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VicRoads: a State Road Authority in Transition*

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VicRoads is a leading State Road Authority expert in the management of road infrastructure and the traffic that uses it. The organisation is well advanced in a transition from a provider of services to a purchaser of services. This transition naturally involves a re-examination of engineering knowledge requirements in the organisation and also raises questions of the type of engineering education required, particularly when management, financial control and quality management issues are considered. For the information of engineering educators and organisations this paper attempts to provide a description of the background considerations confronting VicRoads, a medium-size government organisation, as it moves forward into a purchaser role in the late 1990s. It also endeavours to provide some views on the role and activities of the organisation, as well as an understanding of its relationship with institutions involved in the development of human resources in engineering, such as the UNESCO International Centre for Engineering Education (UICEE).

INTRODUCTION

VicRoads is the Victorian State Government agency responsible for managing Victoria's road network and its safe and efficient use for over 80 years. In accordance with Government policy VicRoads is in transition from the traditional role of a government department providing services delivered by its staff to a purchaser of services.

The transition is well advanced and involves a closer working relationship with the private sector and a re-examination of the organisation's structure and engineering knowledge requirements. Whilst VicRoads has retained engineering capabilities in a number of specialised road and other activities, the question arises as to how much engineering knowledge and experience is necessary to ensure the learned (defined by the dictionary as *deeply read, erudite, showing profound knowledge*) purchasing of products and services.

Design briefs, construction specifications, maintenance standards, network operational standards all require expert knowledge for their satisfactory management. Much of this can be purchased, however the purchaser needs to know that what is specified and supplied is appropriate and satisfactory. The design brief, specification, and construction standards of the bridge that collapses on opening or the road pavement that fails in the first few years are the crucial first documents to be attacked. Suppliers of services are only obliged to deliver according to the brief/specification. How much engineering knowledge and experience is necessary for the management of road engineering services? How do senior management (some with professional engineering qualifications) inform/educate themselves in respect of new techniques, materials, products, services?

The level of engineering knowledge required and the method of obtaining the knowledge, whether it be by recruiting or training, is an issue for this organisation and similar organisations. What is the role of tertiary learning organisations in this area of need?

VicRoads is presently reviewing role statements to ensure all staff have a clear understanding of role, responsibilities and key result areas. This exercise will also assist in identifying necessary skills for each position and therefore a summary of positions requiring engineering qualifications, knowledge and/or

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experience. A further examination of structure may be required to strengthen the purchasing style of operation.

VICROADS' MAJOR ACTIVITIES

In the management of the arterial road network, VicRoads' major activities that are affected by the transition from provider to purchaser include:

- Maintenance of the road system:
  - roadside maintenance
  - pavement management
  - bridge management
  - traffic sign maintenance
- Road improvement projects:
  - construction of new roads/bridges
  - intersection improvement
  - new traffic signs
- Traffic regulation:
  - mass, length, width regulation
  - vehicle roadworthiness
  - introduction of new freight vehicle limits
  - control of permit vehicles
- Road safety:
  - accident blackspot elimination
  - education programmes

All of the above are to be purchased through the specification and management of contracts.

TRANSITION PROGRESS TO DATE

Staffing

During the late eighties the move of the organisation toward delivery of more work by contract had begun, particularly in the road construction area. By 1989, when VicRoads was formed, the general direction of more work by contract was clear, but received impetus in 1992 when the purchaser model became apparent.

During the period 1989-1997 the drive toward more contract/consulting work (purchasing) was against a background of reducing staff (see Figure 1).

The reduction from 5,760 to 2,460 staff included a reduction of professional staff from 750 to 440, representing an increase from 13% to 18% of professionals in the total staffing. This increase represents the need for a greater amount of task definition required in the preparation of briefs and specifications. This

Figure 1: Total staff.

