Work(er) driven innovation

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Abstract

Purpose:

The focus on innovation as a foundational element of enhanced organisational performance has led to the promoting and valuing of greater levels of employee participation in innovation processes. An emergent concept of employee-driven innovation could be argued to have hindered understandings of the creative and transformative nature of work and the kinds of work and learning practices that all workers engage in as part of their routine occupational practices. This paper proposes that a stronger focus on work-learning as workers' personal enactment of the collective activities that comprise their occupational practice and its circumstances can help clarify the nature of innovation.

Design/methodology/approach:

The paper is based on an extended ethnographic study (18 months) of twelve employees from four different workplaces and who were engaged in a variety of different occupational practices.

Findings:

The argument is advanced through discussion of four kinds of innovation that were identified through examining the work-learning practices of restaurant, gymnasium, computing and fire service workers. They are i) personal heuristics, ii) test benching, iii) efficiencies and iv) shared needs.

Originality/Value:

These innovation forms illuminate personal work-learning practices and offer means of explaining innovation as a foundational factor of work, suggesting that work that supports these work-learning practices can enhance organisational innovation.

Keywords: work-learning, personal practice, innovation, innovation forms, work(er) driven innovation

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The economic development focus on innovation as a characteristic of enhanced organisational performance (e.g., Sawyer & Bunderson 2013, Keeley et al 2013, Lazonick 2005) has led to the promoting of greater levels of employee participation in innovation processes (CoA 2015, NEC&OSTP 2015, OECD 2009). This increased participation has been conceptualised as employee-driven innovation - EDI (Kesting & Ulhøi 2010, Hoyrup et al 2012, Hasu et al 2014). However, EDI could be argued to have hindered understandings of the creative and transformative nature of work and the value of the work and learning practices that workers engage in as part of their routine occupational practices. This paper addresses this issue and proposes that a stronger focus on work-learning and

its personal enactment as the collective activities that comprise individuals' practice and its circumstances can help clarify the work emergent nature of innovation.

Innovation, here, is viewed as a context dependent transformation practice that emerges from organised activity. Hence, in the domains of business and service provision, innovation is constituted in the work and associated learning practices that characterise organisations' operational and developmental processes and the enhanced performance outcomes they generate. The paper examines and discusses workers' contributions to organisational innovation, acknowledging that workers, and the very personal ways by which they enact their work and occupational circumstances, are generative of a range of innovations. And this, because engagement in the seemingly routine practices of work is very often generative of the new and different - the inventions, solutions, improvisations, alternative perspectives, adaptations and contrivances that constitute innovation. Put simply, work is an innovation practice. Workers' personal engagement in and substantial contribution to that practice can be understood as the changes they enact as learning and work transformation (Billett 2012, Hasu et al 2014, Hoeve & Nieuwenhuis 2006, Lippke & Wegener 2014).

The term work(er) driven innovation is used here in replacement of EDI. This is done to emphasise the relational and interdependent nature of employees, their work and their organisations. Irrespective of employee status, be they permanent, casual, contracted, in positions of authority or subordinates, all workers' capacities to develop and enact new practices are bounded by the organisational constraints and affordances in which their work is situated. Similarly, organisations' goals and the quality of their operational practices are conditioned by the degrees to which workers engage with and invest themselves in the purposes and processes that generate and support these goals and capabilities. Hence, employees cannot act (i.e., innovate, learn, work) alone – they are always subject to and subjects of the organisational policies and procedures that govern their work. Equally, workers are always engaged in collective practice (with colleagues, suppliers, clients, equipment, etc.). Through these collective practices, workers co-contribute, in varying degrees, to the new and different practices (i.e., innovations) by which their work and organisational practices are enacted and progress. Workers cannot be separated from their work, they are mutually mediating – hence the term work(er). Such relational interdependencies are the cornerstones of constructivist and practice-based perspectives of work and learning and the transformations they accomplish (e.g., Billett 2008, Ellstrom 2010, Fenwick 2003, Reich & Hager 2014). Hence, they are the cornerstones of work emergent innovation.

