

# ***Industry Outlook Report***

## **The Future of Telecommunications**

*Werner A. Knetsch, Phil O'Donovan, and Martyn F. Roetter*

The telecommunications industry has a special role in economic globalization: it is an enabler as well as a beneficiary of this phenomenon. The integration of telecommunications markets worldwide, together with new applications and technologies, is enabling multinational companies in other industries to operate globally and become more efficient and effective. At the same time, telecommunications benefits from globalization because communications revenue increases as a result of increased activity in world markets. Telecommunications is therefore in a „win-win“ situation.

However, what applies to the industry overall does not necessarily apply to all participants. There will be winners and losers in the process of telecommunications globalization. Clearly globalization is leading to a massive wave of consolidation, which has just started to build. Most incumbent telecommunications players think they are part of the wave (i.e., the dynamic buyers), but most of them are probably nearer the beach! For any telecommunications player in this wave, there is a clear, classic choice of strategies to make money: to be either first in to buy, or last out to sell. How does a CEO decide which approach to take? If a company chooses to be „last out,“ what tactics should it employ to get the highest possible price?

Of course, the telecommunications industry is not alone in bearing a disproportionate share of the burden in this era of industrial upheaval. Information technology, media, and electronics are also deeply affected. As these industries battle over what now constitute telecommunications markets, we believe that the long-term winners will not simply be those organizations with the greatest financial strength (or influence among sources of capital). The winners will be those who can combine deep pockets and risk awareness with an entrepreneurial spirit, a new business model, and the will and ability to manage effectively across cultures.

In the course of debating this, we intend to debunk some entrenched myths, such as the fixed size of the still fairly separate video and voice markets, the idea that deregulation automatically leads to effective competition, and the notion that the old business models still used and beloved by established players in telecommunications can and will continue to work.

### **What's Driving the TIME Industries?**

Before discussing the future, it is worth understanding today's industry drivers in telecommunications, information technology, media, and electronics (TIME) (Exhibit 1).

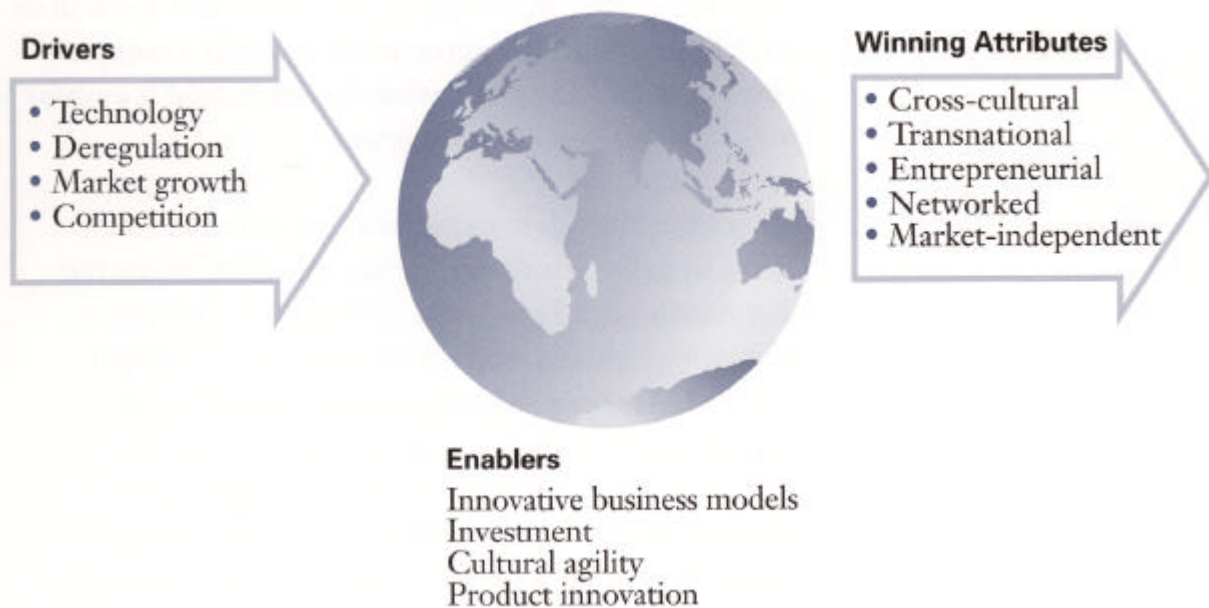
**Convergence and the Internet.** The Internet was, and to some extent still is, regarded by many telecommunications companies as a peripheral phenomenon for computer freaks or, at best, a new online service. However, in terms of industrial politics and competitive dynamics, the Internet must be understood as a symptom of a vertical integration process, the penetration of computer technology into telecommunications. It is not a new online service, but a departure from current understanding of what communications technology is all about (networks built on centralized, proprietary systems). This integration process will radically change global markets for network operators, suppliers, content providers, and end users.

