

## Chapter 21: Skill Ecosystems

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### Abstract

Recent interest in skill ecosystems and initiatives associated with their reform represent the latest manifestation of a long-standing tradition of skills analysis which recognizes the importance of the context in which skills are developed and used. Whilst the original academic literature on the topic was primarily concerned with understanding and promoting high skill ecosystems, this chapter examines national approaches to policy and practice concerned with improving ecosystems associated with workers with low and middle-levels skills. Most of this chapter refers to developments in Australia, the UK and US. All the elements for successful skill ecosystem reform are in existence across these case study countries but they are not co-located. Enduring transformations to skill contexts required for effective change is therefore hard to achieve.

**Keywords:** Australia, low and middle-level skills, Scotland, skill contexts, skill ecosystem reform, skills policy and practice, US

### Introduction

Skill ecosystems are defined as regional or sectoral social formations in which human capability is developed and deployed for productive purposes (Finegold 1999). Their basic elements are business settings and associated business models, institutional/policy frameworks, modes of engaging labour, the structure of jobs, as well as the level of skills and systems for their formation (Buchanan et al. 2001). The defining features of this analytical tradition are a concern with coordination failures (i.e. not just market and/or government failure), a non-linear approach to causal analysis, and a concern with workforce development arrangements at sub- as well as supra-national level.

The recent interest in skill ecosystems represents the latest manifestation of a longstanding tradition of skills analysis: the importance of understanding the context or settings within which skills are developed and used. Researchers working in this tradition explicitly build on labour process theory, comparative political economy, and heterodox labour economics. Its immediate roots lie in critical engagement with mainstream analyses and policies that define most skills issues and problems as essentially side supply related, i.e. as concerning questions of education and training, and the qualifications arising from both. In many countries and amongst international organizations such as the OECD, the 'necessity' to raise education levels or lose out in the modern globalized world has taken on a status approaching that of (an assumed) self-evident truth. Experimentation with skill

ecosystem reform has been supported by a small band of policymakers unconvinced or sceptical of this policy orthodoxy. In essence, researchers and policymakers in this tradition seek to understand skills in context, and are concerned with the wider array of determinants associated with workforce development and how this is connected with particular trajectories of social and economic development.

This chapter is structured as follows. It begins with a short account of the analytical and policy origins of this tradition. New knowledge generated by skill ecosystem researchers has tended to come from applied, policy-based research. It is because of this, most attention is devoted to consideration of experiences in three English-speaking countries which have launched an array of initiatives informed - explicitly or implicitly - by the concept in the last two decades: Australia, the United Kingdom, and the United States. An account of the analytical and policy significance of these experiences is provided. Whilst this tradition has generated important analytical insights, the chapter highlights how its lessons for skills policy are more significant.

### **Analytical and Policy Origins**

Understanding the connection between skill and economic development is as old as the discipline of modern political economy. Smith's *Wealth of Nations* (1776) opens with observations about skill levels, work organization, and productivity in the oft-cited example of the pin factory. Since then the topic has been the subject of almost continuous - and often controversial - analytical interest. Whilst Smith noted the empirical benefit of designing work around lower average skill levels, other analytical traditions have examined the benefits of rising skill levels for productivity. In the 1980s a literature emerged that examined the relationship between skills and economic performance at national level. It was especially concerned with what were termed national skill equilibria (e.g. Finegold and Soskice 1988). This literature's major strength was that skills and economic performance were not considered in isolation. It was constellations of policy and practice that were critical. Key variables of interest included the nature of product and labour markets, as well as business organization and management strategy. Its core thesis was simple: countries with what was described as having a high skill equilibrium performed better than low skill equilibrium nations. The policy challenge was clear: high-skill, high-wage economies could only be created where a broad range of initiatives (constituting a different policy mix) achieved widespread and thorough reform. Changes in skills levels alone would be inadequate. This strand in the literature provided another powerful challenge to the 'high skills leads to high growth' narrative.

The skill equilibrium thesis was not without its problems. Prime amongst these problems was the totalizing conception of national economies at the core of the analysis. Entire countries were characterized as being either ‘high’ or ‘low’ skill in nature. Longstanding histories of leading and laggard sectors in all nations, however, sat uncomfortably with the central tenet of an all pervasive national skill equilibrium. The notion of skill ecosystems emerged out of reflections on this analytical anomaly. The term was first coined by David Finegold in 1999 and used by Crouch et al. (1999) soon after. This nascent analytical current built on the strengths of the skills equilibria literature about the importance of context, but took seriously the reality of diverse skills clusters within countries. The analogy of distinct ‘ecosystems’ was used to defined different ensembles of skill existing within and across national boundaries. This analytical category drew thoughtfully on one of the key ideas of the life sciences (i.e. ecology) to capture the often organic and dynamic of relations associated with the skills political-economic development nexus.