The paper draws on longitudinal ethnographic research that explored the very personal ways in which restaurant, gymnasium, computing and fire service workers enacted their work. Four examples of work(er) driven innovation are illustrated. They are: i) personal heuristics, ii) test benching, iii) efficiencies and iv) shared needs. These innovation forms illuminate personal work-based learning practices as a means of viewing and explaining innovation across differing levels of scope and impact (i.e., improvisations, temporary solutions, suggestions for improvement, new systems, etc.). Through them, innovation may come to be seen as a foundational and emergent factor of work rather than as some unique type of organisational practice. A conclusion that may be suggested from these findings is that work that can better enable and support workers' enactment of personal heuristics, test benching, efficiencies and shared needs practices may better secure the

innovations that develop and accrue from workers' engagement in work and, thus, secure the innovations that organisations need.

Defining innovation

Innovation may be broadly defined in terms used by Fagerberg (2005: 1) - "the tendency to think about new and better ways of doing things and to try them out in practice". Fagerberg (2005) was not specifically seeking to define innovation in these exact words. However, in using them to establish a general context from which to consider the complex nature of innovation, he captures much that applies to the contemporary nature of work and workers' personal enactment of it. Work is goal directed activity and often the goal is improvement. Work is transformative - of the persons, places and practices by which it is constituted (Smith 2008, Billett et al 2005). For example, work may be seen to transform ideas and resources into goods and services, novices into experts, skill sets into occupations and livelihoods and markets into economies. When seen as transformation, the success or otherwise of particular innovations may be found in the degree to which they enable further and additionally useful transformation.

From such a perspective all innovations are incremental, that is, innovations are constructed through time and practice and thereby visible only in hindsight as snapshots or static conceptions of transformations in action. So, for example, contemporary innovations such as 'smartphones', are built on the advances in batteries, circuitry and wave band differentiation that preceded them. And these, in turn, were dependent on the magnets, metals and electricity conduction technologies that were the foundations of early telephony. The new and different is emergent from the old and familiar through the energy and effort of those who work and generate change. Such realities render differentiations of incremental and radical innovations limited in their capacity to do more than categorise innovations on the basis of time lags to commercialisation and market acceptance (Verspagen 2005) or the numbers and kinds of knowledge practices and skill sets integrated in their generation (Bellantuono et al 2013). Radical innovations are those that changed the world, for example, agriculture, representative democracy and electricity generation. They cannot be understood in terms of a singular source or origin. Similarly, the great inventions that have transformed contemporary living are better understood in terms of incremental breakthroughs in science and technology that build on each other through the enterprise of workers and their organisations. Modern refrigerators that are based on gas compression cycles emerged through hundreds of years of development (Rees 2013, Freidberg 2009). Equally, the computer that Charles Babbage built in 1833 using punch cards as its source of instruction or programming owed a great deal to the punch cards used to direct the large mechanical Jacquard weaving looms that enabled the mass production of what had once only been possible through hand embroidery (Collier & MacLachlan 1998).

As incremental, innovation is a social process. In any work or workplace innovation brings together a broad range of resources beyond the material and systems practices of organisations. These include the histories of participants and their contexts, their proclivities and mediating circumstances, the nature of the relationships participants share as colleagues, supervisors, friends, mentors, etc., and the kinds of interactions their work and relationships enable. Just who and what among these integrated resources can be considered primary or initiating of innovation can be unclear when seeking to distinguish what and how workers (collectively and individually) contribute. For Fuglsang

(2010), this active integration of resources in the context of services provision is described as bricolage - where organisational protocols, unforeseen client needs events and the interrelated need of employees to create meaning making and problem solving structures outside existing protocols becomes generative of new practice. Similarly, for Ellstrom and Nilson (2014), this resource integration can be viewed as informal learning and the knowledge creation that develops from the practice of variably dealing with routine and familiar tasks and the new problematic situations that work generates. In each of these perspectives, innovation is emergent from the negotiations among the many resources that comprise workers, clients and their contexts – it is a social and resource intergating process.