The scale and scope of this fundamental change are just emerging, and are most evident today in the services „voice over the Net“ (VON) and „fax over the Net.“ The software for these services, in conjunction with a sound card and modem enabling Internet calls worldwide at the local rate, is already incorporated into Netscape Navigator 3.0 and Microsoft Internet browsers (some of which are even distributed free of charge). Alternatively, the software can be obtained from about a dozen providers as separate modules for between \$50 and \$100. Sending faxes via the Internet also offers huge cost savings – a gap in the market that one or two service providers have already perceived and are offering more and more to their customers as a value-added service. Where does this leave the telecommunications providers whose revenues are still streaming mainly from plain old telephony services (POTS)?

Some of the global players are drawing their own conclusions about the importance of the Internet. In spring 1996, AT&T offered its 90 million telephone customers direct access to the Internet with an aggressive pricing strategy: one year's unlimited use, free of charge. This strategy yielded 400,000 Net surfers to the company at a stroke and propelled it to the top of the nearly 3,000 Internet service providers in the United States, second only to Netcom Online. A few providers (e.g., France Telecom) are even tentatively exploring the possibility of offering VON services themselves, perhaps on the principle that if you can't beat them you had better lead the pack.

## Exhibit 1

### Engineering the Global Telco



The Internet is fundamental to change in telecommunications because it reverses the control structure in the value chain. It gives control to the user to select exactly what he or she wants; it lowers the entry barriers into all kinds of markets on a global scale; and it breaks the hold of the content „gatekeepers,“ through the emergence of software products known as „editors.“ These products enable users to collect the kind of material they like relatively easily. Both Knight-Ridder, the U.S. newspaper chain, and the publishers of *The Times* in the United Kingdom are aggressively pursuing the potential of this kind of software, to turn a paradigm shift into a business. Arthur D. Little is currently actively helping clients understand the opportunities and implications created by the many paradigm shifts introduced by the Internet to help them marry the technology and business issues to create strategies for investment and action – because those who do not act will probably find themselves among the losers.

More and more evidence is emerging that the Internet constitutes a major threat to telephone companies. This evidence is stimulating a flurry of acquisitions and alliances by forward-looking companies. For example, in one week in May this year, GTE (America’s second-biggest carrier) announced the acquisition of Internet service provider BBN, part of Qwest’s fiber-optic network, and an alliance with Cisco Systems to upgrade its data-handling abilities. This is the rate at which companies now have to move to maintain their positions in this dynamic marketplace.

**Digital Everything.** It is highly dangerous for any telecom industry participant today to restrict its vision to the market in which it currently operates, because the boundaries of that market are constantly being eroded as more and more services go digital (Exhibit 2).

Moreover, what was considered the short term by telecommunications players in the past – say, two to three years – has now become the long term, because the rate of change and the product/service development cycles in telecommunications are now resembling those in the computer industry, with major innovations emerging every few months rather than years.