Finegold’s particular interests were with high-skill ecosystems such as the information technology and bio-technology clusters in California. These clusters were regarded as important potential sources of innovation and growth, not just for regions but for their host nations. If the sources of prosperity were to be understood and promoted, the challenge was not to understand how nations move from a ‘low skill’ to a ‘high skill’ equilibrium but, rather, how to understand and support high skill ecosystems. The ecosystems analysed were not just a geographic or sectoral descriptor; for Finegold they constituted a distinct organizational form. Firms came together through intermediaries to pursue initiatives such as improved technical training that were of mutual benefit. Finegold argued, however, that the main way professionals and technicians developed their skills was through informal means such as working with others in their networks to overcome technical challenges. The high skill ecosystem as a distinct organizational form facilitated this mode of knowledge creation and diffusion. As a result, Silicon Valley (and Stanford University) came to constitute the epicentre of innovation in the United States - not only in aerospace and defence related industries but more generally in technology and design sectors.

The academic literature on skill ecosystems is growing but limited (cf. Anderson and Warhurst 2012; Hall 2011; Hall and Lansbury 2006; Payne 2008, 2011). The idea has had greater impact in shaping policy debate and experimentation in Australia and, to a lesser extent, the United Kingdom (especially Scotland). As a matter of practice tacitly informed by these ideas, the United States has also generated a wealth of experience. These developments have attracted the attention of international organizations, especially the OECD (cf. Buchanan et al. 2010; Eddington and Toner 2012; OECD 2012). Whilst the original academic literature on the topic was primarily interested in understanding

(and promoting) high skill ecosystems, the policy debates and experimentation in the three countries noted have primarily been concerned with reforming ecosystems associated with workers with low and middle levels of skill (see Buchanan et al. 2001). In Australia and the United Kingdom especially, skill ecosystem analysis has emerged as a distinctive intellectual undercurrent that endeavours to provide a new way of thinking about and reforming what is described in these nations as vocational education and training (VET) and intermediate skills.

Most of this chapter refers to developments in Australia, the United Kingdom, and the United States. This focus is not because these countries offer superior ways of thinking about or nurturing either employment or skills. On the contrary, all three countries have deep problems with their business models and especially their labour markets (cf. Buchanan et al. 2013, 2014). Many other countries have been experimenting with similar types of initiatives, often in different domains of policy and practice. The burgeoning literature on clusters in innovation is one example (cf. Ramstad 2009). We confine our attention to the recent emergence of skill ecosystem approaches to analysis, policy and practice in these countries because the subject matter of clusters and ecological dynamics has explicitly focused on skills and training.

### **Australia: A Supply-Focused Mainstream Leavened Slightly by an Array of Demand-Side Experiments**

Since the mid-1970s Australia's labour market has been transformed. Well-defined occupational and internal labour markets for those workers with intermediate skills have steadily eroded after decades of 'restructuring' (ACIRRT 1999). This transformation has coincided with rising levels of higher education and the total recasting of workforce development for those with intermediate skills (Watson 2003; Buchanan et al. 2004). The key development in skill formation has been the shift to a so-called 'demand driven system'. The older skills regime, especially the apprenticeship system for the skilled trades, was criticized as suffering from 'producer capture'. Teachers in publicly funded technical education colleges were accused of providing skills they thought were important - not what 'industry needed'. To 'teacher-proof' the system, vocational development of people at intermediate level is now defined on the basis of industry determined 'units of competence'. These are highly disaggregated specifications of tasks individuals should be able to perform. It is assumed these can be acquired in any combination any employer deems relevant. To help drive the system, public technical education funding has been recast. Previously block grants were made to longstanding institutes of technical education. Now funds are allocated by competitive funding models and open to other 'registered training organizations'. Increasingly, funding is being allocated by means of

‘student entitlements’ (i.e. quasi vouchers) to ensure money follows ‘demand’ and not ‘producer preference’.

Whilst the key features of this system are now entrenched, its emergence has not been without controversy. Questions concerning the coherence in skill formation and the quality of the skills offerings have been constant and are rising (OECD 2009). Most importantly, because the system was formally ‘demand driven’, nearly all attention has focused on supply issues - especially the creation of a ‘training market’ consisting of thousands of private VET providers. Since the late 1990s, however, the assumption that ‘skill demand’ is unproblematic and self-evident has been increasingly questioned. What if demand itself is in part, if not the major problem with skill formation and use? Whilst a concern with skill ecosystems has not been the central focus of Australian skills policy, the growing interest in demand side aspects of the system has provided the context for considerable interest in the reform of skill ecosystem. A number of state and national government programmes supporting skill ecosystem reform ran between 2003 and 2011. Over time the object of concern shifted to better ‘workforce development’ - a term regarded as more accessible but still retaining the central concern with the connection between business and skill development. Most recently ‘workforce development’ has slipped back to the old concern with boosting the number of people with qualifications. Government funded support to reform demand side problems has all but disappeared in Australia today. Three major programmes collectively supported around 100 different skill ecosystem reform initiatives between 2002 and 2011. Whilst there were some differences between these programmes, there were strong commonalities in how they supported skill ecosystem reform. By and large, all these initiatives:

- were directed at addressing both supply and demand determinants of skills problems and improving business performance as well as outcomes for individuals
- involved interventions directed at changing work organization, employment arrangements and business strategy as well as training design and provision
- typically were funded for less than two years
- were overseen by multi-stakeholder reference groups
- involved engaging one full-time project manager/project officer
- occurred in a diverse range of sectors including: information and communication technology, water, land conservation, horse racing, fruit and vegetable supply chain, defence support industries, forestry, dairy manufacturing, aged care, disability support services, mental health services.