Further, Hoyrup (2012) identifies three orders of EDI in efforts to clarify the scope, source and directionality of innovations that arise from the energy and efforts of workers. First order EDIs are 'bottom-up processes' where innovation arises from workers simply doing their work through their "reconstruction of work practices that is not initiated with a goal of innovation in mind" (Hoyrup 2012: 10). Second order EDIs are combinations of bottom-up and top down processes where management supports innovation initiated by employees and third order EDIs are top-down processes that initiate innovation through managers purposefully involving employees in projects and development opportunities (Hoyrup 2012). As useful as these orders are in identifying how innovation might be understood as beginning in and with certain individuals and practices, the differentiation of employees and managers through top-down and bottom-up understandings may be seen as unnecessarily separating worker roles. Managers are employees of the organisations they work within and their capacities to direct or monitor the work of others may have little (or much) influence over the creative, agentic and often accidentally fortuitous actions that can be the catalyst of innovation. In some instances (and of course dependent on what constitutes routine practice in any particular organisation) managers bringing staff together to address a specific issue or task may itself be highly innovative and thereby be an example of EDI or, more accurately here, work(er) driven innovation.So, work(er) driven innovation is the socially derived practice of developing new and better ways of doing things in and through engagement in work. It is the fact and complexity of work that distinguishes these kinds of innovations. Employees are one kind of worker among many. Others include, supervisors, managers, contractors, consultants, directors, etc. The nature of their roles and positions as casual, permanent, senior, junior, executive, advisory, etc., and the degrees to which they work alone or in teams and are centrally located or distanced by geographic or virtual circumstance are some of the mediating factors that need to be accounted in examining the relational and interdependent nature of innovation as it emerges in work.

Such innovation perspectives on workers, work and workplaces (or organisations) align with what Tzeng (2009) outlines as the corporate entrepreneurial school of thought that arises from Schumpeter's economic and innovation theories (1934, 1942). This school of thought conceptualises innovation as a grassroots impetus, a social phenomenon that is grounded in and emergent from the interdependent engagement of multiple actors. These actors are the stakeholders, the vested interests in the work at hand, that come together around new ideas and understandings in their efforts as co-producers of better ways of doing things. Tzeng (2009) notes this coming together is indicative of strong identity-based relationships likened to belonging to a community and is generative of loyalty that enables creativity. In illustrating the entrepreneurial school, Tzeng (2009: 380) states, "innovation is not an economic thing and is not calculable … Rather, innovation is something that happens in human relationships". A primary quality of these relationships and the

belonging and identity on which they are based is their authenticity – the voices of those so engaged are relevant, they come from within the processes of their creation and are thereby able to identify and articulate genuine need and opportunity. The shop floor, the coal face, the front line, the end user, are the kinds of descriptive phrases that identify who and where these identity invested voices and the relationships they enact are and can be found. A final quality or characteristic Tzeng (2009) outlines is that grassroots innovation emphasises improvisation in action. Drawing on Brown and Duguid's (1991) research into Xerox technician's work, Tzeng (2009: 381) notes these workers "worked, learned and innovated in real time. They responded to problems and developed actual work practices in situ. They had the tendency to make do with whatever they had at hand". Through these defining characteristics, Tzeng (2009) captures much of the nature of work(er) driven innovation and its immediate entrepreneurial qualities. To paraphrase, innovation is interdependent co-production based on a relational and situated authenticity that improvises through learning in practice that is both responsive and creative.

Fundamental to these grass roots innovation qualities and the work from which they emerge, is the practice of learning in and through work. Work is a learning practice that is enacted through workers' personal engagement and investment in the tasks and activities that constitute the social practice that is their work. This engagement is negotiated in the transactions of person, place and practice that identify all the resources of work as having some level of influence in shaping what occurs (Smith 2012). That is, work is a set of multiple and on-going negotiations among; workers (in and with their personal histories and the values, priorities, habits, skills and dispositions this history has generated); workplaces (in and with the organisation systems, collegial relationships, etc.); and occupational practice (in and with the cultural, economic, material, etc. aspects and features of a particular set of work activities, etc.). Learning may be understood as both the process and product of these negotiations (e.g., Lave & Wenger 1991, Billett 2008, Ellstrom 2010). This learning evidences and gives rise to the transformations of person, place and practice. So, for example, personal skills sets develop, occupational practices and organisational systems alter, and success in the market place waxes and wanes. Innovation may be understood as one of the conceptualisations of the transformations that learning in and through work accomplishes (Ellstrom 2010, Miettinen 2013).

In summary, the concept of work(er) driven innovation brings together a range of interrelated understandings about organisations as social, practice and learning contexts. These contexts varyingly enable and support the incremental development of the new and better ways of doing things referred to as innovation. Exploring these understandings requires examining workers engaged in the regular practices that constitute their work - practices that are highly person dependent, organisation specific and in transformation.

