

IMAGINING THE FUTURE: TRANSFERRING KNOWLEDGE TO THE NEXT GENERATION

Sub theme: Knowledge and information

Lorna A. Paton¹, William L. Pate² and Catherine E. Milne¹

¹ Future Farming Systems, Scotland's Rural College, Edinburgh, EH9 3JG

² Richard Amos Ltd, 2 Golden Square, Duns, TD11 3AW

Abstract

To ensure that farm businesses remain competitive and profitable it is essential that knowledge is transferred to the next generation of farmers. Traditional familial transfer of knowledge is becoming less relevant therefore new solutions are required to efficiently transfer knowledge, particularly to new entrants to farming and those returning to farms later in life. Finding effective and efficient ways to transfer informal knowledge to prevent poor decision making that could result in long-term disadvantage is very important. This paper highlights two strategies commonly employed within the construction industry that could be applied in the agricultural sector; the multi-layering of maps and 'quick start guides'. Both of these have clear merits which include providing clear formats for capturing and sharing knowledge with the ability to be used as a 'living' document which can be updated as and when new knowledge becomes available. In addition these formats can also be used as a boundary objects to initiate and stimulate the transfer of knowledge which cannot be easily articulated or recorded.

Keywords: *knowledge, knowledge transfer; knowledge artefacts, new entrants, succession*

Introduction

Successfully transferring knowledge to the next generation of farm managers is essential in ensuring that the farms of the future are productive and profitable. Knowledge has been described as the most important resource for businesses in the 21st century, its uneven distribution causes inefficiencies and reduces industry performance (Parminter & Neild 2013) and it is a key driver of the bottom line of businesses (Smith 2001). Within the agricultural sector, current advances in science and technology are offering farmers diverse development opportunities and are the main focus of many knowledge transfer systems. However, much of the knowledge required for efficient and profitable farming is not new, and is held informally within the farming community. Informal knowledge can be defined as knowledge that is acquired through personal experience and unlike formal knowledge is transferred outside of the formal learning environments such as schools and training courses, some examples include: local practice-based, traditional,

lay, farmer, tacit, endogenous and indigenous knowledge. It is essential that the effective sharing of this knowledge is not overlooked and science and technology advances that could help with its transfer need to be utilised. Failure to transfer this informal knowledge to the next generation can be costly (Hansen et al. 1999) and could reduce technical efficiency of farm businesses, reducing their competitive advantage (Carlile 2002).

Traditionally the main pathway for transferring informal knowledge was familial, with knowledge gained from respected peers being highly thought of and desired by new entrants to farming (Lantra 2009). This gradual process allows the younger generation to learn whilst working alongside older family members and farm workers. As a result incumbents spend much of their life learning about the business, developing their skills and a detailed knowledge of the home farm, microclimate and idiosyncrasies (Lobley & Baker, 2016). Early exposure to the family business enables them to have deeper levels of firm-specific knowledge (Danes et al. 2009) though the time spent can mean making personal sacrifices and risks (Sharma et al. 2003). Arguably, the familial mechanism of knowledge transfer has allowed family farms to dominate (Brookfield & Parsons 2007) and means intergenerational transfer of farms is a fundamental aspect of their sustainability (Lobley & Baker, 2016). *Ex novo* new entrants (newcomers to the agricultural sector who did not have previous farming experience) and those who return to the family farm after a period outside of the industry recognised as being disadvantaged by the familial knowledge transfer system.

Factors such as reduced numbers of familial successors and lower labour levels are making the traditional familial knowledge transfer pathway more difficult. There is often insufficient time and team working for the traditional one-to-one and “hands-on” teaching methods to operate effectively. Successful knowledge transfer can also depend upon the development of a trusting relationship, (Hansen et al. 1999) and a willingness for people to disclose what they do and don’t know (O’Dell et al. 2012), both of which can be restricted by the structural changes that have taken place. Furthermore, much of the knowledge held is tacit in nature, and notoriously difficult to transfer (Nonaka 1994). Whilst accepting that there is no single way of transferring the vast array of knowledge and information to the next generation, there are technologies and ideas than can be borrowed from other sectors that could be used to fast-track the transfer of farm-specific knowledge

