"2025, Fisher & Paykel, and Geelong District Water Board... What Do They Have In Common?" or "Business is War"

The use of open systems technology has achieved wide spread use in the past two years. This paper cites three examples of organizations in widely divergent areas, all experiencing the same benefits and flexibility open systems offer. Through the appropriate use of technology, and the standardisation of interfaces, protocols, and formats, customers are gaining increased information management flexibility independent of the technology.

Roger Fraumann
Managing Partner
EF Consulting
203 Bellevue Way NE #141
Bellevue, WA 98004
+1-206-251-1111

Introduction:

We are at the cusp of a significant change in the way we conduct business. Already some organizations are finding the human reference of time is glacial compared to the electronic arbitrage requirements. The human element is planned out, well in advance, and the following execution is then independent of human intervention. This enables "real-time" sales, production, and quality analysis to be incorporated across the enterprise.

To be successful, an organization needs to acquire information, decide what to do, and deliver product more quickly, reliably, and accurately than their competitors. To the military, they want to know, decide, and act within the enemies decision cycle. At the heart of this is "C4I" (Command, Control, Communications, Computers, and Intelligence). For both, the major focus is rising above the technological differences and on what integrates and works together.

Borrowing from the Japanese motto, "Business is war", we can gain insight where planning and open systems (the standardization of interfaces) is used for competitive advantage.

Three organizations are highlighted:

- The U.S. Department of Defense, and the recently completed "2025 study" which studies the art of war by 2025.
- Fisher & Paykel, a NZ white goods and electronics manufacturer, which has focused on being a "smart company" with a lot of IT in the washing machine.
- The Geelong District Water Board, a regional Victoria, Australia water authority, which has worked to build an IT capability to improve level of service.

What do they have in common? They have all worked to be flexible and adaptable with open systems, albeit in different ways.

Observation about the Japanese motto 'Business is War': "In the event of war; the first recourse of American military planners has been to turn to its industrial base: the U.S. has produced its way to victory. Japan's industry had little surplus capacity and there was great scarcity of raw materials. In order to produce the weapons it needed, Japan first had to engage in political and military actions to secure the natural resources that industrial production required. In other words, for Japan, war was the foundation of industry, while for the U.S., industry was the foundation of war."[1]

[1] Friedman, George and LeBard, Meredith *The Coming War with Japan* (1st edition) New York: St. Martin's Press, 1991, p. 30.

U.S. 2025 Study:

Because of the declining Soviet Union threat with resulting declining competitive morale, planning lethargy and pessimism, and the need to balance technology futures with human limitations, Admiral Jeremiah[2], Chair of the Pentagon's Joint Requirements Oversight Council, commissioned the "2025 Study". The result is a "purple" consensus driven strategic planning document. Its impact has been considerable in U.S. military, congress, and defense industry circles.

Phase one, managed in late 1990 by Dr. Cronin[3] a senior fellow at the Institute For National Strategic Studies, resulted in four independent scenarios for the future. Phase two, managed by Dr. Montaperto[4], distilled the initial scenarios to define several technical directions and mission impacts. The result was thirteen more scenarios which were then fed into a final team of 14 people, formed into three task groups; forestructure, regional security, and technology. Both of the project phase managers credit Dr. Al Bernstein with the overall project coordination.

The final product is an "unfinished" 4,000 page DoD working paper, touching in part, on what advanced technology the U.S. military will need to meet their changing mission requirements. Since late '92, portions of the content have been revealed to the general public.

Starting with general observations, including the likely doubling of the world's population to 10 billion people - and perhaps a quarter of them hungry every day; it is expected that massive migrations and regional conflicts over natural resources will escalate. This suggests the post-Soviet Union era will be dominated by regional conflicts, ethnic rivalry and humanitarian relief tasks.

This forces a re-thinking of the U.S. defense posture, and highlights three time proven qualities which are needed for the armed forces to prevail; superior technology, superior ability to adapt forces and resources, and Command, Control, Communications, Computers, and Intelligence (C^4I).