Examining workers in action

The nature of work(er) driven innovation is elaborated here through drawing on research that examined workers' personal efforts and contributions to the work and learning processes that comprised their everyday work. The ethnographic research was conducted over an 18 month period and with four groups of three workers from four different workplaces - a government funded and city based fire station, a privately owned restaurant, a chain owned gymnasium or health centre and a university computing support team. Each of the twelve workers was engaged in quite distinct work and so the project enabled twelve very personal sets of work and learning experiences to be

identified and considered. The twelve comprised; three male firefighters, a junior, a senior and a station officer aged in their early thirties, late thirties and late forties respectively; from the restaurant, a senior partner in his late thirties, a junior partner in his mid-twenties and the head waiter in her early twenties; the manager and two senior support staff from the computing team, all male and in their late forties, mid-fifties and mid-thirties respectively; and from the health centre, the manager in her late thirties, a personal trainer in his mid-twenties and a part-time receptionist in her early twenties. Over the 18 month period, each of the workers was interviewed five times and observed in their practice on at least three occasions. The focus was on workers accounting for the ways they went about their work, the learning that supported this work, the kinds and array of influences that shaped these experiences and the kinds of changes that characterised and emerged from their work. The primary focus of the research was on work-learning as a socio-personal practice. However, the strong focus on change, its generation and impact (as a fundamental characteristic of work at both personal and organisational levels throughout the project) was foundational to viewing workers' practice as innovation. The four work(er) driven innovation forms are examples of this practice.

The extensive semi-structured interviews and observation sessions enabled a highly detailed and rich set of data that afforded the twelve workers high levels of personal reflection on their work and their understandings of themselves in shaping and responding to it. Some important considerations in the interviews were related to the subjective bases from which they enacted their work. These included the personal values, priorities, interests and aspirations they held and the degrees to which they could exercise their personal agency to develop and sustain these personal factors. So levels of discretion, for example, to act alone, to act on behalf of others, to engage and direct others, to initiate work activities and to promote and implement change were discussed and examined as both work constraints and affordances and learning practices. These, in turn, were some of the codes and emergent themes used in the iterative analysis process of i) organising information and identifying patterns, ii) developing explanatory ideas and iii) drawing and verifying conclusions (Singleton & Straits 2005).

Four kinds of work(er) driven innovation are elaborated– each primarily illustrated by the experience of one of the twelve workers. The four are the dominant data-driven examples of how workers' personal work and learning practices contribute to the innovations that emerge through their work enactment. Other, less evident forms, including re-purposing (where materials are deployed for purposes outside their usual use) and invitation (a form of absorptive capacity where external parties are invited to participate), have not been elaborated here. In the terms of interpretive thematic analysis and its meaning seeking and making processes (Miles and Huber 1994) the four innovation forms represent coherent conceptual models of work-practice that emerge from the data and were verified through extensive participant feedback.

Work(er) driven innovation 1: Personal heuristics

Work is a very personal process. No two workers are identical and therefore the performance of work can evidence a range of highly person specific task management and enactment practices. These practices can be the self-developed techniques, job aids and reminders that assist task completion, ensure high levels of personal productivity and build the self and work satisfaction that sustains engagement. Here, these practices are referred to as 'personal heuristics'. They are the

unique and person dependent ways by which individuals support learning and enacting their work. Often, these personal practices can shape and enhance the work of others who pick up on and adopt similar practices (e.g., through observing and learning from their colleagues). Equally, other workers can benefit from the greater speed and accuracy such individual practices may generate (e.g., the levels of energy and effort required of the team is reduced through the personal efficiencies of its members). When such transactions occur, that is, when workers' practices are transformed through the influence of fellow workers' personal or idiosyncratic ways of doing things, learning and work(er) driven innovation are evident.

To illustrate – in a busy restaurant, wait staff are simultaneously engaged in a range of important and necessary work tasks. This work is intense and complex, there is much to do and much to monitor, and it is highly coordinated and collaboratively enacted. The work demands speed, accuracy and a systematic execution within a strong focus on detail and customer attentiveness. To support her successful performance of this work, Rosie has developed a set of task prompts and reminders that enable her to attend to whatever task is the highest priority at the time without neglecting or forgetting other important tasks that can be undertaken when the immediacy of this moment's priority is past. These prompts and reminders are her personal heuristics, the visual cues she attaches to the necessary equipment of her work. For example, getting food to the table is more important at the time of its placement on the servery counter with the Chef's call, than entering newly taken orders from other customers. These orders are noted in a pad and then transferred to the kitchen through the computer located at the wait station. Rather than put the pad into her pocket and perhaps forget to enter the new order immediately after attending to the table service, she will leave the pad in a conspicuous place where she knows she cannot help but notice and attend to it. Such attention will be *'automatic'* because of the significance of the pad to her work and the constant scanning of the room that her work requires. In interview she elaborates,

