

December 2002 Shared Technology Summary

The series of interviews and continuing desk-top research has uncovered the areas of interest listed below. Each of the 'Shared Technology' areas will have a discussion paper prepared for review by the relevant stakeholders who are expected to be experts in these areas. As a result of the comments received from the review, a full description of the technologies will be prepared for the layperson for future use and reference.

The content within each area will be common knowledge to those who are involved in the area and who are looking towards the future. Therefore some of the comments will not come as a surprise to those who are informed.

Shared Technology Areas

Networking

Integrated Building Systems (HVAC, security, fire, power, data, AV, etc.)

Emerging integration is expected in these areas. At present, the conventional design is for separate systems to work on vendor protocols. Integration with motion detectors, security, fire and lighting requires a vendor-free or open systems approach using standard network protocols and able to be integrated into PC-based control systems with plug-and-play functionality.

Engineering protocols for automation (serial, ethernet, TCP/IP, fieldbus)

Current process and manufacturing facilities utilise a range of vendor-based protocols. Current thinking is for an open-system that relies less on vendor-based protocol with more integration.

Engineering protocols for instrumentation (open communications, vendor protocols)

Data from instrumentation has in the past been relatively sparse from measurement and control devices. Emerging instrumentation is able to measure a greater range of aspects and leads to more data being available. Less emphasis is being placed on receipt of all measurements made by the instrument and more on the speed of data as these emerging devices are measuring events at a rate of several hundred readings per second. Data is able to be collected as real-time and archived for time-series and database analysis.

Next Generation Networks (link voice and data on one network)

Telecommunications using voice and data will be increasingly combined on a single network providing 'instant messaging' on a range of devices including fixed-line telephone, mobile telephone, fixed computer, mobile computer, mesh-networks and motor vehicles. Voice over Internet Protocol is planned to become ubiquitous reducing communication costs and increasing complexity of interconnections.

Wireless communications

Wireless communications are likely to impact upon all of the industry areas pertaining to this project. This technology will have perhaps the greatest impact on all areas of the workplace in coming years.

Data Processing

Embedded microprocessors

Instrumentation, appliances and nearly every piece of electronic equipment will be able to be connected to a network and provide a range of data processing functions. Microprocessors will be 'hard-wired' with software and will control the device. The inclusion of the microprocessor is not a new technology, but the ability to connect the device to a network will introduce the requirement of new skills.

Programmable microprocessors

Usually known as 'field programmable gate array' (FPGA) microprocessors, these devices are set to become the standard microprocessor with the ability to be re-programmed. This option allows for a single device to have a range of software loaded on to the device. Future product offerings are likely to be a single physical product with a range of software functions able to be loaded or made operational. This has particular value for commercial applications where product improvements are software driven rather than through capital cost expenditures.

National Instruments "LabView GUI-style" programming capacity

The increase in programmable microprocessors and the increase in the number and types of devices being connected to the network will require an increase in the range of software for each device and for the contribution of the device to the network. This requirement will see the need for increased programming ability of instrumentation specialists and general network engineers, managers and administrators.

Energy production - Embedded and distributed generation

Fossil fuel (microturbines, co-generation)

The distribution network of natural gas and the access to smaller turbines will see the need for an increase in the number of operators and maintenance staff.

Renewable (wind, solar)

Costs of the equipment and government subsidies for this equipment will see the increase in the adoption and installation of this equipment. Wind generation has reached economically viable levels already and will continue to be expanded within appropriate areas in Australia. Solar generation is likely to become more popular with production capacity increasing by manufacturers and lowering of production costs leading to lower capital costs. Further advances in technological development are likely to see this area increasing over the coming years.

Power electronics

Connections to the grid from distributed generation facilities and an increase in the use of power electronics in other industrial applications will see this technology become more of a requirement for electrical and electronics personnel.

Fuel cells (stationary, motor vehicles, portable)

While still developing in some areas, fuel cells are becoming increasingly efficient. The use of fuel cells in 'premium power' applications such as mining and remote locations will increase. The use of fuel cells in motor vehicles are likely to initially be applied in public transport where refuelling

infrastructure is able to be easily developed at a single location. The use of fuel cells for mobile computing devices will become more popular requiring increased maintenance staff.

Enabling technologies

The following technologies will not have a direct impact on the industries involved in this project but will enable these industries to gather data more quickly and therefore impact on the workplace processes.

Radio Frequency Identity Tags (RFID, e-tags)

This technology is already available for use in security access cards, tollway revenue collection and livestock control. Further developments in technology will see the a reduction in costs of manufacture leading to the RFID devices becoming as commonplace as product bar-codes but more easily accessed and able to provide greater data on the product's history.

ENUM (single number per user, instant messaging)

ENUM (electronic number) and the introduction of IPv6 for increased number of Internet addresses will see the development of a greater range of connections between individuals and devices. This will provide for an increase in available data.

Grid computing

The increase in data will lead to an increase in the amount of processing required. The interconnection between networked computers will provide for more efficient use of the processing capacity.

Human interface

Employability Skills

The ability of individuals to become self-directed learners to engage in professional development will be central to the productivity of workplaces in the future due to the increase in complexity. Additionally with the decentralised nature of workplace interaction that will be provided by mobile computing and networked devices, individuals will need to have or develop managerial skills to allow for appropriate decision making and interpersonal interactions.

Investment concerns

The continuing application of technology will require the managers to change their worldview towards technology use. The recognition of benefits and adoption of new technology will continue to provide a competitive advantage to those enterprises that are able to adjust quickly to these developments.

For a single-page summary, please go to [December_2002_Table_of_Shared_Technology.pdf](#).

If you would like to comment on this brief overview, please contact the IEU-ITC via any of the addresses on the web-site at <http://www.ieu.com.au>. Telephone: +618 9240 2688.