The federal procurement system is one of the first areas being changed as a result of the study, in particular because of changes in strategic requirements, domestic priorities, and advanced technology. The acquisition cycle is being compressed to exploit the state-of-the-art technology (including production prototypes and prototype deployment). Price/ performance/ support metrics are also being considered more fully. The need was highlighted by the results of one recent study where a specialized military computer was found costing 100 times more than a similar off-the-shelf system.[5]

The Center for Strategic & International Studies completed a "Military Technical Revolution" (MTR) study in mid '93 sponsored by the Undersecretary of Defense Acquisition. "It concludes that the critical aspects of the MTR will include the availability of Reconnaissance, Surveillance, and Target Acquisition (RSTA) information in real time; on-demand strikes to neutralize targets as quickly as possible; the use of distributed and resilient networks for information distribution; increasingly multi-functional military forces that can perform a broad range of missions; and more flexible behavior by the organizations - military and

---

2 Jeremiah, Admiral David E., USN, Vice Chair of U.S. Joints Chiefs of Staff. Commissioned in 1956, rose to commander of U.S. Pacific Fleet, and planned the operation resulting in the capture of the hijackers of the Italian cruise liner Achille Lauro. Personal communications with ADM Jeremiah's aide Lt. Col. Larry Icenogle, JCS Public Affairs Office, January - June 1993.

3 Cronin, Dr. Patrick M., Senior Fellow, Institute For National Strategic Studies, National Defense University; Washington, DC 20319-6000 U.S.A., 2025 Phase 1 manager, Personal meeting, 3 June, 1993.

4 Montaperto, Ronald N., Ph.D., Senior Fellow, Institute For National Strategic Studies, National Defense University; Washington, DC 20319-6000 U.S.A., 2025 Phase 2 manager, Personal meeting, 3 June, 1993.

5 Jeremiah, ADM David, Speech delivered to the Security Affairs Support Association, Arlington, Va., November 5, 1992.

political..."[6] It seems that this is a recipe for what will happen in the civilian (business) sector as well.

Compounding this acceleration in integration are numerous technological breakthroughs possible in the next several years, particularly in robotics, biotechnology, artificial intelligence, directed energy weapons, and superminiaturisation.[7]

To highlight the danger that the U.S. faces with becoming technologically obsolete, ADM Jeremiah uses the example of the British Navy launching the Dreadnought class ship in 1907. Essentially, it rendered all surface combatant ships obsolete, including the rest of the British Navy! Britain had to start over like everyone else. This enabled Germany to challenge Britain because of it's greater industrial capacity to produce the newer types of ships.[8]

Although we are not able to predict the full effect of technological changes, we can anticipate the effect on the systems. ADM Jeremiah believes that the U.S. needs to move **away**[9]:

1. From highly specialized systems that can be used only against a narrow threat to unique environment.
2. From inflexible systems that can not be easily adapted to exploit new technologies.
3. From systems that lack a high degree of strategic and tactical mobility.
4. From systems that lack low-observable or stealth technologies.
5. From systems that require large, vulnerable logistical trails.

In short, away **from** isolated and dependent **to** independent yet integrated systems.

When it comes to C4I, "the greatest work is probably end-to-end integration. It's not enough to assemble intelligence, or even make informed decisions. We need to be able to know, decide, and act faster than our enemy at every turn. We need to operate inside his decision circle. We need the data our reconnaissance systems gather to be transmitted in real time to command centers, where targeting instructions to loitering cruise missiles or other weapons, which then hit the target -- possibly with terminal guidance from overhead systems."[10]

Specific examples of enabling technology include:

The U.S. Navy's Advanced Combat Direction System (ACDS) to be tested in 1994 and fully deployed in 1996. It automatically combines many data feeds across the fleet into a single, unambiguous tactical display. Working "hand and glove" with the new Command and Control Processor (C2P) technology, it includes decision support features, and will be fully interoperable with U.S. and allied forces through the Joint Tactical Information Distribution System Link 16 network (JTIDS).[11] ACDS is expected to address "New Threat Upgrade" requirements for most of the ships in the Navy, and is based on an open systems computer architecture using Motorola and LANs.