There are always priorities but if everything seems a priority … I leave things out [on display]. I have somehow developed that because it works for me. Like, I'll leave a pad out with stuff [new orders] on it … so I'll leave the pad out in the middle of the bench so that I know when I come back I'll see it and put it [the new order] straight through … I see it and I remember. So I must do it, so I remember.

Other tasks are signposted differently. A fork positioned slightly off the table prompts that additional cutlery is required. A crushed napkin left on the table signals the dessert trolley is required. An upturned glass signals freshly polished glasses are required. In the busyness of service, none of these prompts would seem out of place particularly given the speed with which they are first created at the table and subsequently attended to. However, Rosie is aware of them potentially seeming *'messy'* to customers (in that they clutter the table or unbalance its appearance) and this aspect of her work gives these personal heuristics added significance as she works to ensure high levels of customer service.

Over the 18 months of the research Rosie became the senior wait staff and was asked to take responsibility for training the many on-call wait staff. Despite being reluctant in the role (her personal priorities were her university studies), Rosie was described by her boss as a good trainer who ensured new wait staff were quick to conduct themselves as the restaurant required. In interview, discussing her training approaches and responsibilities, Rosie elaborated how she taught new staff to find their own personal ways of ensuring they remembered what was needed and how

to prioritise the range of tasks enacted. She explained her ways of doing this, particularly siting the order pad heuristic as a very useful way of ensuring orders were not overlooked in the busyness of service. Her practice of developing and using personal heuristics became an aspect of staff training and practice.

Work(er) driven innovation 2: test benching

Often, production systems that prescribe work tasks and resource allocation are strict and exacting, for example, when high levels of safety and precision are required (e.g., when using heavy machinery, toxic chemicals). Equally often, there can be numerous ways to secure a required outcome and workers can have discretion to choose (from among a range of satisfactory alternatives) what they discern to be the most appropriate course and sequence of action for the task at hand (e.g., to use scissors or clippers, to prefabricate or construct on site, to consult or mandate). When the choice from among alternatives can accommodate some form of experimentation or monitored use of several alternatives, workers may be described as 'test benching', that is, using their work tasks to test ideas and alternatives that may or may not lead to better outcomes. Such transactions are evidence of learning and innovation. Both personally and organisationally, test benching may grow to become projects that warrant further investigation with an eye to wider deployment or they may be dismissed when little or no enhanced value is detected or realised.

Bob's work enables a degree of test benching. He is a computing support technician and his work involves responding to client requests for assistance. This work enables him to address problems within a range of either short-term, *'quick fix, get them up and running asap'*, and or longer-term, *'serious time will need to be devoted'*, solution finding activities. Often, the solutions enacted are known solutions that have worked in the past in similar circumstances. At other times, these solutions are new, first time applications that emerge from Bob's developing expertise and understanding of the technical systems involved and the people and projects he is assisting. Such new solutions are discussed at team meetings and if considered significant can be documented.

Additional to client response activities Bob's test benching includes experimenting or *'playing'* with other aspects of the computing systems he works within. He discussed his development of a new printer access system for university staff that began with his personally questioning why he couldn't be automatically connected to a printer when he logged on at the start of his working day, rather than having to separately connect to a printer at some later stage when printing was required. His experimenting and discussions with the *'back end boys'* led to the implementation of his ideas and suggestions across a group of 150 staff members that later became the system wide adoption of a distributed printing system known as the NDPS. Bob recounts in interview;

I had the idea and went to the server group because they had to do most of the implementation, most of it is back end work – but yeah, it was great. That was back in 2000 and NDPS didn't take off until 2003-4 in the other areas because it was … only 150 people back in those days. To me it was a great little test area.

