

ELM guidance digital media research: literature review and behavioural analysis

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

In January 2018 the Government published its 25 Year Environment Plan, setting out a comprehensive and long-term approach to protecting and enhancing the natural environment. The Environmental Land Management Scheme (ELM) will be the cornerstone of England's new agricultural policy. It will transform how the agricultural sector is supported by rewarding farmers, foresters and other land managers with public money for public goods.

Defra commissioned Natural England (with support from the Forestry Commission and Environment Agency) to develop a suite of Technical Guidance to support the ELM scheme. The ELM Technical Guidance project aims to draw together existing technical guidance from across a range of sources into one single accessible knowledge bank for land managers.

Defra has an aspiration to make best use of existing and new digital media to supplement the written Technical Guidance. In order to better understand the current (and potential) use of digital media by ELM's target audience, Natural

England commissioned the Countryside and Community Research Institute (CCRI) at the University of Gloucestershire to carry out some specific research. The findings from this research will be used by Defra to help inform the development of a digital media strategy to set out how digital products and tools could be used to augment the written Technical Guidance to best achieve the ELM objectives.

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Further information

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List of acronyms

AES	Agri-environment schemes
DEFRA	Department for Environment, Food and Rural Affairs
EFP	Environmental Farm Plan
ELM	Environment Land Management scheme
ICF	Institute of Chartered Foresters
NE	Natural England
NFU	National Farmers Union
OL	Opinion leader
RPA	Rural Payments Agency
SNA	Social Network Analysis
SNoK	Soil Network of Knowledge
SOC	Soil organic carbon
SSM	Sustainable soil management
VRO	Victorian Resources Online
WoS	Web of Science

Executive summary

This document reviews a range of literature with the broad aim of understanding the potential role digital medias can play in encouraging and supporting farmers' and land management professionals' successful participation in ELM activities.

Digital media encompasses *any digitised content* that can be created, viewed, distributed or modified on digital electronic devices. Examples of digital media include, digital video, web pages and websites, and also includes social media, databases and digital audio. Digital media is transmitted via the internet or computer networks.

The document begins by drawing on a number of different frameworks which understand **land management professionals' behaviour as the product of the complex interaction between many different factors and influences**. Based on the literature reviewed, we suggest that digital media could be valuable in supporting the delivery of ELM guidance. The realisation that land management professionals are influenced by many different sources, coupled with the diversity of modern-day agriculture and types of land management professionals has prompted a change in the way advice is best delivered. The linear, 'knowledge transfer' approach which saw land management professionals as recipients of information has been replaced with approaches that seek to actively involve the end user, i.e. land management professionals. **Digital media has a central role to play in this new approach**, allowing for the timely and efficient translation of knowledge, facilitating peer-to-peer support, as well as the inclusion of land management professionals in problem solving and the development of new approaches.

The literature review itself draws on 28 studies from the UK and comparable countries published between 2009 and 2019. Initial analysis of the literature sources revealed that the **majority explored the use of social media** as a form of digital media. The research cited was **heavily farmer-oriented**, with only a small percentage of studies focusing on foresters and 'other' types of land management professionals.

Actionable insight¹: Work so far has tended to focus on the use of social media as a type of digital media. The comparative lack of studies into other forms of digital media in this context is a gap that this research intends to address.

Actionable insight: Given the absence of 'other', non-farmer voices, it is important that *all* types of land management professionals are included and represented in research regarding digital media use. This applies to Phase 2 of this commission and to wider work.

After auditing the different types of digital media platforms (as per the work of Jespersen *et al.*, 2014), the literature review explores the different uses – or functions – of digital media in a land management context, including: marketing and consumer engagement; lobbying and campaigning; farmer-to-farmer knowledge sharing; communicating land management objectives/practices; and engaging land management professionals in scientific research. Although its use was in its infancy in a number of the (earlier) studies, generally, the

¹ Note, 'Actionable insight' refers to something that this particular commission will seek to address in Phase 2 of the research. A 'Wider recommendation' refers to something that will need to be addressed by continued engagement with the research topic, i.e. that falls beyond the scope of this commission.

reviewed research suggests digital media has been used to good effect across all the different functions. It is capable of delivering **timely, relevant, and actionable information and advice** to land management professionals, particularly in relation to land management objectives/practices.

Actionable insight: Despite its successful implementation, the research suggests that digital media should not be viewed as a panacea nor as a single tool to deliver ELM guidance to land management professionals. Evidence suggests it can be used to enhance and facilitate the delivery of traditional learning and knowledge sharing methods. Further work to understand its relationship with other learning and knowledge sharing methods is therefore conducted part of Phase 2 of this research.

Whilst the literature on digital media use amongst land management professionals suggests it is a useful and increasingly popular tool performing a number of functions, the **evidence does not assess or quantify the impact of its use on the ground** (e.g. ecological benefits).

Wider recommendation: At the broader scale, longitudinal and interdisciplinary work is needed to ascertain the impact of digital media in agri-environment behaviours, i.e. how is digital media affecting (improving) land management?

Much of the literature reviewed has tended to demonstrate the use of digital media as a means of classical, linear information dissemination. However, **there is evidence to suggest more interactive forms of communication emerging** from digital media use. Where higher-level, knowledge exchange is documented, it is thought to be something that develops over time. On balance, the review concludes that the potential of digital media use for knowledge exchange needs to be investigated further, including whether there is appetite for this amongst land management professionals.

Actionable insight: Further work (incl. Phase 2 of this research, and beyond) is needed to understand the appetite for digital forms of knowledge exchange, and to understand conditions that facilitate knowledge exchange.

Wider recommendation: Research is needed to document/audit the digital media use over time (including type and nature of use).

A range of factors were thought to impact on digital media use, including age, education, engagement in diversification activities, role/land management professional type. Of these factors, age emerged as the strongest influence on digital media use across the different types of land management professionals, with younger land management professionals more likely to be using digital media.

The **biggest barrier** to digital media use amongst farmers and land management professionals cited was **internet access**. Whilst the trend was an improving one (92 per cent of farmers thought to have internet access in 2012), the lack of a consistent dataset on internet access means definitive and up-to-date conclusions about access are difficult to make. A more recent but numerically small study (2018) has suggested that despite

increases in numbers of farmers with access to the internet, access to sufficient speeds was variable. The operability of devices such as mobile phones or tablets in the agricultural environment has emerged as a concern.

Actionable insight: Digital media as a tool for ELM guidance relies wholly on land management professionals being able to access the internet. Given the lack of clarity around internet access (particularly relating to whether land management professionals have sufficient download and upload speeds), a deeper, qualitative understanding of land management professionals' internet access is required. This will include but also go beyond 'access or no access', to understand whether the ELM target audience is capable of receiving digital media guidance.

Wider recommendation: To complement the deeper, qualitative understanding of land management professionals' internet access, longitudinal work is needed to monitor internet access and internet speeds in rural areas.

Actionable insight: Further understanding of the extent to which 'farm proofing' hardware such as mobile phones or tablets is necessary to support engagement with digital media on-farm, i.e. what do land management professionals mean by 'farm proofing'? Have recent developments in technology sufficed to overcome concerns that mobile phones or tablets are not sufficiently 'farm proof'?

To fulfil the research objectives and respond to the gaps highlighted by the literature review, **Phase 2** of the research engaged with a spread of participants across the different age/digital media user status categories to participate in interviews and a focus group. A total of 14 land management professionals participated in an interview, and a further eight attended a focus group. An additional three digital media experts working in the land management/farming sector were interviewed to give a different perspective.

The **relationship between age and digital media** use – i.e. that younger land management professionals are more likely to use digital media – emerged strongly in the literature review; however, this work suggests the relationship is far more nuanced. We suggest this is linked to the diversity and continued development of digital media products. There are now many ways of 'doing' or 'being' online and as a consequence, the world of digital media is open to anyone (regardless of age and familiarity with IT). Furthermore, digital media use has advanced significantly since much of the literature was published – having become more mainstream and there are more opportunities to use it.

Recommendation 1: Overall, the data presented here suggests the importance of understanding digital media use at the *individual* land management professional level. This could include, further research into of how/why older land management professionals are using digital media. With this in mind it is important to avoid making rigid assumptions about age and digital media use when designing and targeting materials, platforms and/or training events at the land management community. At the aggregate level there is a clear association between age and digital media use; this research has reminded us there are always exceptions and any resources or training should not be targeted in ways that perpetuate existing understanding around age and digital media use.

A key **benefit of digital media** was thought to be its potential for efficiency gains. Specifically, the idea that land management professionals could be freed from hefty reading or complex administrative tasks, was a clear appeal of digital media usage. However, despite participants' positive relationship with digital media, the exact role of digital media, relative to more traditional methods, was contested across the cohort. In short, the general enthusiasm for and appreciation of digital media should not be confused with a desire to replace traditional methods of receiving advice and guidance, namely face-to-face, which was upheld by many as the gold standard. Participants stressed the need for a combination of digital and traditional methods and resources as a ratio of approximately 80:20 (digital:traditional).

Recommendation 2: Digital media should be considered as one part of a broader suite of tools for engaging with land management professionals. Therefore, any digital media strategy developed to engage with land management professionals should situate digital media alongside more 'traditional' methods e.g. face-to-face communication and hardcopy materials, and should not seek to *entirely* replace 'traditional' methods. Land management professionals should be able to pick which ones work for them and should be offered the flexibility to do so.

Key point 1: Enthusiasm for digital media amongst land management professionals should **not** be interpreted as a desire to move towards completely digital means of communicating and receiving information.

The **issue of trust** – i.e. whether a source could be trusted and how/where to source trustworthy digital media sources – was a significant theme to emerge from the empirical engagement. There was notable concern (and even in some cases, fear) amongst participants about the trustworthiness of digital media, particularly relating to social media posts. This concern also means that engaging with unofficial sources requires extra work in terms of 'filtering' the information. Concerns of legality and liability emerged here, particularly those working on behalf of other people e.g. agents/advisers and institutional land managers² – could they trust these unverified sources? In the context of decision-making under existing agri-environment schemes – where options and agreements are prescriptive and deviating from these and 'getting it wrong' can be costly when such deviation is identified in an inspection – more value was placed on *official* digital media material and

² We define an institutional land manager as someone that is employed on behalf of an institute in a land management role, e.g. for a conservation charity or a county council or school. Unlike a farmer or private forester, they may have more a defined '9-5' role and are unlikely to own or rent the land themselves.

sources. Digital media produced by unofficial sources e.g. individual land managers – in particular social media – was instead seen as a place to find new or innovative techniques or discussions. There was also suggestion of an operational need to look beyond official sources. If the focus of ELM shifts to the delivery of environmental outcomes rather than rigidly following management prescriptions, as is the case under existing agri-environment schemes, this change in emphasis – which may allow land managers to be more flexible about how they manage their land under an agreement, without risking penalty - should be clearly communicated in order to enable land managers to realise the potential of peer-to-peer knowledge exchange in helping them support each other and find innovative solutions to achieve these outcomes.

Recommendation 3: A means of supporting land management professionals in engaging with unofficial but potentially innovative content is required. In addition to clearly communicating the less prescriptive nature of ELM to build confidence in land managers finding their own way of delivering environmental outcomes, this could include training land management professionals on using different digital media platforms and content, e.g. advising on/signposting to reputable sources; training on how to check reputability and engage critically with digital media content.

Recommendation 4: The evidence presented here suggests a pressing need for more diverse digital media content that is verified and can be trusted. An example would be a bespoke ELM monitored forum that can offer land management professionals the opportunity to share their first-hand experiences with their peers but in an official/trusted space.

A **range of digital media mechanisms and platforms** were referenced across the interviews and focus group. There were clear preferences for different platforms and mechanisms across the cohort, and different platforms were seen to provide different things or suit certain topics/aspects of land management. Generally, Twitter emerged as the most popular platform, owing to its efficiency in delivering information.

Recommendation 5: In line with the fact that different platforms and mechanisms fulfil a range of different purposes within the land management community, any digital media provision needs to be diverse and offer a range of ways of engaging with it, i.e. avoid focussing on a single type of mechanism or platform. Any provision should be dynamic and flexible in terms of the way it allows participants to engage with it.

Although there were pockets of true **knowledge exchange**, knowledge transfer was dominant across the experiences of those interviewed. The land management professionals interviewed reiterated the point that knowledge exchange was not something they were involved in. However, they also expressed a notable enthusiasm towards it – as ‘something they might do in the future’. This suggests there is an appetite for it, but it is yet to be fully realised in the Land Management community. Participating land management professionals were deterred by a fear of making themselves vulnerable to online abuse or trolling by engaging in knowledge exchange.

Key point 2: Whilst knowledge transfer remained the dominant method of engagement for participating land management professionals, there is a burgeoning appetite for knowledge exchange. Carefully designed platforms and mechanisms (i.e. that safeguard participants from online abuse) would likely increase participation significantly.

Recommendation 6: Engagement in knowledge exchange could be fostered by means that help land management professionals feel they can participate in open and honest (public) exchanges, safely. This could include policed or monitored forums.

Recommendation 7: Further engagement with The Farming Forum team and a better understanding of The Farming Forum as a platform for knowledge exchange is recommended. The Farming Forum are an example of best practice in terms of knowledge exchange in the land management community.

Recommendation 8: Facilitating knowledge exchange can be done through structuring discussions on Twitter. AgriChatUK is a good example of this. Any Natural England / Defra digital media strategy could include developing a similar model or approach or exploring collaboration arrangements.

Recommendation 9: Closed groups e.g. hosted on WhatsApp or Facebook Messenger could provide a safe platform for knowledge exchange ideally suited to discussion of topics that are particularly contentious or problematic, e.g. where there might be animal welfare issues or TB. They may also suit groups dealing with local issues. They can be seen as 'digital extensions' of offline interactions.

Focus Group participants were asked to review four **different digital media products**, in order to capture land management professionals' preferences for different formats. The products reviewed included:

1. Video – High production value
2. Video – Low production value
3. Video – Professional (whiteboard) animation
4. Podcast – Variable quality

Of the products that were tested, the difference between Product One and Product Two was most telling. Land management professionals clearly favoured Product Two – a farmer 'vlog' – owing to its authenticity, relatability and its (potential) functionality. Any digital media strategy will need to prioritise collaboration with 'real life' farmers and other land management professionals in order to produce this kind of content. Whilst authentic, low quality productions were preferred in the context of videos, there was a clear desire for high quality audio on podcasts.

Recommendation 10: Video content should be low production, authentic and relatable, e.g. vlog style. Collaboration with 'farmer champions' will be essential to deliver this in an authentic way.

Recommendation 11: Any audio digital materials need to be of the highest audio quality.

All discussions of digital media materials were couched with the limitations of internet connectivity in mind. This would need to be considered in any design and production of materials.

Recommendation 12: Digital media products should be created with technological limitations in mind – particularly levels of internet access and variable internet speeds.

Recommendation 13: Any digital media strategy should accommodate for and be able to adapt to improvements in hardware and internet connectivity. This may mean auditing or measuring land management professionals' access to hardware/technology types or high-speed internet (via primary data collection or secondary data sources e.g. Ofcom) and allow digital media materials to be designed in line with this.

In line with previous discussion in the literature, land management professionals believed digital media use was **set to increase** as younger generations were coming through. Although digital media use in general is on a clear, upwards trajectory, there will be patterns within this with platforms and mechanisms waxing and waning in popularity over time.

Key point 3: Demand for digital media products and mechanisms is anticipated to increase with younger, more technologically-minded persons 'coming through' into Land Management roles.

Key point 4: Improvements in high-speed internet connectivity should be a priority to support the anticipated increased demand for digital media products.

Of all the barriers to engagement discussed, **internet connectivity** was the issue that generated the most discussion. There were some examples of positivity around internet access but equally, participants for whom any connectivity was impossible. In some cases participants had found 'workarounds' e.g. using 4G as an alternative to broadband, but this was comparatively very expensive and limited in terms of data allowances. A culture of 'tolerance' towards relatively unacceptable levels of internet access/connectivity emerged from the data; many reported internet access as 'fine' but in relative terms – outside rural areas – they were experiencing impractical levels and speeds. As per the literature review, the evidence presented here suggests the issue of internet access has moved beyond a question of 'access versus no access', towards access to suitable speeds and bandwidth e.g. that allow almost instantaneous downloading or uploading of high-quality images or other data-heavy content.

Key point 5: Improvements in high-speed internet connectivity – both broadband and 4G – are needed to facilitate digital media use.

Recommendation 14: A better understanding of levels of internet access is needed. As internet access has moved beyond 'access/no access', a more nuanced dataset is required. This will allow digital media materials to be designed more sensitively, i.e. compressed versions of content for individuals without access to high-speed connections.

Another notable barrier to digital media use was **IT literacy**. Whilst there may be individuals who simply do not wish to engage with training for digital media use, amongst low level users there might be opportunities to foster interest and develop skills.

Whilst there was some appreciation of the physical limitations of using conventional **hardware** in a land management setting amongst the cohort, there was limited evidence to show that it was hindering digital media use. Many participants utilised screen protectors and robust or waterproof cases for mobile devices which were seen as inexpensive and effective workarounds. Although an option that participants talked about, 'ruggedisation' to make hardware 'farm proof' was felt to be costly and inaccessible, and not needed in the majority of cases. There is insufficient evidence from this study to differentiate between different types of land management activity in terms of 'farm proofing' hardware requirements, but this could be considered for future research.

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Phase one: Literature review and proposal for
segmentation approach

1. Introduction

“There are huge opportunities and risks to engaging in these new avenues of communication, all of which must be explored to adapt appropriately in the new world that we live in” (Stanley, 2013: 14)

The design of a post-EU Exit Environmental Land Management (ELM) system represents a significant juncture in the delivery of agri-environment schemes. Development of appropriate and robust guidance – including digital media products and tools – is an emerging priority to enable *all types* of land management professionals to deliver positive environmental outcomes.

Communication has long been understood as a key element of learning and capacity building in agriculture (see Leeuwis and Aarts, 2011). Digital media has become an implicit communication tool in the extension landscape, facilitating the “timely and efficient translation of knowledge into productive use” (Chowdhury and Odame, 2013: 98).