The Intelligence and Planning (I&P) segment of the Advanced Research Projects Agency (ARPA) War Breaker program is "automating battlefield intelligence, planning, and targeting to shorten cycle times between detecting a 'time critical' target, transferring that information to decision makers, and launching an attack against the threat."[12] They have taken a programmatic approach to shorten the I&P cycle by automating the "choke points" in the process. For example,

---

6 DoD studies impact of 'military revolution *Jane's Defence Weekly* 12 June, 1993, p. 25.

7 Gauging U.S. Military Requirements in 2025 *Aviation Week & Space Technology* November 30, 1992, p. 68.

8 Jeremiah, ADM David, Speech delivered to the Industrial Base Symposium, NDU Washington DC, 7 April 1993.

9 Jeremiah, ADM David, Speech delivered to the Longrange Forum Symposium, NDU Washington DC, 9 September 1992.

10 ibid.

11 USN sets for ACDS Block 1 *Jane's Defence Weekly* 15 May, 1993, p. 25.

12 War Breaker I&P project aims to cut strike cycle times *Aviation Week & Space Technology* June 7, 1993, pp. 151-153.

repetitive and tedious data comparisons and correlation are being reduced from hours to seconds. Due for full scale demonstration in 1999, four examples include:

- Intelligence correlation where AI and "fuzzy logic" is applied to extract special forces electronic mail for correlation and resolution.
- A multiple access intelligence and nomination system intelligent network called "Mains" ensures target nominations are simultaneously routed to multiple command levels.
- Local Attack Controllers (LAC) providing real-time target recognition and indicator information to satellites, aircraft and ground-based sources, and unmanned airborne vehicles (UAV).[13,14]
- Terrain and feature imagery delimitation - where the goal is to identify as quickly as possible the majority of the battlespace that be safely ignored. It appears work is underway where a specialized parallel computer using embedded algorithms and software will be able to delimit one million sq. km in 2-3 minutes.

Using the Improved Data Modem (IDM), Apache attack helicopters can exchange digital targeting information with Army armored and fire support units and USAF C2 and attack aircraft.[15] Although the IDM is data only - the U.S. Army aims to drastically curtail the need for insecure voice communications. During a proof-of-principle joint exercise, there was only one voice communication during a three phase attack operation including Apaches, tanks and other vehicles, artillery, mortars, UAV's and other assets. The interoperability specifications for the IDM seem to be permeating a broad spectrum of military assets and will likely become consistent across all branches of service.

The U.S. Air Force Special Operations C-130U Gunships are being fitted with integrated fire control avionics and sensors including synthetic aperture radar and infrared detection systems coupled with computer-driven and trainable 25mm. Gatling, 40mm. cannon and 105mm. howitzer weapons.[16] The integrated weapon systems within the craft will soon be relying on real-time targeting intelligence from other sources. At some point, ground troops, perhaps even in another branch of the service, will desire to directly control fire from a forward observatory. Asking the aircrew to surrender fire control will be a tougher task than connecting the technology.

Eventually scenarios like a stealth ship[17] insensitive to high waves receiving surveillance information from other assets including a Autonomous Underwater Vehicle[18] (AUV) and launching a cruise missile to loiter in a predetermined battlespace for terminal guidance by yet other surveillance asset, perhaps a real-time video imaging system mounted in a parafoil and launched by a 155-mm. artillery shell.[19] will require a significant amount of consistency with command and control. (The 160' stealth "SWATH" (Small Waterplane Area Twin-Hull) ship prototype was not visible on X-band radar even within 100-200 yards, but its trail was.[20])

Efforts are already underway to accomplish the required C2 consistency. In 1991, the USAF Electronic Systems Center initiated an on-target 5 year Portable, Reusable, Integrated Software Modules (Prism) effort to develop an off-the-shelf open systems based multi-level secure generic command center. After conducting a survey with 30 command center software developers, it was found that

---

13 CL-227 Sentinel unmanned airborne Surveillance System *Aviation Week & Space Technology* May 31, 1993, p. S15.

14 New Ships Carry UAVs *Aviation Week & Space Technology* July 12, 1993, p. 24.

15 Apache shows off its digital data skills *Jane's Defence Weekly* 15 May, 1993, p. 10.

16 Computers, Sensors Boost Gunship Lethality *Aviation Week & Space Technology* May 3, 1993, p. 46.

17 U.S. Navy Unveils Sea Shadow Stealth Vessel *Aviation Week & Space Technology* April 26, 1993, p. 23.

18 Out into the blue *Jane's Defence Weekly* 12 June, 1993, p. 92.

19 Industry Outlook *Aviation Week & Space Technology* May 17, 1993, p. 19.

20 Sea Shadow Eludes Radar *Aviation Week & Space Technology* May 3, 1993, pp. 43-45.

"67% of all functions are common to all command centers and 21% are common to some".[21] According to the Prism program manager, Lt. Col. Robert Ridlehoover, "We are finding that our architecture will satisfy 80% of the functionality of any command center regardless of who they are."[22] How long will it take for this to be applied to business?

