BUILDING REGISTRATION: TRAINING AND HOUSING QUALITY

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The lack of attention to quality control by house builders has been a contentious issue for more than three decades. In an attempt to improve the quality of housing, various mechanisms have been adopted and discarded by industry-based organisations and government legislation. Now that registration of builders has been achieved (since 1995) the regulating authority, the Building Commission have placed the maintenance of standards from registered builders at the forefront of their priorities. The provision of suitable training and continuing professional development programs is likely to receive greater attention over the next few years. However, a key factor that is often overlooked in the debate on quality of house construction is the use of subcontract labour by both, registered builders and owner builders. The repetitive nature of some activities ensures that tacit knowledge within the subcontract system becomes an integral part of house construction. Research by the authors into defects in housing has provided some interesting analyses from the statistic collected. This paper analyses the incidence of defects over a number of years in a range of functional elements within the house envelope and presents the results. Particular attention is paid to the incidence of defects where the licensed trades are involved compared to the non-licensed trades and elements. This work suggests where housing defects are likely to occur and the authors suggest that appropriate educational resources may be directed to areas where it will be most effective and beneficial. The authors propose a more integrated and inclusive approach.

Keywords: builder registration, housing, quality, training.

INTRODUCTION

Concern with quality and efficiency in the housing industry has a long history in Victoria. The quest for better quality has been driven at various times by industry itself, government and in recent decades by greater consumer awareness and sophistication. This in turn has focussed attention on government controls, the registration of builders and the problem of education and training, which includes research and knowledge flow.

The Master Builders Association of Victoria (MBAV) has sought builder registration since the early 1900s (Keast, 1994). For varying reasons, probably political, they were not successful. In the absence of registration, other voluntary industry sponsored schemes were introduced and discarded (Georgiou, *et al.*, 2000). A significant step

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towards registration occurred in 1984 when industry guarantee funds were merged to form the independent Housing Guarantee Fund Limited (HGFL). This Fund was further strengthened in 1987 under the House Contracts Guarantee Act 1987. Under this Act a form of pseudo registration existed in that builders needed to meet specific criteria before the HGFL would approve them as builders (a requirement under the Act). However, it was not until 1995 that formal registration for individual Building Practitioners was introduced (Georgiou, *et al.*, 2000). In association with the quest for builder registration, there was also a move away from prescriptive type building regulations to performance-based regulations such as the Building Code of Australia (Australian Building Controls Board, 1999). Reasons advanced for this were, greater efficiency, innovation and economies gained from uniformity throughout Australia. However, Georgiou (1994) identified possible shortcomings with performance-based regulations for housing and how they could impede the flow of knowledge and possibly affect quality.

THE STUDY

Georgiou, *et al.* (1999), identified the common types of defects and the incidence of defects in various functional elements within a house so that resources may be directed to the areas where it will be most beneficial both to the house builder and the end user (consumer). Data from this study is used to discuss knowledge flow within the housing industry as a whole.

The National Public Works Council (NPWC) and its successor the Australian Procurement and Construction Council (APCC) through the various state public works departments analysed buildings into common and standardised elements. An element (or functional element to give it its full title) is defined in Australia as:

> *'… an element is a portion of a project which fulfils a particular physical purpose irrespective of construction and/or specification'*
>
> *(NPWC, 1993: 6.2-2; Smith, 1998).*

At the time of the study, no such standard elemental analysis existed specifically for housing. Using the NPWC work as a guide and the experience of the authors in house construction, Georgiou (2000), formulated building elements for a house and refined the list by conducting a series of pilot studies. A total of twelve defect categories were also used to identify and classify the defects in each of the elements using the same pilot studies. The twelve defect types are listed in Figure 1.

The building elements were grouped into three broad sections:

- Internal items
- External items

} *The House*

- Site works

In all, 35 building elements formed the basis of the detailed analysis that provided the framework as shown in Table 1.This framework provided a sound overview of the quality of various trades, licensed and unlicensed in these elements.

Defects from the total sample of 1,772 houses (1,002 owner builders and 770 registered builders) were surveyed, analysed and categorised by Georgiou (2000). The analysis determined the severity, the incidence and location of defects within each of the two categories of constructors. These are summarised in Figure 1.