Once associated with younger, often urban, technologically ‘savvy’ audiences (Chowdhury and Odame, 2013), recent years have seen the exponential rise of digital media use – particularly social media – in agriculture in developed economies such as the United States, Canada, Australia, New Zealand and the UK (Mills *et al.*, 2019; Jespersen *et al.*, 2014; Stanley, 2013). In the US, a survey of 2,554 farmers’ smartphone use revealed that 62 per cent used their phones to visit agricultural websites and/or utilise agricultural apps, and a further 11 per cent used their phones to participate in agricultural-related online chat rooms, discussion boards or social media. At the global scale, there were 2.46 billion registered social media users in 2017 and this trend is set to continue with the number of users expected to reach 3.02 billion by 2021 (Statista, 2018). With 96 per cent of farmers in a recent NFU survey of UK farmers able to access the internet ³ on a mobile phone or computer (NFU, 2018), the potential for the use of digital media in the delivery of agri-environment activity is difficult to disregard. In fact, a study of agricultural professionals in Canada revealed “overwhelming agreement (89%) that government – including the agricultural sector – should use social networking tools as part of their communication strategy” (LaBoeuf *et al.*, 2013: 25). The UK farming press has also advocated for the use of social media amongst farmers too.

Despite these headline figures, the state of, and potential for, digital media use in agri-environment decision making is likely to be more nuanced and diverse than these headline figures suggest. The review continues with the following questions in mind:

Who is (and is not) using digital media? How are different members of the target audience using digital media? What are their preferences for digital media use? What is preventing the use of digital media? What influence is digital media having on land management professionals?

Some key definitions are set out in Boxes 1, 2 and 3.

³ Access simply refers to being able to get on the internet. Issues with internet speed are addressed in Section 4.4.

Box 1 Definition of digital media

Digital media encompasses *any digitised content* that can be created, viewed, distributed or modified on digital electronic devices. Examples of digital media include, digital video, web pages and websites, and also includes social media, databases and digital audio. Digital media is transmitted via the internet or computer networks.

Box 2 Definition of target audience

The target audience includes end users/financial recipients of the system and any agents or advisers who support them. Therefore, for the purposes of this research the target audience categories should be assumed to be:

- end users/financial recipients of the ELM system: farmers, foresters and other land management professionals
- agents and advisers (paid or state-funded) who will support the end users with their land management choices and practices

Box 3 Definition of 'land management professionals': an umbrella term

For efficiency, throughout the report we use the term 'land management professionals' as an **umbrella term** for all members of the target audience and land management community; this includes farmers, foresters and other land managers, as well as agents and advisers.

Capable of delivering **timely, relevant, and actionable information and advice** to land management professionals, the potential of digital media as a driver of innovation in agriculture (Hansen *et al.*, 2014; Jespersen *et al.*, 2014) has been widely recognised. In what follows, we review a range of literature with the broad aim of understanding the potential role digital medias can play in encouraging and supporting farmers' and land management professionals' successful participation in ELM activities. Like digital media itself – which encompasses but is not limited to social media, vlogs, webinars and podcasts – the literature pertaining to its use in the agricultural context is disparate and multifaceted. In view of this, this review seeks to draw these sources together in order to present a coherent and empirically supported case for its use and in the delivery of ELM objectives. The findings from the evidential review are intended to directly inform development of the ELM digital media strategy. Owing to the heterogeneity of the target audience, the review pays particular attention to understanding the target audience's usage of digital media products.

The literature is structured around the following themes:

- Understanding agri-environment behaviour
- Digital media mechanisms and platforms
- The use of digital media in land management
- Barriers to digital media use

Drawing on the literature review findings, the report culminates in a series of recommendations for Phase 2 of the project; specifically the approach to the segmentation approach to the behavioural analysis.

2. Method

Given the desire to provide a robust, contemporary overview of the literature pertaining to digital media usage amongst the target audience, the review followed what will be described as a 'hybrid systematic literature review'. It is inspired by the approach deployed by Sues- Reyes and Fuetsch (2016) in their literature review of succession-oriented strategies on family farms.

In the first instance a Web of Science (WoS) search was conducted ⁴. The search string (detailed in Box 4) was developed in line with the three criteria outlined in Table 1.

Table 1 Literature search criteria

Criteria 1	The report or research relates to: <ul style="list-style-type: none"> • one or more of the ELM objectives and/or land management activities and/or • any segment(s) of the ELM target audience
Criteria 2	The report or research covers: <ul style="list-style-type: none"> • the use or development of digital communications and/or • other insight on communicating on the ELM objectives/land management and/or with the target audience
Criteria 3	The report or research was published within the last ten years and is based on studies from: Europe, North America, Australia and New Zealand

Box 4 Web of Science search string

TOPIC: ("clean air" or "water quality" or "water resources" or "natural resources" or "harvest" or "plants" or "wildlife" or "nature" or "chemicals" or "resource efficiency" or "waste" or "invasive species" or "exotic diseases" or "natural hazards" or "resilience" or "biodiversity" or "pollutants" or "sustainable" or "non-native" or "soil" or "greenhouse" or "emissions" or "natural environment" or "landscapes" or "waterscapes") **AND TOPIC:** ("livestock farming" or "farming" or "farmer" or "land manager" or "adviser" or "agronomist" or "land agent" or "vet") **AND TOPIC:** ("social media" or "digital media" or "online" or "virtual" or "Twitter" or "Facebook" or "WhatsApp" or "smartphone" or "tablet" or "ICT" or "communications" or "knowledge exchange" or "knowledge transfer" or "agricultural extension" or "forum" or "Instagram" or "chat rooms" or "podcasts" or "video" or "webinar")
Refined by: COUNTRIES/REGIONS: (USA OR WALES OR ENGLAND OR AUSTRALIA OR POLAND OR GERMANY OR NETHERLANDS OR FRANCE OR ITALY OR CANADA OR SPAIN OR IRELAND OR BELGIUM OR ESTONIA OR SWEDEN OR ICELAND OR FINLAND OR SCOTLAND OR NORTH IRELAND OR NEW ZEALAND OR SLOVAKIA OR DENMARK OR AUSTRIA OR SLOVENIA OR GREECE OR CROATIA OR NORWAY OR PORTUGAL) **Timespan:** 2009-2019.
Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

⁴ The search was conducted on the 22nd May 2019

An additional WoS search was run to explicitly include the term 'forester' in the second search line (having been initially absent). This yielded just two additional outputs.

Given the stipulations in Table 1, the WoS search was limited to the past 10 years (2009-2019) and, owing to the advanced search filters available, was limited to European, North American and Antipodean countries. The database searches were restricted to peer-reviewed, English language articles and included articles from journals with any impact factor. The searches yielded 353 papers. As part of the next stage, article titles and abstracts were screened for their relevance. A total of 326 titles were rejected at the abstract stage, having failed to meet at least one the criteria outlined in Table 1. Furthermore, one paper was removed having proven inaccessible after using our teams' institutional access.

A total of 26 papers from the WoS search were accepted after this initial round of screening. To supplement the systematic search, we conducted a more intuitive/qualitative search. With the three criteria in mind, we screened the bibliographies of the 26 papers emerging from the WoS search for potentially relevant titles. During this phase of the search, basic Google searches using a combination of the key terms were also conducted. As well as this, we searched the teams' existing collection of literature and asked colleagues at Natural England and Forestry England to provide documents for screening/consideration. This yielded a further 15 titles which included two conference papers, seven peer-reviewed papers and six reports.

The next phase of the literature review was to read each document. As reading progressed, 12 of the papers that emerged from the searches were excluded from the review. Reasons for rejection at this stage included an incomparable geographic focus (despite the necessary stipulations during the search) or simply limited relevance to the topic which only became apparent after reading the whole document.

A total of 29 documents were included for final review. Although more generic literature pertaining to land management professional behaviour and internet access that did not emerge from the literature search, is included (mainly in Section 4.1).

The screening and reject/accept decision-making was conducted solely by one member of the research team.

3. Summary of literature

As outlined above, the literature search culminated in **29 studies from the UK and comparable countries** which specifically explored the impact or potential impact of digital media in the context of land management. A summary of that research is now presented and some initial observations outlined.

Of the 29 studies, nine were conducted in the UK, with a further study conducted in the UK and France. The research topic was also fairly well-developed in Canada – particularly Ontario – where four studies were conducted. US studies also accounted for a further four studies. Three studies used multiple European countries as cases. Switzerland, Italy, Germany and the Czech Republic accounted for one study each.

Each paper/report was broadly categorised according to the digital media type/topic it focused on. The breakdown is illustrated in Table 2. Overall, social media was the dominant focus of this work, featuring in 16 studies.

Table 2 Literature main topics: some basic analysis

Topic – category	Frequency
Smartphone apps	2
IT (general)	4
Other or N/A	4
Other interactive media (webinars and forums)	2
Other non-interactive media (videos, podcasts)	1
Social media (Twitter, Facebook, etc.)	16

The most significant observation from this broad-brush analysis is the dominance of farming-oriented research in this area (Table 3). Only two studies focused specifically on foresters.

Table 3 Participants targeted in the research

Target audience	Frequency
Agricultural extension officers/advisers, land managers etc. only	3
Farmers only	9
Farming professionals (including farmers, agri-business owners/workers)	15
Foresters	2

4. Review of the literature

4.1 Influencing land management professional behaviour

Before we can explore the role of digital media in land management professionals' agri-environment behaviour, it is necessary to understand the key factors influencing such. It is important to note at this point that, as stated in Section 3, the existing research has tended to focus on 'the farmer', neglecting wider agri-environment decision makers. Therefore, a **clear research priority**, that this commission will go some way to addressing, is the inclusion of 'other' members of the target audience, e.g. particularly other land management professionals, as well as agents and advisers. Owing to this deficiency, we continue by mainly presenting farmer-oriented frameworks for understanding (agri-environment) decision-making.

The work of AHDB (2018) is useful in summarising the determinants of farmer behaviour change, which include:

1. Personal factors: These include age, gender, experience, attitudes, beliefs and education levels as common determinants of behaviour.
2. Business factors: These include factors such as farm size, cash flow, staff numbers, succession plans, and profitability were highlighted as major influences on behaviour.
3. Family, peer and adviser networks: The influence of family, friends, peers and trusted advisers were *highly influential* on farmer decision-making and behaviour and also helping normalise types of farm management. The report cites the work of Mills *et al.* (2017), which observed that the willingness of UK farmers to undertake pro-environmental management was influenced by social pressures, and similarly, the work of Kuhfuss *et al.* (2016) which found that farmers are more willing to enrol in a management scheme if they thought a large number of their peers would do the same.
4. Feeling in control of decision-making: Farmers' perceived levels of behavioural control was deemed to be highly influential. This includes the perceived level of autonomy over decision-making, as well as the perceived ease of implementing a particular behaviour (self-efficacy). The report concludes; if a farmer feels they are being told what to do, or feels they do not have the skills/knowledge to implement a management practice, it is unlikely the action will be implemented.
5. Relative advantage: Direct financial incentives to adopt particular behaviours are often needed because there is a cost associated with the change. These can be direct payments of financial rewards, or promoting relative advantage.
6. Market or compliance based rewards: One particular way of promoting relative advantage of a particular behaviour is to associate it with market- or compliance-based rewards, i.e. gaining higher prices or doing an activity that helps them satisfy compliance.
7. Information provision education: According to the review, good communication and provision of information is associated with positive behaviour change; citing work by Alarcon *et al.* (2017) who found information sources played a crucial role in implementing good disease control amongst pigs. In the USA, adopters of field edge planting were found to have used more information sources than non-compliers. The provision of useful information has a key role to play in enhancing perceived behaviour control (see above).

Whilst the cases for these factors are well-rehearsed in the literature, AHDB (2018) note that the evidence this stems from measures of intention as opposed to measures of action. In any case, the framework offered by the AHDB report offers a useful overview of the key factors that shape farmer behaviour.

Another useful conceptual framework in understanding what influences farmer behaviour is that presented by Mills *et al.* (2017). The concentric rings (Figure 1) simultaneously distinguish between and draw together the *farm*, *community* and *societal level* influences:

- At the *farm level* the influence of the individual farmer or internal family dynamics are important for environmental decision-making. Mills *et al.* (2017: 290) identify “at the core of an individual farmer’s attitude to environment practice is their personal beliefs and moral norms”. Whether a farmer was more oriented towards custodianship or productivity also determined the type of advice and support they would seek.
- At the *community level* farmers’ attitudes to the environment can be influenced by those in their reference group, and by their perception of how other farmers see them through social norms. Mills *et al.* (2017) highlight the power of farmer/peer groups in influencing *and* engaging farmers in environmental behaviours. Engaging at the community level creates a positive social norm (if/when most farmers act on the message).
- *Societal level influence* is the product of the way farmers perceive consumer and public concerns. Societal influences can also shape subjective norms.

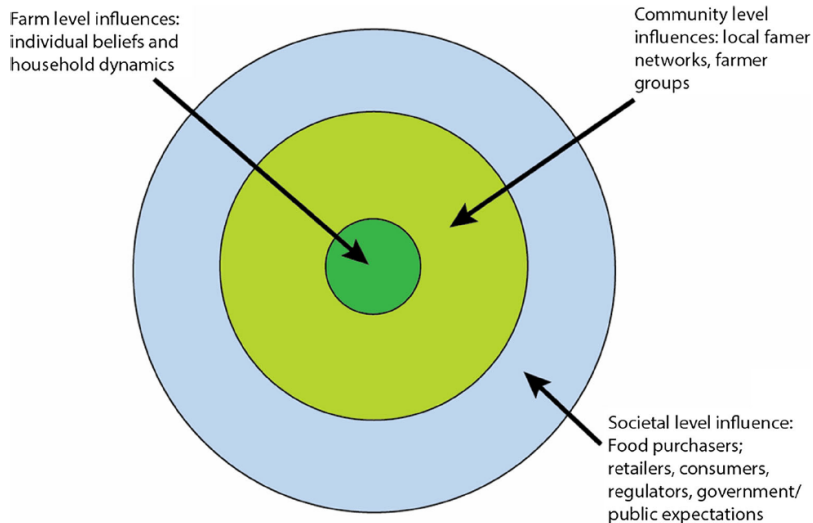


Figure 1 Different levels of influence (*Source: Mills et al., 2017*)

Work by Dandy (2012) on behalf of the Forestry Commission has specifically sought to conceptualise influences on private land manager⁵ decision-making. The framework Dandy presents depicts “a considerable number and breadth of influences on land-manager decision-making” (p.15), including:

- *economic*
- *social*
- *physical-environmental*
- *operational* factors

Dandy (2012) emphasises the range of influences, and stresses how the mix of influences will vary depending on the specific decision being taken.

The preceding frameworks are useful in understanding the complex set of inter-relationships influencing land management professionals’ environmental management decision-making, and help contextualise the potential role, value and appropriateness of digital media in agri-environment decision-making. Although it is interesting and important to note that the preceding conceptual frameworks do not make explicit reference to the potential role of digital media influences.

Whilst these different approaches to understanding farmer and land management professional behaviour summarised here differ in their specific approaches and target audiences, they universally emphasise the diversity of factors influencing land management professionals’ decision-making. Notably, the importance of specific factors such as good information provision (AHDB, 2018) **and** the role/influence of social networks and referents (AHDB, 2018; Mills *et al.*, 2017; Dandy, 2012) give further weight to the idea that digital media is capable of playing a significant role in land management professionals’ delivery of the ELM objectives.

The discussions presented above also hint at the heterogeneity of land management professionals and agriculture, and the subsequent failure of formal advisory systems to cope with farmers’ desire for diversified and complex knowledge (see Poncet *et al.*, 2010; Milone and Ventura, 2019). With digital media use in mind, recognition of this heterogeneity also suggests that digital media is unlikely to be a ‘silver bullet’ or panacea; it may prove very successful in supporting agri-environment behaviours in some members of the target audience, but not others.

This realisation that farmers and land management professionals are influenced by a multitude of sources, coupled with the diversity of modern-day multifunctional agriculture and the heterogeneity of land management professionals **has prompted a paradigm shift in both the theoretical understanding and practical implementation of the provision of advice** (Blackstock *et al.*, 2010), i.e. we no longer consider simply telling/disseminating information to farmers/land management professionals as the best way to advise them, but seek to actively engage them to do so. To borrow an analogy from Dandy (2012), land management professionals are no longer considered as ‘blank canvasses’, who wait passively to receive information on the best course of action. The linear, ‘knowledge transfer’ approach which positioned land management professionals as passive recipients of information has been progressively replaced with “human development approaches”, rooted in principles of participation, empowerment and ownership of the problem (Blackstock *et al.*, 2017; Chowdury and Odame, 2013). This new approach recognises land management professionals come to decision making with very different experiences, perspectives and

⁵ Defined as landowners, farmers, agents and community representatives

their own expertise; it seeks to include land management professionals in discussions and interventions and anticipates any outputs will be more successful if they are a product of engaging with those on the ground. As a result of this shift, Chowdury and Odame (2013: 98) note, “agricultural and rural communication processes are now understood as *facilitating* and *learning* from the knowledge of multiple stakeholders in order to explore ideas” (emphasis added); they add, central to this new approach to extension is the use of digital and mobile technologies. As well as allowing for the timely and efficient translation of knowledge, media and communication technologies facilitate the co-production of knowledge and support the development of networks of actors and institutions (ibid.). With specific reference to social media, Mills *et al.* (2019) recognise its potential opportunity for marketing and lobbying, but note its “greater potential for its use as an interactive, learning and knowledge sharing global platform” (also see Stanley, 2013; Wick *et al.*, 2019).

Whilst there has been an obvious paradigm shift in the way the academic and scientific community think about influencing behaviour amongst farmers, Blackstock *et al.* (2010: 5634) note given “the heterogeneity of modern agriculture [this] suggests that no single approach influencing behaviour is likely to be sufficient”. Instead, they propose top-down knowledge transfer and bottom-up, human development approaches are best understood as two ends of a spectrum; how knowledge is (or should be) transferred or created will depend on the context and no single approach or strategy is likely to be sufficient in communicating and influencing agri-environment decision-making. Digital media in its various guises is a promising platform in this regard, offering the ability to simply and quickly disseminate (small or large amounts of) information to land management professionals, or engage them in more dialogical forms of communication and knowledge creation (Mills *et al.*, 2019).

