Digital Knowledge Flow Platforms for Regional Innovation Systems

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INTRODUCTION

For the first time in history, practically all the information required to navigate the oceans of a globalising knowledge economy are embodied in the Internet. Yet the demand for proximity to sources of economically valuable knowledge has never been greater. The rise of knowledge clusters like Oulu in Finland, Kista in Sweden, Cambridge in UK, and Cambridge, Massachusetts, let alone Silicon Valley, are testimony to the human desire for face-to-face and handshaking business contact. This paradox is widely commented upon by leading economists and business analysts (Chesbrough, 2003; Krugman, 1995; Porter, 1998) who show that the age of the hierarchical, vertically integrated production function embodied in the fabric of the multinational firm has changed significantly. Ushered in to replace it is a system, we have called Globalisation 2 (Cooke, 2005) based on externalised "node and network" forms of interaction. The Internet and other digital means of managing such informational complexity were said to be essential if we would but learn its rubric and adapt practice accordingly. But, rather like "e-learning" and "online learning" as means to do this, much less is heard of their virtues now than hitherto. The reason is that they underplayed and even ignored the important corollary regarding "learning organisations," which is that good knowledge management also requires "developing organisations." By that is meant reconfiguring inherited hierarchies and their associated technologies and incentive systems.

BACKGROUND: FROM LEARNING ORGANISATIONS TO DIGITAL KNOWLEDGE PLATFORMS

Although "the myopia of learning" has been condemned since at least 1993 (Levinthal & March, 1993), the most penetrating critique of this comes recently from two distinctive sources. The first is Hansen (2002) who showed the failure of organisational learning wrapped up in the language of "knowledge management" to lie in failure to develop the organisation. He showed that under the guise of "knowledge management," large firms had sought to look into the brains of the workforce to transform its implicit or tacit knowledge (Polanyi, 1966) into explicit or codified knowledge and exploit it. These ideas had been floated in Nonaka and Takeuchi's (1995) influential book on the knowledge-creating company. However, Hansen showed that the "knowledge management systems" put in place had produced disappointing results. This was for three reasons. First, the knowledge management system technologies were designed so that knowledge mainly moved upwards to executive level. Second, workers received no feedback or knowledge-sharing opportunities and, crucially, no new incentive structure to reward them for sharing tacit or specific codified knowledge, so they stopped divulging knowledge for obvious reasons. Finally the "silo" structures of large-firm bureaucracy also prevented lateral movement of knowledge and information. Accordingly, only top management in theory benefited from knowledge transfer, but they were first presented with knowledge overload that could not adequately be absorbed organisationally, then they were confronted with a knowledge drought when the workforce stopped engaging.

On the basis of this research, Hansen made a number of recommendations that required organisational change that could enable digital knowledge management systems to function optimally on the basis of what we are referring to in this contribution as Digital Knowledge Flow Platforms (DKFP). The first lesson is that knowledge management systems do not function appropriately unless the organisation is itself transformed. The second step, which moves towards a more appropriate knowledge management environment is to reduce organisational hierarchy and remove "silos." Third, knowledge has to be organised so that it has lateral as well as vertical upwards and downwards vectors, allowing for feedback looping. Fourth, the workforce must be incentivised to share knowledge, not merely through improved job-satisfaction but through pecuniary rewards based on the frequency, quality, and impact of knowledge sharing. Finally, appropriate digital systems software is required so that knowledge sharing is made technically simple through interaction with computers and mobile telephony.