Table 1: Coding of building elements

No.	Code[1]	Element	No.	Code	Element
			SITEWORKS:		
1.	XPSP	Site Preparation	3.	XPES	Fences, Ext. Structure
2.	XPPV	Paved Areas			
			EXTERNAL:		
4.	SBSS	Sub Structure	10.	RFAC	Porch, Patio Deck
5.	RFCT	Timber Roof Frame	11.	EWBW	Brick Walls
6.	RFNC	Roof covering	12.	EWSD	Lightweight Cladding
7.	RFNF	Flashings	13.	WWEX	Windows – External
8.	RFFF	Fascia, Barge, Soffits	14.	EDEX	Doors – External
9.	RFDP	Gutters, DP's and Fittings			
			INTERNAL:		
15.	SBTF	Timber Floor Frame	26.	CFPL	Ceiling Lining
16.	SBFL	Timber Flooring	27.	CFPF	Ceiling Finishes [2]
17.	RFIN	Roof Insulation [2]	28.	FTAS	Joinery, Architraves,
18.	EWIN	Wall Insulation [2]			Skirting, Trims [2]
19.	WWIN	Windows Internal [2]	29.	SFFX	Sanitary Fixtures
20.	NWTS	Timber Wall Frame	30.	PDPB	Sanitary Plumbing
21.	NDTC	Timber Doors & Hardware	31.	WSCN	Water Supply
22.	WFPL	Wall Lining [2]	32.	GFFX	Gas Fixtures
23.	WFPF	Wall Finishes	33.	GSCN	Gas Service
24.	FFFN	Floor Finishes [2]	34.	EFFX	Electrical Fixtures
25.	CFTF	Ceiling Frame	35.	LPCN	Electrical Light and Power

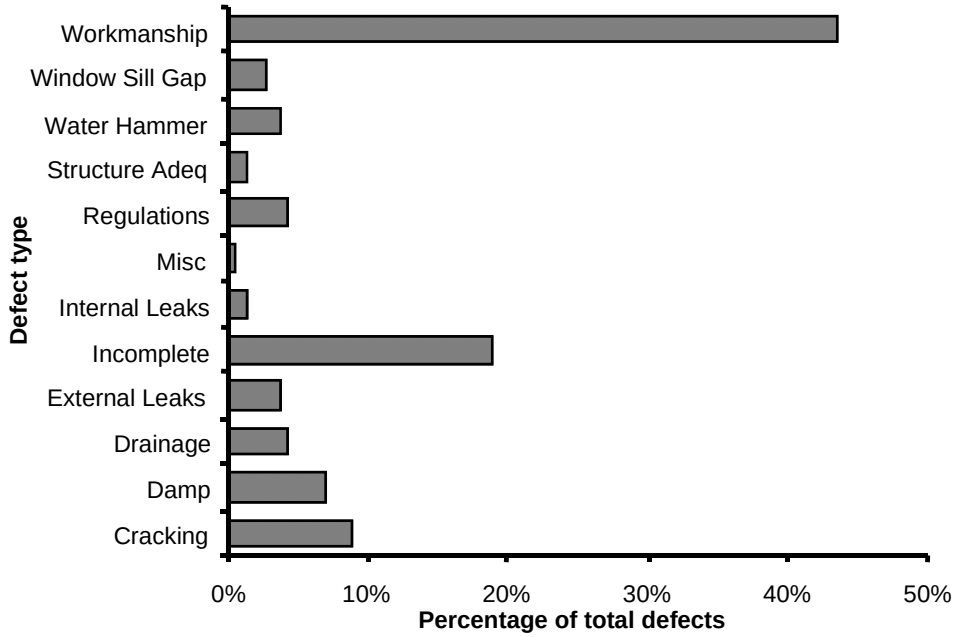
[1] NPWC Standard Elemental and Sub-Elemental Codes; [2] Denotes adjustments made to provide greater detail for this study.

