together to develop truly *universal* directories, capable of providing the foundation of twenty-first century E-commerce.

## Motivation:

GTE wants to be known as the company that is “*easy to do business with.*” This phrase could be taken in at least two different ways:

- 1) GTE wishes to make our customers’ experience in obtaining and managing services offered through GTE as pleasant and as easy to provision and use as possible, and
- 2) GTE wishes to so enable our customers to more easily do *their* business, so that they in turn are perceived by their customers as being “easy to do business with.”

The first of these interpretations is focused on GTE’s *efficiency*; while, the latter interpretation is focused on GTE’s *effectiveness*. The first saves our customers expenditures; while, the latter enables our customers to develop new streams of revenue. The first enables the customer to perform his current job better; while, the latter enables the customer to select/design a better job to perform.

Recently in InfoWorld, April 21, 1997, page 56, Bob Lewis expressed this concept thus: “You have to decide where you’re going to focus your attention. You get much more leverage [with your customer] out of value creation than cost reduction.”

The bottom-line issue that GTE must address may thus be stated: “*How do we add more ‘value’ to our customers?*” This is the most certain and permanent way to add more value to GTE, and to GTE’s stockholders.

## Background:

Several articles that have recently appeared in various technical publications are provided here as relevant indication of the transformations that now are taking place in the new digital economy. Some of these indicate strategic direction of a general nature; while, others provide specific examples of how other companies have leveraged these concepts and principles to improve their own businesses.

The first on the list of strategic documents is The Digital Economy by Don Tapscott. There is also the *digested* version of this work that appeared in two consecutive issues of Communications Week in November and December of 1995. Reading this book, or at least read the *digest* version provided in the appendix, should set the general mindset for further discussion and ideation.

To quote Don Tapscott from that article:

<http://www.techweb.com/se/directlink.cgi?CWK19951113S0024>

<http://www.techweb.com/se/directlink.cgi?CWK19951113S0023>

“It is fairly widely accepted that the developed world is changing from an industrial economy based on steel, automobiles, and roads to a new economy built on silicon, computers, and networks. Many people talk of a shift in economic relationships that's as significant as the previous displacement of the agricultural age by the industrial age. There are new dynamics, new rules, and new drivers for success.

“A dozen overlapping themes are emerging that differentiate the new economy from the old. By understanding these you have the precondition for transforming your business for success.”

To bring matters closer to the current focus, consider the statement made by David Braun recently in “*Net Turns Marketing On Its Ear*,” TechInvestor, March 12, 1997,

<http://www.techweb.com/investor/newsroom/tinews/mar/0312mark.html>

“Out goes the traditional emphasis on the five P's: *product*, *position*, *price*, *packaging*, and *promotion*. In comes a new five-point model which emphasizes *finding* consumers online, *engaging* them, *retaining* them, *learning* their preferences, and *relating* to them by offering unique value through customized interaction.”

Note the emphasis on the following fundamental capabilities:

- *Finding the customer's solutions*—via directories to online information [and to supporting services] for finding people, organizations, products, services, ...,
- *Engaging the customer*—with interfaces that are readily accessible, whether by the individual (e.g., via web browser), by an intelligent agent (e.g., via a gobot), or via a mechanized process (EMA, EDI, ...)—[Microsoft's theme: “Where do you want to go today?”],
- *Retaining the customer*—with meaningful follow-up, e.g., call-completion, product presentation, package-delivery, service-delivery, ...; as well as, by establishing the customer's expectations for future/continued service fulfillment, as new needs arise or as existing ones evolve,
- *Learning customer preferences*—never needing to ask the customer the same question twice; but rather collecting and storing past and current contextual information about the customer's personality or style (e.g., of user

interaction), and preferences in products and services—yet, without compromising the customer’s privacy (security!), and

- *Relating to the customer*—leveraging the newly learned customer knowledge to better serve with products and services that reflect [adapt to] personal preferences and nuances of the customer.