Eventually, I expect Prism provide a consistent command center function governed by "rules of engagement" to be reduced to high-software content silicon and embedded in systems ranging across the C2 landscape from individual "smart" weapons to Task Force and Pentagon applications.[23] Of course, this could also potentially backfire if an enemy were to reverse engineer it and exploit a flaw.

What about emerging technologies? Their long term effect is difficult to predict, but, here are a few examples:

- Micro-ElectroMechanical System (MEMS). Produced with the same process as for semiconductors, they are already destined to be used for inertial guidance, embedded sensors, and color scanners. One application is envisioned by "Distributing thousands of sensors and associated actuators - all controlled as a neural network by microprocessors - across the wing of an aircraft ... which could become a control surface for low-drag, stealthy flight..."[24] The information handling requirements for a myriad of MEMS demands the plug and play capability of open systems.

- Radar Absorbing Materials (RAM). A lightweight spray-on polymer radar absorbing coating has been developed, which also happens to change colors when a current is applied.[25] While this reduces radar effectiveness by 40-50%, it can have a greater potential by helping a bomber appear visually as a delta wing fighter, or other pattern. By coupling areas of paint with computer control, it is possible to drive a quivering or flickering effect to confuse gunners and other optically guided systems.

- Non-Lethal Combat. High power microwave projectiles (generating a 12-30 million 400 nano-second rise time pulse for destroying microelectronics devices)[26], optical munitions (with a very bright, broad band burst of light producing temporary blindness), and acoustic weapons (which triangulated produce discomfort to death)[27] These systems all require computer aiming and control. A combination of them, with computer driven accuracy and timing for best effect can simply overwhelm common defenses.

Where weapon systems technology will be in 2025 is up for grabs, but it is clear that the integration of command, control, and computers is paramount. Only the sense of urgency is increasing for standardized interfaces, protocols, and formats - the essence of open systems.

Overall, the 2025 study, and ones like it have already made a significant impact on the U.S. military, government, and private sectors. The changes of the "Military Technical Revolution" are already spreading into the private sector across the U.S. An example is President Bill Clinton's call for technology transfer to the private sector towards the "advancement of the nation's information infrastructure - interoperable communications networks, digital libraries, data bases, and computer systems."[28] The Silicon Valley is

---

[21] Generic Command Center Speeds System Design *Aviation Week & Space Technology* March 8, 1993, p. 53.
[22] ibid. p. 52.
[23] ibid. p. 53.
[24] Micro-machines hold promise for aerospace *Aviation Week & Space Technology* March 1, 1993, pp. 36-37.
[25] Signature reduction key to A-10 survival *Aviation Week & Space Technology* June 7, 1993, pp. 135-137.
[26] EMP Weapons lead race for non-lethal technology *Aviation Week & Space Technology* May 24, 1993, p. 36.
[27] Army prepares for non-lethal combat *Aviation Week & Space Technology* May 24, 1993, p. 62.
[28] Infotech Advances Hinge on Deregulation *Aviation Week & Space Technology* May 31, 1993, p. 102.

attempting to recover from it's misfortunes by becoming the "Smart Valley", and attempting to integrate the very systems it helped create as fiercely independent.

Just as the "Dreadnought" rendered the British Navy obsolete, the American software industry faces a similar problem. While some believe that America's control of the shrink-wrapped software industry is a positive indication of dominance, their reluctance for "open systems", in particular at the application level, builds the case for others to build transparent layers on top. These integration enhancement technologies not only smooth over all of the proprietary software "differentiators", but may leave the U.S. software industry burdened in a trap of its own design. As the "open systems" revolution moves up from operating systems and networks towards applications and beyond, this will become increasingly apparent.