Whilst documentation on these initiatives is limited, four distinct findings of fact about the nature and reform of skill ecosystems can be discerned. The first is that the nature of skill ecosystems and the problems they face are often difficult to define. Understanding skills in context has intuitive appeal. The challenge is clarifying just what it is about ‘context’ that is problematic. The second is that effective skill ecosystem reform requires leaders with deep knowledge of their domain as well as high-level analytical and political/organizational skills. All evaluations of all Australian programmes identified the crucial role of project coordinators or facilitators. Evesson and Oxenbridge (2013) argue that the key role necessary for success is people who work as ‘integrators’. The best occupants of this role appear to be people with deep knowledge of, and who are widely respected in, the domain of interest. Such people are hard to find. The third distinct finding is that establishing social coalitions to achieve skill ecosystem reform is difficult and time consuming. By definition, a skill ecosystem has many components. Only rarely can one part be changed in isolation. Building partnerships between relevant agents is difficult. Key players in a sector or region are often competitors as well as colleagues. Building trust amongst such players takes time and considerable skill. Few of the 100 or so pilot initiatives had either the time or personnel necessary to achieve enduring change. Finally, only rarely do skill ecosystem reform campaigns result in new and better local ‘skill equilibriums’. Current funding models do not nourish even successful initiatives. Even if all these matters are successfully addressed, there is no guarantee of initiatives enduring unless, to use Finegold’s term, the reformed skill ecosystem is ‘nourished’. The absence of such ‘nourishment’ was noted in the evaluations of all the recent government supported initiatives (cf. Windsor and Alcorso 2008; Eddington and Toner 2012; Evesson and Oxenbridge 2013).

However, a number of autonomous initiatives have emerged from within particular sectors and regions. In these initiatives, local employers have endeavoured to become collectively self-reliant in ensuring workforce development meets their business needs. One of the most sustained of these initiatives occurred in the Australian dairy sector. Farmers in this sector have placed a levy on themselves to resource the development of new workforce capability. This levy supports four pilot studies - two in two dairy farming regions, one in dairy manufacturing and one in services providers (i.e. milk machine mechanics) - to identify how better to configure resources to ensure the industry is able to recruit and develop the labour it needs for the future. In all pilots, whilst training was one aspect of the initiative it was not the sole or even major concern (AWPA 2013). A related initiative amongst the dairy farmers in Victoria’s Alpine Valleys is tackling the most challenging issue of all: making it easier for young farmers from non-farming families to enter the industry by way of accessing the capital needed to buy a farm and revitalizing dairy districts. Again this initiative is organized on a collective and not on a farm-by-farm basis, by the farmers and local councils (Bridge

2014). A regionally based initiative has also been emerging in the Narrabri district of northwest New South Wales. Employers from agriculture, construction, and the local council devised a labour demand calendar to help coordinate job offerings, thereby turning seasonally based fragments of jobs into, potentially, a year round offering of employment for local workers. In addition, the employer- and community-based ‘Make it work’ committee promotes a local ‘employer of choice’ programme to improve the quality of jobs offered more generally in the district. Whilst most of the achievements so far have been modest, in 2013 the initiative became the model that five other districts are now emulating.

### *New directions in skills planning*

Historically, workforce planning has involved making projections about the likely changes in the industry and occupational nature of employment in the future. Whilst modelling techniques vary in sophistication, their underlying assumption has been that past trends can help predict the future. Education and training providers were then informed of the likely demands for their services. Implicit in this was the assumption labour demand should be taken as a given, and those concerned with skills should gear up to meet projected demand. Recognition about the importance of understanding and managing skills in context had a major influence in skills planning at national, sectoral, and regional level in Australia in the period 2008 to 2014. At the heart of the new approach was noting that the nature of labour demand is far from self-evident. The challenge is not so much to predict specific skill sets which will be needed but rather what capacities and capabilities are best developed now to ensure the country has the capacity to adapt rapidly as circumstances change and, where possible, shape the way jobs are defined. Between 2008 and 2014 the national body responsible for advising on changing skill requirements - the Australian Productivity and Workforce Authority (AWPA, and formerly Skills Australia) - worked on this new approach to problem definition. AWPA oversaw a three-year programme of scenario development and refinement. The scenarios specified plausible but starkly different medium and longer-term futures. The challenge for policy then became how to best equip Australia to navigate the future, no matter which scenario or combination of scenarios prevailed. Similar approaches emerged at state level, especially in South Australia and Western Australia (TASC 2013; DTWD 2013). Most interesting of all is the growth of sometimes quite sophisticated planning practices at regional and local level concerned not just with ‘workforce planning—but planning for workforce development’ that help identify a wide array factors that need to be monitored and shaped to address skills problems.

