PRESTEL, ESCHER, BACH: CHANGES WITHIN CHANGES

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Richard Hooper

TABLE OF CONTENTS

GODEL & PRESTEL, ESCHER, BACH

The title of this paper is a play on the title of Hofstadter's book Gödel, Escher, Bach.[1] Many of the themes in Hofstadter's book illuminate recent events in British telecommunications policy and practice. Indeed, Hofstadter's notion of the "prototype principle" led directly to the structure of this paper. Hofstadter: "The most specific event can serve as a general example of a class of events."[2]

For the purposes of this paper, Prestel, British Telecom's world-leading videotex service, constitutes the "specific event," and recent changes in British telecommunications constitute the "class of events." I hope to show that changes within Prestel have been mirrored in changes within the British telecommunications landscape.

PRESTEL -- FOUR YEARS OLD

Prestel is the trademark of British Telecom's videotex service, which opened in September 1979. It is the largest videotex service in the world. As of October 1983, the statistics show:

- 33,000 sets connected to the service -- the majority in the UK, the rest in 32 countries around the world;

- 70% of subscribers are business customers, 30% residential;

- more than 1,000 information providers (IPs) have filled 270,000 pages on Prestel;

- 14 gateways connected to Prestel (a gateway is an external computer connection);

- monthly frame accesses now total 11 million;

- 120,000+ messages (e.g., mailbox, teleshopping orders, etc.) are carried on the system monthly.

PRESTEL -- CHANGES

The initial launch of Prestel in 1979/80 did not achieve a sufficiently fast growth of subscribers. The launch was highly successful in building product awareness, far less successful in generating actual sales.

To improve sales performance, a large number of changes have been made to the initial strategy:

- a marketing strategy that focused on selling the services that the technology could deliver, not selling the technology itself;

- a redefinition of the business Prestel is in; Prestel, from being a one-way information retrieval business, is today deeply into transaction processing and electronic mail which are two-way interactive services;

- the price of the service initially was too high, and, more significant, the pricing structure was too complicated to understand;

- jack socket* policy; Prestel sets are increasingly connected to the telephone network via telephone/universal jack sockets and not through special videotex jack sockets;

- the dumb Prestel set of the late '70s is gradually being overtaken by the intelligent Prestel set composed of a micro plus screen plus Prestel adaptor/modem;

- the Prestel computer system is being changed to match the redefinition of the business.

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* Analogous to modular plugs in the U.S. and Canada.

But the biggest change of all was the move away from the so-called "common carrier" policy. This is the change on which I will focus.

PRESTEL'S COMMON CARRIER POLICY

To many Americans' surprise, the term "common carrier" has no standing in British telecommunications law and is not used in any of the telecommunications laws enacted (e.g., 1969, 1981). Nor is it used in the latest telecommunications bill to be placed before the Houses of Parliament, which if approved will become the Telecommunications Act of 1984. The term "common carrier" has, however, great importance in British freight history. In medieval times, certain road hauliers working between key cities were formally designated as common carriers. This meant that rates were regulated and that all and any freight had to be carried without discrimination.[3]

Prestel in 1977/8 adopted a common carrier policy, inspired by the use of that term not in medieval road haulage but by U.S. telecommunications regulation. For Prestel, it came to have a specific meaning. Prestel, acting as an arm's length business within British Telecom, would own and operate the videotex computer system. Any information provider could take space on the computer system on a first-come first-served principle, with the sole constraint being the law of the land. Prestel would provide that space, index the information supplied, and provide billing services to enable IPs to receive revenue from page charges. Prestel would not get involved in information provision except indexing. In addition to Prestel and the IPs, there was one other major player -- the television set supply industry. Any company could manufacture and market videotex sets and

adoptors with integral modems as long as the receiving equipment had the necessary attachment approval. Prestel decided not to get involved with set supply (except editing terminals for IPs). Thus the common carrier policy was born — a loose federation of three interested parties, Prestel, IPs, and set suppliers, often referred to as a "three-ring circus."