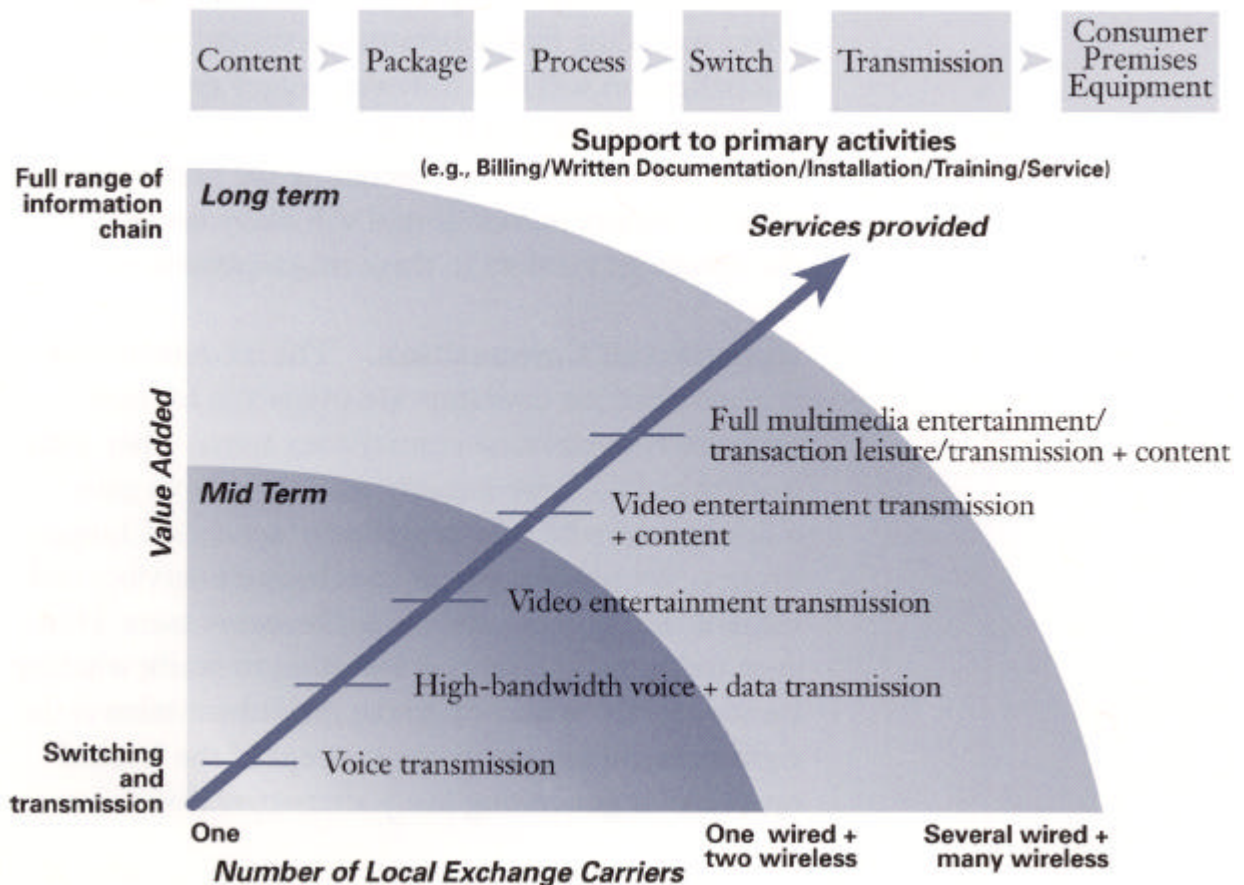
**The Shift to Mobile.** Demand for telecommunications services is shifting rapidly, and mobile communications is driving many of today’s telecom investments. In highly industrialized countries, on the one hand, mobile and data services show tremendous growth rates (although POTS will remain the main revenue generator for some time). In underdeveloped countries, on the other hand, the basic demand for voice communication has yet to be satisfied: the growth potential is enormous in countries in the Far East and Africa, where there is still only one telephone line per 50-80 people. China provides a good example of this situation, and all the big telecom companies are already lined up to invest in order to exploit the huge market.

In all these circumstances, there is an emerging tendency to combine wireless and wireline services (known as fixed-mobile convergence), e.g., through combined network planning and operations and through single-number services and a single bill. The combined approach of British Telecom and VIAG to enter the German telecom market equipped with a mobile license is based on this notion. Meanwhile, governments and commercial

organizations alike are increasingly attracted by the potential of a wireless infrastructure (which requires far less capital investment and labor than wireline) to enable business, educational, and social development in developing countries.

## Exhibit 2

### Digital Everything



As mobile increasingly takes center stage in telecommunications, we expect a major consolidation effect spreading from operators to system vendors. Globalization will lead to fewer, bigger multinational operators of fixed and mobile services. Ericsson, Nokia, and Motorola are becoming the preferred system vendors in mobile and will likely become the dominant vendors to these mega-customers.

**Unexpected Competition.** The incumbent telecommunications operators are preparing for new entrants in the telecommunications arena. They anticipate that these new entrants will compete to gain market share with a broad range of services. Competition is already heating up on telephone services and value-added services, mainly for business users. However, many new entrants are starting to doubt whether becoming the runner-up to the incumbent telco is the right business approach; the concept of the „virtual operator“ is generating lively alternative discussion.

Virtual operators aim to build an attractive customer base by investing only as much as is absolutely necessary in network structure. They buy the rest from the dominant carrier, based on open network provision (ONP), unbundled services, and cost-based interconnection agreements. This business approach lowers the seriousness of the investment, provides a more favorable cash flow, and emphasizes the ultimate competitive success factors: ownership of the customer, attractive service position, and efficient operations.