Burton’s (2004) concept of the good farmer identity is useful here in understanding the potential for digital media in land management. Burton identifies four key sub-identity standards from which the good farmer role is built: (1) physical appearance of any crops and/or livestock; (2) measures of production, e.g. crop yield per hectare; (3) ‘hedgerow farming’, which involves a comparison and evaluation process of how well farmers in specific locales are (visually) meeting informal farming standards; and (4) the ‘farm’ identity which represents the farm’s physical characteristics as well as the family tradition of farming on the land (where relevant). This type of ‘social identity’ situates individual farmers amongst something bigger; critically, it shapes what is and is not acceptable behaviour amongst that group. Some types of digital media provides a new arena for this identity to be played out on (Williams and Philip, 2019) and has huge potential in shaping the agri-environment behaviours of farmers and other land management professionals through targeted digital media campaigns.

The concept of ‘strong’ and ‘weak ties’ is also useful in understanding the potential for digital media. The dualism which distinguishes between daily, intimate, close contacts/family (strong ties), versus acquaintances, neighbours and work-contacts (weak ties). Weak ties are thought to provide a flexible network for the transmission of ideas and critically, are a key source of new information for land management professionals. Some types of digital media provides an additional platform for these weak – but informative – ties to play out.

Furthermore, digital media offers the opportunity for farmers to learn from each other; farmer-to-farmer learning has been long understood as a powerful mechanism. For example, Phillips *et al.* (2018) suggests that acquaintances were not only relied on as sources of information, but critically provide a way of validating information received. By comparison, Phillips describes the role of formal information providers e.g. extension workers, as only minor in farmer’s decision making (see also Phillips, 1985). Ingram *et al.* (2016) describe the

importance of credibility, salience and legitimacy when communicating soil carbon science to farmers; digital media content from members of the farming/land management professional community is likely to feel credible, salient and legitimate, and thus more effective in informing agri-environment behaviour.

We now turn to the different digital media platforms, before turning our attention to their different uses in the agricultural context.

4.2 Mechanisms and platforms

With specific reference to social media (although this insight could easily be applied more widely to certain types of digital media), Chowdhury and Odame (2013) suggest it intensifies communication in two key ways:

- Amplifying messages from traditional media (e.g. radio, TV and print media);
- Enabling new ways of collaboration and co-creation of content with target audiences

Jespersen *et al.* (2014) provide a useful audit of digital media tools and their purposes in the context of agricultural systems. We present the different digital media tools as per their analysis in Table 4.

Table 4 Audit of different digital media tools (*Source: Jespersen et al., 2014*)

Software type	Tools	
Knowledge portals	Slideshare	Knowledge portal tool for upload and sharing of slides, PDFs, videos, webinars and support documents. Relevant for dissemination and branding. The website gets an estimated 58 million unique visitors a month.
	YouTube	Knowledge portal tool for sharing videos. It has 4 billion video views a day with users uploading an hour of video per second. YouTube is particularly relevant for branding, promotion and dissemination.
E-document management systems	Organic E-prints	E-document management system tool for papers and research projects related to organic food and farming. At present it contains almost 13,000 publications.
Data warehouse	FADN	Data warehouse tool, the Farm Accountancy Data Network is an instrument for evaluating the income of agricultural holdings and the impacts of the Common Agricultural Policy. The tool is mainly relevant for dissemination purposes.
Groupware	Wikipedia	This Groupware tool is a multilingual, web-based, free-content encyclopaedia project, written collaboratively by largely anonymous Internet volunteers. This tool is relevant for co-production, co-operation and dissemination.

Table continued...

Software type	Tools	
	Yammer	This closed groupware tool provides secure enterprise social networks within organizations or between organizational members. This tool is particularly relevant for discussion, engagement, co-production, co-operation, dissemination, crowdsourcing and networking in closed networks.
	Crowdsourcing	This open access Groupware tool is used for obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from an online community, rather than from traditional employees or suppliers.
Community of practice	ResearchGate	This community of practice tool is a social networking site for scientists to share papers, ask and answer questions, and find collaborators. It includes profile pages, comments, groups, job listings, and 'like' and 'follow' buttons. Currently it has 2.7 million members of which 120,000 are categorized in agricultural science.
Social communities of interest	Facebook	This social community of interest tool had as of 2013 more than one billion active users, of whom more than half use Facebook on a mobile device. Users may create a personal profile, add other users as friends and exchange messages, including automatic notifications when they update their profile.
	LinkedIn	This social community of interest tool is mainly used for professional networking. As of January 2013 it had more than 200 million acquired users in more than 200 countries and territories. This tool is particularly relevant for networking, discussion and branding and to a lesser extent for promotion.
	Google+	This social community of interest tool is Google's response to Facebook. Google+ is an 'overarching layer' and therefore is perceived by many to make it more complicated.
Individual communities of interest	Wordpress	This individual community of interest tool started as a blogging system but has become a full content management system with possibilities for using more than 24,000 plugins. WordPress is currently the most popular blogging system in use on the Web. This tool is particularly relevant for dissemination and co-production.
	Twitter	Twitter is a micro-blogging site via which users share updates in "tweets" that are limited to 140 characters. Users build audiences of "followers" and also choose to follow other users, read their content and then share it with their own followers through what are called retweets.

Other social media platforms have developed. Notable platforms include:

- **Instagram:** Instagram is a photo and video-sharing social networking service. It was created by Kevin Systrom and Mike Krieger, and launched in October 2010 and was available exclusively on iOS at this time.

- **WhatsApp (Messenger):** Is a freeware, cross-platform messaging service which allows users to send text messages, voice messages, voice calls and video calls, share images, documents and user locations.
- **Snapchat:** Is a multimedia messaging app.

4.3 The use of digital media in the agricultural context

(i) Digital media use: trends

It is widely propagated that digital media use is growing exponentially, both in wider society and amongst the agricultural community. In 2012 – nearly 7 years before this literature review was written – Defra (2013) reported 86 per cent of UK farmers had access to a computer and 98 per cent of those computers had some form of internet connection. A more recent study of (812) NFU members conducted in 2018, suggested 96 per cent of farmers had access to the internet (whether that be via a mobile phone or computer) (NFU, 2018). The trend towards increasing computer use was also observed in the USA, where in 2003 74 per cent of farmers were using computers for farm business and/or personal use, compared to just 61 per cent in 2002 (Yiridoe *et al.*, 2010).

Whilst these statistics depict a positive trend towards increasing internet usage and access, it is pertinent to caution that the use of digital media is wholly dependent on the ability of land management professionals to access the internet. Before considering its impact and potential benefit(s) to the delivery of ELM objectives, it is important to consider that access to sufficiently fast internet (whether that be via broadband or mobile internet) is a prerequisite for digital media to work (or begin to work) in this context. The headline figures suggest a positive trend, i.e. the proportion of UK premises with access to superfast broadband measured 89 per cent in 2016 and average download speeds are 74 Mbps (Ofcom, 2016). But despite these figures representing a clear advancement in internet access and speeds, Riddlesden and Singleton (2014) suggest these figures hide a 'digital divide' and that access can vary hugely across the UK, particularly in remote, rural areas. Williams *et al.* (2016) describe a 'second digital divide' which goes beyond simply accessing the internet, but refers more specifically to internet speeds. Low speeds preclude users from making use of 'digital heavy' activities, which is particularly important in the context of digital media for ELM guidance, which could potentially include the use of 'data heavy' platforms such as webinars or YouTube. It is important to keep this geographical inequity in mind when reviewing the benefits and uses of digital media, particularly given the rural nature of land management.

Furthermore, can we assume increased access and speeds will be synonymous with increased digital media usage in this context? It is also pertinent to suggest a consistent dataset (i.e. from longitudinal research) is also needed to enable improved understanding of digital media accessibility (or lack of).

Although there is a lack of comparable data for foresters and woodland managers, data from the British Woodlands Survey (2017) (reported by Hemery *et al.*, 2018) identifies social media as one of the most popular methods deployed by foresters to share knowledge with others (compared with more traditional face-to-face or hard copy mechanisms). This allows us to infer that digital media use is on a similarly positive trajectory amongst foresters too.

Chowdhury and Odame (2013) audit of social media use for agri-food development amongst farmers in Ontario, Canada, is arguably the catalyst for interest in social media use in the agri-food and rural sectors. It suggests that social media practice in the Canadian agri-sector

is in its infancy with 50 per cent of subjects using social media in the previous 5 years (i.e. 2007 onwards).

Chowdhury and Odame (2013) conducted a content analysis of the social media posts to understand the nature of its usage. Their work revealed text and discussion posts as the most popular format/approach (Table 5). They also note, users were utilising text and images more frequently than video and audio, despite the latter having a superior ability to communicate higher volumes of information. They attribute this in part to a lack of access to sufficient internet speeds in rural areas.

Table 5 Form of media use (Source: Chowdhury and Odame, 2013)

Forms of media	Frequency	Percentage
Sharing a news link	33	66
Video post	6	10
Image post	40	80
Audio post	18	36
Discussion post/text post	50	100

Work by LaBoeuf *et al.* (2012) also in Ontario, Canada, concluded that 84 per cent of agri-professionals ⁶ visited at least one social networking site in the last year. Nearly a quarter (23 per cent) claimed they found social media to be ‘very important’ to their work, and an additional 50 per cent claimed social media was ‘somewhat important’ for their work. Twitter was the most used tool, followed by YouTube, Facebook and blogs. A total of 68 per cent of agri-professionals claimed to use social media for sharing and/or capturing knowledge and information in order to fulfil their roles. Other reasons for using social media included, developing their network of contacts (49 per cent), marketing (38 per cent), socialising (37 per cent) and keeping in touch with colleagues or other contacts (36 per cent). Critically, LaBoeuf *et al.* note, 62 per cent of users expected their internet usage to increase over the next year.

Bogdanou *et al.* (2013) have also noted generally high levels of usage of digital media as a resource amongst professional foresters. Institute of Chartered Foresters (ICF) members were connecting with other professionals in discussion groups, completing online training and distance learning, reading and commenting on blogs, downloading technical articles and social networking (although there are some notable differences in usage according to age – see below). Bogdanou *et al.* also charted the fluctuation of ICF LinkedIn group (‘Trees, People and the Built Environment’ ⁷) membership over a year period; the group experienced a steady week on week growth rate of 112 per cent, starting with 20 members in March 2011 and totalled 389 in April 2012. Note at the time of writing this review (June 2019) the group has 1,976 members. Whilst Bogdanou *et al.* (2013) note an understandably larger use of digital media, especially social media, amongst younger foresters, they also note a ‘growing trend towards a progressively greater use’ across the population as a whole, after all, to use their rationale, younger (Associate) members “are the future professionals” ⁸ (p. 154). This

⁶ This includes any farmers, producers, employees of a farmer or producer and non-farm agribusiness owners/workers

⁷ The group can be found here: <https://www.linkedin.com/groups/3848875/>

⁸ ‘Professional’ vs. ‘Associate’ refers to membership of the ICF. Professional Membership indicates an internationally recognised forester; Professional Members were on average older (mean age of 55). Associate Membership refers to an early career or newly qualified forester; Associate Members tended to be younger (mean age of 38 years) (ICF, 2019)

suggests that amongst foresters, and more widely, the increasing use of digital media is likely to continue as successive 'new generations' of land management professionals enter into forestry, farming or advisory roles.

With reference to Twitter use, Mills *et al.* (2019: 201) described it as an 'explosion' during recent years that was only set to flourish. They surmised "they [farmers] did not think any other social media were better for the purpose of knowledge exchange or more user-friendly, they expected that the Twitter usage would increase with new and younger farmers" (Mills *et al.*, 2019 201).

Further evidence of the significance of digital media amongst the agricultural community comes from Dehnen-Schmutz *et al.* (2016). Their survey of British and French farmers' smartphone use (in 2014) revealed that after making calls, internet use was the second largest use of smartphones (ranked primary function by 25 per cent of users); this is notably different to recent statistics on mobile phone use in the wider population, which notes how internet use is now the primary smartphone function (see Ofcom, 2018), but could be related to the fact Dehnen-Schmutz *et al.* collected their data in 2014. The 6 participants not using smartphones cited access to suitable quality phone signal and internet ("Poor phone signal, poor broadband connection so slow WiFi"), operability of the devices ("Do not like complicated devices", "non-smartphone more able to withstand life on a holding"), as well as feeling that smartphones were unnecessary. In a similar study in Germany, Bonke *et al.* (2018) found that 93 per cent of farmers were using a smartphone for agricultural purposes. Bonke *et al.* suggest the higher rate could be, at least in part, due to the survey being more recent. Bonke *et al.* also noted, on average farmers had 5.26 years of smartphone experience, suggesting smartphone use is well-established in the agricultural context.

It is a challenge to draw a consensus from this insight; digital media is being used to good effect and the ability to be able to use and access digital media is improving. However, there are a number of issues – internet access and speed being the primary (but not only) one – that are prohibiting digital media reaching its full potential in this agricultural context.

(ii) How is digital media being used?

"The power in social media's mass influence is something which agriculture can ill afford to ignore" (Morris and James, 2017: 104)

As observed by Mills *et al.* (2019), social media is serving a number of different functions in the agricultural context. We build on the summary provided by Mills *et al.* (2019) to also include other types of digital media uses (Table 6).

Research into social media use was the most prevalent type of digital media in the agricultural context; research has documented its use across *all six* of the different functions.

The evidence supporting the different functions is presented below.

Table 6 Digital media functions and supporting evidence

Function	Social media	Online resources (general)	Webinars	Videos	Smartphones
Marketing and consumer engagement*	Chowdhury and Odame (2013); Stanley (2013); Morris and James (2017); Kaushik <i>et al.</i> (2018); Pechrova <i>et al.</i> (2013); Bos and Owen (2016); Cornelisse <i>et al.</i> (2011)				
Lobbying and campaigning*	Stanley (2013); Morris and James (2017)				
Farmer-to-farmer knowledge sharing*	Stanley (2013); Phillips <i>et al.</i> (2018); Mills <i>et al.</i> (2019); Laforge and McClauchlan 2018				
Crisis support*	Stanley (2013)				
Communicating land management objectives/practices	Ingram <i>et al.</i> (2017); Wick <i>et al.</i> (2019); Bogdanou <i>et al.</i> (2013); Ball <i>et al.</i> (2018); Cornelisse <i>et al.</i> (2011)	Wick <i>et al.</i> (2019); Bogdanou <i>et al.</i> (2013); Imhof <i>et al.</i> (2019); Yirdoe <i>et al.</i> (2010)	Jenkins <i>et al.</i> (2019); Bogdanou <i>et al.</i> (2013)	Fry and Thieme (2019);	Bonke <i>et al.</i> (2018)
Engaging land managers in scientific research	Stroud (2019)				Dehnen-Schmutz <i>et al.</i> (2016)

*denotes the functions observed by Mills *et al.* (2017) in their investigation of social media for SSM

FUNCTION 1: Marketing and consumer engagement/awareness

Five of the studies (Chowdhury and Odame, 2013; Stanley, 2013; Bos and Owen, 2016; Morris and James, 2017; Kaushik et al, 2018), explore the use of digital media – specifically social media – for marketing and raising consumer awareness. Chowdhury and Odame (2013) categorise the uses in this context as follows:

- *Social media for social marketing campaigns:* Creating awareness of specific issues and targeting behavioural changes, e.g. ‘100% Canadian Milk’ uses social media to increase consumer awareness of milk products free of antibiotics and growth hormones.
- *Social media for community engagement:* Connects relevant stakeholders, linking information and sharing potential resources, e.g. ‘Local Harvest’ is a North American platform for organic and local food producers. The organisation uses social media to connect consumers to local food in their areas and promote a wider agenda of conscientious food consumption.
- *Social media for community engagement and fundraising:* Social media has also been used to engage the community and also attract financial support from the community and beyond, e.g. Farm Start, focuses on new farmers, uses social media to build its membership and fundraising by posting activities and economic opportunities in the agricultural industry.
- *Social media for enhancing outreach of business:* A number of farmers had utilised private sector companies to build them websites, including platforms that incorporate social media. These businesses use their networks for revenue generation through advertising and subsidiary e-business platforms.

In their survey of Welsh cooperative members, James and Morris (2017) observed the application of social media for entrepreneurship. Specifically, farmers were using social media for marketing and branding purposes. As one farmer outlined: “I’m selling lambs to a butcher in London and he’s buying 10 lambs off me a week and that is only through social media” (ibid., p.1036). James and Morris attribute the use of social media in this way – what they term ‘micro branding’ – to increased desire amongst consumers to know where their food is coming from. The research highlights the work of ‘Farmer 2’, describing him as an innovator and entrepreneur who used ‘felfies’⁹ to open up new markets and create a unique micro-brand. In other cases, farmers were using social media to simply develop an online presence. A number of farmers were already using social media to promote their diversified businesses, but were yet to do the same for their agricultural enterprises. Whilst the empirical work of Morris and James (2017) has advanced understanding of exactly how (some) farmers are using social media, it has focused on the innovators and pioneers. They ultimately conclude there has been a ‘low uptake of social media’ in agriculture in relation to their case study, and suggest there is further work to be done to unlock its potential. With specific reference to organic production in the Czech Republic, Pechrova *et al.* (2015) also note social media’s potential as a marketing tool was not being fully utilised in agriculture, owing to farmers’ lack of understanding/familiarity of the platform. These suggestions of low uptake of digital media for marketing and consumer engagement seem to contradict the optimism and potential outlined in Section 4.3 (i), but together point to the fact more work is required to understand the exact role of digital media in the agricultural context.

Stanley (2013) presents a number of examples of the use of social media to increase consumer engagement, including the case of Jake Freestone (Arable Farmer, UK).

⁹ A ‘felfie’ is a photographic self-portrait taken by a farmer

Cornelisse *et al.* (2011) also suggest the social media offers agri-business entrepreneurs a range of opportunities to market their business and provide customer service.