The new five-point business model suggested above clearly indicates directory services as the beginning point for the execution of any business in the digital economy. The new digital economy cannot be *well-connected* until its supporting directory services are *well-connected*. The interoperability *Directory Challenge '97* demonstration at the recent EMA'97 [Electronic Messaging Association] of *world-class* directories interoperability indicate that this requirement is clearly recognized by everyone.

Historically, we have been exposed to various forms of specialized non-interoperable forms of *directories*, such as the white and yellow pages of telephone fame, the yellow pages of the internet [a la, DNS], and computer operating systems directory services [e.g., Novell’s NDS, and Banyan’s StreetTalk]. These directories each exist in their own unique domains of functionality and utility [lookup a phone number, address a computer, retrieve a file, print to a printer, ...]. There has been no clear connection between the use of directories of one type with those of another type.

Consider the ramifications of the following quote by David Braun from “*Web Advertisers Demanding Results*,” TechInvestor, March 12, 1997:

“Advertisers used to joke that only half their advertising effort worked, but the problem was they did not know which half.

The Internet has changed all that. The new technology allows precision tracking of what works, elicits responses, and converts to sales—*feedback so detailed and reliable* that it threatens to turn the entire advertising industry on its head.

One implication looming large on the horizon is savvy Internet advertisers may demand, and get, a system in which they pay only for responses—a notion which, were it to become a trend, may cause some concern among web businesses that rely on a business model based on revenue per page impression, or “*click-through*.”

Such *interoperability* [in the above case, URL-interoperability; and in the general case, directory-interoperability] is critical to any follow-through [i.e., “click-through” in the above example] to the other key points of the proposed digital economy business model. This interoperability has two dimensions: 1) interoperability between various directory systems, and 2) interoperability with other [non-directory] systems that need to be reached by, and to address queries to these directories. Both of these dimensions must be considered for any strategy to be successful.

The “click-through” potential of truly interoperable directories is even more far reaching than the level suggested by the EMA’97 demonstration. Consider a later quote from the same TechInvestor article:

“Scott Stoegbauer, senior vice president/technology of WebConnect, a company which manages advertising across Internet sites, told the convention that the web allowed advertisers to see exactly what was going on with their advertisements.”

“WebConnect, he said, would put up a customer's advertisement on say 30 or 40 sites, and within a matter of weeks would know exactly what worked and what was a waste of money. The feedback was so advanced that many advertisers were able to tell how specific advertisements converted to sales, which was clearly a lot more valuable than mere click-through.”

As this quote indicates, the potential for achieving, and the value in having timely feedback between the several levels of the new business model have been clearly demonstrated. Directories services can no longer be viewed as a detached front-end step in the business process. There must be *feed-forward* to the later processes regarding the nature [content and circumstance] of a directory query [e.g., to avoid the user’s repetitive input of the same query information at a later process step]. On the other hand, *feedback* from those downstream processes back to the directory service are crucial to the *continual self-improvement* of the directory service [for learning the user’s needs, and adapting accordingly]. This end-to-end functionality will be made more concrete in the scenarios that follow.

As another aside to the TechInvestor quote, the technological changes are already motivating business model [renumeration] changes. The user wants to only pay for what actually works, and to quickly [perhaps immediately?] adapt to improve performance. Such concepts as annual directory advertisements will quickly become less important, as they become less useful and less flexible than other means.