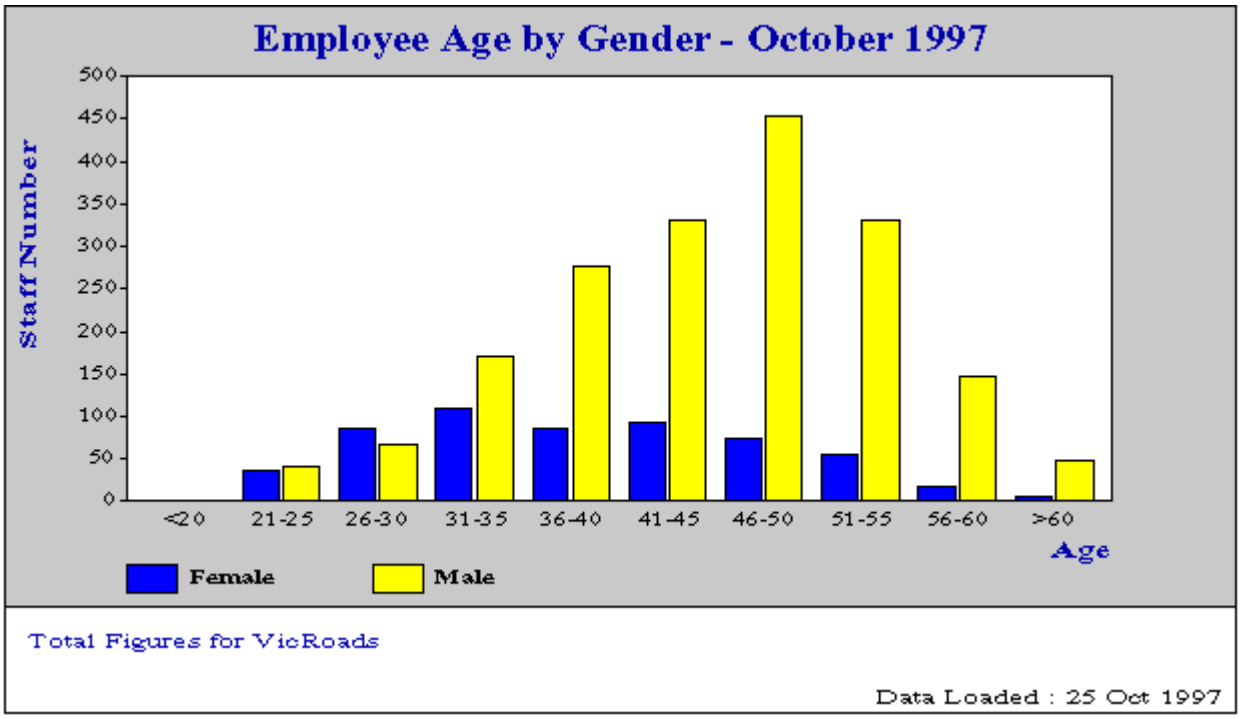

Figure 2: Employee age by gender.

load has been met; however, it has relied heavily on the extensive experience available within VicRoads. This experience has come from *hands on* management of works and is held by an ageing workforce (see Figure 2).

During the same period, 1989-1997, some professionals realised opportunities in positions of a non-engineering nature within VicRoads, increasing their versatility but taking valuable engineering experience away from the core engineering works. Related to this adjustment is the change in expectation of staff to promotion into senior management positions. These positions are no longer seen as normal progression for people exclusively with engineering qualifications. Staff have seen people without engineering qualifications take up senior management roles with success, confirming the recent trend of appointments.

Construction by contract 1989 - 1997

VicRoads (presently, and through its prior organisational manifestations) has for some time been moving toward a greater use of contracts for the delivery of this work. In order for young engineers to gain experience prior to becoming involved in delivering work by contract, it has been the practice to allow them to control road construction by direct management using VicRoads staff. This option is removed with the purchasing model.

The percentage of road construction by VicRoads by contract has increased from 80% to 98% since 1989.

Road maintenance

However, there are still limited opportunities to train young engineers due to the retention of a small number of VicRoads staff directly carrying out maintenance work.

The percentage of road maintenance by VicRoads by contract has increased from 10% to 75% since 1989.

Traffic engineering design by consultants

Since 1989, staffing in the traffic management area of VicRoads has reduced from 360 to 160, whilst the basic workload has remained similar. The use of traffic engineering consultants has increased significantly to cover the staff reduction in VicRoads. In order to prepare briefs and specifications to allow hire of traffic engineering consultants, the more experienced VicRoads staff have been required to call on their experience of *hands on* traffic engineering to ensure realistic and adequate documents are prepared. The opportunity to gain this experience in VicRoads reduces as the purchasing model comes into place.

CORE BUSINESS

VicRoads sees its core business as road system management, road safety, traffic and road use management, and registration and licencing. The particular issues thought to require engineering knowledge are

maintenance standards, network operational standards, design briefs, construction specifications, etc.

The success of these core activities are central/ vital to the success of VicRoads in managing the network and delivering its services to the Victorian community.

In order to ensure the most efficient and effective delivery of these services the questions arise: to what degree should the above activities involving expert engineering knowledge be purchased?; how will VicRoads know exactly what it has purchased?; how much engineering knowledge is necessary to ensure satisfactory delivery of the above core activities?; and, most importantly, how does VicRoads become a learned purchaser?

A learned purchaser could be described as one who understands materials, services, products, specifications, and the application of products, materials, services. A learned purchaser is one who understands:

- why the service is required;
- how the service should perform;
- the balance between output and cost;

in order to deliver the most efficient and effective result for the community of Victoria and VicRoads.

ORGANISATION STRUCTURE - MANAGEMENT LEVELS

Engineering knowledge is currently widespread throughout the organisation management levels, extending across the organisation from Level 1 to 3 and beyond. There is a heavy concentration at Level 2, where 5 out of 11 senior managers have professional engineering qualifications, and at Level 3, where 21 out of 27 have professional engineering qualifications. In attempting to position itself as a learned purchaser the organisation has chosen to retain small core technology units, covering materials, land surveying, road and bridge design and some road maintenance activities. Structures are expected to change with more emphasis on the management of consultants and contractors rather than on in-house staff as the purchaser/ provider requirements are applied further to VicRoads.