Bob's NDPS experience illustrates work(er) driven innovation in the sense of shop floor suggestions being organisationally supported for greater and wider adoption. As such this NDPS innovation seems more visible and perhaps more enduring than the client problem-based solutions that are the

mainstay of his work activities. However, the impact of these routine client-response work practices that keep researchers and laboratories *'up and running'* is more difficult to ascertain and may, overall, represent greater value to the organisation. Part of that value may be found in the nature of client-response work generating and sustaining the kind of attitudes and expertise that underpin work(er) driven innovation practice.

Work(er) driven innovation 3: efficiencies

Saving time, energy and money through, for example, conserving resources, reducing costs, alleviating waste and double handling, seem to always be motivations and foundations for changing practice. At personal and organisational levels of activity, accomplishing such change can improve performance, raise productivity, enhance profits and may generate growth. At personal levels of work engagement, the kinds of practices that secure these benefits can be as simple as foregoing perceived unnecessary stages in familiar processes, using a single tool where usual practice requires two or more tools, using greater quantities of cheaper resources in place of fewer more expensive resources and recycling or repairing rather than replacing. Here, these kinds of practices are referred to as 'efficiencies'. They can be minor or major, improvised or planned. The savings they achieve across all the resources engaged in work identify them as innovations.

For example, Bruce is a fire station officer. He manages the fire crews and resources deployed at the city fire station. His many responsibilities include staff training, emergency response management and supervision and station and heavy equipment management. He recounts the earlier experience (at another station) of being the central hub for a group of suburban stations who coordinated their staffing rosters for ease of staff deployment across their region. On a shift by shift basis, each station would account for its staff and fax a report through to the central hub where Bruce would collate into a single report and fax on to the rosters section in the city headquarters. Ensuring the complement of necessary staff for all stations is essential and managing roster allocation is a big part of that process but Bruce could not see the reason for outer stations to fax their reports to him when a simple phone call would do.

I said to the area director out there why do they have to fax it through, why don't they just ring us and say, we're all here today, we've got such and such, then I'll print out the one sheet and fax it through to rosters rather than them faxing it through and having to send it all again … all stations now get people to ring.

These kinds of simple efficiencies were recounted by all the workers who participated in the research. For example, Dick, one the computing support technicians who had previously worked in the university's audio studios, described his reconfiguring of wireless microphones and receivers, thus enabling their greater use across the facility. Jane, the casual receptionist at the health club recounted the increased sales that were generated by her getting the cold drinks cabinet moved to the other end of the reception counter where it was more easily accessed by clients when leaving the premises. Rosie from the restaurant devised a table waiting process based on only three table visits that each prompted a purchase decision from customers. Such efficiency practices emerge from the efforts of workers seeking to streamline their work, to make it easier to enact and more sensible in terms of their understandings of what is required and in terms of deploying their developing skills sets in those requirements. These are learning practices, applied, monitored and evaluated through the work changes (i.e., innovations) they initiate and accomplish.

Work(er) innovation 4: shared needs

The circumstances of work may be described as being in a constant state of flux - everything is always changing. Many of those changes and the influences they generate are less visible than the process and product changes that mark organisational transformation, not because they are slight or incrementally slow, but because they are indirect or peripheral to operational practice. Some of these changes are emergent from the personal life experiences and circumstances of workers. Workers marry, separate, fall ill, have accidents, take up and give up interests and aspirations and respond to all manner of personal circumstances that mediate their engagement in work. When changes in the personal life circumstances of workers generate changes in work practices, innovation has occurred. These kinds of work(er) driven innovations are here referred to as 'shared needs'. They are characterised by the needs of workers becoming the needs of organisations as each seeks to negotiate and realise their interdependence in ways that secure what might be described as mutually beneficial arrangements.

To illustrate - Ian is a senior fire fighter. He is a heights specialist charged with responsibility for high ladder deployment and ropes rescue in emergency responses. During the 18 months of the research his wife became very ill and he needed to take long periods of leave to care for her and his two young children. These leave periods were longer than could be effectively accommodated by the human resource management practices of the fire service and so his capacity to secure his employment was threatened. Through the interviews he discussed that he felt he would need to resign - doing so would enable him to attend to his wife and family as fully as possible without the burden of work concerns. These concerns included; how and when his leave could be secured within the regulations, meeting the requirements of the additional officer training he was undertaking and the disappointments he felt he generated for his crew and colleagues by having to alter rosters and scheduled events when his wife's circumstances altered unexpectedly (as was becoming increasingly the case).