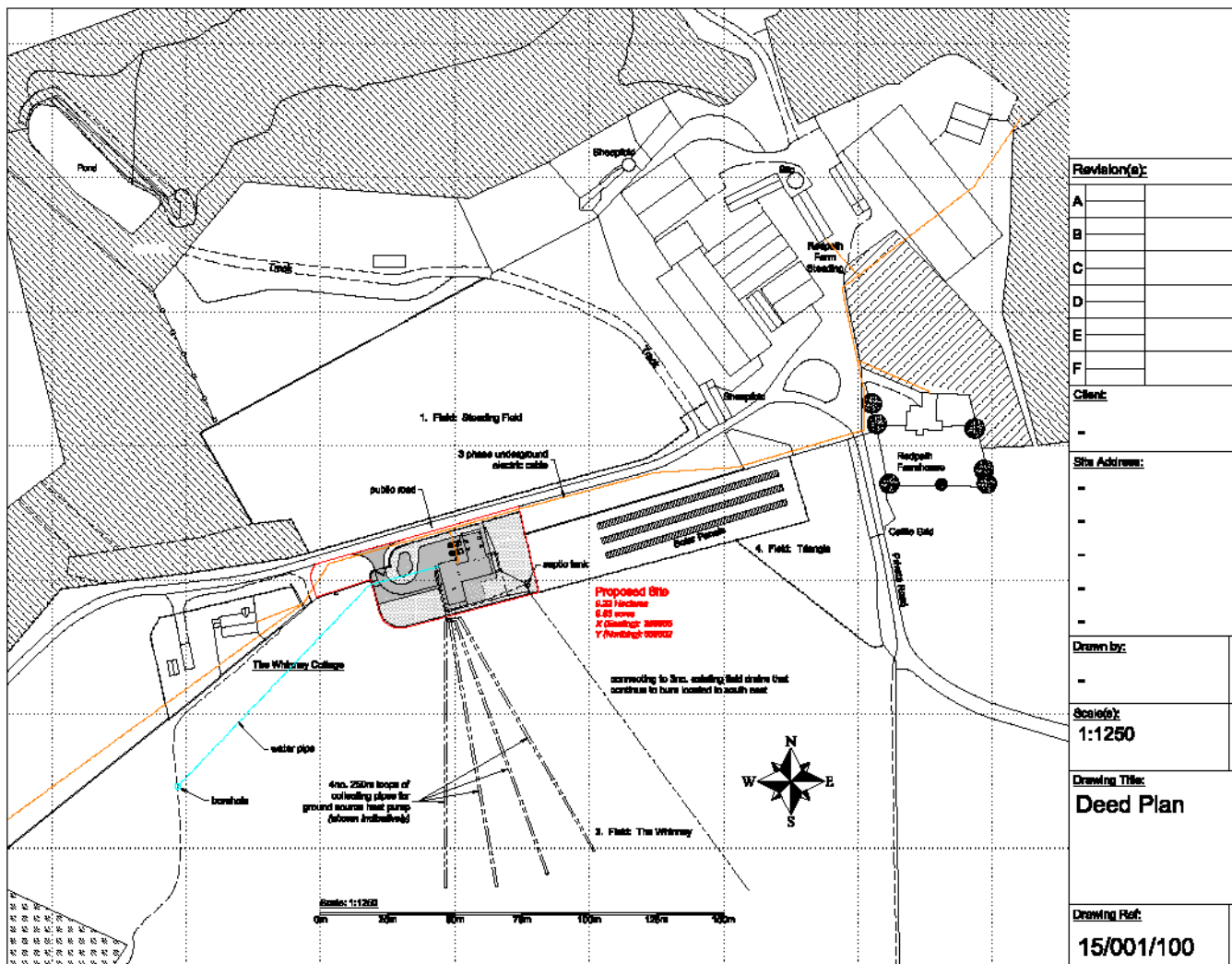
This paper shows how approaches used in the construction industry could be used in the agricultural sector to improve the knowledge transfer process. Specifically, two approaches are explored with respect to both recording and capturing knowledge and

information. The first is the use of mapping technologies for spatial information and the second is an adaption of the quick start guide concept used by Scottish Government in its guidance on Sustainability for a dwelling (Scottish Government 2016).