Utilising a Social Network Analysis (SNA), Kaushik *et al.* (2018) explored the role of social media across four case study stakeholders – including a government organisation, a non-profit organisation and two farms. They observed social media played significant, but nonetheless very different, roles in the everyday business of the farms. ‘Farm M’ had been using Facebook and Twitter for marketing, enhancing popularity and business growth. Their online presence was intended to gain recognition or connect with large businesses such as supermarket chains. In contrast, ‘Farm B’ utilised both Facebook and Twitter to inform local consumers and the general public about the seasonal availability of produce, and to send and receive delivery confirmations.

Notably, the aforementioned research has been concerned with farmers using digital media for marketing and consumer engagement. There is **no discussion of farmers as consumers or marketing themselves**, i.e. how do they respond to digital media marketing for farm products or services? This is a key evidence gap that also needs to be addressed. Better understanding of how farmers and land management professionals receive (marketing) information will assist with designing the delivery of ELM (and other agri-environment) guidance.

FUNCTION 2: Lobbying and campaigning

In addition to its use in marketing and consumer engagement, Morris and James (2017) also observed the use of social media in raising awareness of industrial issues. One farmer in their study said:

“I’ve been able to change a law in the country through one Tweet, which was when we had the big snow disaster. I Tweeted our Agricultural Minister and I asked him to change the law for us to get, bury our animals, and it went viral”

Similarly, Stanley (2013) cites the #SOSdairy campaign in the UK to demonstrate the potential of digital media – specifically Twitter – in ‘lobbying for the greater good of the industry’. The Twitter campaign, she notes, mobilised approximately 3000 farmers who protested and blockaded supermarket distribution centres.

FUNCTION 3: Knowledge sharing (farmer-to-farmer)

In their analysis of farmers’ (and rural professionals’) use of a Facebook group, Phillips *et al.* (2018) noted the opportunity to interact with peers was greatly appreciated by farmers: “This is a great way to meet like-minded farmers where you can be bluntly honest” (UK farmer). The online groups act and function in a similar way to real world on-farm discussion groups, with the benefit of eradicating the need to travel. Jespersen *et al.* (2014) note how de facto peer review facilitates the sharing of authentic and credible advice and information.

Another key study on use of digital media in farmer-to-farmer knowledge exchange is by Mills *et al.* (2019). Their innovative analysis of Twitter activity and supplementary semi-structured interviews explores the extent and type of farmer-to-farmer knowledge in relation to sustainable soil management (SSM). Farmers using Twitter in this context noted the convenience and the opportunity to interact with other farmers who were not immediate competitors: “there is no commercial edge to be had” (Farmer). Mills *et al.* observed how

Twitter was “providing inspiration and an extra stream of information as well as making the job more interesting” (p.200). According to farmers, Twitter was particularly useful for ‘time constrained farmers’ in that messages were succinct and digestible; “... you get bullet points through Twitter – it is a gateway” (Farmer). For farmers leading the way in SSM and more advanced conservation practices, Twitter fulfilled a need for support and guidance, when “looking over the neighbour’s fence” for advice was no longer sufficient. Mills *et al.* (2019) claim their evidence supports the idea that “Twitter can provide a dialogical form of communication, which engages users in practical problem-solving discussion” which they claim directly contradicts the earlier findings of Chowdhury and Odame (2013) (as well as Kaushik *et al.*, 2018).

Whilst the use of Twitter was regarded as successful in the context of SSM, Mills *et al.* (2019) suggest “farmer preference is still to share knowledge and learn from others in a face-to-face environment”. They conclude that there is potential for more purposeful use of Twitter (and other social and digital media) when blended with non-virtual approaches to learning (see also Matera *et al.*, 2015). Although farmers’ use of Twitter in this case is promising, Mills *et al.* note the fact that SSM is a unique agricultural issue that may lend itself to this kind of platform. Specifically, they note the benefits of SSM practices are not immediately noticeable and require sustained engagement, monitoring and adaptation – not easily implemented by traditional extension approaches (which tend to be more short-term).

The investigation of Twitter users also highlighted the different user types. In particular, Mills *et al.* (2019) identified the activity of influential users, or what they term ‘Farmer Champions’. These champions are emerging as leaders in SSM. One – Farmer Alpha – had a distinctive profile. He had posted 24,000 Tweets, had 9,500 followers but only followed 1,795 people, suggesting others were listening to him. It is clear from the work of Mills *et al.* (2019) that Twitter lends itself well to SSM content; this hints at the fact different digital media platforms might lend themselves to different topics/content. Further investigation is needed to unpack which platforms lend themselves to which topics or problems (if any). This work will help devise more effective digital media strategies and ensure the right tools are being used for the job.

Champions or Opinion Leaders (OL) (Phillips *et al.*, 2018) are leaders in these digital media communities. The following examples are taken from a Farmers Guardian Online article and showcase the power and (potential) influence these individuals have amongst the farming community.

‘Farmer Jake’



Jake Freestone or ‘Farmer Jake’ is a Farm Manager at Overbury, Gloucestershire, UK. He has a [blog](#), and a YouTube channel where he shares videos of key moments in the farming calendar. His [YouTube channel](#) has 3,373 subscribers and a number of his videos have had in excess of 10,000 views. He is also on Twitter as @No1FarmerJake, where he has over 10,000 followers, and has Tweet over 29,000 times.

Image: Farmers Guardian Online (2018)

'Yorkshire Shepherdess'



Amanda Owen or the 'Yorkshire Shepherdess' as she is known on Twitter, shares regular pictures of everyday life on her 810-hectare upland farm – Ravenseat – she manages with her husband and nine children in Swaledale, Yorkshire. As well as her [blog](#), Amanda has featured in international TV and radio shows, including ITV's 2011 series, *The Dales* and *BBC Breakfast*. She has 58,900 followers on Twitter and has posted over 23,000 Tweets.

Image: Farmers Guardian Online (2018)

Camilla and Roly Purzey



Camilla and Roly entered the industry as new entrants. They have since built a successful sheep enterprise, online retail firm and have a number of diversification ventures, including running farm visits. Their [website](#) showcases their work; you can find recipes, book accommodation in their Bed and Breakfast, or arrange to become a shepherd for the day! They are also on Twitter as @CamillaandRoly, where they have nearly 2,000 followers.

Image: Farmers Guardian Online (2018)

Concerns about the scientific validation of information via 'champions', are expressed by Wick *et al.* (2019). So whilst the potential of utilising these industry leaders to influence farmer behaviour and support ELM delivery, it is important to consider if this process can be shaped/managed, and if so, the best ways to do this.

In their research into agroecological learning amongst new farmers in Canada, Laforge and McLachlan (2018) discovered what they describe as a 'mycorrhizal network' of hidden connections between farmers in the form of online or virtual communities. The informal learning networks are proving an instrumental source of support for farmers wanting to pursue alternatives to productivist food systems which are unsupported by formal learning provision.

FUNCTION 4: Crisis support

Stanley (2013) is the only commentator to note the use of digital media – specifically social media – for the purposes of crisis support. Stanley references the potential for social media in reporting disease outbreak or incidents of contamination, where communication needs to be immediate.

FUNCTION 5: Communicating land management objectives/practices

In their investigation into communicating information about soil carbon management, Ingram *et al.* (2016) conducted a number of workshops with farmers across Europe. An exercise conducted with participants consistently ranked ‘real life examples’ as the most effective way of communicating the benefits of soil organic carbon (SOC) to farmers. Factsheets (printed, hard copies) were ranked the second highest method. Videos and decision support tools were ranked next, although this was dependent on the particularities of each case study. Notably, social media was consistently ranked least effective across *all case studies*. It seems contradictory that digital mediums such as video and social media did not emerge as effective methods, as both support farmers’ desire for succinct, simple communication:

“[Farmers] they want specific information on what steps should be taken to implement a given measure and what effects (especially short-term) they will have” (Polish farmer, Ingram *et al.*, 2016)

In this context, farmers’ placed significant value on a tangible document or example to reassure them of the benefits of a new practice. These findings mirror that of a US study by Yiridoe *et al.* (2010), who found that amongst farmers participating in Nova Scotia’s Environmental Farm Plan (EFP) deemed newsletters and agricultural magazines to be the most important source of information for them. Conversely, “electronic and computer channels of information (especially radio and television) were generally used less relative to traditional channels of communicating farm conservation information” (p. 1103). Although, the authors note online information – particularly those resources available for free – appear to be increasing in popularity.

Wick *et al.* (2019) conducted a study of the most influential participants in a University Extension programme (including two scientists, five farmers, one crop consultant and two extension specialists) with the aim of improving soil health. The Soil Health Café programme – a series of face-to-face meetings/discussion groups – was supported by online and social media tools. This research suggests that the **combined use of face-to-face discussions and online resources** “has increased the technical knowledge of farmers, adoption of social health building practices by farmers” (p. 182). This suggests that digital media need be a part of a suite of advice and guidance mechanisms.

Important evidence of the use of digital media use amongst the forestry profession comes from Bogdanou *et al.* (2013). They suggest digital media, particularly social media platforms and webinars, offer considerable opportunities for CPD (formal opportunities), as well supporting more informal opportunities to enhance professionals’ knowledge and skills base (e.g. the sharing of articles to read), with overall benefit to the sector. They explored this potential using a survey of chartered foresters (members of Institute of Chartered Foresters (ICF)) and documented generally high usage, particularly in relation to online learning and research (the other uses are listed above). In order to understand the value of digital media in practice, Bogdanou *et al.* conducted a pilot CPD webinar on forests and carbon. When asked about their experiences 100 per cent of participants felt the webinar was an ‘effective’ or ‘highly effective’ way of learning, although there was a lack of consensus around the amount of interaction during the webinar: 57 per cent of participants claimed no more interaction was required, with the remaining 43 per cent suggesting the opposite. Although this work provided a much needed understanding of webinar experiences, what it did not explore was the decision to participate in a webinar and the factors that influence this.

Jenkins *et al.* (2019) also explored the role of webinars to extend the reach of soil learning in New South Wales, Australia. Initiated by the Australian Government’s Department of Primary

Industries, the webinar programme has reached a significant proportion of its target audience. The Soil Network of Knowledge (SNoK) monthly webinars were conducted on a monthly basis, aimed at Local Land Service ¹⁰ employees, private advisers, and grower groups. Information communicated in the webinar was intended to inform discussions and advice given to participants' clients. Despite the success in terms of numerical outreach, Jenkins *et al.* (2019) claim it is **too early to tell whether the SNoK webinars have affected practice change**. They suggest the 'trickle down' effect, where information *gradually* reaches the 'next users' (land management professionals and farmers), takes time. Follow-up empirical work is needed to understand the impacts on the ground.

In the same special issue of *Soil Use and Management*, Imhof *et al.* (2019) explore the usefulness of the Victorian Resources Online (VRO) website (an online repository for soil and landscape information generated from research, field days and workshops). Using user surveys and more detailed qualitative interviews with 13 users, they reveal the VRO is considered a useful 'tool of the trade' for those involved in research, extension, planning and education. They highlight, in particular, the value of online visualisations, including videos and interactive panoramas, which "explain dynamic and often complex, processes that occur in the soil and landscape" (p. 47). Imhof *et al.* note two key functions of the VRO, including (1) information and knowledge management function (i.e. storing that information) and (2) an information dissemination function. In the concluding sections, the authors state "we believe that adding new and dynamic content (such as video, animations and interactive panoramas) to base information which is generally static (i.e. text and images) *has been effective* in making soil and landscape information more accessible" (p. 49, emphasis added).

Also in the special issue, Fry and Thieme (2019) explore the potential of a social learning video method in the transformation of knowledge for sustainable soil management. Social learning video methods bring together different stakeholders, e.g. researchers, government and farmers, to create video content. Three key stages to the approach are described by Fry and Thieme (2019): (1) setting up a multi-stakeholder discussion group; (2) co-producing videos; and (3) distributing these videos. The authors describe the social learning video method process as "enabling transformation knowledge to be shared with peers using storytelling" and considers it to have potential to change sustainable soil management (p. 185)

As above, Bonke *et al.* (2018) explored the potential of smartphone apps in facilitating sustainable crop protection. Although the survey of 174 German farmers suggested there was a willingness amongst farmers to pay for a smartphone app to improve the sustainability of their crop production, it does not explore or measure the impacts of such an app. Interestingly, over 60 per cent of farmers (62.62 per cent) expressed a preference for a certified app ¹¹, i.e. an app they could trust. This suggests there could be a difference in the effectiveness of certified and non-certified/official and non-official apps or resources.

Ball *et al.* (2018) also note the potential of social media groups (as well as more traditional 'real life' groups e.g. farmers' clubs and discussion groups) to direct farmers towards more soil-focused farming methods (e.g. organic farming, cover crops and no-till). They suggest social media is just one example of how different groups of people – including farmers – can improve their connections to and understanding of soil.

¹⁰ Government employees

¹¹ A certified app is defined by Bonke *et al.* (2018: 51) as being "certified by an independent government agency"

With reference to social media, Cornelisse *et al.* (2011: 3) note “boundless opportunities exist for extension to grab hold and use these tools”, citing opportunities such as the promotion of extension workshops, real-time interaction with clientele and the distribution of extension materials. Like many of the studies cited in this review though, the study does not actually seek to quantify or assess the impact of digital media in this context, but instead speculates at the likely benefit.

FUNCTION 6: Engaging land management professionals in scientific research

With regards to engaging land management professionals in scientific research, Chowdhury and Odame (2013: 108) criticised both agri-food scientists and rural researchers for rarely using social media tools and feeds. However, writing in 2013, they observe “growing inspiration to use social media for enhancing outreach of research” (p.108).

Stroud (2019) conducted the only investigation into the potential of social media as a tool in engaging land management professionals in scientific research. Specifically, the paper explored farmers’ engagement with the *#60minworms study* which saw the assessment of over 1,300 hectares of farmland soils in 2018. Stroud notes: “in terms of farmer participation, Twitter and Farmers Weekly magazine were highly effective channels for recruitment” (p.1). Of the 126 field sites surveyed, 0 per cent of participants were recruited from traditional, non-digital methods (newsletter and workshop), 55 per cent were recruited via Twitter, and 40 per cent from The Farmers Weekly Forum (note the remaining 5 per cent were not specified).

Stroud also noted that engagement with the research also resulted in continued/on-going communication with participants, e.g. providing method support and helping with earthworm identification requests, in the most part via Twitter and email (an average of 15 interactions per day over the 42 days of the project). Furthermore, the online materials generated additional online resources including a YouTube video demonstrating the sampling method. The creation of the YouTube video, led to a change in the design of the approach to improve accessibility for colour-blind participants.

At a fundamental level, Stroud’s work highlights the value of digital media platforms such as Twitter and The Farmers Forum in recruiting and engaging farmers in scientific research. At a broader level, she suggests this success “demonstrates the potential importance of these media channels to achieving soil security (Stroud, 2019: 11).

In their survey of British and French farmers’ smartphone use for citizen science participation, Dehnen-Schmutz *et al.* (2016) note the use of smartphones “offer a great potential for participatory agricultural research and large scale data collection”. Despite this clear potential, the authors contend that online connectivity and skills are not a ‘universal phenomenon’, and citizen science methods should reflect this (see Section 4.3 (iii)).

(iii) Digital media for knowledge exchange

Uses of digital media in the agri-context presented thus far have (albeit with exceptions) tended to demonstrate its use for the ‘classical process’ of information dissemination. In their breakdown of social media activity, Chowdhury and Odame, (2013) observe the dominance of users passively sharing information and links, as opposed to actively commenting. They note in their 2013 study, “limited two-way communication behaviour among social media users” (p.109), and concluded there was limited evidence of social media users engaging in

reflective dialogue. As a consequence, Chowdhury and Odame recommend a priority for future work is to develop strategies that will facilitate and promote *interaction* and *dialogue*. The findings of Kaushik *et al.* (2018) update the work of Chowdhury and Odame, and very much reinforce their earlier observation; the use of social media in agriculture was not being used for interaction but one-way dissemination. In their study of Italian AKS, Materia *et al.* observed implementation of virtual ICT platforms to support interaction between researchers and agricultural advisers was still rooted in linear and traditional learning philosophy. They observed that activities associated with virtual Communities of Practice remained predominantly passive. Exchange of ideas and construction of knowledge was only found when virtual and non-virtual methods were deployed together: “ICT interaction spurs real life face-to-face interaction, and ICT supports follow-up on real life face-to-face interaction” (p.203). Despite continued dominance of knowledge transfer functions, Mills *et al.* (2019) concluded the use of Twitter in SSM was *undoubtedly* facilitating dialogical forms of communication. Although, as noted above, they recognise SSM as a unique agricultural context that has never lent itself to traditional extension methods.

Perhaps the best conclusion to draw from the above evidence is that digital media offers the *potential* for knowledge exchange, but facilitating this higher-level function is complex and a better understanding of how this occurs is required.

Work by Phillips *et al.* (2018) partly responds to this. They offer a detailed insight into the use of digital media and its potential as a knowledge exchange tool. Their case studies (presented below) serve to:

- (1) conceptualise knowledge exchange in or on digital platforms as something that evolves over time and,
- (2) highlight differentiated uses of digital media platforms.

The following summaries of their case studies are now presented in turn (Box 5 and Box 6).

Box 5 Dairy farmers' use of Facebook

The study compared two Facebook groups formed for the purposes of discussing 'Farm Management' decisions. In 2014, Group A had 1,400 members (established in 2011) and was administered by a dairy farmer. Group B had 700 international members (established in 2008) from 12 different countries and was established by a pasture-based dairy farm consultant.

Group A conversations were dominated by employment discussions (30 per cent), social (21 per cent) and farm business management (15 per cent). By comparison, there was little social discussion in Group B. Discussion was spread amongst employment (16 per cent), farm business management (16 per cent), cow nutrition (16 per cent), milking (13 per cent) and pastures (10 per cent).

A further analysis of Group B's activities was conducted in 2017 when it had become a larger, more active community. The group had grown from 700 to 1,208. Interestingly, the number of new Farm Management questions rose from less than one per day in 2014, to nearly 2 per day in 2017. This clear trajectory towards more interactive discussion, suggests that use of the platform for exchange and discussions takes some time to evolve.