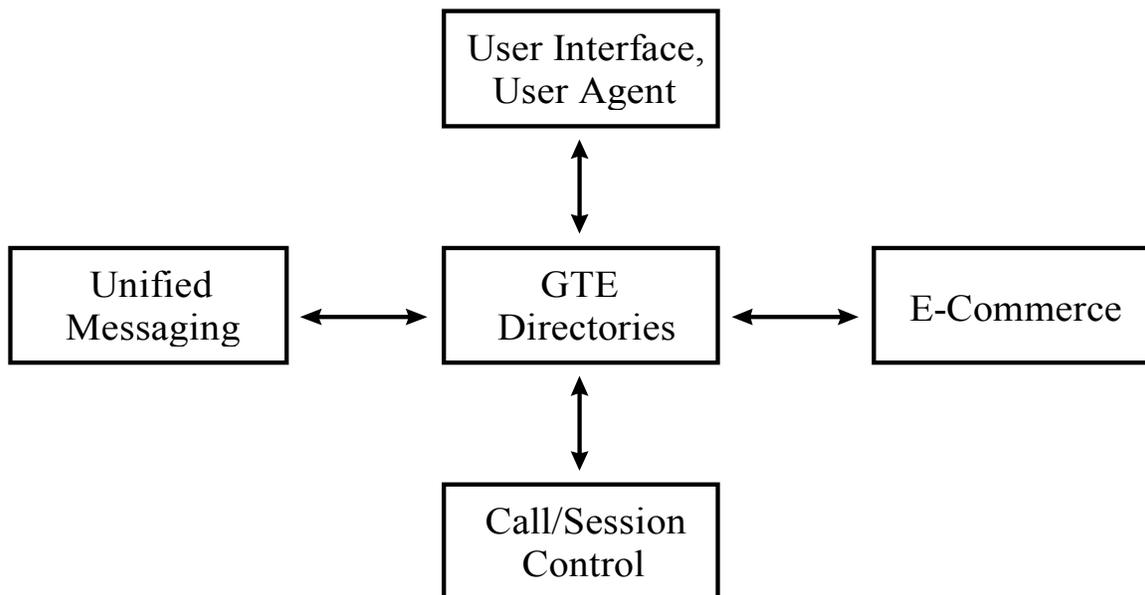
Some queries are subject to little interpretation/extrapolation by the directory service. For example, a query for the phone number of James T Smith at 7708 Emerson Lane, Flower Mound, TX is quite straightforward, in comparison to a query for the phone number and location of the *best place* to buy lawn mowers, locally. In the latter case, the directory could consider who is querying [e.g., the user’s personal profile] in addition to what is the normal content of the query [e.g., information traditionally found in a yellowpage directory], and what is the current information base [whether directly or via indirection] available via the directory. If I have a SAM’s club membership, then SAM’s might be the best place for me to purchase the item; otherwise, ‘the best place’ might be somewhere else. Also, the [continually changing] tie-in of weekly specials to the directory’s information is to be considered in the generation of a response to the query.

The Question:

*The question is then, what constitutes an appropriate vision of the functionality and interoperability that directories must support in the new digital economy?*

Figure 1 provides a high-level depiction of some directory interdependencies which will be used to facilitate the discussion. The GTE Directories located in the center of the figure depicts the future evolution of the traditional whitepage and yellowpage directories that are now part of the telephone business. The arrows between the GTE Directories and the other Unified Messaging, E-Commerce, and Call/Session Control [AIN and LIDB] Directories indicate the interoperability [transparency] that must exist in the future. Such interoperability is crucial to the new business model of the digital economy [recall: 1) find, 2) engage, 3) retain, 4) learn (adapt), and 5) relate (in a customized, personalized manner)].

The fact that GTE Directories is in the center of the diagram and is linked to the user's access [whether interactively (user interface) or via some intelligent agent or proxy] reflects the vision that the traditional directories business has the opportunity to become the "point of first query" [a *meta-directory*] for locating people, companies, and [more generally] any information; which then leads logically and consistently to follow-up activities [make a call, leave a message, peruse a catalog, determine product/service availability, initiate a purchase, contract, ...].



**Figure 1. High-level Depiction of Directory Dependencies**

GTE Directories is the place to begin a query when one knows no where else to start! Smooth transparent handoff of the user [follow-through of the process] from one directory to another is critical to facilitation of the new business model.