By far the greatest proportion of defects was recorded in the *workmanship* and *incomplete* categories. For owner builders, these two categories recorded in excess of 77% of the total number of defects. In registered builders these same categories accounted for a slightly better performance with 62.5% of all defects. For information, *incomplete* items as a defect category are not the serious ones that prevent the occupation of the building. Rather they are items that are clearly not finished to the standards most occupiers would expect in a completed house. Classification of workmanship was a more difficult process as it is not possible to be absolutely precise about standards of workmanship across all elements of a house because it changes with time. Standards have evolved and changed over the years. In response to new materials, economic pressures, a changing workforce, plant and equipment. Accordingly, the quality of workmanship is relative to the eyes of the reviewer. Some of the inspection reports used in this analysis may have more items recorded than others. This reflects the views and experience of the inspecting architect. Some of the types of faults falling clearly into this category were:

- Exterior wall cladding not installed to manufacturer's recommendations;
- Dislodged or cracked wall tiles bowing indicating an unsound installation of the tiles;
- Some floor joists not bearing properly on bearer;

- Gaps in the heads of windows;
- Floor slightly springy in places.

Figure 1: Proportion of defects by defect type



Workmanship defects, represented 43.6% of the total number of defects was the largest of the 12 defect categories. Workmanship defects were distributed among 32 of the 35 building elements. Brick walls recorded the highest number of defects with 10.4% of the total number of defects identified. The next highest was roof coverings with 10.0% followed by gutters and downpipes (8.7%) and wall finishes (7.3%). The high incidence of workmanship defects suggests poor supervision may be prevalent in house construction. This assertion is further supported by the fact that almost all building elements were affected by workmanship defects. When building elements were combined to form trade categories, the two trades with the highest number of defects were plumber (25.9%) and carpenter (22.9%) (Figure 2). It should be noted that carpenters, with the image of the hammer and nail bag are perceived by the community as builders in the true sense of the word where as plumbers are one of the two licensed trades in Victoria (the other trade being electrician). It is noteworthy that until recently, most housing supervisors have moved into supervision from that trade. In the carpentry trade, defects were recorded in all building elements associated with that trade. That is all aspects of the three sections of carpentry, framing, lock-up and fixing were affected (Figure 3). In the plumbing trade, defects were recorded in all elements with the exception of gas service. The element of roof covering represented the highest number of defects in this category recording 27.7% of the in the plumbing. In turn 68% of these were attributed to poor workmanship and 20% to external leaks. Gutters and down pipes recorded 18.2% of the defects for the plumbing category with poor workmanship being responsible for 81% of the defects and incompletion 15.7%. The element of water supply recorded 17.4% of the defects for the plumbing category with the majority being attributed to water hammer (81%) and workmanship (15%) (Figure 4).