Critically, Phillips *et al.* documented how conversations were not initiated by 1,087 members – nearly 90 per cent of the total group. This suggests that it is only around 10 per cent of users engage, whilst 90 per cent remain passive observers (in line with other non-agricultural studies of social media – see Nonnecke and Preece, 2003). The authors make the distinction between people keenly observing the discussions (but not being actively involved), and those who are not regular users and/or are simply not interested: with reference to this ‘under the radar’ group they claim, “it is difficult to assess their involvement nor should assumptions be made” (*ibid.*, p.9).

The role of ‘observers’ emerge from the above case warrants further attention. Lurking¹² – as it is referred to in the wider literature – “is a common pejorative term for those who are present in public online spaces but do not prominently speak up” (Crawford, 2009: 526). Critically, Crawford suggests categorising passive observers or lurkers, and dismissing them, has hampered understanding of online spaces, and overlooks the efficacy of passive observers. She conceptualises online use as a spectrum, with listening and disclosing making up its two ends; both are necessary and both, technically are participation. Crawford also highlights an “overemphasis on posting, commenting and ‘speaking up’ as the only significant forms of participation” (p. 528). Of course, of the (typically) 90 per cent who are not seen to participate, a percentage will be infrequent users or are truly not listening. It is hard to distinguish between these groups and more work is needed to do so. Further work is also needed to understand and accommodate for the role of ‘passive participants’ in online agricultural communities and beyond.

Box 6 Comparing agricultural professionals’ and farmers’ use of Twitter

Comparing rural professionals’ and farmers’ use of Twitter

The study explored Twitter activity on 48 agricultural Twitter accounts; accounts were chosen because they were established accounts.

The 24 farmers posted a total of 60,428 tweets (average of 2,518 per account), whilst rural professionals posted only 40,174 tweets (average of 1,647 per account). Farmers had more followers on average than professionals. Despite these differences, Phillips *et al.* (2018:

13) note, generally, “Twitter use among rural professionals and farmers is well-evolved with open participation, collaboration (retweeting), and fuller engagement (asking questions, providing answers/replies) dominating one-way messaging (new/original Tweets)”.

Farmers were more active, using Twitter as a platform to actively engage/respond. By comparison, rural professionals used Twitter to simply disseminate information.

This suggests rural professionals are using Twitter in a more linear and traditional, top-down approach. As a consequence, Phillips, Klerkx and McEntee (2018) conclude, rural professionals are not maximising the potential of social media as a platform for collaboration or knowledge exchange. By comparison, farmers have progressed from passively observing to full engagement within their online communities.

¹² There have been attempts in the wider literature to replace the term with a less derogatory. Alternatives include ‘peripheral participants’ (Zhang and Storck, 2001) and ‘non-public participants’ (Nonnecke and Preece, 2003). For the purposes of this discussion, we suggest using the term ‘passive participants’

Reflecting on both their cases, Phillips *et al.* (2018) conceptualise farmer and professional use of Twitter as following what they describe as a ‘visible evolutionary pathway’ – **observation; comment; create; curate:**

1. Just observation
2. Low level engagement (one-way messaging)
3. Open participation to collaboration (re-Tweeting)
4. Fuller engagement (creating two-way conversations)

By conceptualising participation in social (or indeed digital) media as a process suggests participation is not static and evolves.

(iv) What factors influence use?

Having explored the different uses of digital media in the land management context, we now summarise the factors that have been observed to influence its uptake and usage.

Age

Unsurprisingly, **age emerged as a significant factor in social media adoption** in research by Morris and James (2017). Their quantitative analysis of 733 surveys revealed a statistically significant association between age and likelihood of adoption, with 72 per cent of under 30s utilising social media in some form or another. Even amongst the 31-50 age group, social media usage was more than double the (14 per cent) usage amongst the over 65 age group. Whilst these figures are powerful, social media use in this context was not specifically for agri-business purposes and included personal usage. When personal use is removed, Morris and James note “the overall number adopting social media for the farm is very low” (p. 1035).

Age was also the strongest determinant of digital media usage amongst professional foresters (both in terms of amount, and type of use) (Bogdanou *et al.*, 2013). Only 27 per cent of Professional Members (who had a mean age of 55) used digital resources for their training/development, compared to 80 per cent of Associate Members (who had a mean age of 38 years). Similarly, only 25 per cent of Professional Members utilised social networking sites, compared with 100 per cent of Associates.

Age also emerged as a significant factor in farmers’ willingness to pay for a smartphone app (Bonke *et al.*, 2018). Results of their probit model¹³ suggest that a 1 year increase in farmers’ age decreases their willingness to pay for use of an app by 0.4 per cent (when other factors are constant). Whilst this is a useful finding to consider as part of this review, it is important to consider this specifically addresses farmers’ willingness to pay for an app and cannot be universally applied to digital media use in general.

In their study of smartphone use in the UK and France, Dehnen-Schmutz *et al.* (2016) found age to be a significant determinant of usage. Younger respondents were more likely to own a smartphone, with smartphone owners being on average 42 years old, compared to those that did not own a smartphone having an average age of 56 years old. This difference was deemed to be statistically significant (p value = 0.016). However, the authors also note that “age is not always a reliable indicator, as the oldest respondent, a 74 year old, had owned a

¹³ A probit model predicts/estimates the probability a value will fall into one of two possible outcomes.

smartphone for at least 3 years at the time of completing the survey” (Dehnen-Schmutz et al., 2016: 5).

According to Defra (2012) computer access amongst farmers decreased with age; 98 per cent of under 40s had access to a computer, compared to 72 per cent of those over 65 years old. Defra also explore the relationship between age and possession of an online Government Gateway ID ¹⁴; again, uptake of this service was lowest amongst the over 65s, although those aged between 40 and 54 were the most likely to use this service (80 per cent of users of this age), compared to their younger counterparts (those under 40; 78 per cent).

According to a survey of agricultural industry workers in Canada (LaBoeuf *et al.*, 2013) age was a significant influence on information preferences. Although physical, paper-based publications/magazines emerged as the preferred source overall, this differed with age; 86 per cent of 18-34 year olds sought information from the internet compared with 73 per cent of those aged over 55.

In the only study to consider the impact of age on *type* of digital media use, Phillips *et al.* (2018) note ‘agenda setting questions’ on a farm management Facebook group were younger members (although they offer no further explanation or age breakdown).

Given the association between age and digital media use, it is important to consider that it may not be the (younger) consumers of digital media that are in charge of the ELM delivery (or broader agri-environment decision making). Digital media strategies may need to account for this, or may want to consider ways to make content more accessible.

Education

As well as age, educational attainment also emerged as significant in the adoption of social media in Morris and James’ analysis. They described education as an ‘enabler of technology adoption’. Amongst Welsh farmers in their sample, they note “those with school-only education having the lowest levels of social media adoption, whereas those who have higher education have the highest levels of social media adoption” (p. 1035).

The results of the probit model (Bonke *et al.*, 2017) indicate having an agricultural university degree **decreases likelihood of farmers’ being willing to pay for a smartphone app** by 9.92 per cent. They note that these results contradict other work (with specific reference to Briggeman and Whitacre’s (2010) work on internet adoption). They suggest this pattern reflects the fact highly educated farmers may not feel that an app can benefit them. Bonke *et al.* suggest that for such mechanisms to appeal to the highly educated, they need to be more advanced in what they can teach/offer.

Diversification

Morris and James (2017) also demonstrate an association between farmers who have diversified and use of social media; specifically, those who had diversified were more likely to be using social media. In contrast, with reference to farmers’ willingness to pay for an agricultural smartphone app (as above), Bonke *et al.* reject any association between diversification and increased willingness.

¹⁴ The Government Gateway provides access to the UK government’s secure online services, including the HMRC portal

Role/Land Manager Type

LaBoeuf *et al.* observed use of social media differed across different types of agricultural professionals. Whilst overall, 84 per cent of participants claimed to have visited a social networking site in the last 12 months, usage varied according to their role within the industry. Just 83 per cent of farmers/producers claimed to use social networks such as Twitter or Facebook in this timeframe, which was lower than the number of farm employees doing so (89 per cent).

Other work has recognised the reluctance of extension practitioners to utilise digital media tools such as social media (Newbury, Humphreys and Fuess, 2014). Despite concerns about ‘falling behind’, concerns – which included a loss of control (relating to content they might be associated with), the issue of time required to maintain a social media account, and concerns around internet access – discouraged them. Phillips, Klerkx and McEntee (2018) also recognise rural professionals’ lower levels of engagement within Facebook discussion groups. They attribute this to an unwillingness or unfamiliarity with relinquishing control over the agenda or topics, i.e. it is not the professionals setting the agenda.

In contrast to agricultural professionals, Bogdanou *et al.* (2013) noted the generally high levels of usage of digital media as a resource amongst professional foresters.

Whilst this section will inform the segmentation approach to the behavioural analysis, it also speaks more widely to the potential of the ELM digital guidance and who it is likely to appeal to. In short, the aforementioned evidence suggests interest in and relevance of digital media differs significantly amongst the target audience, i.e. **it will not have a universal appeal** and it would be naive to ignore this differentiation. Equally, there may be room for targeted promotion of digital media and relevant training for groups that are not thought to be using digital media.

4.4 Barriers to use

The biggest barrier to use in the literature is unquestionably internet access, particularly in rural areas. Jespersen *et al.* (2014: 115) simultaneously recognise “a stable, reliant and relatively fast internet connection is crucial for the innovation and collaboration in agriculture”, and yet, mobile and wired internet connections varies across Europe. Although they highlight North and West European countries as offering better quality and higher speed connections, at the national scale, UK internet provision varies hugely. This is undoubtedly a big consideration for digital media use in the context of ELM delivery.

In the UK, Defra reported a movement away from dial up connections (24 per cent of main computers had a dial up connection in 2008, compared to just 6 per cent in 2012). Inversely, they document a clear shift towards broadband connection, with 92 per cent of main farm computers having a broadband connection. Despite this shift towards better infrastructure, the survey revealed two thirds of farmers with broadband still only reported download speeds of less than 2MBps. It is important to note the Defra survey was conducted in 2012. A more recent study from the NFU (2018) suggests that a notable, but nonetheless smaller, proportion of farmers surveyed were still suffering with slow (<2MBps) download speeds.

Mobile connectivity by comparison paints a much more promising picture; according to the NFU survey, 83 per cent of smartphone users were now able to access 4G ¹⁵ on their

¹⁵ 4G offers superior download and upload speeds: download speeds average around 60MBps

devices. However, with reference to mobile internet usage amongst British and French farmers, Dehnen-Schmutz *et al.* (2016) recognised difficulties with access to suitable quality phone signals as a significant barrier to internet usage. They also cited concerns about operability of the device (“Do not like complicated devices” and “Non-smartphone more able to withstand life on a holding”).

Morris and James (2017) survey results make the link between internet access and social media usage; of the 43 per cent of farm business social media users, 91 per cent had broadband access. This signifies the importance of connectivity as an indicator of technology adoption and by default, digital media use. Chowdhury and Odame (2013) suggest concerns around internet speed are particularly relevant to digital media platforms such as YouTube and wikis which require high download and upload speeds, and symmetrical connectivity.

Interestingly, Jespersen *et al.* (2014) cite age as a barrier to internet use – and by default digital media use. They rightly suggest the age of farmers across the EU is increasing and so is the percentage of farmers over 65. This raises an interesting question about the trajectory of digital media use: *can we assume those growing up with digital media will continue to use digital media into older age? Or will they stop using it as they age?* (i.e. a ‘cohort effect’). If it is the latter, then the potential for digital media use could be limited as the farming population ages (as per Jespersen *et al.*)

Other barriers to digital media use may also include concerns about privacy, security and proprietary rights (Chowdhury and Odame, 2013). Jespersen *et al.* also cite a lack of access to appropriate hardware and tools as a key barrier to social media use in the agricultural context, but recognise that the price of ICT hardware (e.g. smartphones, tablets, PCs etc.) is decreasing and the availability of more rugged and robust – or ‘farm proof’ – versions is increasing; they propose that supporting the uptake of such hardware “may help in speeding up the use of ICT by farmers” (p. 115).

5. Literature review: Conclusions and recommendations

This literature review has sought to understand the role digital media could play in supporting the delivery of ELM objectives.

The review has documented the different digital media platforms that exist and considered some of the broad patterns and trends associated with its use. The review has paid particular attention to the ways in which digital media is being utilised in land management. Use of digital media is in its infancy and its use thus far has not been unequivocally successful; there are pockets of excellence and success, and equally room for development and improvement amongst certain user types and functions. In particular, **low use amongst some professionals requires further investigation**. The different examples suggest there is *huge potential* for digital media to support the successful delivery of ELM objectives, although it is important to note that **much of the research has speculated about the outcome/benefit and not actually measured changes to practice or environmental impact**. This likely reflects the fact that the use of digital media tools in this context is in its infancy. Further – possibly longitudinal – work is needed to understand how digital media use translates to on the ground changes or improvements. Any ELM digital media strategy **could benefit from an integrated and ongoing evaluation programme that seeks to measure the benefit of digital media on practice and even on the environment** (through ecological measures). As a minimum a bi-annual self-administered survey could be sent to land management professionals which will seek to capture any changes to practice associated with ELM digital media guidance. It is also important to consider that digital media emerges as just one tool in a suite of guidance tools; further work is needed to understand its role alongside more traditional mechanisms e.g. face-to-face or printed documentation.

It is clear from the evidence that digital media is already playing a significant role in disseminating information within the agricultural industry ('knowledge transfer'). There is increasing awareness of the potential for more dialogical forms of digital communication and, critically interaction ('knowledge exchange') across these platforms, although this is less understood. **Research is needed to understand whether there is an appetite for higher level, knowledge exchange using these kinds of platforms, and if so, what factors facilitate this**. Interestingly, digital media use was presented by Phillips *et al.* as an evolutionary process that starts as more simplistic forms of knowledge transfer and sharing to more elaborate and effective forms of exchange. Research – particularly qualitative research – is needed to develop understanding of the morphology and evolution of digital media use over time.

Whilst there have been significant barriers to digital media usage in the past, the general trend is a positive one. The absence of longitudinal data on internet access and speed would enable conclusions about digital media's potential in this context to be made with more conviction, but smaller, one-off surveys suggests internet access is no longer a barrier to as many. Nevertheless, deeper, qualitative work is needed to properly gauge levels of internet access and accessible speeds amongst land management professionals. This will need to go beyond 'access vs. no access', to understand whether land management professionals are capable of accessing 'bandwidth heavy' digital medias e.g. webinars and YouTube. Instead the literature highlights other possible issues with digital media use, including **concerns about privacy and security, and the need for sufficiently robust 'farm proof' hardware; these issues should be a priority for the next phase of the research**. It will also be important to consider, consumers of digital media are discerning; digital media offers significant potential to communicating information and even shape behaviours, but it requires

a careful strategy. Content will need to be relevant and come from a trusted, respected and relatable source.

Perhaps the most significant point to emerge out of the literature is the neglect of 'other' voices in this debate. The majority of work has been carried out with farming, farmers and those that educate or advise farmers. The role of foresters (land owners) has been sorely neglected and it is perhaps this group that will require the most guidance when it comes to ELM delivery. With this in mind, we **develop a segmentation approach that will capture the opinions and experiences of all types of land management professional**. The approach to the target audience segmentation is an iterative one and was proposed to Natural England in June 2019; the proposal is available in Appendix 1. The method is detailed in Section 7.

Phase two: Behavioural analysis

6. An introduction to the behavioural analysis

As outlined earlier, the design of post-EU Exit ELM represents a significant juncture in the delivery of agri-environment schemes. The rationale for this body of work has been the need to develop appropriate and robust guidance – including digital media products and tools – to enable all types of land management professionals to deliver positive environmental outcomes. With this in mind, the central aim of this research has been to understand the potential role digital media can play in encouraging and supporting farmers’ and other land management professionals’ successful participation in ELM activities. The literature review has, in part, responded to this; the findings of which inform a number of recommendations and actionable insights. The literature review also highlighted the importance of age as a determinant of digital media use, as well as the neglect of certain types of land management professional in the discussion of digital media, particularly foresters. Building directly on the literature review, this second phase of the project – namely the behavioural analysis – is an empirical response to the research objectives and the gaps identified in the literature review.

7. Method

7.1 Data sources

Natural England recruited 49 land management professionals via their advisers and wider network (July 2019 onwards). These potential participants were required to fill out an initial **registration form** which captured basic details including age, role and any connectivity challenges they faced (e.g. lack of access to high-speed broadband) (see [Appendix 2](#)). These potential participants were assigned a unique ID and their details were entered into a spreadsheet by Natural England and shared with CCRI. This information was used to select participants in line with the segmentation approach set out in Section 6: participants were invited to participate (in either the land management professional interviews or the focus group) according to their age and role/land management professional type, with a target of approximately 20 people.

Land management professional interviewees and focus group participants were recruited by telephone. Whilst booking the interviews, the CCRI Project Support Officer conducted a short **screening/pre-interview questionnaire** which sought to ascertain the land management professionals’ digital media use (the screening/pre-interview questionnaire can be found in [Appendix 3](#)). The questionnaire sought to identify digital media users and their level of digital media use; this enabled the interview questions to be tailored to the participants, i.e. where a land management professional was not using digital media, the research team knew not to ask about their digital media use. The land management professional **interview questions** and the **focus group schedule** can be found in [Appendix 4](#) and [Appendix 5](#) respectively.

Running parallel to the land management professional interviews and the focus group, were Digital Media Expert interviews. The aim of these interviews was to gain the perspective of advanced/professional digital media users, particularly around effective digital media use (the interview questions can be found in [Appendix 6](#)). We aimed to interview between 4-6 experts from a Defra- and Natural England-approved shortlist of eight. Experts were recruited via email and Twitter direct message. Figure 2 provides an overview of this approach.

The research was conducted in line with the University of Gloucestershire’s research ethics policy. Oral consent was gained from telephone interview participants and signed consent from all focus group attendees.