Recording spatial knowledge

Maps are well established knowledge artefacts and the abundance of information captured on traditional maps can be enhanced by recording additional information. Areas of interest can be highlighted by circling, adding notes or marking certain parts, thus increasing the value of a map (Tellioglu 2009). Computerised mapping and associated software programmes have increased these opportunities and multi-layered maps are widely used in the construction industry. A single map can now be annotated by a number of different experts to produce one shared document. They can be updated when information becomes available or when changes are made in real time allowing them to be ‘living documents’. Examples where this approach is used within construction includes the creation of deed plans, site plans, building layouts and services – see figure 1 for example.

Figure 1. Example Deed Plan



Within the agricultural sector large scale farm mapping is now common place in many countries including the UK, where satellite mapping is carried out by the Government to check boundary areas and habitat types for subsidy payments. Scottish farmers and their advisors can access these electronic maps free of charge, see example in Figure 2 that shows a map provided by Scottish Government. Many farmers now pay for maps to be generated at a farm field level to help them make management decisions. Advances in technology mean that drone and satellite technologies can increasingly be used by farmers to capture information and create maps at farm level. By applying the same principles used within the construction industry, additional layers can be added to these maps to capture knowledge that is not formally recorded elsewhere, including locations of drains, flood areas, utilities networks, crop rotations and historic information (see figure 3 for example). The additional information captured on such maps can enable better management decisions. The benefits of today's technologies are that the maps can be in a format that can be easily used, modified, communicated and stored. They can also be shared between users and provide a visual object that allows all areas of the farm to be strategically considered and ensures that no areas are overlooked. Looking to the future, farmers will increasingly be able to generate, buy and own electronic maps of their farms.