The Answer:

As GTE Directories [to which I always go, first] adapts itself to my personal preferences [e.g., I prefer to use American Express], learns my circumstances [current, as well as historical], etc., it effectively becomes my **administrative assistant**—able to effectively direct me in the most promising directions, and to assist me along the way!

Some illustrative scenarios of possible directory usage in the impending digital economy should provide relevant input to and motivation of this discussion.

Scenario 1:

The simplest case to consider is the brevity that one finds in today's directories for the lack of space to print and the inability of the user to handle [lifting or reading] much greater volumes. To list all the internal DID [direct inward dialed] numbers of companies such as GTE, EDS, J.C. Penny, etc. in the Dallas/Ft Worth [paper] directories would be prohibitive. With our movement to a digital economy, such an expansion of the electronic whitepages and yellowpages is easily achievable and manageable [both from a GTE, and from a user viewpoint]. These new directories could include not only my desktop number, but also my cellular number, fax, direct voicemail number, etc., as well as an email address, a website URL, etc.

Other meaningful information regarding how and when to reach me [e.g. each user's PIM] also could be supported here—rather than have this information replicated for each of my AIN services, email services, cellular services, etc. [GTE has implemented AIN-based one-number services where these specific numbers could be hidden behind a one-number service.] Support could be within the GTE Directories infrastructure, or be made appropriately accessible [cross-referenceable] from other interoperable directories that are maintained by my company, at my home, etc.

With traditional AIN services, I can only determine the called party's PIM/call-redirect setup implicitly by trying to reach the party at different times of the day, etc. In the new digital economy I could submit my preferences [when I would like to speak with the party] to the directory service; which would compare my submission with the party's PIM and respond with an offer of best time to call, and offer to arrange such a call [a generalization of the call-completion service option currently associated with 411 services], and/or offer to direct me to the party's unified messaging service to leave a message now.

This simple example suggests that much could be done to leverage GTE's existing service offerings in the areas of directories, unified messaging, and AIN

lines of business to provide the customer a naturally interoperable set of services, in place of the disjoint set that now is available..

### Scenario 2:

Consider another typical scenario [in the invisioned future] in which the user wishes, for example, to purchase a product [say, a lawn mower] with some predetermined set of features [e.g., specific mowing width, type of fuel, self-propelled, manufacturer, ...], as well as with specific secondary constraints [retailer conveniently located near the user's residence, business hours during a certain period of time, makes deliveries, authorized for warrantee work, ...].

In today's world, the user would find in a yellowpages the names, phone numbers, and addresses of those retailers that potentially could meet these constraints. Dependent upon the yellowpage content of each advertiser, an Ad might also contain the time each is open for business, what types of credit are available, etc.—but not in any consistent manner, and certainly such information is not uniformly available. To determine whether or not the business also is on the internet with a website or email access requires a trip to yet another directory service [e.g., GTE's Superpages]. Consequently, the user today must *manually* ascertain the rest of the information by contacting each prospective retailer [sometimes getting a busy signal, thereby requiring a working notation by the user to later retry contacting that party again], and by repeating the same set of requirements each time. Determination of exactly where the retailer is located and how best to travel there is yet another ancillary problem.

How often I have wished that I could submit my own *PRFI* [*personal request for information*] to some source [To the Chamber of Commerce? To GTE Directories!] that could distribute my PRFI to pre-qualified businesses [e.g., based on readily determined generic information, such as business hours, nearness to my residence], from which I could receive rated, pre-qualified proposals in response to my query in a timely manner [say, in seconds!].

Follow-up conversations and negotiations with the designated [personalized] employee at each selected retailer could naturally follow. As the directory service dialed each party, their service terminal [a Java browser terminal?] would simultaneously receive pertinent content and context about my query, even as the party answered my call!

If I should choose to suspend a session [say, to go to lunch, to check on the children, ...], the service would be able to return me to that suspended context when I returned. Perhaps I would interactively modify or refine [NOT re-enter; since, the directory service still has the original from which I could work] my PRFI to reflect the new information I had gleaned from the first query—which I could use to perform a second refining query.