Figure 2 Distribution of defects by trade category

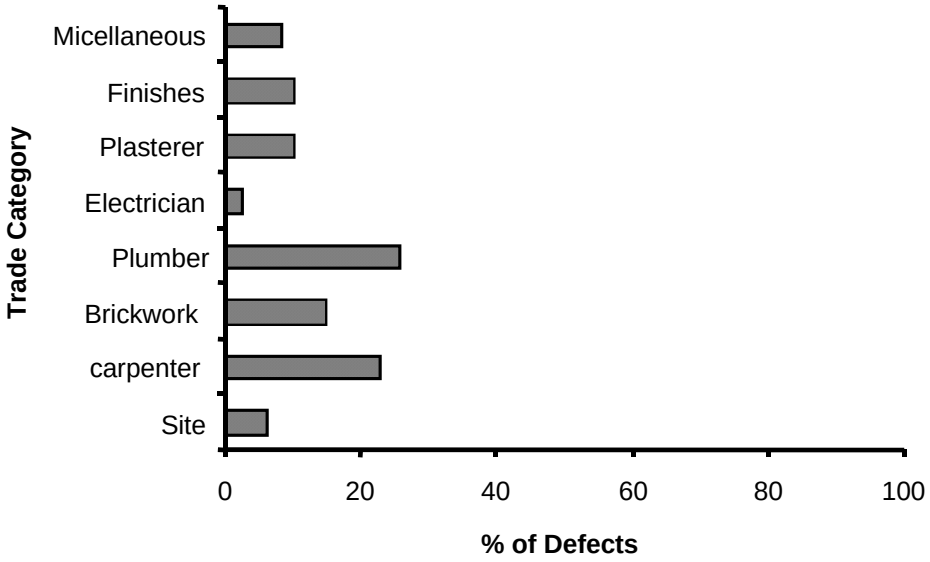


Figure 3: Distribution of defects by element in carpentry trade category

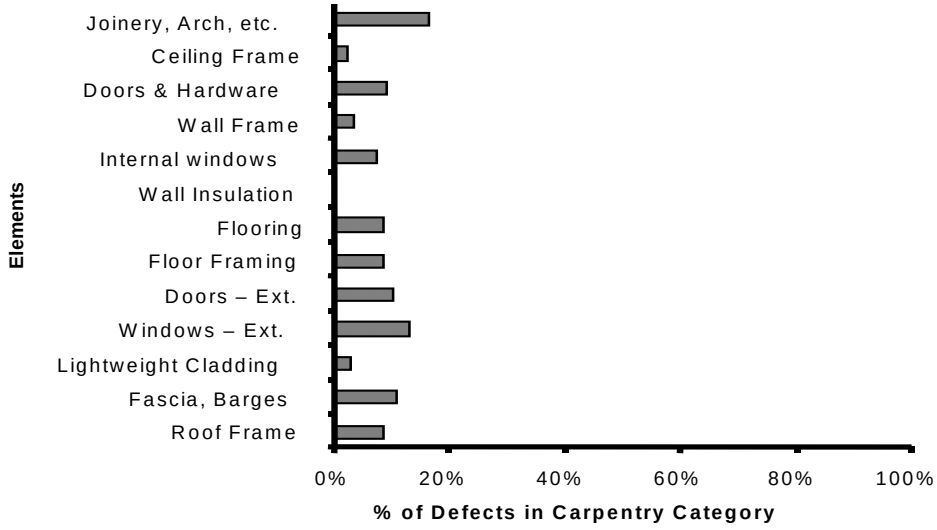
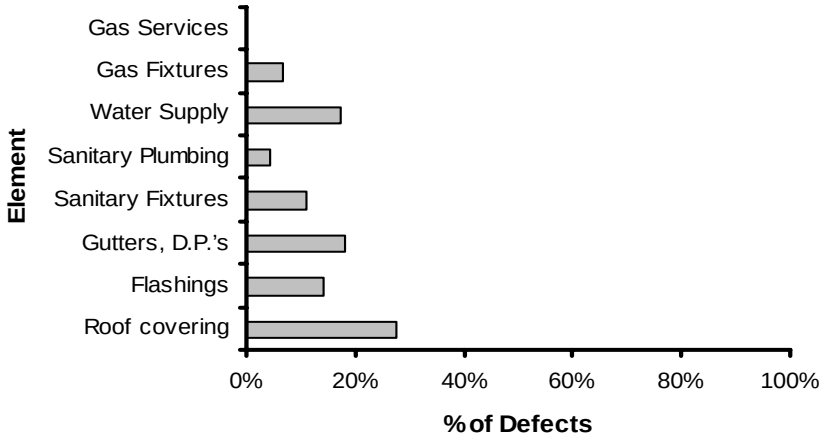


Figure 4 Distribution of defects by element in plumbing trade category



Some explanation of the results in Figure 4 can be gained by understanding that the plumbing trade is inflated by the inclusion of all roof coverings. That is, tile roofs are included with metal roofs. It is only the latter for which (licensed) plumbers are totally responsible. However, even if tile roofs were ignored, the plumbing trade would still rate poorly in this defect category. The disappointing standard of workmanship by plumbers was further confirmed by the fact that the building element of sanitary fixtures recorded nine major defects. This was almost double the five each recorded by bricklayers and plasterers. Clearly, this is another indication that the level or quality of supervision needs to be improved. Interestingly, the other licensed trade in Victoria, electricians, recorded the lowest number of defects with only 1.8% of the total number of defects. This may suggest that the issue may be as much about policing and supervision as it is about licensing.The study presented above, was based on houses constructed between 1988 and 1996, the period of the House Contracts Guarantee Act 1987. The study established a benchmark for defects in housing in Victoria that will be used for ongoing research. Houses built after 1996 were constructed under the Building Control Act 1993 and the Domestic Building Contracts and Tribunal Act 1995 (DBC&T). The Building Act 1993 was a milestone in terms builder registration as it established a significant governing body, the Building Control Commission (BCC) to oversee the operation of the registration and regulation systems.