As the organisation becomes more strongly a purchaser rather than a provider of products and services, three likely levels of engineering knowledge are expected to emerge:

- Engineering experts with professional engineering qualifications:

  Potential sources: Further trained and developed in-house by VicRoads;
  appointed on term contracts from any source.
  Operation style: Central consulting role within organisation;
  located strategically in business units.
  Status: Engineering expert with contract package to suit;
  organisational responsibility Levels 4-5.

- Engineering manager, preferably with professional engineering qualifications plus another degree, such as commerce, economics, etc:

  Potential sources: As above.
  Operation style: A leader;
  acutely aware of programme physical and budget delivery;
  a good communicator;
  potential General Manager/Director, Level 2 Manager.
  Status: A manager respected for delivering;
  organisational responsibility at Levels 3-5.

- Manager with some engineering knowledge:

  Potential Sources: As above.
  Operational Style: A leader;
  commercially astute;
  potential General Manager or Director (Level 2).
  Status: Recognised through performance as a good manager;
  organisation responsibility at any level.

CURRENT ORGANISATIONAL ACTIVITY

Whilst position description, key result areas and responsibility statements have been used in the organisation for some years, the current reassessment of skills and redefinition of responsibility statements will assist greatly in defining the level of engineering knowledge required in the full range of positions across the organisation. This assessment is occurring whilst the organisation continues to strive for greater efficiency and effectiveness, the two actions being complementary.

TRAINING - EDUCATION

VicRoads' approach to the delivery of training and education is flexible. Delivery may be as follows:

- Training is purchased externally.
- Training is delivered in-house informally either by

plan or by actual work experience.

- Training is delivered in-house by structured career paths.
- Training is delivered in-house by exchanges of staff between business areas of VicRoads.

The levels of engineering expertise described above may be achieved in the following ways:

- Engineering Expert - education for formal qualifications can be delivered formally via:
  - Tertiary learning institutions (universities), either full-time or part-time.
  - Face to face lectures.
  - Correspondence.
  - Internet.
- Engineering Manager - may be an engineering expert and may also be a double degree holder, but still requires additional training or education:
  - The training is available as above.
  - Additional education is likely to be available from correspondence/Internet/part-time evening lectures.
  - Many engineer/managers who qualified some years ago (10 years+) have a need for further education but find it difficult to walk away from the job during the day. Often evenings are also unavailable.
  - Managers who need some engineering knowledge, but generally not detailed knowledge, need brief, concise packages to introduce and update their engineering knowledge as required. This area is regarded as an area for development.

TERTIARY LEARNING ORGANISATIONS

Learned purchasing to ensure appropriate quality and effectiveness is of prime importance to VicRoads. Retention of some core capability to build will assist in allowing VicRoads to establish appropriate standards, write effective consultant briefs and construction standards, and understand the balance of output against cost. Many organisations are facing restructuring and a shift of their prime practice from that of a provider to a purchaser with the need to become learned purchasers. Experience in hands on work has proven valuable, but will be more difficult to obtain in the future.

The staff within these organisations, perhaps without engineering qualifications, need access to a flexible service to gain knowledge on a specific subject, or an update of knowledge. How can tertiary learning organisations assist; what is their role? Is the above an opportunity for tertiary learning organisations?

VICROADS-UICEE PARTNERSHIP

The signing of a Memorandum of Understanding between VicRoads and the UNESCO International Centre for Engineering Education (UICEE), on 30 May 1997, represents a significant opportunity for the further achievement of the aims of both organisations in technology transfer and engineering education.

Perhaps the area of particular collaboration for the two bodies is in working together to further strengthen the network of engineering education in South East Asia, a process which found impetus in 1995 with the establishment of the Asia-Pacific Higher Education Network in Engineering Education (APHEN-EE).

VicRoads has been active for a number of years in carrying out consulting work in the region. This consulting work is normally carried out in partnership with Australian companies and meets the prime objectives of involving/facilitating Australian companies in gaining market access and offers development opportunities for VicRoads' staff through technology transfer and the delivery of projects.

The experience of recent years has shown that the infrastructure works usually involve technology transfer and require the training of staff from the client country. Training may be required for non-professional staff, but it also takes the form of postgraduate education. Subjects range widely from basic engineering subjects to relatively sophisticated system development and introduction. The investigation and development of techniques for the delivery of this training/education relates closely to the objectives of the UICEE and have strong parallels with VicRoads' current in-house engineering/training needs

The partnership offers opportunities to promote the work of VicRoads and the UICEE and to satisfy needs for engineering education, particularly in the South East Asia region.

BIOGRAPHY

John E. Coles is currently Manager of International Projects with Road Corporations, Victoria (VicRoads). He has been a member of the organisation through its various incarnations for some 35 years, following a stint with the Ministry of Works in New Zealand.

John Coles' background in VicRoads includes considerable experience in the areas of structural design, road construction and maintenance, and strategic planning of road networks. He has worked in the area of management of engineering groups, and subsequently moved into regional management, before taking over the management of international projects.

John has been closely involved in the training and development of staff throughout VicRoads' transition from provider to purchaser of services, an organisational shift from direct involvement in road maintenance and related areas, to manager of the provision of services in road maintenance by others.