Cable companies may also pose a direct threat to incumbent telecoms operations – as they are already doing in the United Kingdom. The obstacle for cable companies, however, is that they tend to be much smaller, highly geared businesses that may not attract the investment needed to develop a substantial telecoms operation. Their balance sheets tend to be unattractive to investors because they show high growth, but with high investment, and their management skills tend to be thin. To be credible, long-term competitors to telephone companies, cable companies will have to be astute in how they upgrade or engineer their cable (or more likely hybrid fiber

optic/coaxial cable) networks to accommodate two-way services, and in how they develop the requisite customer care and technology expertise for two-way, interactive services. Telecommunications companies, on the other hand, have high profits (at least for the moment) but slow growth, and they must prepare for the inevitable erosion of their profits with competition. They are often hindered by bureaucratic cultures that are ill-equipped to respond nimbly to competition or to pursue emerging opportunities effectively.

Players are also entering the market from outside TIME altogether. For example, in Germany, the competitors to Deutsche Telekom are led by firms with backgrounds such as mechanical engineering (Mannesmann) and public utilities (VEBA and VIAG). In Brazil, where the main constraint is that 51 percent of any venture has to be owned locally, Bell South is participating in a consortium in which the local partners are a communications group (with limited experience in telecommunications), a strong financial institution, and a large conglomerate with interests in the construction and petrochemical businesses. Utilities, also, are showing clear desire for engagement: they already have the advantages of established infrastructure and customer base, and, in the United States in particular, they are already competent at bundling services to supply both gas and electricity to customer accounts.

The long-term positions of traditional telecom suppliers are particularly vulnerable to initiatives from new (mainly US.-based) suppliers from the computer sector. For example, Cisco, Cascade, and others occupy powerful positions with their routers and switches for the Internet infrastructure and their broadband switches and multiplexers. The leading voice-message systems are from companies such as Octel and Boston Technology, rather than from the telecommunications companies carrying the messages. Computer telephony integration (CTI) innovations are being driven by the PC and software industry; indeed, we believe that companies such as Microsoft are using this and aspects of electronic commerce as a kind of „Trojan horse“ in a determined strategy to sneak into the camps of the enemy (telecommunications companies) and steal market share – and especially customer „ownership“ – from under the enemy’s nose.

**Deregulation.** The spread of telecom deregulation throughout the world has significant implications for all TIME companies in terms of opportunities, threats, and industry restructuring. The rate and style of implementation of deregulation vary considerably. In the United States, for example, the final stages of industry restructuring are approaching as a result of the 1996 Telecom Act, although the pace of change is slower than was originally expected. Most European Union and OECD countries are following similar paths, but at different rates and with varying emphases according to their diverse social and institutional traditions. Some, such as New Zealand and the United Kingdom, have gone further than the United States in liberalizing markets, while others are still more protected. The world’s less-developed countries are also headed in the same direction, but along various paths (Exhibit 3).

Such variations in pace and approach (and, to an extent, national culture) are translating into different local market structures. One of the biggest practical problems for deregulation is the setting up of a suitably powerful, independent, and effective regulatory body (such as Oftel, the Office for Telecommunications, in the United Kingdom). At the heart of this issue is a human resource problem: the regulator’s staff needs to know about telecommunications practice and technology in enough depth to regulate sensibly and in the best interests of all concerned – but, in most countries, the best people for the job already have jobs – in the incumbent telecommunications monopoly. Nonetheless, the United Kingdom, United States, and other countries have shown that this problem can be resolved provided the right levels of funding, authority, and expertise are achieved. Germany is still seeking the right approach.

### Exhibit 3

#### Telecom Market Trends in Less-Developed Countries

- *Wide open competition* (Mexico, Chile, Philippines)
- *Privatization with phased competitive liberalization* (Argentina, Hungary, Venezuela)
- *Privatization with limited competitive entry* (India, Colombia – although timing and conditions are still unclear in these two countries)
- *Privatization with little or no liberalization* (Singapore)
- *State-controlled „competition“* (China – complicated by struggles between central and regional authorities and between Ministries)

**Technology.** Advances in broadband technology and other trends are allowing the kind of integration embodied in the growing Internet to take place right across the spectrum of scale, from public global networks right down to single-location systems (phone and intranet) (Exhibit 4). At the same time, new standards are emerging, e.g., the Multimedia Network Cable System standard published in December 1996, in whose development Arthur D. Little played a primary facilitation and information role on behalf of a consortium of

