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Evolution in Healthcare IT Delivery

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Just after the turn of this decade, it quickly became apparent that investments by the healthcare sector in the emerging e-business infrastructure were simply not keeping pace with other industries. For many analysts of paradigm shifts in technology, however, this was a blessing in disguise. The dotcom Big Bang, as we all know, was followed by an almost equally frenzied Big Whimper.

Of Early Birds, Band Aids and Expensive Lessons

Not a few early birds flying into the dotcom maelstrom paid a price. Major league insurance firms like Cigna saw a near meltdown of their IT systems – and their operations – for embracing new e-business much too hastily. There were other casualties, though only some are known. Many have managed, sometimes expensively, to Band-Aid their blunders, go back to the basics, and start again.

For healthcare, a sluggish commitment to immerse itself in the new e-World may very well have avoided the expenses and broken dreams of a boom-bust. However, it is clear that the time is now ripe for change. As *Healthcare IT Management* has described in a previous issue, nothing illustrates this better than the commitment by Big IT firms to develop healthcare-specific offerings.

A Robust New Substructure

In spite of continuing concerns about interoperability and standards, such resolve by the major league players provides a solid sub-structure. Astride it are hundreds of smaller, nimbler players, who have begun designing, testing and implementing new products and solutions, knitting together what will inevitably become a seamless, operational e-Health superstructure. Like an iceberg, what we are now witnessing is only the tip of the new e-Health edifice. Only the ostrich-like would argue there is little beneath.

Delay in Adoption = Flatter, Cheaper Learning Curve

Some experts believe that healthcare has been one decade behind on the technology curve. Indeed, if this is accepted, healthcare IT is exactly where eager beavers in other industries sat – just before the dotcom bust. If played correctly, healthcare IT can acquire the benefits of new technologies, without paying too high a price for the learning curve.

Journeys to the Centre: The Age of the Mainframe

Any analysis of the evolution of healthcare IT in Europe would begin in the late 1950s and early 1960s. These were years marked by the emergence of massive new centralised hospitals, as urbanisation gathered pace. This was the period of bringing huge, multi-speciality hospitals to the people, in the new metropolitan conurbations.

On the IT side, both the above periods would be symbolised vividly by the IBM 360 series. This was the Age of the Mainframe. Corresponding to the move by hospitals into the midst of patients, mainframes entailed a move by users to the computer, hosted – often underground, in their silos of power.

In the early 1970s, Europe witnessed a major spurt in suburbanisation, and many new, usually smaller hospitals began to be built around the fringes of the larger cities. Community clinics served as feeders to regional and metropolitan hospitals.

By the mid-to-late 1970s, the prior Zeitgeist of concentration had reached its peak. The two oil price shocks during the period also resulted in some powerful countervailing pressures, and reality checks, for example, by putting brakes on the building of new highways.

Minicomputers: Computing Moves out of the Basement

As the decade turned, so did the focus of healthcare IT. New mid-range offerings in the shape of minicomputers became ubiquitous. Technically speaking, minicomputers formed a clear group with their own transistor/core memory 16-bit hardware and operating systems - including multitasking pioneers such as VMS and UNIX (whose origins as a minicomputer OS remain largely unknown). Digital Equipment, with its PDP and VAX series, was the leading minicomputer vendor, for some time the worlds second largest computer firm (after IBM).

An important factor to note here is that minicomputers, for the first time, permitted not only multi-tasking but also multiple users at different locations, via hardwired local networks. These lighter-weight computing engines not only found favour in the new smaller community hospitals, but also in individual departments within the big metropolitan hospitals.

But the Era of Minicomputers was to be short-lived. Today, almost all the flagship vendors of that period – some near iconic – are only memories: think of Control Data, Data General, Honeywell, Nixdorf, Norsk Data, Prime Computer, or Wang Laboratories.

The Age of the Personal Computer

The reason for the demise of the minicomputer lay in the advent in the late 1980s and early 1990s of the personal computer. These were powered by the Intel x86 processor, and accompanied by (what now seem almost elementary-school level) networks from the likes of Novell.