Discussions with his fire station officers and senior executives lead to mutually favourable arrangements that enabled Ian to complete much of his work from home. He states,

I have had some influence in changes that have taken place. With my situation at home with my wife's illness I was in a position, after getting involved in management meetings, where I could put my point of view across in relation to procedures for working from home due to the precedent set by my particular situation.

This work from home entailed greater levels of project analysis and evaluation and report writing that supported things such as internal systems and departmental reviews, high rise building construction fire-safety and security audits and government compliance reviews for staffing and training requirements. Ian recognised this work as *'valuable'* and himself as *'contributing'* in ways that were very different than his usual on-shift duties. These new working-from-home arrangements developed from Ian's personal circumstances. The work engagement needs these circumstances generated for him and the fire service have since become more widely applicable across the organisation. They have become the basis of new policy and employment conditions. They generated greater work flexibilities for the fire service and its staff and represent a form of work(er) driven innovation that emerged from the shared needs that characterised this work.

Work(er) driven innovation

The four forms of work(er) driven innovation briefly outlined above illustrate a range of transformed work practices that derive from the negotiations among workers, their work and their workplaces. In these four examples it is relatively easy to see what can be described as individual employee sources of initiation. Hence, the origins of work emergent innovation may be found in the personal and initial energies, efforts and circumstances of individual workers as they engage in their work. So, Ian's personal needs and circumstances initiate new working from home arrangements within the fire service. Bob's ideas initiate improved printing access systems at the university. Rosie's personal reflections initiate more efficient staff training methods at the restaurant and Jane's repositioning of the drinks machine initiates better access and increased sales at the health club, and so on. Further, these employee initiated practices can be described as simple, low cost, easy to enact and seemingly common sense developments given the knowledge, skills, responsibilities and opportunities of these workers. Equally, they could be described as experiments, improvisations, adjustments, accommodations and even hunches that in both the short and long terms proved effective and valuable, personally and organisationally. As individual initiations of altered practice they may be classified as EDI (Hoyrup 2012).

However, attributing these work emergent innovations to employee agency discounts the significance of the broad range of resources negotiated in their generation and, saliently, camouflages the learning practices from which they were developed. These four innovation forms were enacted collectively and supported by colleagues (e.g., fellow workers, less proximal colleagues from other departments, managers and executives at various levels of authority, etc.) and the organisational systems in which they operated (e.g., information and technical systems, training protocols, human resource management systems, furnishings and equipment provisions, work task type and allocations, client and stakeholder relationships, etc.). They are best seen as work(er) driven innovations, that is, transformed work practices that emerge from the relationally interdependent work-learning activities of workers who together, negotiate and yet personally enact the roles, tasks and relationships that characterise their work.

For example, Rosie's work learning and staff training innovations emerged from the speed and accuracy demands of her work and the personal skills and priorities she brought to and developed through her engagement in that work. She learned, through her enactment of the work, how to do what was required - how to prioritise tasks, sequence and pace their enactment, schedule that sequence across multiple sites, monitor other workers, etc. Her learning then became the basis of her teaching. So more than being recognised as a first order innovation (Hoyrup 2012) or being categorised as improvisation (Miner et al 2001), Rosie's personal heuristics illustrate work(er) driven innovations as personal work-learning practices that emerge from the demands of her work and her ways of learning and doing things within the bounds of those demands.

Similarly, Bob's work is about problem solving. His work requires that he deploys and develops solutions to his clients' computing problems. The solutions he enacts and the problems he identifies, such as the NDPS, may be recognised as second order innovations (Hoyrup 2012) or everyday innovations (Lippke & Wegener 2014) that emerge from improvised solutions. His work requires such innovative practice. This work is, of necessity, improvisation in action, that is, innovation in action and is based in his learning through and for the changes he both encounters and generates.

This learning is responsive to (e.g., in meeting the necessities of change experienced as problems by clients) and generative of (e.g., in proactively test benching and trialling ideas) the kinds of change that characterise innovation. Equally, yet in different ways, Bruce and Dick exercise discretionary capacities to enact their work in ways that save time and more fully utilise resources. This discretion to act, that is, to innovate, is not some form of organisational dispensation or planned expansion of their work. Rather, it is a fundamental aspect of their work and its performance. Yes, they communicate their intentions and seek support where necessary, but the efficiencies they enact as innovative practice are implicit elements of their job requirements and emerge from their routinely getting on with what their work entails.