Fisher & Paykel:

When a top graduating engineering student at the University of Auckland mentioned that he was very interested in working at Fisher & Paykel (a New Zealand white goods and electronics technology manufacturer), I determined that I had to learn more. What I found is a very capable high technology company, competing very much like a Velociraptor.[29]

Fisher & Paykel was founded in 1934 to import appliances and electronic goods, but four years later a change in NZ government regulations forced the company into local manufacturing. Until the early 1960's the company assembled copies of U.S. and U.K. based products, which did not leverage well in New Zealand's small market and did not create a significant opportunity for export. As result, Fisher & Paykel was motivated to develop an internationally competitive manufacturing philosophy.

53 years later, in 1987, they launched the Fisher & Paykel brand and year later announced their "whiteware manufacturing plan" to position the company for the 1990's. By 1990 they had expanded to build a plant in Cleveland, Australia, and were voted "Supplier of the Year"[30] for two years running.

The four strategic elements of Fisher & Paykel's manufacturing philosophy are:

Unique Production Technology: Fisher & Paykel are early adopters of flexible manufacturing techniques like using pre-painted steel and by creating micro-processor production controllers. Fisher & Paykel Production Machinery Ltd. now designs and builds complete production lines including modular factories for both Fisher & Paykel and other international customers. For example, the Cleveland, Australia whitegoods factory was shipped in modules from New Zealand and assembled on site in two months.[31]

Product: The focus is to **add value**, including unique products for niche markets. For example, their Rynite™ thermoplastic polyester resin Smart motor[32] makes it cost effective to manufacture motors in New Zealand, and enables their washing machines to be considerably simpler, lighter, and easier to maintain.[33] This computer driven motor design is driven off of the DC bus, significantly simplifying meeting international power requirements. It can be driven at varying rates of speed and in either direction, which enables the

---

29 Fisher & Paykel's "Dino Buster" marketing campaign symbolizes competing technology as dinosaurs. Using a play on words, if you were to picture Fisher & Paykel as one of the competition, it would be as efficient as a pack of Velociraptors, portrayed as an extremely intelligent and capable hunter in Michael Crichton's book "Jurassic Park".

30 Fisher & Paykel was voted "Supplier of the Year" by the Australian appliance industry in *Mingays Magazine*

31 Smartdriving with client/server *Managing Information Systems* August 1993, Client/Server Supplement p.12.

32 Fisher & Paykel Industries Limited *Annual Report 1992* 78 Springs Road, East Tamaki, Auckland, New Zealand.

33 Fisher & Paykel Industries Limited *Company Profile* p. 17.

computer controlled machine to be truly under software control. It also eliminated the need for the heavy and expensive transmission and literally revolutionized the washer industry.

Electronics: Fisher & Paykel attracts some of the best engineering graduates, and has some of the best technology research and development opportunities in New Zealand. They effectively export high technology embedded in white goods, and is one of the best examples of New Zealand high tech companies.

People: An example of Fisher & Paykel's dedication to quality is the Electronics Division recently receiving ISO 9002 quality certification. Their approach to Total Quality Management was, in part, influenced with their 30 year relationship with Matsushita Electric. One of Fisher & Paykel's keys to success has been to manage the constant manufacturing and product changes through an emphasis on the customer and through employee education. According to Bruce Caldwell, General Manager of Information Systems[34], 5-10% of employee time is spent on education which permeates across the company through the quality and personal education program. The company wide program is driven by Gary Paykel focused on *learning to satisfy our customers*.

Effectively, Fisher & Paykel has been able to reduce the tyranny of distance through innovation and long term focus on quality and simplicity. They have effectively used planning, where appropriate to establish priorities and then adjust on the fly. The ability to move fast is paramount. Their battle plan is to identify problems, identify the critical issues, and then resolve as quickly as possible.

Over time, they have been building an information system model for a generic production and distribution company. By standardizing the model, they will be able to simplify management of corporate IT growth. In a way, their effort compares with the U.S. Prism program encapsulating Command and Control in software.

Fisher & Paykel's approach to flexible manufacturing places interesting demands on their information model. Information is a viewed as a key asset owned by the appropriate business unit. For other operations to gain access, they must show they can provide value. For example, the linking of warranty information and repairs to the production design group helps them feel the heat.