THE BUILDING CONTROL COMMISSION (BCC)

The BCC (re-named the Building Commission in 2002) was established to oversee the administration of building control in Victoria. The Commission is a self-funding corporate body whose role is to develop and apply building law to provide for the design, construction of healthy, safe and energy-efficient buildings. The income of the Commission is provided by a statutory levy paid to the relevant building surveyor who is either employed by local government or a privately registered practitioner (building surveyor) when a building permit is issued. To assist it in fulfilling its function, the Commission has a number of committees and Boards. Among these is the Building Practitioners Board (BPB).

THE BUILDING PRACTITIONERS BOARD (BPB)

This Board comprises building practitioners from professional organizations and industry. Its function is to administer the registration system of building practitioners and monitor their performance. For domestic builders there are three categories of registration:

1. domestic builder (unlimited) being a person who has appropriate knowledge and experience to carry out, manage or arrange to carry out all components of domestic building work;
2. domestic builder (limited) – trades such as bricklayer, carpenter, concreter etc, and
3. domestic builder (manager) being a person who has adequate knowledge and experience (including financial management) to manage or arrange the carrying out by a registered builder (limited or unlimited) of the components of the work.

In the unlimited category the builder needs to possess an accredited degree, diploma, associate diploma and have three years of practical experience or have completed a "Course in Builder Registration (BPB)" offered by an approved provider together with three years of practical experience. Similarly, for the "limited" and "manager" categories appropriate competencies must be achieved and a minimum of three years experience is required in a recognized domain of domestic building work. All registered practitioners in the three categories listed above are required to operate within the provisions of the Domestic Building Contracts and Tribunal Act 1995.

DOMESTIC BUILDING CONTRACTS AND TRIBUNAL ACT 1995 (DBC&T ACT)

The DBC&T Act replaced the House Contracts Guarantee Act 1987and with it the HGFL. There were a number of factors for this, but essentially, the HGFL was perceived by consumers to have failed to live up to consumer expectations to deliver better quality housing. The Fund was seen as being biased towards builders when disputes arose and for allowing too many shoddy (cowboy) builders to operate. Also, the HGFL approved companies to operate as well as individuals. When companies went into liquidation, or became bankrupt, directors were free to resume business under a new company while leaving consumers with incomplete houses and invariably with some defective work. That is, the corporate entity was deemed responsible and not the individual directors. The intention of the DBC&T Act (1995) was to raise the standard of house builders and in turn deliver better quality housing. It operates under two main requirements to regulate the quality of domestic building. These are:

1. insurance of the works,
2. registration of the builder as a building practitioner.

The insurance requirement replaced the monopoly of the HGFL by allowing insurance companies in general to cover builders in relation to house quality. Without insurance builders are unable to obtain building permits in order that they may legally proceed with construction. A perceived advantage of this approach was that the insurance companies would weed out the bad builders by refusing to insure them. In practice, the perception is that this has not eventuated. When the DBC&T Act came into operation on 1 May 1996, there were six insurance companies with whom builders