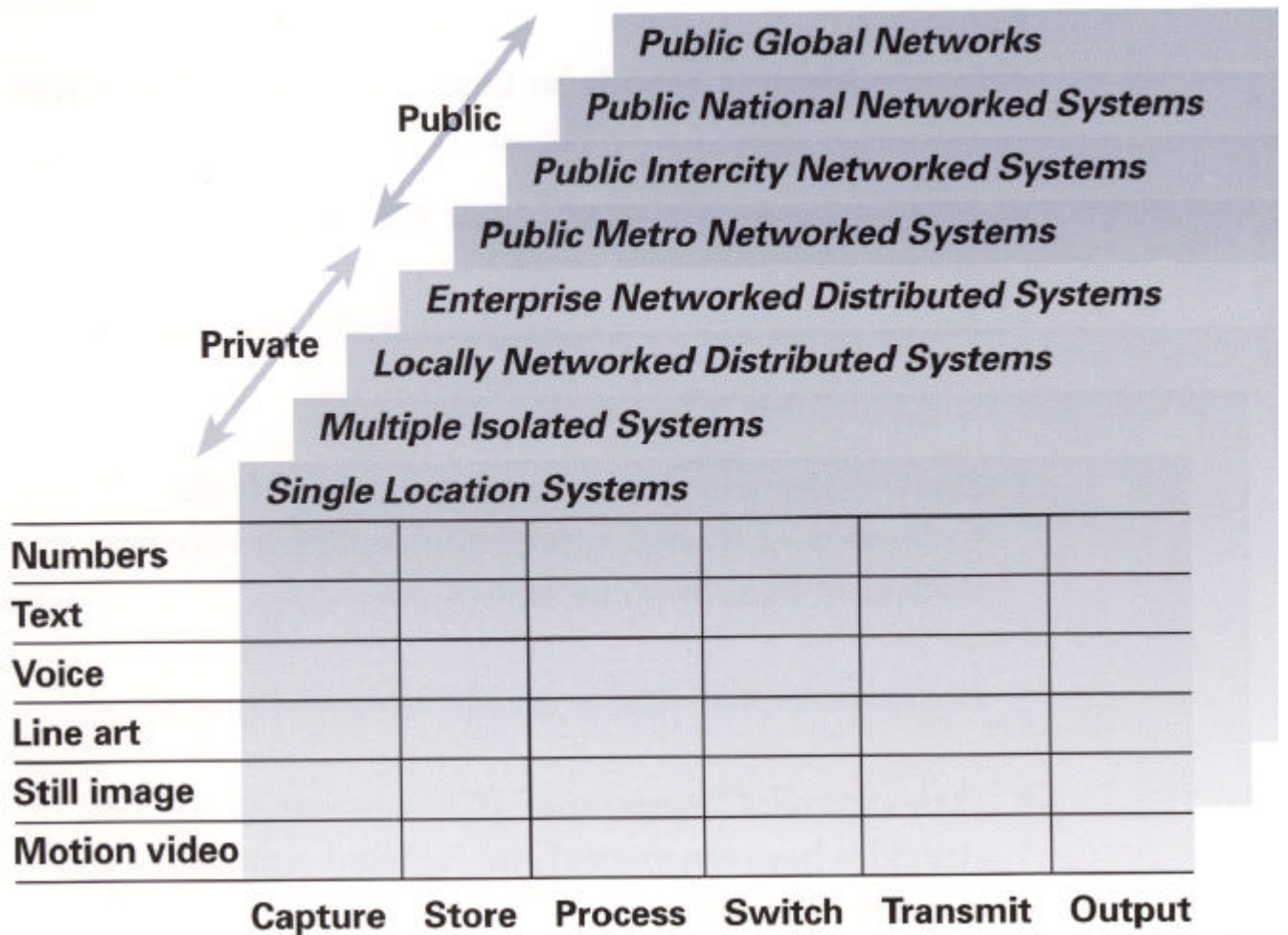


leading North American cable companies. Technological advances, including compression and other techniques, are enabling vastly increased database storage and processing power to be located in equipment in the user's premises. This obviates the need for the horsepower of a dominant carrier, thus freeing the customer (business or consumer) from dependence on the carrier.

**Exhibit 4**

**External Environmental Common Themes and Drivers (Network Ubiquity)**

**Broadband technology and other trends are driving toward convergence and filling in of the entire space**



Another new technology trend is embodied in „Internet appliances.“ These are a collection of very application-specific devices that feed off a central server (e.g., in the home), supplementing rather than supplanting the PC (unlike „network computers“). These appliances are already being given away to create „instant“ customer bases for services such as home banking, shopping, video on demand, and the like: for example, witness the joint venture by Barclays Bank and cellular carrier Cellnet in the United Kingdom.

**Opportunities and Myths**

The drivers of the telecommunications and related industries are creating enormous opportunities, both for users and those from whom they buy their products and services. However, several misconceptions have also grown up around these opportunities; users and suppliers both need to understand these misconceptions to realize the opportunities fully.