They have been able to leverage the industries gradual evolution towards "Open Systems" through standardisation. Their movement towards using an open systems model has been a step by step approximation rather than a one time capital investment.

By using primarily Sequent, Sun, Data General and IBM UNIX machines across the organization, they have made access and support as transparent as possible. The remaining legacy systems, including CAD/CAM is being moved off of the mainframe to RS/6000 workstations. "Why pay millions for a mainframe when you can use workstations costing between $A20,000 and $A100,000 to do the same job?" says Caldwell[35]. Currently there is a movement towards using Microsoft Windows for the PC users.

Fiber optics form the backbone of the network, while unshielded twisted pair is used for the spreaders. One of the key developments was the interconnection of the process controllers onto the network. In fact, the washing machines are connected through testing jigs to the network several times during production.

---

34 Caldwell, Bruce, Gen. Mgr. of Info. Sys. Fisher & Paykel 78 Springs Road, East Tamaki, Private Bag 17, Panmure, Auckland New Zealand, Personal meeting 20 May, 1993.

35 Smartdriving with client/server *Managing Information Systems* August 1993, Client/Server Supplement p. 14.

One of the world's largest Ingres RDBMS users, they use Ingres to manage both production and corporate information, and are currently evaluating the Ingres Star distributed database technology. Over the past several years they have been working on breaking Ingres across a number of machines and forming a more associative rather than relational data model.

By using databases to control the production lines, they can drive an "every model every day" manufacturing strategy while being able to change product specifications across the line in 20 seconds. For example, the New Zealand refrigeration line is capable of making 1,400 different refrigerator model variations back to back (2 widths * 24 models * local market variations * colors). The computers also take into consideration optimization of work-in-progress inventory issues.

Fisher & Paykel uses a 'risk adverse' approach while working with information technologies. Avoiding the 'bleeding edge', they have utilized the cutting edge of technology to enhance their flexible manufacturing approach. They make extensive use of bar-codes and other techniques to embed intelligence within the product so it can participate in its own production. They are an outstanding example of what can be done in a modern manufacturing facility with open systems.

Geelong District Water Board:

The Geelong District Water Board (GDWB) was formalized as a self funding statutory authority in 1984 after operating over 70 years as a Trust. It is the largest water authority in Victoria, outside of Melbourne, covering 3,900 sq. km. and servicing 200,000 people. More importantly it services one of the hearts of Australian heavy industry including Alcoa, Ford, and Shell. These heavy industries are very reliant on a dependable water supply.

The board's business mission, as defined in it's 1984 charter is "to provide, maintain, and operate water management functions related to water supply, wastewater systems and designated waterways in an efficient, cost effective, and environmentally accepted manner."[36]

Their top level planning document, the *10 Year Capital Works Plan*, maintains a list and prioritization of capital works. This plan is evaluated annually, and supplementary lists and documentation are maintained when changes are required. This plan features extensive long range planning, including a dam project scheduled for 2015 which entails years of preparation work including siting and land usage.

The *Business Plan* which falls out of the Capital Works document is a living 5 year document which includes budgets and forecasts, 5 year capital plan (with 3 year sliding horizon), equity and cash flow and 12 month tariff settings.

In the mid 70's, enmeshed deep within this framework of heavy planning, the EDP section could be found tucked under the Finance Manager. By 1987, the financial accounting and billing was performed on a low end System/38 with 19 terminals, and engineering and laboratory services had access to 4 microcomputers and a terminal link to a DEC 20 at a local University.

Computer based word processing throughout the five story GDWB building was printed on a single dot-matrix printer in the computer room. All water supply network analysis data was obtained on hard copy printed out at the University, 5 km. away. Acquisitions between 1987 and 1989 were largely without plan, and islands of computing and data were quickly created.

In 1989 the Board developed a *Corporate Computing Strategy* to incorporate the existing investment in computing technology with any proposed investment. Driven by a combination of the above mentioned GDWB documents, and the vision of newly hired Joe Adamski, Executive Manager for Information

---

36 *Providing Customer Service with I.S. - A User Story* Geelong District Water Board Information Systems Division May , 1993.

Systems[37], an overall *IT Strategy* plan was created, complete with predicted 5 year costing.