These recent experiences must be kept in perspective. They have never been ‘system defining’. At best they have constituted a novel undercurrent of policy and practical innovation. Whilst the

government-funded pilots spawned a wealth of novel experimentation, little enduring change has been achieved. The autonomous initiatives in particular sectors and regions appear to provide more promising models of change. The defining feature has been groups of employers prepared to share in responsibility for becoming collectively self-reliant in meeting their workforce development needs. These initiatives have survived despite, not because of, current funding models. Unless these ideas mature and begin to reshape funding models to support the development of building adaptive capacity as opposed to issuing de facto vouchers for a ‘training market’, examples of successful and enduring skill ecosystem reform are unlikely to flourish.

### **UK (Especially Scotland): Policy in Search of Effective Practice**

The United Kingdom comprises what Raffé et al. (1999, 9) best describe as ‘four “national” football teams’: Scotland, England, Northern Ireland, and Wales. The Scottish education system has been historically held in high esteem (cf. Paterson 2003) and is regarded as one of the ‘nation’s defining institutions’- producing a distinctive flavour (cf. Davie 1961; Paterson 1997) that has strengthened following devolution in 1999 (Humes and Bryce 2003), notably in post-16 provision (White and Yonwin 2004; Keating 2005; Gallacher 2007). The Scottish Government has been especially eager to realize its ambition of a ‘smarter, more successful, Scotland’ (Scottish Executive 2001). Futureskills Scotland was established to ensure progression towards this vision, operating as a feed into policymakers, and was an important catalyst in recent skill ecosystem reform. In contrast to Australia, this reform has been a matter of interest at the highest levels of the Scottish Government. Unlike Australia, however, practical experimentation and impact on skills planning has been limited. Employer engagement remains an issue and, whilst there is an unequivocal will to make something happen, the infrastructure necessary to effect actual change is yet to be established. Initiatives associated with the idea, despite these failings, remain a continuing force in the reform of post-compulsory education, most notably in the area of intermediate-level skills and qualifications.

Throughout the 1990s and 2000s, as with the rest of the United Kingdom, Scotland devoted considerable resources to boosting education levels as the primary policy response to the challenges of ‘globalization’ and the ‘new economy’ (Anderson and Warhurst 2012). These initiatives largely ignored demand side factors increasingly recognized as the primary generators of most skill problems (e.g. Buchanan et al. 2001; Keep 2002; Warhurst and Findlay 2012). The limits of the supply side strategy were particularly stark in Scotland. Scotland has one of the highest higher education participation rates amongst OECD countries - consistently higher than England and now standing at 56% (SFC 2012, 4) - and yet the prolonged, large-scale injection of more ‘knowledge workers’ into the labour market has not improved productive performance. A report for Futureskills Scotland

(Felstead 2007) was blunt on this matter. It found that despite relative success in producing a highly qualified labour force, 57% of all Scottish jobs demanded fewer than three months' training, 31% did not require any qualifications, job polarization had increased, and over-qualification and skills under-utilization were endemic. The skill content of Scottish jobs was lower than the rest of the United Kingdom and, what is more, had declined over the preceding decade. Stimulating demand and ensuring employers made better use of employee skills, Felstead's report proposed, should be a policy priority. An allied report prepared by Payne (2008) argued that Scottish policymakers could learn from emerging Australian experiences with skill ecosystem reform. UK policymakers, he urged, should emulate this approach because simply boosting the supply of people with higher-level qualifications did not engage the key skills issues such as skills under-utilization, job polarization, and poor training and progression pathways.

In 2007 a new government took office. One of its first activities was to produce a new, distinctly Scottish skills' strategy. Skills for Scotland: A Lifelong Skills Strategy (Scottish Government 2007b) unequivocally embraced skills ecosystem thinking, drawing heavily on the work of Payne and a range of related Futureskills Scotland reports:

Simply adding more skills to the workforce will not secure the full benefit for our economy unless employers and individuals maximize the benefits that they can derive from these skills. Furthermore, how skills interact with the other drivers of productivity, such as capital investment and innovation, is crucial. Equally, investment in capital and innovation will be most productive when it is supported by a well-trained workforce. We need to move beyond a focus on meeting the current demand for skills and tackle the issues which underlie and drive demand. We need the skills to facilitate sustainable economic growth but we also need our firms to be ambitious and demanding users of skills. (Scottish Government 2007a, 13)

Skill ecosystems thinking has been badged in Scotland as 'skills utilization' and focuses on developing individuals and workplaces in order to increase productivity, improve job satisfaction and stimulate investment and innovation (Scottish Government 2010, 6). The Scottish Government attempted to bring this new approach to life in a number of ways. A new national skills agency for Scotland, Skills Development Scotland, was established. The Scottish Government signed a joint communiqué with the Scottish Trades Union Congress (STUC) committing the parties to pursue the main aims of the new skills strategy (Scottish Government/STUC 2008). To foster communication and strategic cohesion between key partners, the Scottish Government discussed with business leaders and other stakeholders how they could take forward the skills utilization agenda. One of the key

outcomes was the establishment of the Skills Utilization Leadership Group, chaired by the Cabinet Secretary.