A second illustration of how DKFP requires organisational transformation comes from Aalborg Uni-

versity, Denmark where Dirckinck-Holmfeld (2002) showed how e-learning failed when no change was made to the traditional lecture-based pedagogy of traditional learning. This discovery occurred with the introduction of e-learning, Internet-based activity in Aalborg University itself, where it worked. But when it was transferred to other Danish universities it was a failure. The reason was that Aalborg, like Roskilde University was one of Denmark's two new universities dating from the 1970s. In those radical times, they were organised with an interdisciplinary core curriculum centred upon students engaging in team-based project work rather than lecture-based learning. E-learning in a classroom where a video of a lecturer standing at a lectern with text of the lecture scrolling down the side of the lecturer's image proved actually to be a good cure for insomnia. However, interactive, project-based team learning where problem-solving information of relevance to knowledge development by the student team is instantly accessed by Internet is actually efficient, effective, and exciting. However, most universities still mainly use lectures rather than projects to teach, especially the much enlarged classes of the 2000s, hence e-learning has failed to make great inroads. That is not to say that lecturing itself cannot be refreshed by DKFPs, as cases where the lecturer accesses from a console Internet updates to points that are being made verbally show. But this requires levels of expenditure and expertise, never mind possible time inefficiencies if technological discontinuities occur, that make it something of a luxury in most public sector pedagogic contexts[1].

Thus, some important lessons have been learned about learning and knowledge generation itself during the past decade. For example, many business leaders confronted with the preceding account might emphasise the fact that their businesses have successfully run DKFPs for year if not decades. But these are usually information not knowledge management systems. Hence, as long ago as the early 1990s IBM utilised a third party to manage its supply chain for items costing then less than DM 50 per unit. At that time, in Germany for example, the media giant Bertelsmann was IBM's favoured third-party supply chain manager for small items. IBM's strict internal accounting rules meant that, at that time, more valuable items had to be signed off by the head purchasing manager (Cooke & Morgan, 1998). More recently, it has become common in global supply chain management for all predictable items to be managed even by small, specialist third party supply chain management companies. Hewlett Packard in Scotland, for example, and presumably elsewhere was in 2002 contracting this function to such a company that used proprietary IBM Lotus Domino software to replenish consignment stocks as these ran down (OECD, 2004)[2]. But such systems are scarcely knowledge management, they are scarcely even artificial intelligence—another digital dream that turned sour in the 1990s—but simple automatic shelf stacking systems based on codified information. Clearly, the key lesson learned is how different knowledge is from information.

To dwell on this distinction for a moment, let us consider the nature of the difference. Information theory can be traced back at least to the pioneering research at Bell Laboratories of engineer Claude Shannon (1948, p. 379-380) who defined information as messages possessing *meaning* for sender and recipient. This is a "train timetable" theory since Shannon said that communication's "significant aspect is that the actual message is one *selected from a set* of possible messages..." (1948, p. 379 original emphasis). Thus, you choose from a menu of provided information that has meaning for your next action as a relatively passive recipient. Typical of its time this was a linear, inscriptive, traditional engineering metaphor. This approach then fuelled research professing to have identified "information overload" (Miller, 1978) from the exponential growth in messages, subsequently increasingly diffused by "information and communication technology" (ICT) (Lievrouw & Livingstone, 2002; Seely Brown & Duguid, 2000). This rather conflated information and knowledge. To return to the train timetable, it is clearly full of information, but it is as Shannon said, only useful when meaningful. But meaning is not supplied by the information but by the knowledgeable actor. In this case, the knowledge of where she wishes to travel to is what gives the timetable meaning on which action is based. So the distinction is based on interactions between the supply of (codified) *information*, the application of *meaning* derived from tacit (but codifiable) *knowledge* that triggers subsequent *action*.

DKFP AND REGIONAL INNOVATION SYSTEMS

Hence, we have a glimpse at the cause of a major problem both for firms and other kinds of organisation, including whole economies or regional parts of them that must change to confront new pressures to innovate, be creative, and implement novel strategies. Digital systems react to information not knowledge, especially not tacit knowledge. Transferring tacit knowledge to the outside world in a meaningful way is not a direct but a mediated process. Thus far much of the knowledge management literature has been insufficiently appreciative of these considerations. The innovation literature typically refers to the necessity for implicit knowledge to be made explicit and codified as documentation, manuals or software, for example, in order that the potential productivity of new