Today the GDWB vision is stated as "By 30th June, 1997, through our business excellence, we will be providing the best customer services in the Australian Water Industry".[38] This vision statement demands comprehensive, integrated, accurate, and reliable data about assets and performance to be made available and maintained, hence their heavy reliance on IT and on open systems.

The pattern of having the procurement process being one of the first things to change within the U.S. government after the 2025 study also occurred for the GDWB. One of the early results from the *Corporate Computing Strategy* was to revise their tendering process to include requiring a registration of interest, formal evaluation, benchmarking, and final board approval. In addition, they established the following minimum criteria:

1. Utilize existing investment in computer facilities
2. Implement an open system
3. Seek a multi-vendor solution
4. Select one vendor to act as a Prime Contractor
5. Develop in-house expertise to ensure success of implementation and ongoing systems support. (Adamski estimates 10% of his staffs time is required for education and staying current.)

The changes with the GDWB IT structure have been significant as key components of the corporate computing strategy are being implemented:

1. One homogenous network able to cater for a number of protocols and interfaces including: Network file system for microcomputers, Workstations, TCP-IP, and connection to the Internet.
2. RDBMS and 4GL application generator including a Water Information Management System (for current and historical hydographic engineering and laboratory data) and Drawing Retrieval and Management System (for all CADD projects and files).
3. Facilities information system supporting a "seamless" geographic (graphic and non-graphic) map for the entire water district (3,900 sq. km.), including asset accounting and management. The supporting data base relates property polygons via parcel identifiers to associated property address, ownership, rating, values, servicing, water consumption, and meter records. Utility elements belonging to particular classes such as pipes, manholes, pump stations, mains, stop valves, hydrants, flow meters, etc. are related to the appropriate asset. An interesting quandary recently presented itself when, compared to all of this coordinated and accurate data, a fence line was found to be physically off by several meters. The original ,and now old, land surveys are maintained by another agency and no protocol has yet been established to reconcile the differences.
4. Computer aided design and drafting providing an integrated 3D graphics environment for civil, mechanical, electrical, surveying and general engineering design and drafting. Applications include digital terrain modeling, electronic field data recording, major works, site layouts, dam, reservoir, road, pipeline design, automated reticulation (piping network) design and survey set out.
5. Document image processing system for the scanning, storage and management of existing plans and documents as raster images on optical

---

37 Adamski, Joe, Exec Mgr. IS Geelong & District Water Board 61-67 Ryrie St., Geelong, VIC 3220 Australia, Personal meeting 17 May, 1993.

38 ~Vision~ Geelong District Water Board Executive Summary, Draft, 1993.

laser disk. The GDWB level of service for remote offices has already risen from the days of shipping of documents to 30 second delays for images. They are able to determine centerline of all underground assets (piping, valves, manholes, etc.) within ±2mm with photogrammetry, and ±.3m with digitized drawings.

6. Word processing/office automation linked with sophisticated desk tools across the organization.

Currently the GDWB is working on transferring all financial and administrative systems from the System/38 to UNIX by Jul94. Other projects include HR management system by Nov93, a laboratory information management system by Dec94, and total asset management strategy by Dec95. A project for "workflow" management is being piloted by Jun94, as the GDWB moves from being competitive to being proactive.

Today the computer facilities include 8 Sun Servers, 124 Sun Workstations, 120 microcomputers, 40 terminals and the soon to be retired IBM System/38 Model 700.

Comparison and Conclusion:

Borrowing from the motto "Business is War", these different organizations share:

1. A common sense of purpose:
   to prevail through flexibility.

2. Have common characteristics that inspire success:
   leadership and vision.

3. Are moving to integrated, flexible, adaptable open systems:
   by being adaptable and pro-active.

The U.S. DoD 2025 is working hard to provide end-to-end integration while moving away from isolated and dependent to independent yet integrated systems. They are driven to be able to know, decide and act faster than their enemy at every turn. They are working to be able to operate inside their adversary's decision circle.

Fisher & Paykel has developed a framework within to fight their battle plan which is to identify problems, identify the critical issues, and then resolve them as quickly as possible. They are building an information system model for a generic production division, and have been able to leverage efforts towards "Open Systems" through standardisation. Their movement towards using an open systems model has been a step by step approximation rather than a one capital investment.