As a direct result of the work of the Skills Utilization Leadership Group, the Scottish Funding Council called for proposals for skills utilization pilot, exploration or development projects (SFC 2008). Just less than £3m was awarded to 12 projects (SFC 2009, 9-11).<sup>1</sup> Examples of projects included: working with business leaders in the creative industries through their professional body to examine ways in which creative thinking and design processes could be harnessed to improve productivity; working with the Scottish dairy industry to address problems of attracting and retaining staff through workforce development; and a regional college/university knowledge transfer network linked to improving rural business skills.

Important insights into the operation and impact of these pilots were provided in an interim evaluation (Payne 2011). As with the Australian experiences, the short funding time frame of the pilot studies was noted as severely restricting their impact (UKCES 2010; Payne 2011). Evaluation also highlighted problems of programme design and employer engagement. Colleges and/or universities were the lead agents in the pilot reform initiatives; unsurprisingly therefore most projects tended to revert to skill supply/development solutions. Future initiatives, it was proposed, should focus on bringing together a broader range of actors - with employer engagement and job redesign/work reorganization priority areas. As with the evaluations of the Australian experience, the importance of building networks ‘in a particular sector, region, or supply chain’ and securing key stakeholder engagement were identified as being especially important (Payne 2011, 52). The evaluation did not just identify the need for ‘more employer engagement’; it also emphasized the importance of cultivating appropriate business engagement. In particular Payne questioned the benefit of engaging with employers who were neither ambitious nor demanding users of skills, and disinclined to move up the value chain. This last insight has proved to be prescient. Employer engagement has emerged as arguably the most problematic aspect of skill ecosystem reform. The Skills Utilization Leadership Group was disbanded in 2010; employers are still grappling with the term, let alone concept, of ‘skill utilization’ (Warhurst and Findlay 2012); and any infrastructure to meaningfully engage employers at the local/regional level remains conspicuously absent.

### ***New directions in post-compulsory education and intermediate skills***

Engagement with employers has proven difficult but a concern with skill ecosystem reform has remained an ongoing element of the changes in Scotland. A key area of reform has been developing intermediate-level skills for intermediate-level jobs. Beyond the traditional trades there has been

limited and, recently, declining public support for quality jobs in this part of the labour market (e.g. Canning and Lang 2004; Gallacher et al. 2004; Anderson 2014). Colleges in Scotland are an important source in middle skill supply but what OECD and other headline data typically fail to reveal is that one- and two-year sub-bachelor's certificates/diplomas (HNCs/HNDs) delivered in colleges account for 40% of Scotland's higher education participation rate (SFC 2012, 13). In the past, these certificates/diplomas provided the middle-level qualifications integral to ecosystems based around intermediate skill levels. Changes in the content of HNCs/HNDs and a policy focus on large-scale articulation to, often less prestigious, universities, has meant that these qualifications are variable and best conceived as on a continuum from vocational to transitional - fulfilling neither function particularly well (cf. Gallacher and Ingram 2012). Meeting middle skill demand in key growth/comparative advantage sectors is also proving problematic. Middle skill demand in the renewables sector is of particular interest. The Scottish Government is committed to become 'the renewables powerhouse of Europe' (Scottish Government 2011a, 8) and the green economy provides more 'decent' jobs at intermediate level than other sectors (Muro et al. 2011).

Reflecting the realization that investment in education and training for middle skilled jobs has lagged, policymakers are now addressing issues associated with these jobs. In 2013 the Scottish Government established The Commission for Developing Scotland's Young Workforce (Scottish Government 2013). The Commission is charged with producing a set of recommendations on the future direction of Scottish VET to help ensure that young people develop the requisite skills to move into sustainable, high quality jobs. These recommendations will: focus on the development of high-quality VET in key sectors identified in the Scottish Government's economic strategy as most promising in terms of growth/comparative advantage (e.g. Scottish Government 2011b); provide guidance on how to better engage employers and other key partners; include suggestions on how to improve Modern Apprenticeships; take proper cognizance of post-compulsory education reforms (e.g. Post-16 Education (Scotland) Act of 2013); and make recommendations to support Scotland's evolving regionalization agenda (e.g. Skills Investment Plans, Regional Skills Assessments, Regional Outcome Agreements). Colleges, often regarded as the 'Cinderella Service' (cf. Randle and Brady 1997), have now got a VIP ticket to the regionalization ball and have been clustered/merged into distinct geographic areas. There will be 'a duty on regional college boards and regional boards to consult representatives of local communities and local employers' (Scottish Government 2012b, 10). Regionalization endeavours to improve local and regional decision-making and encourage a 'bottom-up' sectoral skills policy/practice approach to economic, social and workforce development. These developments mean that, by a remarkable coincidence, the indirect end point of workforce development reform in Scotland is very similar to that of Australia's situation where there is growing