The common carrier policy was justified by British Telecom on three main grounds. It was politically wise for the telephone company to avoid getting involved in editorial content, even through an arm's length business. It was administratively wise since the supervision of hundreds of thousands of different pages would be difficult. It was commercially wise because market forces and competition would ensure that low-priced Prestel sets would be produced, and that good pages on the database would drive out bad.

However, the common carrier policy did not work in practice for a number of reasons. It did not solve the fundamental marketing dilemma. It did not solve the problem of building new subscribers from a zero base. It would probably be an excellent policy when Prestel has 200,000 subscribers, but it did not help Prestel get from 0 to 200,000! In other words, common carrier policy did not solve the chicken/egg problem at the heart of the marketing requirement. Subscribers will only subscribe when there are good information and transaction services. But IPs cannot afford to invest in good services until there is a good population of subscribers. Common carrier policy seemed to offer no mechanisms for breaking into the vicious circle and transforming it into a virtuous circle of growth.

Common carrier also did not seem to satisfy the customer. It led to a poor quality database where, instead of the good driving out the bad, the bad dragged down the good. The problem of indexing for the system operator

was horrendous because of the incomplete and variable nature of the services on offer. The service was also difficult for the customer to understand since he or she had to deal with three separate entities (in fact four, if you add the jack socket and telephone transmission aspects provided by the "telco" end of British Telecom).

Common carrier had another basic defect. In a competitive industry such as UK videotex where "private" videotex systems jostle increasingly with Prestel to provide services to business customers, there is no clear evidence that the system operator can make sufficient revenues from "pure bit transport." The system operator can end up being squeezed out of the chain of communication as an unnecessary and expensive middle-man.

Finally, common carrier did not resolve the publisher/printer dilemma -- what to do about sex, politics, and religion. In theory, British Telecom could stand back and allow legal but distasteful pages to be displayed on Prestel, quoting common carrier policy. In practice, the service is seen by the receiving customer and by politicians as Prestel, belonging to and being endorsed by British Telecom. In practice, it is not analogous to the telephone service with its single-point to single-point communications axis. It is more like broadcasting, with single-point to many homes being the model. Thus in practice, Prestel and British Telecom found it could not stand back and remain indifferent to the carriage of content which was controversial. Even in traditional paper publishing, printers, wholesale distribution agencies and retail outlets have to make commercial, moral, legal decisions about which publications to handle.

COMMON CARRIER POLICY DISCARDED

The old common carrier policy led to the development of many "incremental" services, services which people would use if they had Prestel but which would not trigger people to get Prestel. News is a classic example of an incremental service. As a result, the common carrier policy has increasingly been dismantled. It has largely been replaced by a growing range of vertically integrated services produced for targetted market sectors, with joint ventures between Prestel and selected IPs/set suppliers. Examples would be Prestel Citiservice, serving the business community with fast updated information on stocks, foreign exchange and commodity prices, and Micronet 800, a service aimed at home computer users. These services which marry conduit, content and receiving equipment are designed to trigger new subscribers -- hence the term "trigger" services.

BRITISH TELECOM AND BRITISH TELECOMMUNICATIONS

Let me now, in Gödel, Escher, Bach style, move up (down?) one level to examine British Telecom of which Prestel is a small corner.

British Telecom is the fourth largest telecommunications operator in the world, with 245,000 employees and a turnover of £6-1/2 billion ($9.1 billion at January 1984 exchange rates). Telecommunications was nationalized in 1912 and became part of the Post Office. In 1969, the Post Office ceased being a Government department and became a public corporation. In 1981, Post Office Telecommunications was split off and became British Telecommunications. The new Telecommunications Bill has as one of its objectives the transition of British Telecom to the status of a

PLS (public limited company), which will then allow the Government to sell 51% of the shares thus returning telecommunications to the private sector.

Since the arrival of Mrs. Thatcher's Conservative Government, there have been major changes to the telecommunications landscape, much influenced by U.S. experience of deregulation. Mercury has been granted a licence to become a second "public telecommunication operator" thus opening up BT's trunk (interexchange) network to competition. Licences are shortly to be awarded to the first group of cable TV operators which brings potential competition into the local loop. Cable TV operators will be able to carry data traffic in certain parts of the country. If they team up with Mercury or BT, they can carry local voice traffic as well. BT is itself involved in consortia for 10 of the initial cable TV franchises -- unlike the USA, where AT&T has not been involved in cable TV.