Figure 2. Example of farm map provided by Scottish Government

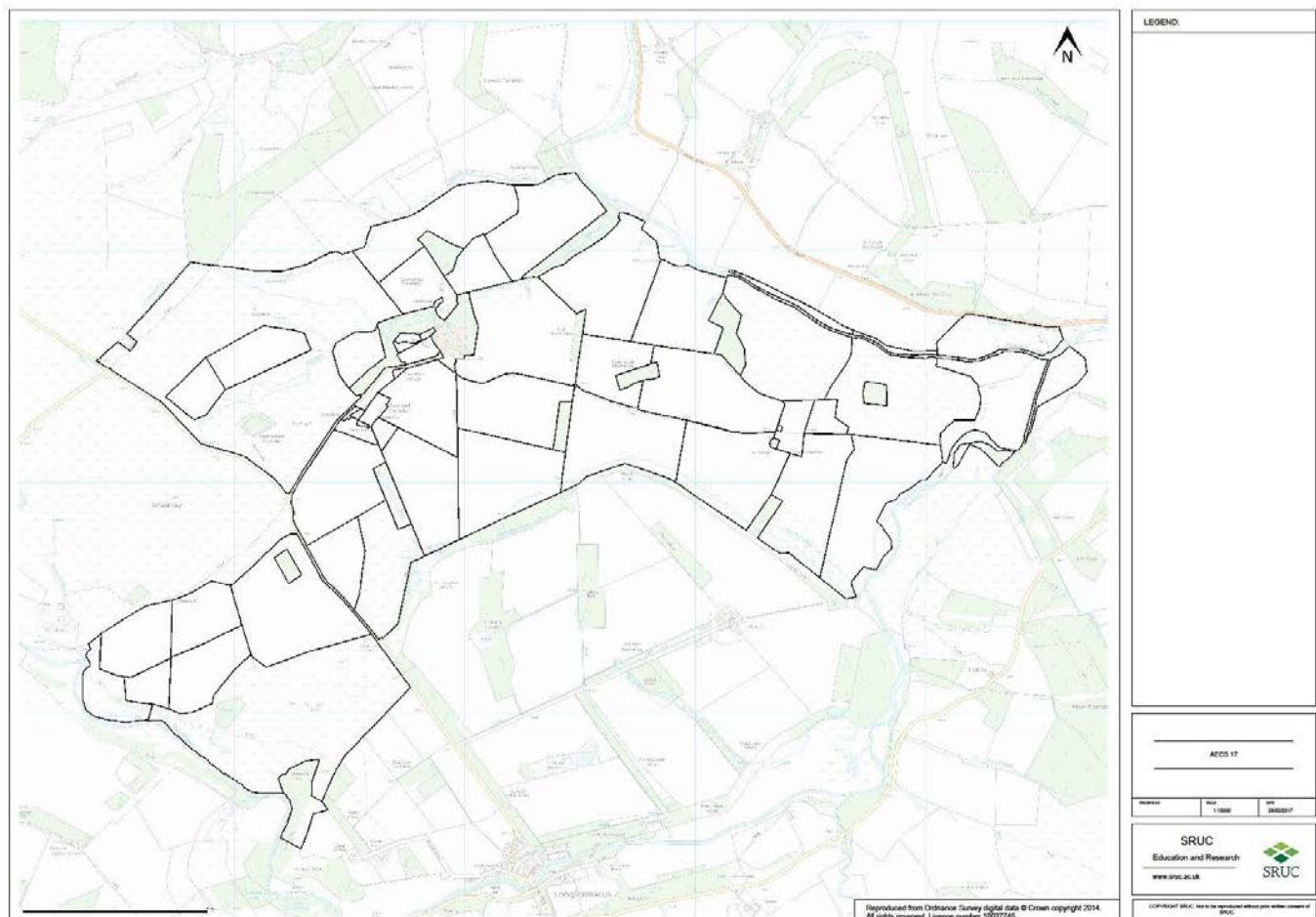
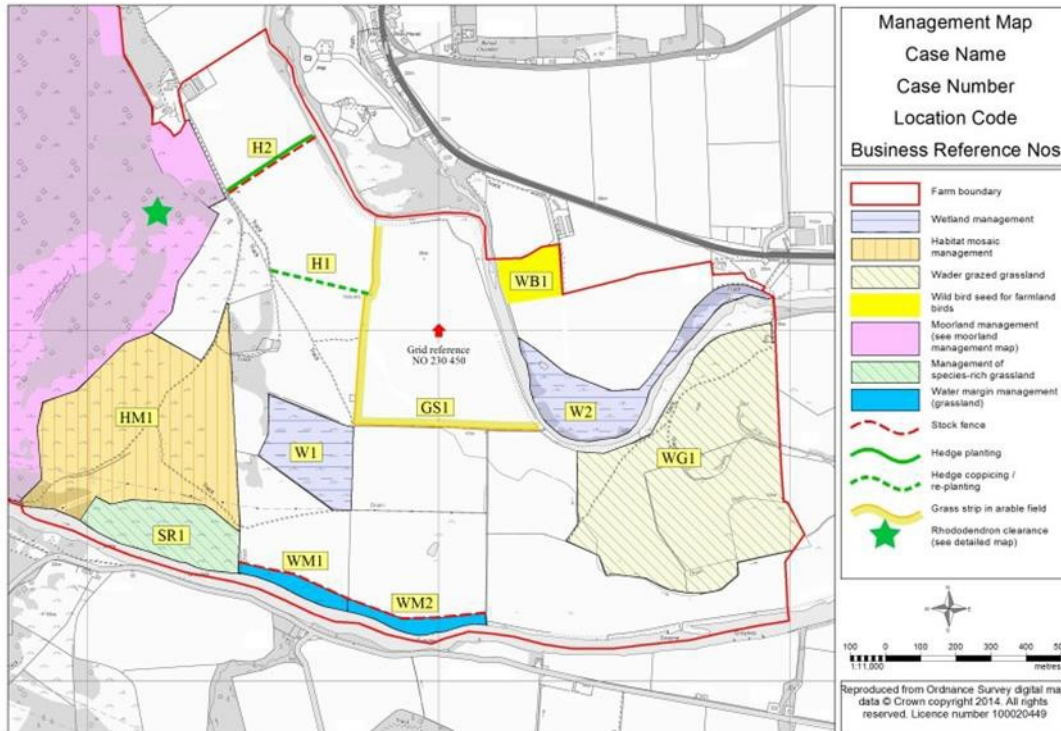