**Market Growth.** For some time there was a mis taken belief, almost amounting to a myth, that the various components of the total market (voice, data, video, etc.) would continue to grow in roughly the same way as in the past, and that convergence simply meant some changes in the way they were carved up among the suppliers. However, we believe the advent of true multimedia, with which people are able to tackle much more

sophisticated tasks, will lead to an explosion in usage. For example, already a phone call need no longer be in real time, or even by voice message, but can take the following form, audible at your computer: [Opens with picture of Paul] „Hi, Tom, this is Paul; it’s six-thirty in the morning here in Kuala Lumpur, how’s the weather in California? Here’s the report I promised you for today. If you click on the graph icon you’ll see the sensitivity analysis we did, and if you’d like more detailed data just click on the ‘filing cabinet.’ The presentation for our client, to go with the report, is in the ‘video can.’ Good luck!“

**Deregulation and Competition.** Something of a myth also surrounds the opportunities created by deregulation. Liberalization does not necessarily mean less regulation, and only those countries (such as the United Kingdom and Hong Kong) that have recognized the need for quite different, but equally stringent, regulations stand to reap the real benefits of deregulation. In fact, a nation’s regulatory agency plays a vital role in determining the rules of the game and the predictability of a participant’s performance by:

- Setting tariff prices and approving tariff changes
- Managing the radio spectrum and granting (or selling) licenses
- Determining policies for interconnection between „dominant“ operator and new competitors
- Setting standards for equipment to be used in, or connected to, the public network
- Awarding (or denying) licenses to enter the market

Far too many of the 69 signatories to the World Trade Agreement on deregulation of telecommunications, signed in February this year for ratification by the end of November, are failing to move with the kind of speed necessary to implement it properly. The different shapes taken by deregulation, and different stages of development in different countries, also mean that global players – while clear in their strategy – must be flexible in implementing strategy so that it can be tailored to local conditions and modified over time.

**Business Models** Anyone in the telecommunications industry who believes they can continue to trade in the traditional „big company“ business model is deluded. In the past it might have been good enough to be a fast second-to-market, as long as you had good marketing and distribution. But the computer sector of the TIME industries is demonstrating that this model no longer works, or at least is becoming extremely risky. Companies, such as Intel, that are consistently first-to-market are increasingly dominating in areas such as microprocessors (where Intel has over 80 percent share). In time the same scenario will emerge for service as well as product providers right across the spectrum.

Another example of the „big company“ model has been the traditional telecommunications companies’ way of obtaining return on the huge capital investments needed to develop and install the equipment, i.e., by charging as high a price as possible for as long as possible for its use, governed by agreements on „allowable rates of return.“ In the new scenario being driven from the computer sector of TIME, there is a clear recognition that the real money is to be made not from the equipment, but – at this stage in particular – from the multitude of services providers can offer on it. So the sensible thing to do is essentially give away the equipment (or, as AT&T did, the access to the Internet) and hence gain a substantial customer base in as short a time as possible.

### **Fashioning a Strategy**

All these considerations are important parameters in the creation of a strategy for the global telecommunications market. However, in the final analysis, the business models and strategy created have to answer the question, „What does the customer want?“ While common in other industries, this profound customer focus has yet to become widespread in telecommunications. It will enable companies to make better decisions about which parts of the value chain they want to cover. From these decisions will emerge a clear direction for the products and services they should offer, and what external alliances they will need to make to ensure these offerings become market leaders.

**„What does the customer want?“** Technology and competition are making mass customization of product and service not only possible but essential. Winners in the telecom market will be those who can provide the user trouble-free, realistically priced communications, with:

- No technical obstacles and no need to study operating manuals
- No lengthy wait times
- No need to go through a different provider for each individual service
- No impenetrable tariff structures, and flat (or at least capped) rates rather than rates charged by the second or the kilometer
- No complicated billing mechanisms with multiple bills from different operators

- No need to remember countless „personal identification numbers“

Manufacturers of global products will also need to be able to cater to the preferences as well as the technical standards of different cultures. In the Far East, for example, people generally like small handsets, whereas U.S. consumers prefer larger sizes. The Japanese and their neighbors like their products to have innovative shapes, whereas U.S. consumers generally prefer more familiar shapes. Such differences have technical as well as design implications. On the standards front, for instance, few people who travel want to carry two phone handsets: one to cope with the GSM standard used in Europe and the other to work with the digital AMPS and CDMA used in the United States. (Cambridge Consultants Limited, Arthur D. Little's European Technology Center, is currently developing a telephone that can „sniff the air,“ in much the same way as many modern electrical appliances have built-in adapters to deal with the difference in mains voltage supply between the United Kingdom/Europe (220 volts) and the United States (110 volts).)

**Coverage of the Value Chain.** In creating a strategy to provide what the customer wants, the most important decision for any telecommunications player is which parts of the value chain they want to cover: i.e., what kind of company they want to be. Telecom operation is clearly two businesses: wholesale (network design, construction, and operation) and retail (attracting and understanding customers, packaging operator offerings to best meet their needs, billing for these, and providing after-sales service). Traditional operators today are good at wholesale, but generally weak at retail.