### The Sum of the Matter:

This last scenario presents a clear example of the need for directories and [unified] *messaging* interoperability. In fact, Figure 1 could be overlaid with an

equivalent set of messaging-centric labels in place of the directories-centric ones. Furthermore, appropriate confidentiality [here comes *security* into the picture] must be maintained throughout the process.

Scott Hamilton recently summarized the issues in “*E-Commerce for the 21<sup>st</sup> Century*,” *IEEE Computer*, May 1997, pp. 44-47:

<http://www.computer.org/pubs/computer/1997/r5044.htm>

“How will it all come together?”

“Though people in the industry tend to talk about Internet commerce in more arcane terms like public-key infrastructures, digital signatures, and payment protocols, Marty Tenenbaum, chair and founder of the *CommerceNet* consortium, summarizes the barriers in three words: content, convenience, and confidence.”

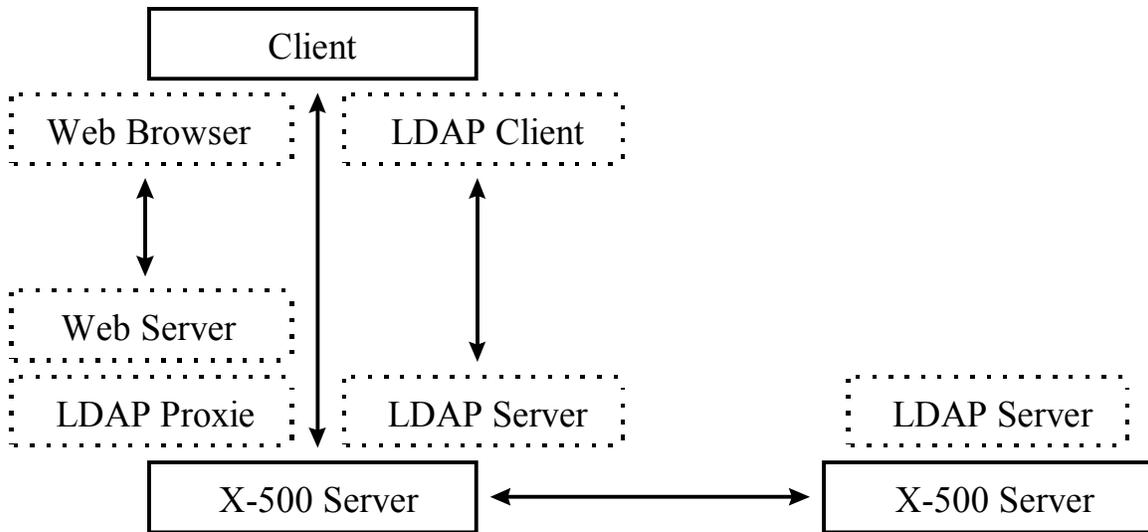
“There must be incentives to purchase goods over the Internet, be they a better selection, service, or price. It must be convenient, as simple to use as ATM’s and as ubiquitous. Finally, users must have confidence that their transactions are secure, their privacy is inviolate, and they will not be subject to liability. All three of these areas call for collaboration to build a marketplace, an infrastructure, and a legal and regulatory framework.”

#### Architectural Interoperability:

The achievement of any vision is dependent upon having an appropriate architecture to provide the fundamental capabilities that the vision requires. Marty Tenenbaum reduced the identification of these to:

- *Content*—value to be created, achieved, delivered, exchanged, ...
- *Convenience*—directories to facilitate quickly identifying [when not sure of what is needed] or locating [once the desired solution is known], and
- *Confidence*—security to perform all activities with proper protection of information, preservation of value, ...

The high-level diagram in Figure 2 reflects the emerging standards in the directories industry, and the client-server and server-server interoperability being pursued. The best candidate for a universal directory platform currently appears to be one that is X.500 compliant.