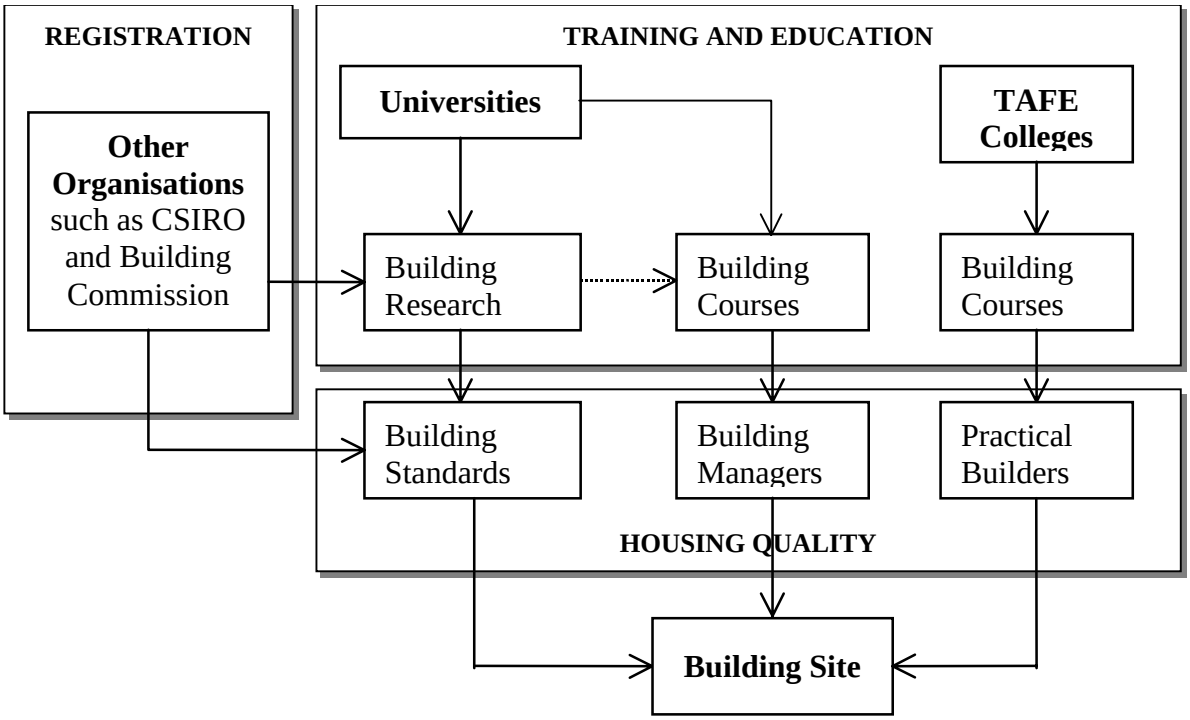
could underwrite their insurance premiums. In 2003, this has fallen to three underwriters in the market place. As a result, builders are experiencing significant difficulties obtaining the required cover to comply with the DBC&T Act. Registration of builders as practitioners now applies to individuals. Companies cannot register, thus eliminating the loop-hole referred to earlier. The DBC&T Act has been in operation for seven years, the same period as the Act it replaced. Despite tougher legislation and more stringent builder registration requirements, reports in the media of consumer victims at the hands house builders do not appear to have diminished. Arguably, they may have increased. Unsubstantiated industry speculation and anecdotal evidence suggests there have been no improvement in house quality and perhaps even some deterioration in quality. It is relevant then to ask the question: "Does government regulatory control improve the quality of house construction?" The authors have begun work on a follow up study for housing from 1996 and to compare results with the study reported earlier (1988-1996). Consideration of defects may be rendered meaningless unless considered in the context of education; training and knowledge flow in the housing industry. The research into defects in housing summarized above provides some indication and guidance as to where effort and resources ought to be directed to achieve a potential reduction in defects in housing, specifically, and buildings in general.

KNOWLEDGE FLOW

The two mainstream providers of education and training for the housing industry are universities and Technical and Further Education (TAFE) colleges. Universities view themselves as bastions of academic (theoretical and abstract) studies, intellectual rigour and problem solving. It is widely felt that technical skill based learning is the responsibility of TAFE colleges. These TAFE colleges have the twin responsibility of training trade and para-professional or technician level personnel, based in skill training. The perception generated is that universities tend to produce "researchers" and "managers" and TAFE colleges produce the "practical" builder. Regardless of the institution, knowledge gained must and should eventually flow to the building site. Figure 5 shows the relationships between tertiary institutions and how knowledge permeates its way down to the building site. This figure also identifies the three elements of training, registration and housing quality. Other parties with a vested interest in the education and training provided by the respective institutions are the professional construction associations and other governing bodies such as the Australian Institute of Building (AIB), the Housing Industry Association (HIA), the Master Builders Association (MBA), the Building Commission (in Victoria), government (State and Federal) departments such as the Office of Training and Tertiary Education (State) and the Australian Training Authority (Federal). The building and construction unions also have a strong interest in the training of members and potential members in the construction industry. It would appear these bodies often operate independently of each other and to some extent create policy and initiatives without sufficient reference to the other interested stakeholders. For example, to register as a Building Practitioner in Victoria, an academic component must be satisfied to a minimum standard at the TAFE diploma level. An undergraduate university degree also satisfies this component. Yet, university course accreditation is not at present on the charter of the Building Practitioners Board and the Building Commission. However, university Construction Management degree courses are accredited by the AIB. Unfortunately, there appears to be little evidence of "working together" between the two bodies. Similarly, at trade level, syllabuses for trade

training are formulated by a combination of Federal and State input. The process involves input from National Training Packages at Federal level and Industry Training Boards at State level.