Geelong District Water Board is driven by the vision to provide the best customer service in the Australian Water Industry. (Of course, the possibility of privatization needs to also be anticipated.) Their focus demands comprehensive, integrated, accurate, and reliable data about assets and performance to be made available and maintained, hence their heavy reliance on IT and on open systems.

As the merging of the media, communications, consumer, and computer industries accelerates, the computer industry will increasingly face the inevitability of having to rely on the standardisation of interfaces, protocols, and formats. If they don't, then standards of the adjoining technologies will become dominant by default.

Bibliography:

[01] Apache shows off its digital data skills *Jane's Defence Weekly* 15 May, 1993, p. 10.
[02] Army prepares for non-lethal combat *Aviation Week & Space Technology* May 24, 1993, p. 62.
[03] CL-227 Sentinel unmanned airborne Surveillance System *Aviation Week & Space Technology* May 31, 1993, p. S15.
[04] Computers, Sensors Boost Gunship Lethality *Aviation Week & Space Technology* May 3, 1993, p. 46.
[05] DoD studies impact of 'military revolution *Jane's Defence Weekly* 12 June, 1993, p. 25.
[06] EMP Weapons lead race for non-lethal technology *Aviation Week & Space Technology* May 24, 1993, p. 36.
[07] Fisher & Paykel Industries Limited *Annual Report 1992* 78 Springs Road, East Tamaki, Auckland, New Zealand.

[08] Fisher & Paykel Industries Limited *Company Profile* p. 17.
[09] Friedman, George and LeBard, Meredith *The Coming War with Japan* (1st edition) New York: St. Martin's Press, 1991, p. 30.
[10] Gauging U.S. Military Requirements in 2025 *Aviation Week & Space Technology* November 30, 1992, p. 68.
[11] Generic Command Center Speeds System Design *Aviation Week & Space Technology* March 8, 1993, pp. 52-53.
[12] Industry Outlook *Aviation Week & Space Technology* May 17, 1993, p. 19.
[13] Infotech Advances Hinge on Deregulation *Aviation Week & Space Technology* May 31, 1993, p. 102.
[14] Jeremiah, ADM David, Speech delivered to the Industrial Base Symposium, NDU Washington DC, 7 April 1993.
[15] Jeremiah, ADM David, Speech delivered to the Longrange Forum Symposium, NDU Washington DC, 9 September 1992.
[16] Jeremiah, ADM David, Speech delivered to the Security Affairs Support Association, Arlington, Va., November 5, 1992.
[17] Micro-machines hold promise for aerospace *Aviation Week & Space Technology* March 1, 1993, pp. 36-37.
[18] New Ships Carry UAVs *Aviation Week & Space Technology* July 12, 1993, p. 24.
[19] Out into the blue *Jane's Defence Weekly* 12 June, 1993, p. 92.
[20] *Providing Customer Service with I.S. - A User Story* Geelong District Water Board Information Systems Division May , 1993.
[21] Sea Shadow Eludes Radar *Aviation Week & Space Technology* May 3, 1993, pp. 43-45.
[22] Signature reduction key to A-10 survival *Aviation Week & Space Technology* June 7, 1993, pp. 135-137.
[23] Smartdriving with client/server *Managing Information Systems* August 1993, Client/Server Supplement pp. 12-14.
[24] U.S. Navy Unveils Sea Shadow Stealth Vessel *Aviation Week & Space Technology* April 26, 1993, p. 23.
[25] USN sets for ACDS Block 1 *Jane's Defence Weekly* 15 May, 1993, p. 25.
[26] ~*Vision*~ Geelong District Water Board Executive Summary, Draft, 1993.
[27] War Breaker I&P project aims to cut strike cycle times *Aviation Week & Space Technology* June 7, 1993, pp. 151-153.

SECOND INTERNATIONAL SYMPOSIUM: NATIONAL SECURITY & NATIONAL COMPETITIVENESS: OPEN SOURCE SOLUTIONS Proceedings, 1993 Volume II - Link Page

Previous	Wide Area Information Servers (WA IS) and Global Change Research
Next	High Tech and Low Life.' Power and Communication in the information Age

Return to Electronic Index Page