Although personal computers could not immediately take up the increasingly data-intensive tasks, which minis were doing, mainframes – whose costs per unit of processing power had begun to decline sharply – could, and did, fill the gap. And there were gaps to be filled. Users had, alas, become used to computing.

Healthcare Data and Automation

In the US, in particular, the driver for the kind of data processing intensity only computers could offer came in the shape of Diagnostic-Related Groups (DRGs) in the mid-1980s. Hospitals were obliged to use DRGs (and associated codes) for services based on a range of criteria and classifications: age, gender, principal diagnosis, secondary diagnosis,medical or surgical procedure, complications and outcomes. Adding further impetus was the beginning of managed care.

In a variety of forms, such computer-friendly, data-intensivemetrics also began to creep into Europe. In spite of early resistance, they began to become the rule, especially since they were seen as a weapon against the sharply rising costs of healthcare – already a major issue in the recession of the early 1990s.

During this period, in spite of some Last Stands by minicomputer vendors to develop so-called superminis, the value perception curve on the user side had begun to become increasingly binary. The Vision Thing for IT managers now lay in two directions: towards robust mainframes on the one side and to the newer PCs on the other. Thanks to the geniuses at Intel, the processing power of PCs was doubling every two years (according to the now-famous Moore's Law), but their capacities (on the software and networking side) was accelerating, too.

While Bill Gates and Microsoft'sWindows proceeded to open the floodgates for an explosion in the use of PCs, the last nail in the minicomputer coffin was hammered in by the development of Unix to run on Intel x86 architecture, including Solaris as well as NetBSD (Net Berkeley Software Distribution or NetUnix), as well as its cousins and clones.

Meanwhile, falling prices and proliferation in use were fuelling the traditional virtuous circle for new technologies to the tipping point. As the personal computer soon transformed itself into a commodity, the traditional hospital patient was metamorphosing into a healthcare consumer.

The Internet and the Informed Patient

Looking back, it is hard to imagine the look and feel of a European hospital in the 1980s and early 1990s. Most still greeted patients with paperwork (literally speaking) at the front desk. Some had dumb terminals linked to the mainframe. By the late 1990s, however, it had become almost impossible to find an admissions desk without a personal computer or workstation, or patients nearby stepping outside to use their mobile phones.

The Era of the Internet and mobile healthcare was just beginning. On the healthcare side, one consequence of the Internet is the enormous boost it has provided to what can be termed the Informed Patient. Patients, especially young and middle-aged ones are/or certainly can be armed to the teeth today with information about health. Such empowered patients have forced changes in their interaction with physicians, many of who have been (or will be) brought down from their traditional pedestals as benevolent dispensers of health to professionals providing a service.

Governments in Europe too have plunged into the fray, supporting an arsenal of Internet enablers, from healthcare information portals to hospital

quality-of-care comparator sites. Forcing further change in driving healthcare IT to new frontiers will be mandates to enact laws like the Health Insurance Portability and Accountability Act, of policy makers to devise standards such as HL-7, C Electronic Data Interchange, ACR/NEMA Digital Imaging and Communications in Medicine Standard Medical Terminology and Code Sets, and last, but not least, lay the framework for the electronic health record,   and anywhere/anytime treatment.

A Brief Look at the Future

Down the road, however, there is more to come. Our own publication *Healthcare IT Management* has portrayed developments such as smartcards, new-generation mobile clinical/ laboratory information systems and computerised prescription order entry, bedside data entry/access terminals and PDAs with digital pens/voice-recognition through to RFID, robots and wearable VGA HeadMounted screen projection devices.Many such technologies have gone live in Germany's Asklepios, billed as the first 21st century Hospital.

The eventual challenge is however going to be philosophical. Healthcare has always been a people business. While cold, gleaming (but large) medical devices could be accepted at a distance by patients as a necessity, the growing pervasiveness of PDAs, RFID scanners and voice-recognition units, driving their healthcare data across invisible digital pathways around the world, may alter acceptance dramatically.

This aspect of the healthcare IT and the emerging e-Health infrastructure to balance the quantity of sophisticated wellmanaged data, with still-personalised and quality-focused healthcare delivery - is one that will demand attention in the years to come.

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