Customer equipment has been liberalized, with attachment approval functions passing from BT to other agencies. Value-added network services (VANs), defined as "applicable systems," have also been liberalized, with licences being awarded by the Government but not by BT. Two competing cellular radio operators have been licensed, of which BT is only a part shareholder in one. Finally, the Government is examining the possibility of allowing resale of BT private circuits -- the final liberalization.

The turbulence in the British telecommunications airspace is caused by the political desire to deregulate a monopolistic industry. But the turbulence is constantly increased by the difficulties of defining and managing the telecommunications business. Although it is technically possible to separate out the conduit-content components of the telecommunication business -- network (transmission and switching); enhanced or value-added services (data processing, protocol conversion); customer equipment

(PABXs, telephones) — there are stronger forces at work which are driving the components together and blurring boundaries between content and conduit. It is this which continues to generate turbulence.

The effects of this turbulence are many and varied. Because the boundaries between the different parts of telecommunications tend to coalesce, for reasons that will be identified in the final section of this paper, deregulation has a cascading effect throughout the business. In the words of Michael Beesley, who wrote an influential paper for the British Government on VANs and resale: "Once competition is introduced, unforeseeable forces build up which accumulate to further competition and entry to the network and transmissions, the lowest three layers of [the seven-layer ISO (International Standards Organization) model]."[4] There are many examples of this in recent British telecommunications history. For example, the liberalization of simple telephones began by excluding the prime instrument which was to remain a monopoly of BT. The prime instrument monopoly could not be sustained and is already being phased out.

A second effect of this turbulence is organizational difficulty within British Telecom. If network, equipment, value added services could be kept apart, then this would be a good framework within which the organizational decisions could be made. BT could create different business units operating in complementary business areas. In reality, British Telecom is creating business units which operate in complementary and competitive business areas, thus raising the headaches of internal competition management and control.

A third effect of the turbulence is the growth of definitional disputes. Is the jack-socket customer equipment? Is AT&T's local area data transport (LADT) service an enhanced service because it includes protocol

conversion? These may look like technical questions; they are in fact political/commercial questions. Part IV of the new Telecommunications Bill has been a definitional battlefield. Part IC is concerned with defining "cable program services" as distinct from telecommunications services since cable program services are to be regulated through a new Cable Authority whereas telecommunications services are to be regulated through a new Office of Telecommunications. In the first wording of Part IV, Prestel ended up as a cable program service. Under the latest version, Prestel is not a cable program service, but recorded information services on the public switched telephone network are! Recorded information services and radio broadcasting are difficult to segregate in legal terms.

A final effect of turbulence is, of course, intense regulatory difficulties. For example, the same advertisement could be carried over broadcast teletext, in print, over Prestel, and over teletext on cable (cabletext) and could theoretically be regulated by four different agencies.

THE POWERS BEHIND VERTICAL INTEGRATION

There are two power sources which are driving content-conduit and network-customer equipment-services together, despite regulatory desires to keep them apart.

The first is commercial -- the needs of the supplier. All telecommunications forecasters seem to agree on one thing: over the next 20 years, you cannot live by bit transport alone. Revenues and profits from pure bit transport will tend to flatten out (at the top of the familiar S-shaped curve of innovation adoption) as a result of the declining costs of micro-electronics allied to increasing competition. Thus a network business is

forced by commercial logic to extend into businesses beyond pure bit transport if revenues and profits are to show consistent growth. Those businesses are enhanced or value-added services, customer equipment manufacturing/marketing, and systems provision.