interest in rethinking the content of intermediate qualifications. Whilst the influence of skill ecosystem on skills planning is not as advanced as in Australia, the experimentation with skill ecosystems in Scotland has contributed to a positive legacy for the forgotten middle skilled jobs.

### **The US: Dynamic Innovations on the Margins of a Fragmented System**

Skill ecosystems thinking is not immediately discernible in US policy discourse - despite the fact that the term was coined by David Finegold of the United States. On closer inspection, however, an abundance of effective skill ecosystem reform in practice and interesting policy developments are evident; these developments are partly linked to the infrastructure provided in, and a series of initiatives following, the Workforce Investment Act (WIA) of 1998. Non-profit organizations feature prominently in US developments and have been adept in helping the most disadvantaged, often tapping into government funding sources. In contrast to Scotland and Australia, the United States has been comparatively successful in engaging employers and other key stakeholders. Recent promising innovations have a distinct regional/sectoral focus. Yet it is important to view these initiatives in context. Innovations remain a tiny feature of the overall, still fragmented, system of workforce development in the United States. The absence of a national skills policy is problematic and financial cuts have been severe in recent years. Developments in the United States are therefore best understood as effective skill ecosystems practice on the periphery of a system in dire need of sustained funding injections and a coordinated skills policy. Despite such drawbacks many dynamic innovations continue and evolve.

Whilst the United Kingdom was still pursuing skill supply policies, the United States moved to a 'demand-led' workforce development system in the late 1990s - deeming the old system no longer fit for purpose in the context of a rapidly changing global economy. Federal/state/local provision of services was fragmented and ill-equipped to produce the increasing level - and changing nature - of skills required of the new century. The new infrastructure has nurtured considerable innovation and experimentation. Much of this innovation, however, has focused less on large-scale upskilling and more on moving disadvantaged/displaced workers into paid employment, much of it low skilled in nature (Osterman 2007). Low-skilled work/low levels of educational attainment are inextricably linked to America's in-work poverty problem (cf. Osterman and Shulman 2011; Bureau of Labor Statistics 2013). The United States has not kept pace with the demand for higher-level skills since the late 1970s (Autor 2011). Once the world-leading producer of higher education graduates (Freeman 2010), anxiety about the potential oversupply of graduate skills in the early 1970s quickly transferred to anxiety about their undersupply - with an ever-declining US participate rate in comparison to other OECD countries (Schurman and Soares 2010). Higher education non-completion is especially

problematic, further exacerbating America's diminishing capacity to innovate in high-tech sectors (Freeman 2010). In response to this situation the Obama Administration declared that 'by 2020, America would once again have the highest proportion of college graduates in the world' (US Department of Education 2012, 1). This ambitious target is in the context of creating more flexible, affordable higher education and training pathways through the life course, linked to industry demand - especially in STEM (science, technology, engineering and mathematics) subject areas.

After its introduction by the Clinton Administration in 1998, The WIA was formally implemented in 2000. WIA is the largest single source of federal funding for workforce development activities. Replacing the Job Training Partnership Act (JTPA), WIA set out to create an infrastructure to 'improve the quality of the workforce, reduce welfare dependency, and enhance the productivity and competitiveness of the Nation' (WIA 1998). This infrastructure, Claggett (2006) explains, was specifically designed to support a demand-led workforce investment system, better coordinate and integrate services for jobseekers and employers and, importantly, transfer powers from federal to state level. This transfer of power increased the potential to respond flexibly to local circumstances.

The Department of Labor administers WIA with funds distributed to states. WIA requires state governors to establish State Workforce Investment Boards, comprising a range of key stakeholders including state labour and business representatives - stipulating that the majority of board members must be drawn from the business community and a chair selected from this group. Governors are also required to identify local workforce investment areas and establish local workforce investment boards (LWIBs), made up of a similar grouping of local stakeholder partners. One-Stop centres/shops are an important mechanism for streamlining and consolidating mandatory services (Blank 2009). One-Stops have been created in all local areas of the United States and boards assigned responsibility for overseeing mandated and other 'desirable' local partners (John J. Heldrich Center for Workforce Development 2002, 5). There are now just fewer than 600 distinct LWIBs and 3,000 One-Stops operating in the United States, and the National Association for Workforce Boards point to the 13,000 volunteer members of the business community serving on LWIBs.