Figure 5:Knowledge flow and building site relationship



It is significant that in Victoria there is no Training Board for the building industry. Industry Training Boards are usually composed of employer and union representatives. In Victoria, the two parties could not work together so there is no state training board and this does not give confidence that the industry is working together for the benefit of its clients, or more importantly, for its trades-people. Sadly, the building industry is the only industry in Victoria not to have a Training Board. The result is that the industry suffers in terms of development, reviewing and endorsing National Training Packages. This aspect is particularly important because of the industry's heavy reliance on sub contract labour and the sub contract system. As a result, the industry has adopted principles based on industrial manufacturing and standardization. Its work processes and procedures have become simplified and systematic over time. The repetitive nature of some activities ensures that tacit knowledge passed on within the subcontract system becomes an integral part of house construction. Thus, the authors argue that the process of constructing a house largely remains similar.

CONCLUSION

The research into housing defects summarized in this paper indicates that there are certain trades in the housing industry that need to improve their standards and competence to raise the quality of their workmanship. Whilst some of the licensed trades such as electricians have good standards of workmanship, others such as plumbers need improvement. Similarly, unlicensed trades such as carpenters also need

to improve their performance. This requires better supervision of their work, but in the authors' opinion it also requires some institutional guidance and regulation. The authors found the housing industry is still fragmented and sadly, this matches the conclusions of authors of nearly thirty years ago such as Kennedy (1975) and Woodhead (1976). There are many organizations and bodies in the housing industry, each dependent to some extent on each other, but they do not act as though they are working together to improve the service and quality to customers. The examples cited above, are not isolated. Even the two employer bodies (HIA and MBA) view each other as competitors and rarely work together for the good of the housing industry. There is an obvious need for greater emphasis on education and training housing supervisors and the creation of a supervisor's category for registration with the Building Practitioners Board. Serious thought should also be given for the licensing of carpenters following the results of this research. However, regardless of what reforms are introduced, they may well be rendered impotent if competencies are not supervised, policed and enforced. More importantly, the various parties in the housing industry must find a way of working together if they are to improve the image of poor quality. Inspection of Figure 5 shows the three discrete elements noted in the title to this paper and the fact that they remain separated is the greatest challenge facing the registration authorities and industry associations. The education institutions (universities and TAFEs) still lack a distinct link to integrate these two key components in building education.

REFERENCES

Australian Building Codes Board, 1999, *Building Code of Australia*, CCH Australia Limited, Sydney, N.S.W.

Georgiou, J. (1994), Knowledge Transfer and Building Failures, Proceedings of the Australia and New Zealand Architectural Science Association (ANZASCA) Conference, Deakin University, Geelong, Victoria.

Georgiou, J (2000) *A Comparison of Defects in Houses Constructed by owners and Registered Builders in Victoria 1988-1996*. Unpublished masters thesis, School of Architecture and Building, Deakin University, Geelong, Victoria.

Georgiou, J; Love, P.E.D; Smith, J. (1999) A comparison of defects in houses constructed by owners and registered builders in the Australian State of Victoria, *Structural Survey*, **17**(3), 160-169.

Georgiou, J; Love, P.E.D; Smith, J. (2000), A review of builder registration in the State of Victoria, Australia, *Structural Survey*, **18**(1), 38-45.

Keast, W. R. H. (1994), A History of the Master Builders Association of Victoria, Master Builders Association of Victoria, Melbourne.

Kennedy, W. B. (1975), Structure of the Building Industry Why It Is As It Is, Fifth Australian Building Research Congress – Planning and Construction, Melbourne.

Smith, J (1998) *Building cost planning for the design team*, Deakin University Press, Geelong, Victoria.

Woodhead, W.D. (1976), Measurement of Productivity in the Australian Housebuilding Industry, *CIB Working Commission W65, Symposium on Organization and Management of Construction*, Washington, DC.