There is no one right way for a telecommunications company to go about making the strategic choices that will define its business. Some companies (or combinations thereof) will inevitably attempt to cover large parts of the entire chain. Companies such as Cisco Synoptics, which have hitherto played to a niche (albeit a big one) and have been hugely successful, will now try to compete head-on and broadly with the big players. Other players will prefer to focus on narrower market segments, defined by type of customer, product, or service. Unfortunately, recent history provides plenty of examples of companies that have wasted billions of dollars going into sections of the value chain for which they were lamentably ill-suited. One such example is the U.S. Baby Bell companies' foray into video production: this failed because the Hollywood people who were taken on to manage the venture represented a totally different culture, they required different salary scales, and incurred various kinds of risk about which the Baby Bells knew little or nothing.

The best strategies will be those that walk a narrow path between two extremes, neither mistaking a mirage of universal market coverage for a true business vision, nor sticking too closely to established markets that may be swept away by technological or market developments. What's needed is a well-balanced mix. It would be a mistake for incumbent telecommunications suppliers, for example, to plan their future on the assumption that they will hold onto the market they have enjoyed in the past. Most telecommunications companies should expect, if they stand alone, to lose a significant share of their existing voice and fax traffic, as well as much of their markets for value-added services (because others will be offering more innovative services at better prices). Beware, too, of the assumption that any company will last as a single-service supplier, however good that service currently is; competitors will inevitably, in time, use economies of scale, customer ownership, and other weapons to threaten and then take over the lead position.

**Product and Service Offerings.** Once a company has determined what portion of the value chain it will cover, it can identify the range of services and products it will offer and begin to identify the underlying technologies needed in the short and the long term to deliver those services and products in a way that is acceptable to the customer. Technology is more often a „failure factor“ than a success factor for service providers, despite what many companies seem to think. After all, many service providers can gain access to essentially the same technologies. If a company's technology is good, but its marketing, planning, distribution, service, and other processes are substandard, there is no hope of success – however liberal the market or however established the company's position today.

**Partnerships.** A clear view of the service offering envisaged, and a clear perception of the company's inherent strengths and weaknesses (both technological and management-related), will start to generate a profile of the partner or partners needed to achieve the vision. In the telecommunications market of the future, it is highly unlikely that any one company will be able to go it alone, at the very least because of the conflicting dynamics required to be a leading player: leaders will have the scale and economies of a large company, but the agility, entrepreneurial spirit, and innovative spark of a start-up. Examples of the partnerships of the future can already be seen, for example, in the relatively new fax machines that can send non-urgent faxes on the Internet. Development, production, and distribution is by Xerox and the Japanese majors such as Ricoh, Seiko, and Toshiba, but the ideas come from small start-ups with clever software.

The key success factor for such „competitive constellations“ is how the technology is absorbed and transferred into the larger company. Should this process be entrusted to a division? A team? The whole company? Silicon Valley’s success in creating competitive constellations within the IT industry can teach much to telecommunications industry participants. The large company’s attitude to the process will also be a decisive factor. In the United States, for example, telecommunications companies have a poor image among IT companies (large and small) as slow, bloated, and arrogant. The innovative start-ups, whose ideas the telecommunications companies need, would on the whole prefer to team up with companies such as Microsoft and MCI, which are themselves much more accomplished at, and comfortable with, today’s pace of change.

When the right companies are combined – united by a common vision, an appropriate organizational and operational structure, and a cooperative culture – our experience shows that many of the other issues that currently test management, such as time to market and speed in reacting to competition, can often be ironed out with relative ease.

Making the strategy work involves many critical factors for success in meeting future customer requirements and expectations. These include: understanding user requirements, customer care and billing, ability to integrate, cost position, technology and product management. Underlying these factors are three fundamental requirements: the adoption of new business models, the right kinds and levels of investment, and the ability to handle corporate and national cultures effectively.

**New Business Models.** As indicated earlier, traditional „big company“ ideas about how to serve markets not only are dated – but they will accelerate the loss of market share and ultimately revenues that await the telecommunications industry’s established players in their current areas of operation.

Traditional models for determining how and where to invest and develop also require a shake-up. As telecommunications becomes more mass-customized, the industry will need new models akin to those used by fast-moving consumer goods companies. There must be considerable diversification of funds among partners and projects, in the full knowledge that only a portion of these investments will bring in returns – but that those returns will more than pay for the technologies/ products/services that did not make it to market.