Heinrich et al.'s (2008, 49) non-experimental evaluation of WIA notes a positive net impact 'in almost all states'. The Government Accountability Office (GAO) highlighted 14 initiatives generally regarded as exemplars of innovative practice in employer/WIB collaboration (GAO 2012) - many of which were notably supported by additional employer cash or in-kind support. Employer engagement with One-Stops, however, tends to be primarily around recruiting low-skilled workers (Blank 2009, 8), with private sector employer engagement limited (Cottingham and Besharov 2011). WIA's 'work

first' ethos has also meant that issues concerning job quality are often ignored and career progression opportunities limited (Conway and Rademacher 2003). What is more, LWIB employer representatives are not always necessarily the 'best' or most appropriate (Holzer 2011). Edelman et al. (2011) argue that despite such difficulties policy innovation at state level in particular has been 'impressive'. WIA has helped institutionalize the link between workforce development and economic development (Bray et al. 2011). This link has supported federal initiatives such as Workforce Innovation in Regional Economic Development (WIRED), targeting labour market areas in high-growth sectors within and across state borders (US Department of Labor 2008). The final report of the California Innovation Corridor initiative, led by the California Space Authority, underlines the success of the WIRED approach (Conner 2010, 5). Certainly, there is increasing academic and policymaking consensus that sector and/or cluster-based initiatives are delivering fruitful results (cf. Conway and Rademacher 2003; Froy and Giguère 2010; King and Heinrich 2011). This approach can support multi-employer engagement, address job quality issues, map career pathways to middle- and highskilled jobs, join up networks, foster regional and cross-state cooperation, and further align workforce development to economic development, i.e. generally start to address whole skill ecosystems (National Governors Association 2008).

The relatively small size of the US welfare system in comparison to Scotland and Australia may go some way to explain why non-profit initiatives/organizations, especially those supported by charitable foundations, are a prominent feature in US workforce development. The sustained work of non-profits is impressive. Philanthropedia recently spotlighted 16 'outstanding' US workforce development non-profits, including the National Skills Coalition, The Aspen Institute, the Wisconsin Regional Training Partnership, and Year Up. These initiatives/organizations envelop practitioner-based activities, policy/advocacy activities, and research-as-catalysts activities. Some initiatives are directed at system, not just project-based, change. The Annie E. Casey Foundation (AECF), for instance, set up its Jobs Initiative in 1995. It invested \$30m dollars supporting disadvantaged families in securing sustainable jobs with career progression paths, concentrating its work in six US cities and aiming for 'system change': 'We care about system change because, whilst innovative employment projects are important, we simply cannot address the needs of thousands of workers and businesses without changing the rules of the game' (Hebert 2010, 6).

Evidence of changing the rules of the game was clear in its Milwaukee Jobs Initiative, which was later incorporated into the Wisconsin Regional Training Partnership. Systemic transformations included the introduction of effective workplace reorganization and adoption of 'high road' strategies in the healthcare, manufacturing, hospitality, and technology sectors - with demonstrable benefits for

employers and employees (Hebert et al. 2005). Although the AECF Jobs Initiative has now ended, its legacy is one of sustained system change (AECF 2007). There is no sign, moreover, that the work of a broad range of non-profits in the area of workforce development will wane. However, as many non-profits rely on government funding sources, recent spending cuts following the global economic downturn have come at a time when demand for services has risen (Boris et al. 2010).

### ***Funding squeeze and renewed interest in middle skills***

A key problem for US workforce development is systemic underfunding (Biroonak and Kaleba 2010). Longer-term trends suggest a further funding squeeze, although the American Reinvestment and Recovery Act of 2009 provided some temporary respite (Decker and Berk 2011). Edelman et al. (2011) note that WIA Governors' Reserves have been disproportionately affected - reserves that allowed for experimentation and innovation. WIA was due to be reauthorized in 2003 but endures only under a Continuing Resolution (King and Heinrich 2011). The revised content of WIA when it is finally reauthorized is not inconsequential.

Notwithstanding impressive innovations at the margins, Jacobs (2013) argues that WIA is inextricably tied to remedial efforts at the low skills segment of the labour market and represents just one facet of a largely fragmented workforce development system which, despite claims to the contrary, is still far from 'demand-led'. Lerman (2010) points to the cost-effectiveness and impressive rate of return to US apprenticeships in comparison to other education/training options offered through WIA. The nature of apprenticeship training, he suggests, renders it an apt, effective vehicle for linking skills investment to business/economic growth. Despite the comparatively low proportion of apprentices in the United States (Steedman 2012), unsurprisingly given past political resistance (e.g. Reich 1998), apprenticeships are now being pushed as one solution to the US middle skills gap (Kochan et al. 2012; Lerman 2013). Indeed there is renewed interest in what Holzer and Lerman (2007) term America's Forgotten Middle-Skilled Jobs. Almost half of all US jobs are at middle-skill level and there is a widening middle-skills gap across a range of industrial sectors (Kochan et al. 2012). As part of a broader transformation of Careers and Technical Education (CTE) (US Department of Education 2012), community colleges, much as is happening in Scotland, are being manoeuvred centre stage in the fight to develop the right, and increasingly middle, skills for America's future (GPO 2010; Soares and Steigleder 2012; US Department of Education 2012). Helping to support the Obama Administration's 2020 higher education target, community colleges are seen as key players in addressing STEM demand. Community college fees are cheaper for individuals (an important factor in reducing non-completion rates) and college qualifications have a dual role as labour market 'tickets' and transitional qualifications (US Department of Education

2012). Employers, Osterman (2007, 127) points out, view community colleges in a much more positive light than community employment/training organizations - suggesting that the 'real center of gravity for the adult training system is America's roughly 1,200 community colleges'.