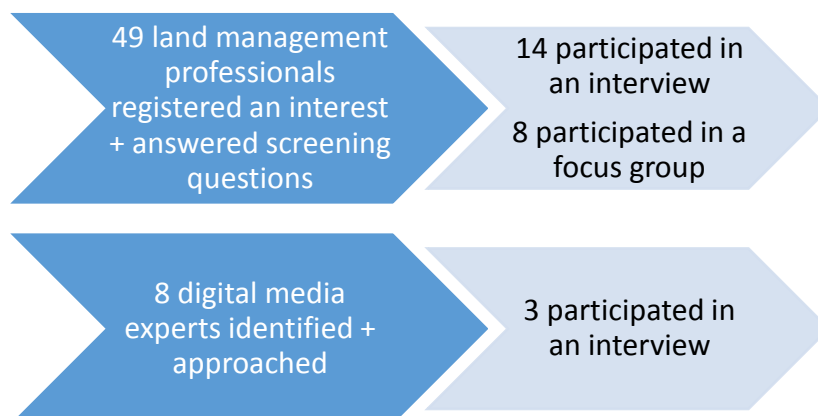


Figure 2 Overview of the data collection approach showing total numbers of each type of participant involved at each stage

7.2 The segmentation approach

The first round of recruitment randomly selected 10 participants. After these initial participants were selected, the research team reviewed the spread of participants across the segmentation framework. After taking stock of the ‘gaps’ in the segmentation approach, the second phase of recruitment was a little more intuitive, and sought to identify/target participants according to their digital media usage to ensure good coverage of the ‘digital media pathway’ typology (Table 7), as well as fill gaps in the segmentation approach. An additional four land management professionals were interviewed.

In total, the team conducted interviews with 14 land management professionals across the different categories:

- Farmers
- Foresters
- Institutional land managers (defined in Box 7)
- Agents and advisers

We recruited an additional eight focus group participants. This represented 10 out of the 12 segmentation categories (83 per cent).

Box 7 Defining institutional land managers

Institutional land managers

We define an institutional land manager as someone that is employed on behalf of an institute in a land management role, e.g. for a conservation charity or a county council or school. Unlike a farmer or private forester, they may have more a defined ‘9-5’ role and are unlikely to own or rent the land themselves.



Table 7 Digital media pathway (user types)











Non-users These members of the target audience have never engaged with digital media.
Passive participants Passive participants are members of the target audience who may observe/watch/listen, but do not actively participate in activity on digital media and associated platforms.
Engagers Including: <ul style="list-style-type: none">• <i>Low level engagers</i>: These members of the target audience may engage at a low level, e.g. once a week, sharing links to news stories, commenting on posts/videos and re-Tweeting or liking.• <i>Moderate engagers</i>: These members of the target audience may engage at a moderate level, e.g. 3-4 times a week, sharing links to news stories, commenting on posts/videos and re-Tweeting or liking.
Leaders Leaders are pioneers/champions/influencers in the digital media world. They create and curate content and engage in two-way conversations (knowledge exchange).

Whilst the aim was to draw from every one of the 12 sections of the segmentation framework, this was not possible – owing to the content of the sample, i.e. the original sample of 49 potential participants did not include any Foresters under the age of 40 nor any Institutional Land Managers aged 60 or over (this is likely to reflect the lower numbers of Foresters and Institutional Land Managers in these age categories in the wider population). Despite not fulfilling the original aim of interviewing participants across each of the age categories, we were able to get a good spread of participants across the role/land management professional types. Notably, we were able to secure interviews with 2/2 of the foresters that had signed up, which was a key strategic aim of the methods. Therefore, whilst imperfect, the empirical data goes some way to filling the gaps identified in the literature review: i.e. it does include Foresters and other – ‘non-farmer’ – land management professionals. The data collection also represents the realities of empirical data collection in the social sciences.

It is also worth noting that three participants fulfilled multiple roles across the segmentation categories, e.g. both a farmer and an adviser; they have been placed in the category the research team deemed most applicable but in the interests of transparency, where participants fit multiple categories we have also denoted them in Table 8 (in footnotes).

Table 8 Proposed segmentation approach (n=22)

: Focus group attendee (n=8) : Interviewed (n=14)

	Land management professional type				
	Farmer (n=10/26)	(Private) forester (n=2/2)	Institutional land managers (incl. agriculture & forestry) (n=2/6)	Agents and advisers (n=5/16)	Other (n=1/4)
<40	 1				
40-59	 2				
60≥		 3			

¹ Other

² Other

³ Agent & adviser

We achieved the desired spread of digital media user types including *non-users* and *leaders* in the interviews (Figure 3).

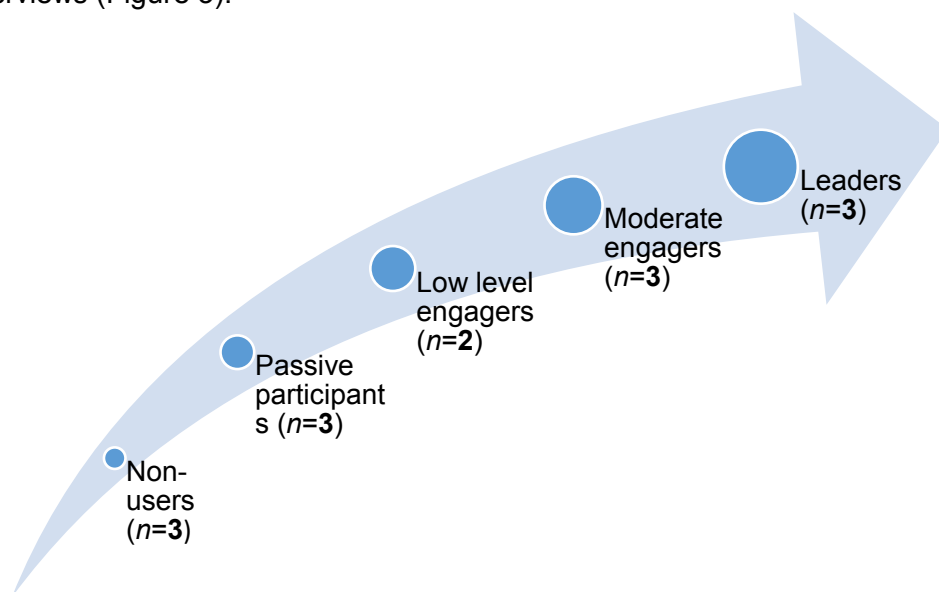


Figure 3 Digital media usage pathway - interviewees (n=14)

7.3 Land management professional interviews

As mentioned, a total of **14** land management professional interviews were conducted between July and September 2019. Each interview took approximately 30 minutes to complete (range: 25-45 minutes). As already mentioned in Section 8.1, depending on each participant's answers to questions in the screening/pre-interview questionnaire, some questions were omitted to suit the individual participant's circumstances (see [Appendix 4](#)).

7.4 Focus Group

One half-day (09:30-12:15) focus group was held on the 26th September 2019 at Sixways Worcester Rugby Stadium. The location of the Focus Group was chosen based on a review of the locations of each of the 49 volunteers; the location was set in the West Midlands, where there was a large enough cluster of participants. A total of 12 (staggered) invites were sent, with the aim of recruiting between 6-8 participants. The focus group was attended by **8** participants (see [Appendix 5](#) for the schedule).

In addition to some core questions, the Focus Group was an opportunity to test existing digital media materials, including:

Video – High production value

This was a professionally shot video exploring the topic of biodiversity in practice. The short, approximately 5-minute-long video, included 'vox pops' of different stakeholders and a variety of high production agricultural/rural scenes. The video is available on YouTube. We showed 92 seconds of the video.

Video – Low production value

This was a 'vlog' style video shot by a land management professional on site on a farm. As a consequence, the video is not professionally shot (it was likely shot on a mobile phone). The approximately 6-minute-long video explores the production of a wildflower meadow and focuses on the *process* of doing this, i.e. so someone could reproduce the steps. The video is available on YouTube. We showed 1 minute and 50 seconds of the video.

Video – Professional (whiteboard) animation

This production was a professional whiteboard style animation that explores the value of insect pollinators. The video breaks down a complex set of ideas by using sketches. The approximately 6-minute-long video is available on YouTube. We showed 1 minute and 17 seconds of it.

Podcast – Variable quality

The podcast was a variable quality production, where a farmer was interviewed on the topic of farmland conservation. The podcast is available online or through iTunes/Spotify and other major podcast repositories. The podcast was approximately 30 minutes in total, and we presented two separate one minute segments.

7.5 Digital Media 'Expert' Interviews

A total of three Digital Media Experts were interviewed during September 2019 (see [Appendix 6](#) for the interview questions). Participants included:

- Two social media managers from separate industry bodies
- The founder and owner of a large online farming forum

The focus group content and both interview questions/scripts were designed with Natural England and Defra colleagues. All interviews/sessions were recorded on a dictaphone and transcribed, verbatim.

Table 9 summarises the data sources and participant numbers:

Table 9 Summary of data sources

Data source	Target	No. of participants
Land management professional interviews	20	14
Focus Group		8
Digital Media Expert Interviews	5	3 ¹
Total	25	25

¹Note: One of these experts also attended the Focus Group, so the total number of people involved across the whole project = 24

7.6A note on structure

As a qualitative piece of research, the following text draws heavily on participant voice, i.e. quotes from the interviews and focus groups.

Note all utterances ('ums' and 'ahs') have been removed to make passages more readable. 'False starts' to sentences, repetition or words/sentences that are not deemed to be relevant to the point/narrative being presented are denoted by [...]. This is intended to make the quote easier to read.

To contextualise passages additional information may be presented in { }.

Some specific details of the interview content have been 'reduced' in detail to maintain anonymity.

Following each quote, the land management professional ID, their role, age and user type (for interviewees only) by way of contextualisation.

Passages of *italic* text denotes a commentary or reflection on the point and is intended to provoke thought and discussion.

8. An introduction to the sample

8.1 Study recruits (n=49)

By way of context, the preceding section reports on the wider sample of 49 land management professionals that initially signed up to participate in the project. As documented above, potential participants were required to fill out a registration form which captured basic details including age, role and any connectivity challenges they had.

As per Table 10, half of the sample were aged between 40-59 years old. Those over 60 accounted for nearly a third of the sample, whilst those under 40 accounted for just under a fifth of the sample. The lower percentage of under 40s is likely to partially reflect agriculture's ageing workforce; in 2016 the median age of farmers was calculated as 60 years old (see Defra, 2017).

Table 10 Age of sample (n=46)

	Frequency	Percentage
<40	9	19.6
40-59	22	47.8
60+	15	32.6
Total	46	100

Note: 3 participants did not give an age

Farmers accounted for the majority of the wider sample with agents/adviser being the second most common type of role held by participants (Figure 4). Note participants were able to assign themselves to multiple categories.

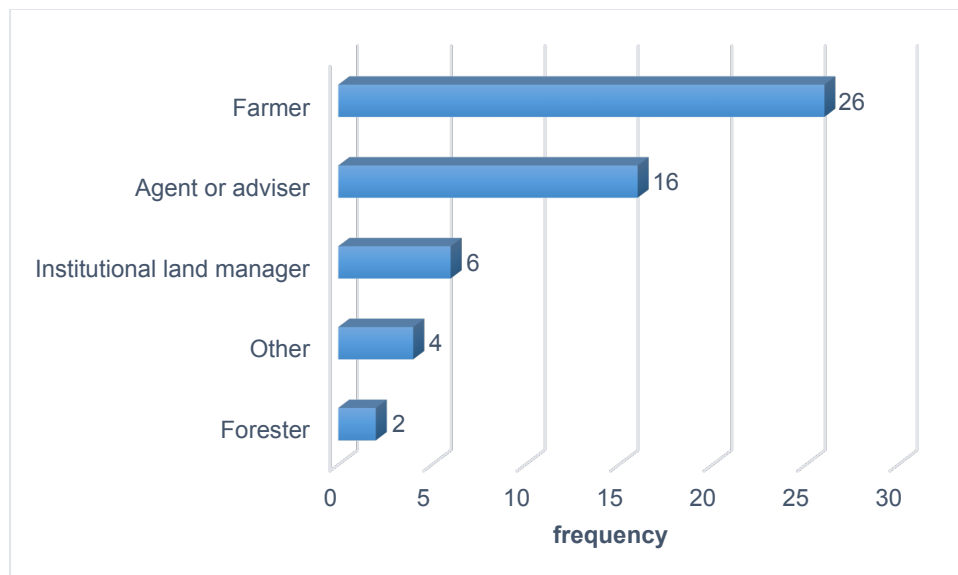


Figure 4 Participant roles (n=49)

As per Figure 5, laptops and smartphones were most commonly used to access digital media (84 per cent and 90 per cent respectively). This perhaps reflects the fact that land management activities necessitate time out of the office, therefore portable devices are important.

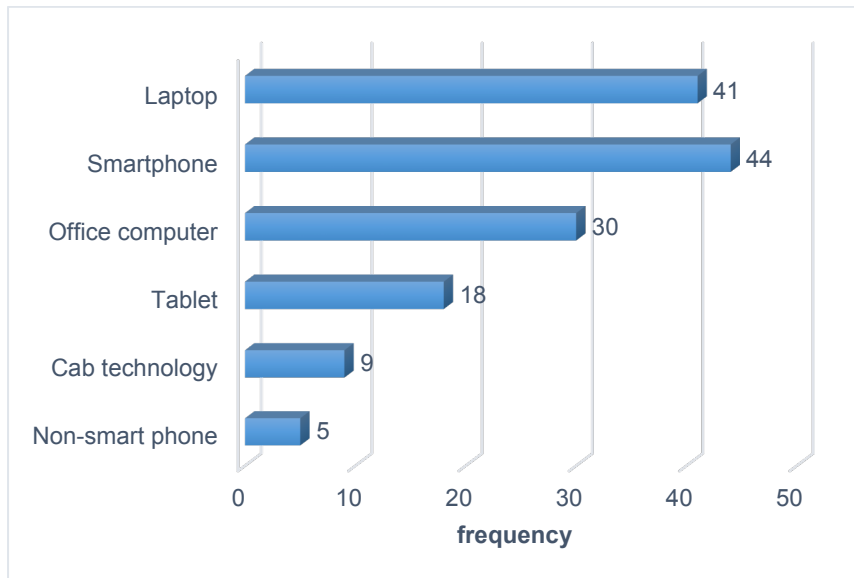


Figure 5 Technology use ($n=49$)

Participants were recruited across all English regions (with the exception of London). Representation was concentrated in the western regions. The high numbers in western regions is likely to reflect the fact that the Natural England team responsible for the recruitment were based in Worcester. It is likely their requests for participants would have had more purchase in nearby areas, i.e. the team's influence in local agricultural/land management networks.

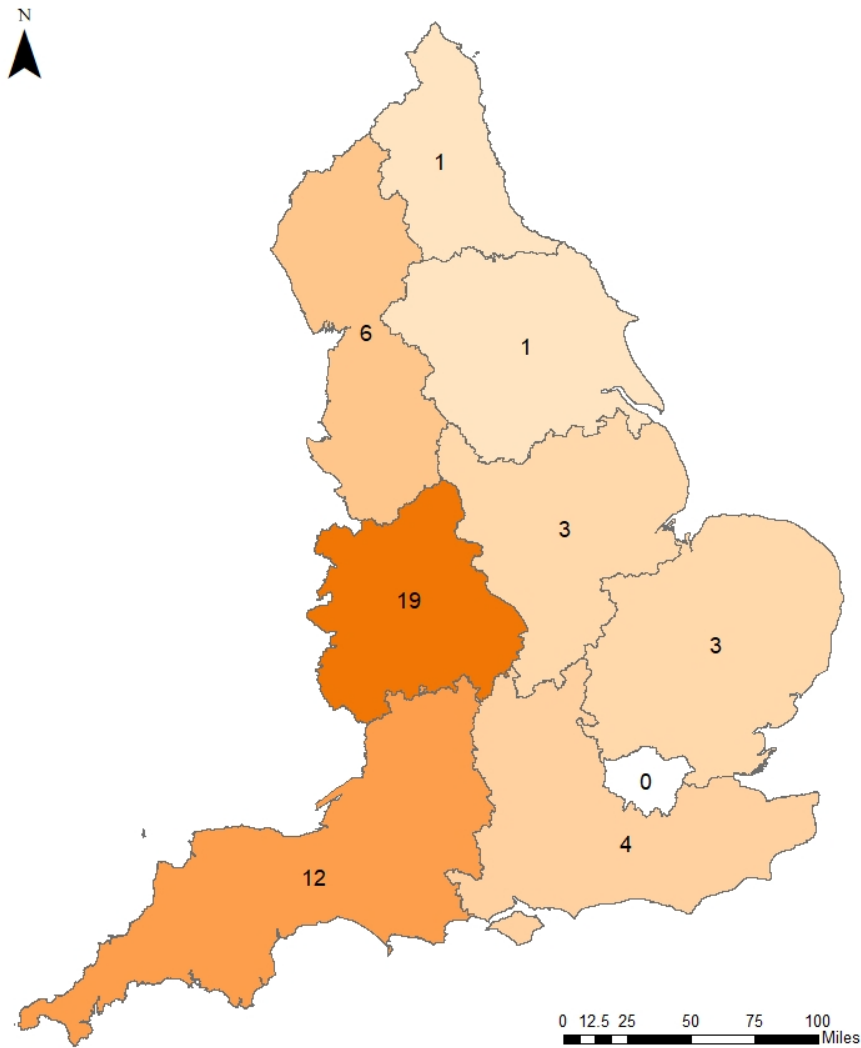


Figure 6 Distribution of the sample ($n=49$)

8.2 Project participants ($n=22$)

The project sample is comprised of 14 land management professionals (a subset of those described in Section 9.1) who participated in a telephone interview with the research team and a further eight who attended an interactive focus group concerning digital media.

As per Table 11, nearly half of the project sample were aged between 40-59, with just under a third being aged 60 or over. The remainder, just under a quarter, were aged under 40. These figures are broadly in line with that of the total sample of 49 land management professionals.

Table 11 Age of sample ($n=22$)

	Frequency	Percentage
<40	5	22.7
40-59	10	45.5
60+	7	31.8
Total	22	100

Farmers accounted for the majority of project participants with agent/adviser being the second most common land management professional type (Figure 7). Note participants were able to assign themselves to multiple categories.