Ian's circumstances initiated what might be described as a third order innovation (Hoyrup 2012). However, the senior managers' acted in response to worker circumstances. They did not, in the first instance, initiate the changes nor direct subordinate employees to find opportunities for change in line with directions and capacities they were pursuing. Rather, they reacted to Ian's enquiries and suggestions, enlisted his advice and through consultative processes supported a plan that secured innovative solutions to their shared needs. These shared personal and organisational work needs were shared in the nature of work-worker-workplace relationships constituting a community of belonging-in-practice based on the occupational identities and loyalties (Tzeng 2009) generated. Ian needed the Fire Service and the Fire Service needed Ian. Together, they generated the innovations that addressed their needs and secured new and better ways of addressing such issues in the future.

It is important to identify and acknowledge the individual workers who were the locus of the four forms of innovation elaborated here. Equally, it is important to understand the social character of this locus. It is based in sets of socio-personal relationships including personal work and learning priorities and practices, the nature of work tasks and their attendant necessities and responsibilities, and the broad range of interdependencies among workers and their colleagues, their organisational constraints and opportunities and the broader social and ideological circumstances in which workers and their employers operate. Workers do not work alone – they are part of a situated and socially derived collective practice (here conceptualised as work-worker-workplace). The significance of these relationships requires acknowledging that the innovations that emerge from work practice can be more accurately seen as work(er) driven innovations. Thus, it is work, the job and all it entails, that initiates innovations by establishing and enabling the socio-personal nexus in and by which engaged individuals enact themselves as workers.

From these analyses and considerations, the following two suggestions are made. First, some of the distinctions used to conceptualise work-practice based innovations may be of little use. For example, distinctions between improvisations and other kinds of seemingly lesser innovations may not be useful in accurately characterising the nature of innovations that emerge from workers' personally enacted work practice. Innovations develop (Miettinen 2013, Kesting & Ulhøi 2010, Lippke & Wegener 2014). They do not arrive in work practice as discrete and fully formed. They are incremental, discontinuous and nurtured by effort and circumstance (Bessant 2003, Hasu et al 2014). Limiting understandings of innovation to only those changes that demonstrate high levels of scope and impact may hinder their initial identification and the opportunity they may represent. Similarly, distinctions between employees and managers as sources of innovation can confuse understandings of work-practice innovations by narrowly focusing on certain types of roles and responsibilities rather than the socio-personal relationships that constitute all work. Innovation is a

participatory and transformational practice (Billett 2012, Hoyrup 2012). How and to what extent employees of all standings in an organisation participate and contribute can be more significant than their hierarchical position may indicate (Waite, Evans & Kersh 2012). Managers, and others in supervisory roles, may hinder innovation efforts and hence be in need of greater levels of innovation learning support than those employees who engage more directly in the practices and processes of production (Jespersen & Bysted 2016).

Second, the depth and breadth of those relationships suggests that it is the nature of work rather than the individual characters of workers that create and support the innovations that emerge from work practice. Ellstrom (2010) elaborates the nature of work practice and its contribution to learning and innovation through the tensions between officially prescribed processes (the explicit dimension – as recognised by a job description) and the actualities of how those processes are perceived and performed by workers (the implicit dimension – as identified by individual personal practice). This relational tension may be seen illustrated through the four innovation scenarios outlined above. For example, Rosie's work and learning experience suggests that work that encourages and supports workers to engage in and develop their personal heuristics, their personal ways of making sense of their task requirements and how they can be effectively enacted, can be generative of innovation. Equally, Bob's experience suggests that work that enables and supports test benching can lead to valuable innovation. And likewise, as Bruce and Ian's experience suggest, work that encourages efficiencies and work that openly champions community and loyalty through accommodating its people and their needs and contributions, can be generative of work(er) driven innovation. Work is more than a set of tasks to be completed. Rather, it is a set of negotiated engagements through which workers contribute to the learning and innovation processes and outcomes that enable and transform their practice and the organisations in which they work. Overall, work(er) driven innovation can and does emerge from the routine practice of work. Certainly, the complexity of work, its organisation and enactment, go well beyond the parameters of the innovation forms briefly elaborated here. However, tentatively suggested here is that staff training and work design for the enabling and enactment of personal heuristics, test benching, efficiencies and shared needs may prove generative of the work-learning that is foundational of work(er) driven innovation.

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