### **Conclusion: The Importance of the Content as well as the Context of Skill**

At the heart of many skills problems is not so much market or government failure but the challenge of coordinating a wide array of practices and arrangements shaping the development and deployment of labour. Historically, education policy has assumed market failure and turned to public provision as a solution. Over time, the limits of government intervention have legitimized calls for market inspired solutions, with policy problems becoming narrowly defined challenges of appropriate 'market design'. Both responses are inadequate. There are more options available for solving problems of political-economic coordination than either 'markets' or 'states' with their allocative mechanisms of 'prices' or 'plans'. As has long been recognized, this binary conception of alternatives mis-specifies profoundly how societies function. These allocative mechanisms are not mutually exclusive; neither are they the only means of coordination. Within markets, enterprises do considerable conscious planning. Wherever possible, governments usually avoid relying on bureaucratic power; instead they work with and endeavour to shape (and not supersede) market operations. Occupational arrangements associated with the professions and recognized trades can provide a third logic of coordinating skill development and use (Freidson 2001).

The skill ecosystem literature and the initiatives associated with their reform are the latest variant of this more nuanced approach to understanding and engaging with reality. Critical to this understanding has been moving beyond the supply side bias that has characterized much analysis and policy concerned with skills in recent decades. In taking demand seriously this tradition is not just concerned with the quantity but also with the changing nature of labour demand. The initial research and policy work on skill ecosystems focused on the necessity of understanding skills in context. Each of the case study country experiences identified necessary but not sufficient conditions for reform to skill contexts required for effective change. In Australia, the autonomous initiatives of dairy farmers and employers in northwest New South Wales seeking greater collective self-reliance in the development and deployment of labour was identified as a key prerequisite to success. In the case of Scotland, strong leadership at the highest levels of government and the social partners was equally promising. The US technical and funding support for reform by organizations such as the Annie E. Casey Foundation provided serious sustained resources for reform. Ironically, all the elements for successful skill ecosystem reform are in existence across the case study countries, but they are not co-located. Without all the elements, co-existing enduring reform is hard to achieve. It is conceivable that the

Narrabri employers and Australian dairy sectors could flourish if supported by Scottish-style peak-level political and stakeholder leadership and Annie E. Casey Foundation-style technical support. Given the findings of the literature so far, however, such an alignment of forces is unlikely in Australia, Scotland, or the United States anytime soon. Without such an alignment enduring, effective change will not occur.

This reality points to a deeper limitation of the skill ecosystem approach. Context is not neutral or self-evident as is implied by the ‘ecosystem’ metaphor taken from the life sciences. Recent experience with skill ecosystem reform in particular has highlighted that the matter of interest is probably more accurately understood as ‘skill settlements’ between various actors and their interests. When considered in these terms, a host of questions, only implicit when the issue is defined in terms of ‘ecosystem’, become manifest. What are the defining features of the settlement of interest? Who are the key parties? What is its character in terms of high-, intermediate-, and low-skill work? The foundation scholarly literature in this field focused on ‘high skill ecosystems’. The applied literature, on the other hand, has examined attempts to reform arrangements associated with low and intermediate skills. These initiatives have shown starkly that the problem is not just one of modifying essentially healthy ecosystems. Rather, the reforms have hit considerable tacit resistance as they have run up against key features of the current skill settlements in particular sectors and regions - settlements with which many employers and governments are comfortable.

Ultimately, analysis and reform in this tradition will only advance to the extent the skill ecosystem approach engages with the nature and level of the skills nurtured or hindered by the settlements of interest. Most skills problems are not imperfections in an essentially sound context that need only minor remedies. Rather, most arise from the ways skills in demand are defined, used, and developed, and have their roots in the nature of the work concerned. Often the product and service itself needs to change as well as the way it is produced if the underlying ‘skill problem’ is to be solved (Evenson et al. 2009). Traces of this broader way of defining analytical problems and reform agendas are already emerging in the research being undertaken into modern notions of vocation and occupation (e.g. Bretherton 2012; Yu et al. 2012, 2013, Wheelahan, Chapter 30 in this volume). Such new work, giving appropriate weight to the content as well as the context of skill, will inject more depth into the analysis, and more realistic insight guiding the politics, of skill in the future.

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