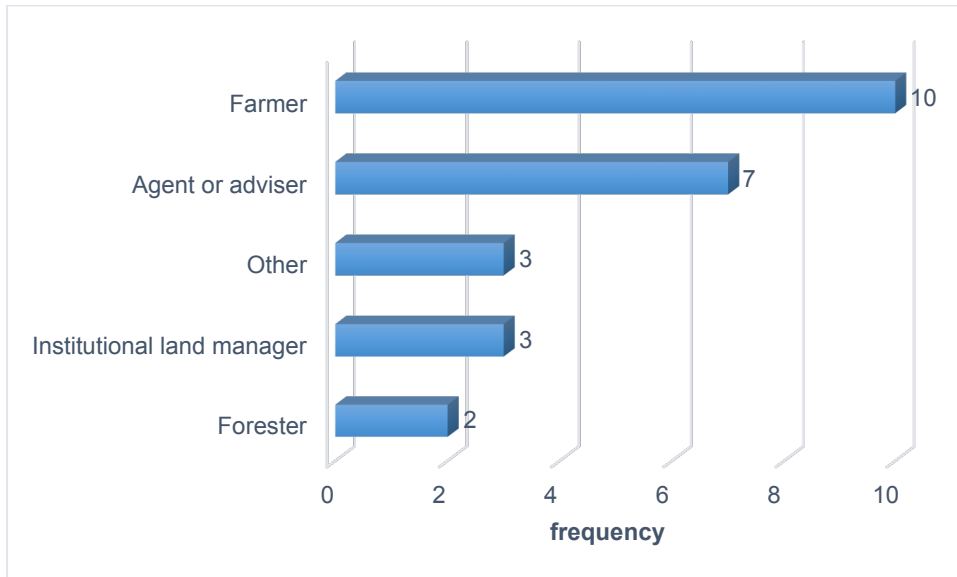


Figure 7 Land management professional type ($n=22$)

As per Figure 8, laptops and smartphones were the most commonly used forms of technology by the sample (90 per cent and 86 per cent respectively).

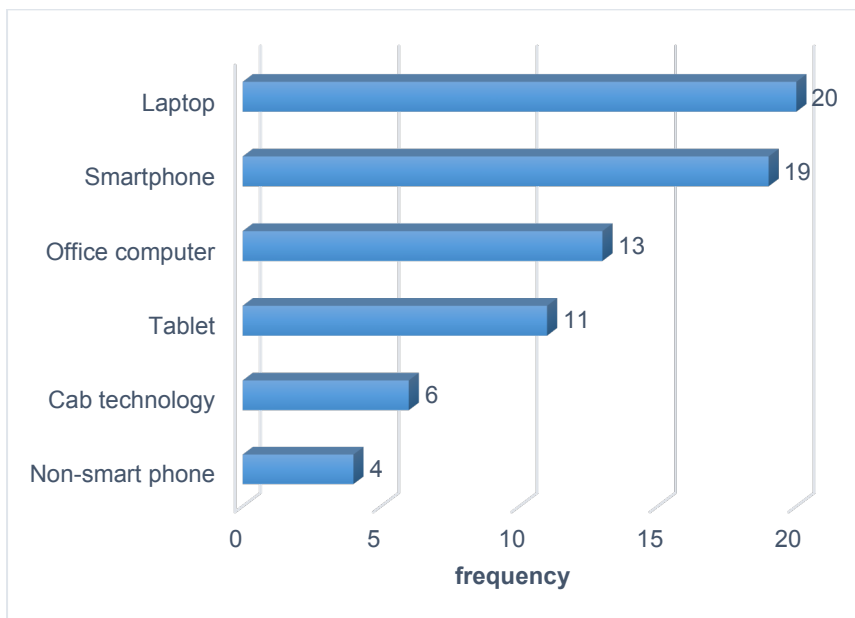


Figure 8 Technology use ($n=22$)

Project participants ($n=22$) were asked whether they experienced any challenges concerning technology. Just over a quarter (27.3 per cent) cited issues concerning broadband speed and connectivity.

As interviews were conducted via telephone, the geographical spread of these was balanced with just over 20 per cent being based in each of the North West, South West and South East. The East and West Midlands accounted for 14 per cent each, with the remainder being from the North East. As above, the Focus Group was conducted in the West Midlands, therefore an additional eight participants were recruited from the region (Figure 9).

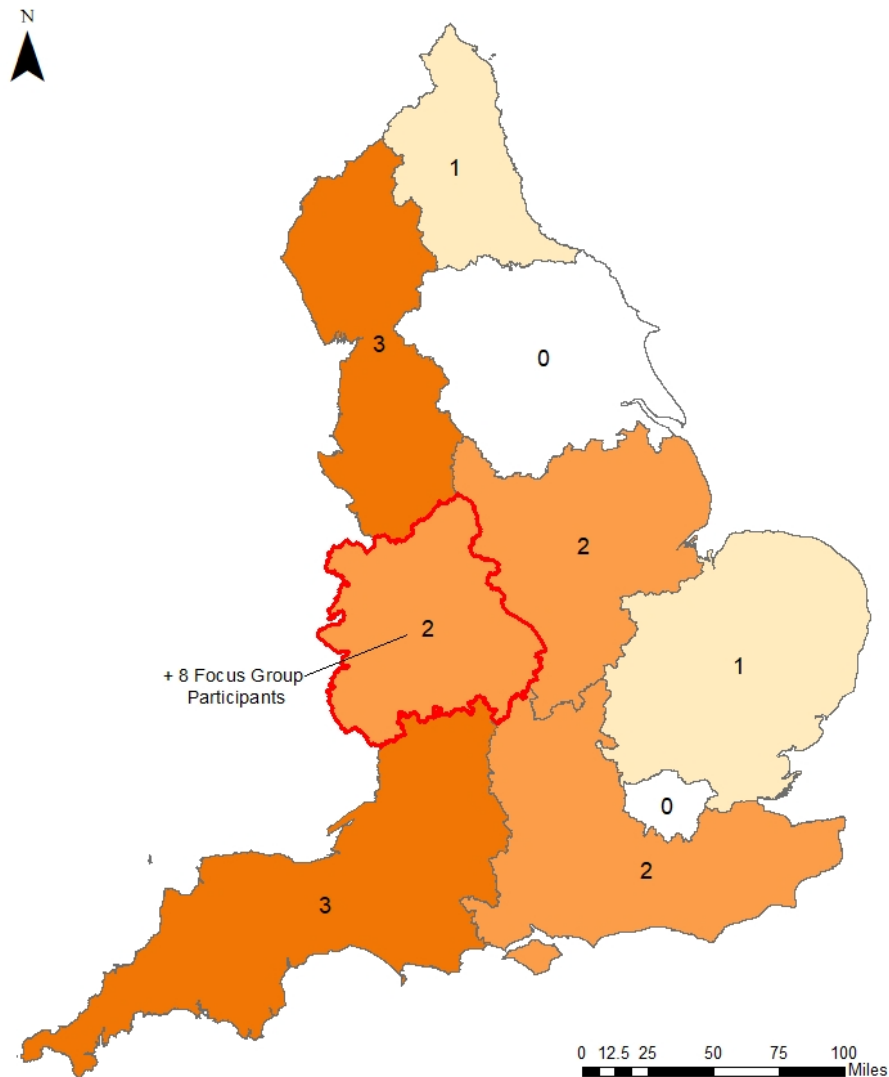


Figure 9 Distribution of participants (interviewees & focus group, $n=22$)

As per Figure 10 the most commonly used platform amongst project interviewees ($n=14$) was Twitter (42.9 per cent), with Facebook being the second most used (28.6 per cent).

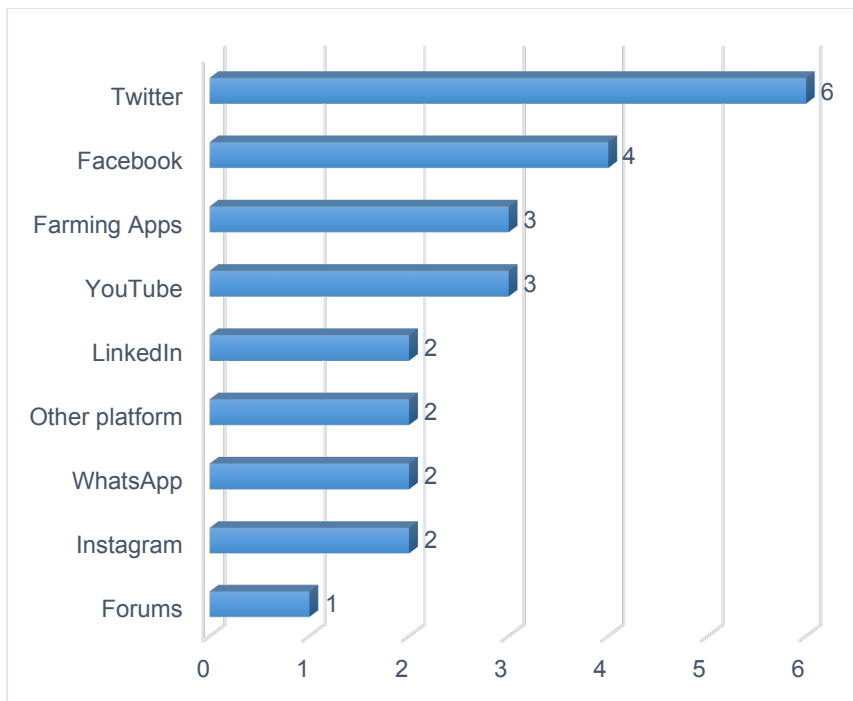


Figure 10 Digital media platform use by project interviewees ($n=14$)

9. Results from the behavioural analysis

The following sections outline the results from the behavioural analysis. The results are directly aligned with the project themes and objectives:

- **Audiences:** To understand the target audiences' relationship with digital media
- **Mechanisms and platforms:** To establish which digital mechanisms / social media platforms are most used by the target audience, to establish the best ways of reaching the target audience with ELM digital products
- **Knowledge transfer/exchange:** To determine the appetite from the target audience for the ELM digital 'new media' solution to incorporate two-way 'knowledge exchange'
- **Products:** To understand target audience usage of digital 'new media' products to identify which are likely to be the most effective ways of disseminating information to the target audience for each of the different levels of the ELM guidance
- **Trends:** To map out trends in use of digital media by the target audience, to provide trajectories of likely engagement in digital media at each stage of the ELM programme
- **Barriers:** To understand barriers to digital media use ¹⁶

9.1 Audiences

Objective: To understand the target audiences' relationship with digital media

Land management professionals' relationship with digital media is complex, multifaceted and changing. The following sections outline some of the key facets of this relationship.

9.1.1 The role of age

In line with previous research (e.g. Morris and James, 2017; Bogdanou *et al.*, 2013; Bonke *et al.*, 2018; LaBoeuf *et al.*, 2013) the association between age and digital media use emerged consistently throughout the interviews, with participants tending to associate it with younger colleagues and peers.

"The young / the farming community, the youngsters, keep in touch about / anything that they are doing within their life and so they can debate and help one another if they've got problems. I think that's more instantaneous / well probably quicker than picking up the phone actually" (Land management professional 11, 60+ Agent/adviser, Non-user)

"I think there's still a lot of suspicions over social media within the farming community, that's what I sense, but it's the younger generation who is using it at the moment, so yes" (Land management professional 12, <40, Agent/adviser, Non-user)

"{Do you think that digital media is helpful in supporting the delivery of work-related / to deliver agri-environment schemes at all?} I think with the younger

¹⁶ This is in addition to the original five objectives stated in the tender; the objective of understanding barriers was originally part of the 'audience' objective, but it emerged so strongly that it has warranted its own objective/section

generation it probably is because they are using it so much more and therefore, yes, it can be very useful for those people” (Land management professional 11, 60+, Agent/adviser, Non-user)

“I think there's a / a hesitancy, I'm not saying distrust, a hesitancy, particularly with the older generation with digital media” (Land management professional 1, 60+, Agent/adviser, Non-user)

However, when we explore the use of digital media across the cohort of participants, the relationship between age and digital media use appears far more nuanced. As a starting point, if we look at the following quantitative representation of the respondents' usage by age (Table 12), we note amongst the 14 interviewees, different user types were represented across all the age categories.

Table 12 Participant ages versus digital media user type

	Non-user	Passive	Low-level	Moderate	Leader
<40	1	0	1	1	1
40-59	0	2	1	1	1
60+	2	1	0	1	1

Like Dehnen-Schmutz *et al.* (2016) in their study of smartphone usage in the UK and France, we recommend that the impact of age be considered more carefully, i.e. it is – at the aggregate scale – a determinant of digital media use, but it does not *always* dictate usage of or interest in digital media. We make this point based on clear examples in our cohort of participants that contradict this accepted understanding (e.g. Land management professional 5, a farmer over 60 who was categorised – as per the screening questions – as a digital media ‘Leader’ and Land management professional 11, an Agent/adviser also in his 60s who was categorised as a ‘Moderate engager’). More broadly, Land management professional 5 commented on the uptake of digital media amongst his farming colleagues.

“I mean I'm amazed at how much farmers have locked on to it {talking about digital media} already and some of that is that, you know, you're on your own and you're not on your own then are you because once you're on social media you know there's plenty of other people with you” (Land management professional 5, 60+, Farmer, Leader)

Further research is needed to unpack the nuanced relationship between digital media use and age.

The case of The Farming Forum emphasises the idea that the relationship between age and digital media use is not a simplistic/linear one.

“So, this is probably what's quite interesting. The farming forum, our weakest demographic is under 25s. [Really, wow!] Really. We are weaker at under 25s than we are over 75s. [Blimey, I'm staggered by that, I think that's fascinating!] So, yes, and we've asked a lot of young farmers about this and the reason is, if you ask them, they say they're not farmers! [Okay] And they will say, oh my Dad's a farmer, or my Mum's a farmer, and my granddad's definitely a farmer, and in some cases, my great- granddad is still a farmer. [Still a farmer.] And what we see is this / and it's like an age break of about 25, so 25 to 35, is actually our

second most popular, umm, and with 35 to 45 they are our core audience. But it actually is under 25s comes last” (Digital Media Expert 3)

We posit this interest and use of digital media across the age groups, in contrast to previous literature and accepted norms, is linked to the increasing diversity and continued development of digital media products. There are now many ways of ‘doing’ or being on digital media and as a consequence, the world of digital media is no longer the preserve of those that have grown up with IT. Platforms can be user-friendly, accessible and open to almost anyone. The fact, as the above quote demonstrates, that succession can be slow and older generations can continue to be involved in the farm long after retirement age (Chiswell, 2018) gives older individuals continued impetus to utilise digital media for agri-environment decision making.

Recommendation 1: Overall, the data presented here suggests the importance of understanding digital media use at the *individual* land management professional level. This could include, further research into of how/why older land management professionals are using digital media. With this in mind it is important to avoid making rigid assumptions about age and digital media use when designing and targeting materials, platforms and/or training events at the land management community. At the aggregate level there is a clear association between age and digital media use, but this research has reminded us there are always exceptions and any resources or training should not perpetuate existing understanding around age and digital media use.

9.1.2 *Benefits of digital media: efficiency gains*

Notably, there was an appreciation – in the most part – of what digital media can or could do in the context of land management/agriculture, even amongst non-users and low-level engagers. Much of the value of digital media in this context related to its instantaneous nature:

“Things like [...] disease alerts, insect problems, that sort of thing. I would have thought they / ideally for Twitter because the minute it happens, it's out there, and then those people who are interested, it's / it just gets spread around doesn't it, very quickly, whereas / if you've got to wait for it to go in the Farmer's Weekly, or something like that, then it's probably too late” (Land management professional 5, 60+, Farmer, Leader)

“A lot more people are more inclined to scroll through a Twitter post than scroll through a 347-page document” (Land management professional 14, <40, Agent/adviser, Low level engager)

Similarly, the benefit of efficiency was widely recognised by participants. The idea that land management professionals could be freed from hefty reading or complex administrative tasks, was a clear appeal of digital media usage.

“You spend a day out there wrestling with the environment and large trees and things like that, you come back in the evening and the last thing you want to do is pick up a 50-page complex manual and try and get your head round it. A lot of farmers will watch YouTube videos and watch other practitioners talking about things because that's like watching TV and you see a lot more information being communicated in that way, but written stuff, they will save for a wet day, when

they've got to do their paperwork and they can't get out there to do / move the stuff around in the environment" (Land management professional 13, 60+, Forester, Passive participant)

{talking about digital media's value} A massive value. Because (a) we haven't got time to go to all the workshops, (b) if there is a workshop, and no disrespect to anybody, they are usually trying to fill out a day of nothing, you know, something that could be done in an hour [...] And then they pad it out for six hours and you're sat there for the last three thinking, if you'd literally just stopped speaking, I could go and actually go and do some work, instead of listening to this dross. So it is just a way / it just cuts out all the chaff" (Land management professional 6, <40, Farmer, Leader)

"Our Countryside Stewardship agreement came in almost 400 pages and it was very, very wordy, and there's a lot to sort of get through, you have to make the time to find / to get through it, just to get your head around it, whereas if it was something that's perhaps digitalised and much more easily digested, [...] then you know / yes, it could certainly be a help in actually implementing those schemes" (Land management professional 8, <40, Farmer, Moderate engager)

"I can remember huge envelopes with two or three hundred-page booklets relating to agri-environment schemes that you had to read or at least try and / pull out the information you needed for your purpose. So I can remember those type of documents, but I'm also now aware that information can be transmitted more quickly through social media or through electronic media and I think that saves / certainly saved a lot of paper and in terms of searching a document I think it's far easier perhaps to search for specific things within an online document than it is leafing through 200 pages" (Land management professional 9, 40-59, Farmer, Moderate engager)

"You kind of get to the nub of what you're trying to achieve and read that bit if that makes sense" (Land management professional 11, 60+, Agent/adviser, Non-user)

Even where participants may not have enjoyed digital media use, there was an appreciation and acceptance of it as a necessary tool for land management professionals. One Land Agent's experiences reflect these mixed feelings. He saw digital media as a means of helping his clients, and therefore a fundamental part of this role.