**Figure 2. Emerging Directory Standards**

The recent EMA'97 convention featured the activity *Challenge '97* that focused on this trend, as expressed by Victor Parra, President, EMA:

"We are excited about the widespread support for *Challenge '97* and believe it reflects a growing momentum for X.500 gaining acceptance as the industry standard directory solution. *Challenge '97* is the perfect vehicle to showcase how companies can easily use this directory technology for secure global electronic commerce."

Though conceived in the realm of OSI protocols, various X.500 protocols, such as DAP, are now being standardized with TCP/IP implementations appropriate for deployment of a global X.500 directories infrastructure over the internet. Additionally, the LDAP [Lightweight-DAP] protocol, initially conceived for development of lightweight-client to X.500 server access, now is evolving toward a lightweight implementation of the whole X.500 architecture.

Three prevalent client-server interfaces are now becoming wide spread, being supported by many directories vendors. These interfaces are: 1) the *traditional DAP* interface between X.500 clients and servers [the middle vertical arrow], 2) *LDAP clients to LDAP-encapsulated servers* [the right vertical arrow], and more recently 3) the *web client to a web-enabled server* (which could be via LDAP or directly to X.500) [the left vertical arrow].

Also currently in the process of standardization by the IETF are supporting infrastructure enablers such as the proposed whitepages schema described in the internet draft: "*A Common Schema for the Internet White Pages Service*" and the LDAP3/X.500 user schema, "*A Summary of the X.500(93) User Schema for use with LDAPv3.*"

A number of proprietary directory implementations exist, such as Novell's NDS, and Banyan's Streetwork, and Microsoft is developing its future

ActiveDirectories. However, all these proprietary implementations are committed to supporting LDAP/X.500 directory services with current or future releases.

Furthermore, efforts are underway to map [implement] various forms of directory services within an LDAP/X.500 directory. An example of such is the internet's NIS, which is described in the IETF draft, "*An Approach for Using LDAP as a Network Information Service.*"

#### Competition:

The previously summarized new business model of the digital economy: 1) *find*, 2) *engage*, 3) *retain*, 4) *learn* (adapt), and 5) *relate* (in a customized, personalized manner), as well as other variants of this same vision, are now being practiced by many companies. The size of the scope, the company, the resources, the commitment, etc. may vary. Some will win, and some will lose.

Several noteworthy results are already beginning to appear. The 'traditional' directories companies [e.g., GTE Directories, and the RBOC directories] are not automatically guaranteed to be the dominant players in the future. To move from a paper directory to also supporting an on-line [Internet] format is but the first step down the road of re-inventing the directory business.

The Internet data world of electronic mail has been on a collision course with the traditional voicemail industry in a race to define the realm of unified messaging. Similarly, the world of Internet 'directory-like' search-engine services [e.g., AltaVista, Yahoo, InfoSeek, InfoSpace, and LookSmart] are in a race with the on-line incarnations of traditional directories [e.g., GTE's Superpages] to define the role that directory services shall play in the successful business models [yes, there is room for more than one] of the new digital economy.

This set of such companies have been taking the subsystem/component approach. Their current versions are all standalone systems [specifically, browser-based] for which the user then is responsible to provide any integration of their use. Specifically, the information one enters into the on-line [webpage] form is NOT conveyed to the target destination [if its a URL], the associated phone is not called, ... None currently are integrated into a comprehensive digital economy business model.

Other companies are coming towards the need of and support for directory services from a more comprehensive viewpoint. An example of such a company is GE, that's General Electric. Their efforts to capitalize on the internet and E-commerce is leading them to implement much of the traditional directory-like functionality now in SuperPages within a larger E-commerce framework:

<http://www.techweb.com/wire/news/0128ge.html>

"GE clearly aims to be a major E-commerce player not only in improving its own processes but also in selling its expertise--in products and services--outside the company. For example, *Actra Business Systems*, a venture formed last year by GE Information Services and Netscape

Communications, will soon release its first product, Business Document Gateway. ...”