Figure 3. Example of farm map with annotations provided by Scottish Government



(Scottish Government, 2017)

“Quick Start” Guides

Another approach that is used to transfer knowledge within the construction sector is “quick start guides” these are part of the sustainable development accreditation in the UK. This accreditation has multiple aims including “the ability for the built environment to be maintained”. The quick start guide, in the form of a short booklet, provides guidance to incoming occupants of a specific dwelling on the way it is intended to function and how to optimise the scope, format and contents. Quick start guides are specific to each individual dwelling and the information that is required for the accreditation process is clearly detailed in the guidance provided in the technical handbook (Scottish Government 2016). A quick start guide should include plans, locating key items of equipment and information on the key items installed along with information on how to maintain the equipment (Scottish Government 2016).

Using the principles and ideas from the domestic sustainability guide a proforma can be created to capture similar information but at farm level. An individual guide could be created for each farm building if there are multiple. An example of information that could be contained for a single farm building could include:

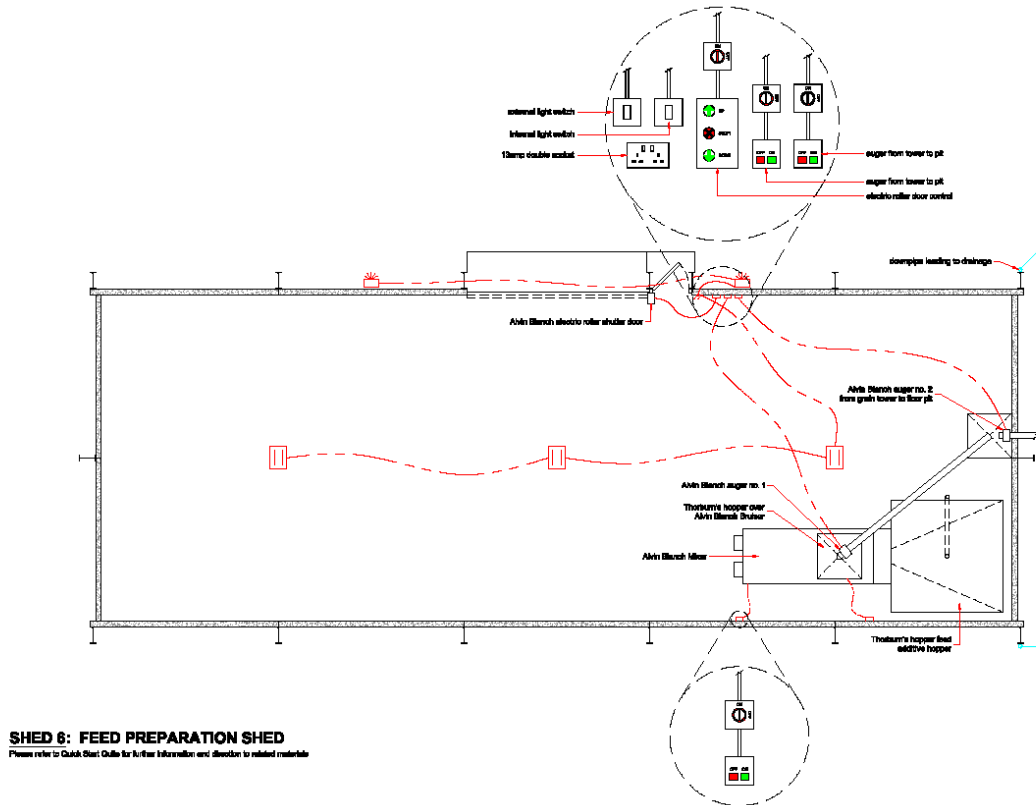
- a) Overview of farm building

A brief description of the basic features of the building that the guide is

applicable for, including a layout drawing of the building highlighting items such as drainage; electrics; mains water; controls; machinery housed within the building.