The notion of bit transport is a slippery one. Gödel, Escher, Bach: "Levels are not cleanly separated...".[5] Looked at from Prestel's point of view, the public-switched network and private circuits constitute the bit transport level. Looked at from the point of view of an organization using Prestel Gateway, Prestel is the bit transport level. The commercial imperative is to move up a level to avoid being squeezed on the current level. Thus packet-switching networks move up into electronic mail and protocol conversion spawning new services such as IBM's Advanced Information Service and AT&T's Net 1000 which are doing a lot more than transporting bits. A few years ago, it was of course voice telephony/traditional circuit switching moving up into packet switching. Similar commercial logic has been hitting the computer bureau business. Originally, bureaus made their money out of selling raw time and power to users. Today, they have been forced to integrate vertically into premises equipment and software product marketing, to survive. Raw time, like bit transport, has become cheap and plentiful, with little value added. Moving up levels equates with increasing value added. For the same reasons, computer manufacturers are being forced to extend their territories beyond hardware (the base level), beyond systems software (level 2) into applications software (level 3). Hardware, like raw time and pure bit transport, is declining fast in price.

The second power which drives content and conduit together is commercial in the other sense -- the needs of the customer. While it is difficult to generalize, there is certainly a large group of customers who

want simple systems solutions from one supplier, and who do not want to deal with lots of different entities to get a service. The biggest customers may be able to afford the staff time and expertise to shop around in the market and buy disaggregated products to their own specification. But smaller customers would be confused by this. The family expects the cable-TV company to provide them one interface for all aspects of the service from the technology to the programming. Prestel is expected to provide one coherent service from jack sockets through to what appears on the screen through to the bill. Consumers do not necessarily make the conduit-content distinction that can look obvious from inside the suppliers' operation. Television is just television, a unitary service, not separable functions such as program production (16 mm film) to program storage (VCR) to program transmission (broadcast network) to program reception (TV receiver).

STRANGE LOOPS

The "needs of the customer" takes us straight back via a Gödel, Escher, Bach Strange Loop to the organizational difficulties for the telecommunications operator/supplier. How does he organize himself to meet the needs of the customer? There are really only two choices, and neither will ever resolve the problem perfectly. The business can be sliced, first of all, by market sector. Market sector can mean three rather different things: either "all those customers and potential customers living in Birmingham" which is the dominant organizational structure both for old Ma Bell and the new 1.1.84 BOCs, and for British Telecom; or all those in the freight industry (one of my BT businesses, the National Data Processing Service, is organized in this way, serving air, maritime and roadfreight interests

across the U.K.); or, biggest potential organizational headache of all, all big customers billed more than £x million a year. Secondly, the business can be sliced by product/service line, as with British Telecom Prestel and British Telecom's packet-switching service.

The difficulties embedded in all this can be summarized in one example. How do you organize, produce, market and account for the sale of Prestel service to a large airline in the freight business who is based in London? There is only ever an imperfect answer -- despite what Government proponents of "purist" competition policy and fair trading requirements might think. "What was once a nice clean hierarchical set-up has become a Strange Loop, or Tangled Hierarchy. The moves change the rules, the rules determine the moves, round and round the mulberry bush.... There are still different levels, but the distinction between 'lower' and 'higher' has been wiped out."[6]

SUMMARY

Prestel, the world's first and largest videotex service, is four years old. Major changes have been made to all aspects of the business to bring it into commercial viability; for example, the initial "common carrier" policy has had to be severely modified. These major changes to Prestel have been happening within the British telecommunications landscape which itself is undergoing radical change. Experience with Prestel and with British Telecom suggests that conduit-content separation remains as elusive, in practice, as ever, despite its theoretical attractiveness.

ENDNOTES

[1] Douglas G. Hofstadter. <u>Gödel, Escher, Bach</u>. London: Penguin Books, 1980.

[2] <u>Ibid</u>., p. 352.

[3] Gerald L. Turnbull. <u>Traffic and Transport, an Economic History of Pickfords</u>. London: George Allen & Unwin, 1979, pp. 8-9.

[4] Michael E. Beesley. <u>Liberalisation of the Use of the British Telecommunications Network</u>. London: Her Majesty's Stationery Office, 1981, p. 29.

[5] Hofstadter, p. 458.

[6] <u>Ibid</u>., p. 688.