“In addition, GE Information Services recently released the second generation of *GE TradeWeb*, a service that fills in the other side of the EDI-Web equation--it lets companies that don't have conventional EDI software use Web browsers to link to companies that do.”

“On the services side, GE plans to turn the *Trading Network* into a revenue generator by offering the service to other manufacturers that want to buy goods from their suppliers over the Net. ...”

...

“That advantage puts GE, which many would still call an old-line manufacturer, in a position to provide a great deal of the infrastructure and expertise to support business-to-business commerce on the Net. Ironic? Not really. “Fundamentally, all the Internet is a new business channel,” says Forrester's Maney. “There will certainly be startups like Amazon.com and Virtual Vineyards that create new business models, but the real growth of Internet commerce will come from the steel-and-ingot folks using it to do business the way they always have—just better.”

The number of products now beginning to appear which support one or more aspects of the just-described vision are almost too numerous to mention. The major players [in terms of current company size and influence], such as Microsoft, IBM, GE, and Netscape are working on their E-commerce offerings. Microsoft is ofcourse building Windows NT-centric products using ActiveX, ActiveDirectories, etc.; while, the others are working on open standards-based solutions, such as LDAP, SMTP/SMIME, etc. These companies have begun to form various partnering relationships, such as the one announced on March 11, 1997, between Netscape and GE:

“This announcement between Netscape and GE Information Services builds on the joint venture, *Actra Business Systems*, that Netscape and GE announced last year. The companies now intend to further strengthen the potential solutions for business-to-business electronic commerce. Utilizing Netscape open, cross-platform software, GE Information Services is creating Extranet solutions for its customers. For example, GE helps manufacturers extend their legacy order entry, order tracking and inventory management systems to their suppliers and distributors. As a result, the manufacturer can establish just-in-time inventory practices, drastically reduce manufacturing cycle times and substantially reduce inventory warehouse space needs.”

...

“Together with more than 40 other companies, Netscape and GE Information Services also announced support for a core set of standards for enabling external networks or Extranets. The standards include the next version of the Lightweight Directory Access Protocol (LDAP),

S/MIME, Signed Objects, EDI.INT, vCard and X.509 certificates. Together these standards provide a blueprint for companies to create a new breed of 'Crossware' applications."

Then there are any number of smaller and new startup companies with bright ideas they are anxious to deliver. One such company is *inCommon* which recently announced December 16, 1996 their new product *Downtown*:

"*inCommon* Unveils Downtown, First Comprehensive Solution for Fast, Proactive Internet Information Delivery; Broad Spectrum of Publishing and Technology Partners Embrace Downtown as a Key to Redefining Publishing on the Internet"

More recently, on Tuesday May 13, 1997, *Four11* <http://www.four11.com>, another such startup company, announced that "it has reached agreements with five major telecommunications companies to link to each others' online directory services. Nynex, US West, Ameritech, Bell South, and Pacific Bell will provide links to their Internet yellow pages from Four11's Web site. Also, the site's white pages directory will be accessible from each regional Bell operating company's online directory. Four11 users will be able to access business information via a clickable US map, which links to each telephone company's online yellow pages."

Also announced on May 13, 1997, *Netbot, Inc.* of Seattle, Washington, "announced availability of a beta version of *Jango*, 'the Internet's first intelligent shopping assistant.' The company introduced it last March at PC Forum. A company news release describes *Jango* as an application for Windows 95 or Windows NT that works with a user's browser. A person enters the name of a product they are shopping for and *Jango* automatically determines which stores and information sites are relevant. *Jango* prepares reports including product information, reviews, pricing, and specifications. The utility can be downloaded at <http://www.jango.com>."

Such events as these send a clear signal that the time has come for the expansion and the integration of the scopes and the capabilities of the directories, the messaging, and the security businesses of GTE. The *vision* previously described in this whitepaper appears to be much closer to reality than even I had believed! We are at the threshold of a golden opportunity!

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