In keeping with this new perspective, telecommunications industry participants need to become much faster and better at identifying and killing projects that will not be winners. As in other industries, companies in telecommunications need a new mindset that recognizes the value of learning from what has not worked, as well as from what has, and which ensures that people are rewarded for trying something new, not just for succeeding. The alternative is a climate that has already brought too many companies down, in which the „nothing ventured, nothing gained“ attitude is completely suppressed by a „nothing ventured, nothing lost“ mentality.

**Investment.** The opening of the information and communications markets is an irreversible process that brings with it enormous investment pressures. Investing properly under pressure is an art; the best returns will go to those who understand where the structures being created have come from and why the new business models are not only appropriate but essential.

Investment related simply to financial operations is tantamount to a waste of money. As the example of the Daimler-Benz merger has already shown in the automotive industry, investment decisions must be substantially underpinned by the business operation, with a focus on technological expertise and its transference to a customer-oriented business model. Otherwise, if and when a different set of economic conditions arises, the investment is doomed to prove disappointing.

Players in the telecommunications industry need to be prepared to invest fast and deeply to reap the rewards. This mindset for investment needs to extend right to the top of each company. One Japanese printing company had the foresight to employ a venture capitalist and give him a pot of money to invest in small R&D companies. He parceled out his funds fairly successfully for a time. Then he found a small company that had not only a technology that was compatible with that of his employers, but also an application for it. However, the board refused him extra money to help the small company develop the application. The board took the attitude „R&D doesn’t develop products, it develops technology“ – and thereby almost certainly lost market-leadership position for that particular product.

**Cultural Issues** Many of the challenges of integration and absorption in creating partnerships can and will be addressed effectively at an organizational level. However, Arthur D. Little’s broad base of experience in consolidating industries shows that cultural issues must also be consciously surfaced and addressed – because these will make or break the alliance. By culture here we mean both company culture and national or regional culture.

Changing a company’s culture – in particular, changing how people in the company think about investment and how they measure success – is not easy. But without such change, the „new organization,“ „competitive constellation,“ or whatever it is termed, will not succeed. For example, in countries such as Brazil and the Tiger



Economies, strategic thinking tends to be relatively short-term, and higher investment returns are expected more quickly than some overseas partners might be used to. Similarly, telecommunications companies tend to think longer-term than newspapers or banking concerns might. Ignoring such differences will not make them go away; instead, they will go underground, to wreak havoc – the moreso because unseen – on the overall success of the venture.

Our own experience as a multidimensional global company shows that success depends on appropriate representation of each individual culture and the sharing of authority and decision-making power in an open, respectful, and cooperative environment. Successful global telecommunications managers will be multilingual and have experience living and working outside their native lands. They will also have the sensitivity and agility to negotiate successfully with potential and existing allies from different backgrounds.

The proof of the transformation of the telecommunications industry into a truly global one will be when the appointment of a gaijin (foreigner) to the top of a Japanese company, or a Japanese businessman to the board of a German company, no longer makes headlines because it has ceased to be an unusual occurrence.

## **Conclusion**

When the CEO of a leading TIME operator and service provider was asked recently what kind of advice he would most welcome, he responded: „The advisor with the clearest vision of the future of telecoms and converging technologies would have a permanent invitation to our corporation.“

No one article could address all the dynamic issues related to globalization and consolidation that will affect the evolution of the TIME industries. We are convinced, however, that the issues we have explored here should be on every telecommunications CEO's agenda. And we hope we have demonstrated the need for consistent excellence in innovation, both in technology and in management.

The future of the TIME industries – and of telecommunications in particular – is full of uncertainties. One thing we can say for sure: those of us involved in these industries are in for an exciting ride.

*Werner A. Knetsch is a Vice President of Arthur D. Little, Inc., and the Managing Director of Arthur D. Little's Berlin office. As the leader of the Global Telecommunications, Information Technology, Media, and Electronics (TIME) Practice, he focuses on planning and implementation of product and marketing strategies; application of strategic management; implementation of technology and market analysis; and technology and innovation management.*

*Phil O'Donovan is an Associate Director of Cambridge Consultants Limited (CCL), Arthur D. Little's European Technology Center. As Manager of the Telecommunications Practice of CCL, he is responsible for consulting and product development projects for clients in the TIME industries.*

*Martyn F. Roetter is a Director of Communications and Information Technology at Arthur D. Little, Inc. He develops new business models and strategies for network operators, service providers, and equipment suppliers who are driven by technology, regulatory reform, expanding customer expectations, and globalization.*

*The authors gratefully acknowledge valuable contributions from several colleagues in Arthur D. Little's Global TIME Practice, especially George Freund, Roger Hay, Tom Kuehle, Stu Lipoff, Malcolm Ross, and Michael Taylor.*