- b) Detail of each piece of equipment/machinery in the building. An example proforma for recording this information is shown below in figure 3.

Figure 3. Example “quick start guide” for a Feed Preparation Shed



Equipment	
Manufacturer and model number	
Serial number	
Location	
How to control it and where controls are located	
Location of further information e.g. manual location or website	
Purchased from	
Recommended servicing organisations	

Discussion and conclusion

Maps and quick start guides are forms of knowledge artefacts that are widely used in the non-agricultural sector. There are clear opportunities for the farming industry to learn from others such as the construction industry, particularly in light of the available technologies and electronically available data e.g. farm maps. In addition to the direct benefits, the process of creating and modifying maps can enable informally held knowledge to emerge, stimulate discussion between individuals and trigger actions that might otherwise not occur, (Tellioglu 2009). Maps can thus act as boundary objects; tangible objects around which people can meet to discuss and share understandings and provide a form of service to users. They can play a key role in helping to overcome barriers to knowledge exchange, for example lack of motivation by one party or difficulties in the relationship between a knowledge holder and person needing the knowledge (Szulanski 2003). The focus on a well-defined outcome (enhanced map/proforma) can make it easier for individuals to work through the knowledge transfer process. Sensitive issues, which are not unusual within the farming sector, can therefore be negated, including the introduction of discussions about succession for example. In the case of new entrants, involvement with the creation of knowledge artefacts can be particularly helpful. These individuals can have difficulties formulating the questions to ask of a knowledge holder and knowledge holders can find it difficult to articulate key knowledge in a clear and concise manner. Thus, these boundary objects could improve the transfer of informally held knowledge by enabling its extraction from a knowledge holder in a codified form that is easy to articulated to others (Hansen et al. 1999).

Anecdotal evidence also indicates that conversations around the creation of these types of document can turn into enjoyable experiences for all concerned.

While at present there is no formal system for the creation of enhanced maps or other knowledge artefacts in the agricultural sector there is no reason why they could not be well utilised. All that is required is for individuals and businesses to take the initiative. Through testing of this approach in different farming cases and situations other opportunities for its application are likely to emerge along with new ways to effectively capture and transfer the wealth of diverse and detailed knowledge which brings competitive advantage and resilience to successful farming businesses.

Bibliography

- Brookfield HC and Parsons H** 2007 Family farms : survival and prospect : a world- wide analysis
- Carlile PR** 2002 A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development*. *Organization Science* 13: 442–455.
- Danes SM, Stafford K, Haynes G and Amarapurkar SS** 2009 Family Capital of Family Firms: bridging human and financial capital. *Family Business Review* 22: 199–215.
- Hansen MT, Nohria N and Tierney T** 1999 What's your strategy for managing knowledge?. *Harvard Business Review* 77: 106–116.
- Lantra** 2009 Your future and farming survey. Coventry
- Lobley M and Baker, J R** 2016 Keeping it in the Family: International Perspectives on Succession. (I Lobley, M.; Baker, J. R.; Whitehead, Ed) p.. Routeledge
- Nonaka I** 1994 A Dynamic Theory of Organizational Knowledge Creation 5: 14–37.
- O'Dell C, Grayson CJ and Essaides N** 2012 If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice. **First..** The Free Press, New York
- Parminter T and Neild J** 2013 Just knowing: tacit knowledge. *Extension Farming Systems Journal* 2
- Scottish Government** 2016 Building, Planning and Design Policies: Technical Handbook. Edinburgh
- Sharma P, Chrisman JJ and Chua JH** 2003 Predictors of satisfaction with the succession process in family firms. *Journal of business venturing* 18: 667–687.
- Smith EA** 2001 The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management* 5: 311–321.
- Szulanski G** 2003 Sticky knowledge : barriers to knowing in the firm. Sage Publications
- Tellioglu H** 2009 Keeping Artifacts Alive: Towards a Knowledge Management System. *International Conference on Computer Systems and Technologies* p.. Ruse, Bulgaria