"It's a necessary evil as far as I can see [...] I mean obviously doing applications for basic payment incentives, Stewardship online, they are far easier than really doing it by hand work, hand paperwork [...] it has made life easier in that respect" (Land management professional 11, 60+, Agent/adviser, Non-user)

He continued:

"Anything that / yes, that can help me, to help them {talking about farmers}, I'm quite willing to use it and go forward really [...] well basically that we're all about and what we do and how we can help the farming community" (Land management professional 11, 60+, Agent/adviser, Non-user)

The reported **efficiency gains of digital media** are well-documented in the literature, for example Mills *et al.* (2019) talked about the benefits of social media – specifically Twitter – for "time constrained farmers", although within the specific context of sustainable soil

management (SSM). Elsewhere, Ingram *et al.* (2016) reported farmers' desire for succinct, simple communication. However, it is important to note that despite a clear desire for such communications, Ingram *et al.* reported how farmers attending said workshops actually ranked printed and hard copy materials above digital media products, including videos and social media. Therefore, whilst the results from this empirical research suggest that land management professionals are *au fait* with the potential benefits of digital media, previous research would suggest their understanding cannot be taken as an *actual* measure of digital media use; further (quantitative) research is needed to provide a sufficient insight into the true digital media behaviours of participating and other land management professionals.

9.1.3 The 'digital:traditional ratio': considering optimum levels of digital media use

Whilst participants' relationship with digital media was largely positive or appreciative, the exact role of digital media, relative to more traditional methods, was contested across the cohort. In short, the general enthusiasm for and appreciation of digital media should not be confused with a desire to replace traditional methods, namely face-to-face, which was upheld by many as the gold standard (as was also observed Mills *et al.*, 2019).

"Certainly, in the agricultural sector it'll (n)ever replace it {face-to-face}." (Land management professional 1, 60+, Agent/adviser, Non-user)

"Face-to-face, nothing will replace face-to-face, if I want to go and talk to my advisers, then I will get much more out of a 45 minute meeting, which sometimes opens up new areas that I hadn't thought about looking at an email or something that's come through the post and I can't see that stuff / important stuff like contracts or tenancy agreements or whatever I like to have hard copy of that" (Land management professional 3, 60+, Farmer, Non-user)

"It's useful, but like face-to-face, I mean we have like the guy that comes out [...] our local Case Officer, I don't know what his / what you would actually call him. But he is invaluable because he will just tell you the actual process" (Land management professional 6, <40, Farmer, Leader)

For some, the potential for digital media to replace face-to-face assistance was dependent on levels of prior knowledge on the particular topic, i.e. the appropriateness of digital media will vary across different contexts and will not fit all situations or land management professionals.

"If your understanding's pretty good on a topic then I think digital media could definitely replace that one-to-one situation, but I think [...] / where you find it more difficult to understand a specific topic, I think a one-to-one situation is irreplaceable in that sense, just because of the immediate feedback and understanding what feedback is required" (Land management professional 7, 40-59, Institutional land manager, Passive participant)

One Institutional land manager expressed particular concerns around the inability of digital media to replace the legal-robustness of paper/hard copy. This is particularly pertinent amongst those managing land on behalf of other people, such as land management professionals working for companies/institutions, or those advising others on land management decisions, where issues of liability take on a unique significance. In this case, the land management professional describes digital media as a 'supplementary thing', suggesting that certain aspects of land management support will be more suited to digital

platforms than others. The disinterest of agents, advisers and institutional managers has been reported elsewhere in the literature (Newbury, Humphreys and Fuess, 2014; Philips, Klerkx and McEntee, 2018). Concerns around the legality and liability implications of relying on material shared digitally could – at least in part – explain this reluctance to engage amongst these types of land management professionals. It will also be important to consider this specific (perceived) deficiency in the development of digital media materials for these kinds of land management professionals.

“I can't see it replacing things [...] it just depends on the circumstance really. Some things are very suitable for it and some I can't / legal document for signing, things like that, some land owners I can see will always want a piece of paper that's signed, in pen, and they've got it in their filing cabinet. We definitely prefer that because that's evidence again, but like I say, we are quite keen on the liability side, so we always want something that's proof that we've got that payment, has made that agreement” (Land management professional 2, 40-59, Institutional land manager, Low level engager)

There were of course participants who simply just preferred hard copy over digital. Whilst he associated this with being ‘a bit old-fashioned’, it serves as a reminder of the importance and continued value of hard copy materials in this discussion.

“Sometimes I'm a bit old-fashioned that I do like a letter, because it's just a hard copy, you can pin it on the notice board, in the office, and you think I'll come back to that, every time I've got like a spare afternoon I'll come back to that” (Land management professional 6, <40, Farmer, Leader)

Digital media resources often provided an initial step in a process or grounding on a topic which was a gateway to seeking further materials or resources.

“Well just looking at the basic information, it's very useful, because it gives you an insight to start with, but I think maybe face-to-face is better if you've got questions and queries around it” (Land management professional 11, 60+, Agent/adviser, Moderate engager)

“{talking about digital media} It would help me get something started, that's actually a very good expression of what I've been trying to say already, you know, so it's get a little bit of information and that would / [...] take me sort of quarter a way up the ladder perhaps” (Land management professional 3, 60+, Farmer, Non-user)

“We planted some hedges about ten years ago and they need to be laid and I did watch a video of somebody doing it, I just sort of looked at it and thought, well, will that work for us, I don't know, [...] who shall I turn to? I've got someone coming next week who is a hedge layer who will be able to point me hopefully in the right direction, so I'll do so much research, so I don't look a complete tit when it comes to sitting down and talking to someone about hedge laying” (Land management professional 3, 60+, Farmer, Non-user)

On balance, the optimum use of digital media was seen as part of a broader suite of other tools that can assist and inform land management professionals in their agri-environment decision-making – or what Mills *et al.* (2019) describe as a ‘blended approach’ (see also Wick *et al.* (2019)). The continued importance of face-to-face meetings and engagement should not be seen as a criticism of or opposition to digital media tools, but reinforces the point that they should be carefully designed to work together. During the Focus Group,

participants articulated the need for a combination of digital and traditional methods and resources as a ratio. Box 8 offers a definition of ‘traditional’ communication and dissemination methods.

Box 8 Definition of ‘traditional’ communication and dissemination methods

Traditional methods encompassed a number of types of communication and dissemination. In the broadest sense, it refers to non-digital methods and the typical package of methods used to communicate and disseminate before the advent of digital media. In the most part, it denotes face-to-face (one-to-one) communication, but in some cases also included hardcopy materials.

Generally, a ratio of 80:20 (digital:traditional) emerged as the optimum combination.

“It’s meeting on site, looking at a problem face-to-face with an expert you can make decisions then that you’re never going to be able to make through remote social media. There’s too many people [...] it’s all based on a square computer screen and they’re making all these decisions, and you’ll find that the majority of the time they are appropriate but there are occasions that totally the wrong decision is made because of a lack of understanding about the whole situation. And that’s what worries me about this and that’s what worries me about Natural England(’s) reduction in staffing levels [...] it’ll refer you to some of these relevant sites and you still can’t find somewhere where you can get the appropriate answer [...] [I] think 80 per cent of it would be perfectly okay, but there’s 20 per cent that you need that, you need to be able to call on experts” (Focus Group Participant 4)

A minority of participants felt digital media could play more of a role, but justified this by suggesting that it would make the non-digital support and content more effective because there would be less of it, i.e. it would require a very small number of personnel to be trained to deliver said support. Even amongst these digital advocates, there was the acceptance that digital media could not and should not replace traditional mechanisms entirely.

Focus group extract

Focus Group Participant 1: I’d probably go a bit more digital, 90:10 (60+, Farmer)

...

Focus Group Participant 2: I’d be happy to like 99 per cent digitally, I would still want that absolute final, right if we get to the point where it’s failed, my situation is unusual, something needs a person to be able to come out, so you’re going to need someone. 100 per cent I think never exists, but I’d go as far as 99 per cent (40-59, ‘Other’)

...

Focus Group Participant 4: But I don’t think it’s there yet (60+, Farmer)

...

Focus Group Participant 2: But those guys can be better, because if you have very few of those people they can be really good. Rather than having to employ a lot of very young people, actually you can employ the top people and there isn’t many of them (40-59, ‘Other’) Continued...

...
Focus Group Participant 3: Better than a student reading off a page (Focus Group Participant 3, <40, Agent/adviser)

...
Focus Group Participant 2: Yeah it's no good at the moment; you've got a lot of people who are frankly no help [...] a lot of the personal help you get now, [...] You know when someone like Defra get busy and they employ a lot of students, they're reading a script [...] It's a false illusion you're talking to someone who knows what they're talking about, they're just following a simple flow chart (40-59, 'Other')

...
Focus Group Participant 4: If you've got a question, they won't have an answer for you if it's not on that script. And those are the questions that we do need answers; the ones that aren't on the blueprint, are where we need the people who actually know this stuff and can give us sound advice and they are the exception to the rule (60+, Farmer)

Overall, it was felt that digital media had significant potential to support land management professionals in their agri-environment scheme work (and beyond), but this should not be conflated with support for a move towards support provided entirely by digital media.

"I know Defra are starting to produce their own YouTube videos and they are very handy, so I think in some instances, yes, that could be a replacement if the person using it has the skill set to be able to use it properly. But certainly when it comes to land management and advice I think the majority of farmers prefer face-to-face so that they can discuss and interact with the advice and if they don't agree or don't understand, explain their point of view or have the other point of view explained to them, to get a better understanding, which you can't do with / or you can't do effectively with a keyboard because you don't get the nuance of interpretation, face-to-face" (Land management professional 1, 60+, Agent/adviser, Non-user)

The above excerpt summarises the desired balance between face-to-face and digital sources of support/information.

Recommendation 2: Digital media should be considered as one part of a broader suite of tools for engaging with land management professionals. Therefore, any digital media strategy developed to engage with land management professionals should situate digital media alongside more 'traditional' methods e.g. face-to-face communication and hardcopy materials, and should not seek to *entirely* replace 'traditional' methods. Land management professionals should be able to pick which ones work for them and should be offered the flexibility to do so.

Key point 1: Enthusiasm for digital media amongst land management professionals should **not** be interpreted as a desire to move towards completely digital means of communicating and receiving information.

9.1.4 Trust

The issue of trust – i.e. whether a source could be trusted and how/where to source trustworthy digital media sources – was a **significant theme** to emerge from the empirical engagement. There was notable concern (and even in some cases, fear) amongst participants about the trustworthiness of digital media, particularly relating to social media posts, as the following excerpt from the Focus Group denotes. This concern also means that engaging with the “overload of information” (Land management professional 10) from unofficial sources requires extra work in terms of ‘filtering’ the information. This suggests a perception amongst the target audience that there is a need to critically engage with information sourced on digital media, in a way that was not necessary/required for information shared via other means or sources.

Focus group extract

Focus Group Participant 3: There’s this thing within digital media that you do have to be (<40, Adviser/Agent)

Facilitator: Protect yourself

Focus Group Participant 3: You do have to protect yourself. You have to be aware. You have to be, okay, what you’re being told is not necessarily unbiased, it’s not necessarily true. You just have to read through and make your own mind up (<40, Adviser/Agent)

Focus Group Participant 5: That’s very difficult if you don’t interact much... And you know, we don’t have a clue what’s bad and what’s good. It’s very difficult (40-59, Farmer)

The issue of **legality and liability emerged strongly** again here. The idea that information sourced from non-official sources cannot be trusted to base decisions or actions on, particularly where outcomes are linked to payments or official scheme requirements and may result in a fine or penalty.

“I tend to be *a lot more or very circumspect* of information on the internet in general because often it’s just an individual’s opinion, so I would always try and verify things via an official website and I do quite regularly email the Forestry Commission or the Environment Agency or Natural England for clarification when things aren’t specified or detailed on the web pages. [...] Yes, you know, “so why didn’t you follow the rules?”, “ahh well, because / some bloke on the internet told me I didn’t have to”, not going to be much defence, but if I can say I actually emailed you about that on such and such” (Land management professional 10, 40-59, Forester, Passive participant)

“[Do you refer to anything sort of you know if you’re really stuck do you go sort of off piste and look at any sort of non-official sources or does it tend to be ...?] No. Because it’s not worth my while really. They are the ones that are going to either fine me or find fault, if they are implementing it, you might as well go with the rules that they are and if you just went on some sort of like farming forum, it’s basically just pub chat isn’t it?” (Land management professional 6, <40, Farmer, Leader)

“I follow the NFU and individuals within the NFU tend to post quite regularly. I tend to trust their sources, even though if I don't agree with their opinions” (Land management professional 9, 40-59, Farmer, Moderate engager)

Owing to its credibility and legitimacy, opportunity for peer-to-peer/farmer-to-farmer interaction is upheld in the wider literature as a key benefit of digital media (e.g. Ingram *et al.*, 2016; Jespersen *et al.*, 2014; Philips *et al.*, 2018; Mills *et al.*, 2019).

However, in the context of agri-environment decision-making – where options and agreements are prescriptive and ‘getting it wrong’ could have (negative) impacts on delivery of said agreements – more value was placed on official digital media materials and sources. There was definite value placed on interaction with peers via Twitter, but this was generally secondary to more ‘official’ – and therefore trustworthy – sources. This contradicts our hypothesis that farmer-to-farmer knowledge remains just as credible, salient and legitimate (Ingram *et al.*, 2016) on digital media as it would be in the real world. The level of prescription associated with an AES is an important consideration in the development of any digital media strategy, i.e. where a scheme is particularly prescriptive, unofficial sources might be less utilised or useful, whereas in a more open scheme a higher value may be placed on unofficial sources. If engagement with unofficial sources continues to be considered ‘risky’, strategies may need to be researched and developed to facilitate engagement with wider sources.

“Obviously from a website or something like that, you know, that is at source, or if it's been like Government funded, then on a farm, again, that's as good as gospel. And then after that you are looking at farmers that you know. I use Twitter quite a lot. I'm not on Twitter. I just look at it. So if I need to find something out I might / and I think oh that's a bit new or a bit on the edge, I'll search in Twitter, but then if I'm looking through something and there might be some farmers on there that are regulars, that are worth looking at” (Land management professional 6, <40, Farmer, Leader)

It is interesting to note that Land management professional 6 saw Twitter content as an opportunity to research something “that's a bit new or a bit on the edge”. Given the potential importance of unofficial digital media exchanges to innovation and knowledge diffusion (see Burbi and Hartless-Rose, 2016), effort needs to focus on how best to cultivate such sources in a way that enables land management professionals to feel able to read and/or engage with them.

Recommendation 3: A means of supporting land management professionals in engaging with unofficial but potentially innovative content is required. In addition to clearly communicating the less prescriptive nature of ELM to build confidence in land managers finding their own way of delivering environmental outcomes, this could include training land management professionals on using different digital media platforms and content, e.g. advising on/signposting to reputable sources; training on how to check reputability and engage critically with digital media content.

There was also some suggestion of an *operational need* to look beyond official sources. In one case the participant attributed this specifically to the failures of official sources to communicate effectively. Another participant suggested his broader engagement reflected the variety of sources his clients would have been engaging with.

“I'm afraid I find Defra very, very poor(ly) communicated. So on the information that we want really you need to get from alternative sources.” (Land management professional 1, 60+, Agent/adviser, Non-user)

“We have to look at broader materials because, if you think about the sort of people I'm dealing with, they take their information everywhere from Twitter through to articles in The Guardian written by George Monbiot through to Countryfile, [...] / so we have a pretty broad what you might call horizon scanning” (Land management professional 13, 60+, Forester, Passive participant)

In sum, this evidence hints at an appetite for official and trustworthy digital media content. Whilst the digital outputs of their peers can be of value to land management professionals, there is a suspicion around this which is fuelled by a fear of making a costly mistake. In turn, many land management professionals are feeling forced to limit their engagement to trusted sources e.g. NFU or AHDB.

Recommendation 4: The evidence presented here suggests a pressing need for more diverse digital media content that is verified and can be trusted. An example would be a Natural England monitored forum that can offer land management professionals the opportunity to share their first-hand experiences with their peers but in an official/trusted space.

9.2 Mechanisms and platforms

Objective: To establish which digital mechanisms / social media platforms are most used by the target audience, to establish the best ways of reaching the target audience with ELM digital products

A range of digital media mechanisms and platforms were referenced across the interviews and focus group. Although the following discussion will draw on the qualitative data collected as part of the behavioural analysis, Table 13 uses some quantitative data to give a flavour of the different digital media platforms being used amongst the 11 digital media users amongst the 14 participants interviewed. Notably, eight platforms were mentioned with two ‘others’ listed. Twitter was the most utilised (used by 42.6 per cent of land management professionals). Twitter’s popularity in the agricultural community has been observed elsewhere; based on their empirical findings, Mills *et al.* (2019: 201) claimed “they [farmers] did not think any other social media were better for the purposes of knowledge exchange or more user-friendly”.

Table 13 Digital media platforms used amongst interviewees ($n=11$)

Single digital media platform	No.	%	Broad types of platform	No.	%
Instagram	2	14.3	Farming apps	3	21.4
WhatsApp	2	14.3	Other platforms	2	14.3
LinkedIn	2	14.3	Forums	1	7.1
YouTube	3	21.4			
Facebook	4	28.6			
Twitter	6	42.9			

Note: the responses are divided into 'single digital media platforms' and 'broad types of platforms' to reflect the fact there are many different types of farming apps and forums etc.

The breadth in range of digital media platforms emerged strongly in the expert interviews, as the Digital Media Experts listed the range of platforms they worked on.

“[And is that across all sort of social medias, so Twitter, Facebook, Instagram?] Yeah, Twitter, Facebook, Instagram, Pinterest, as well for our more consumer-facing side of channels. [Okay great. And do you have any [...] presence on YouTube or anything like that?] We do, but I don't think we really utilise it for what it's supposed to be. It's more like a place to house things, videos, more than broadcast them” (Digital Media Expert 1)

This breadth was also reflected in land management professionals' narratives.

“I find I get information just chiefly from Instagram and a bit of Facebook [...] I use YouTube a bit” (Land management professional 8, <40, Farmer, Moderate engager)

However, an understanding of what digital media platforms participants were using only goes so far. There were clear preferences for different platforms and mechanisms across the cohort, and critically, **different platforms were seen to provide different things or suit certain topics**/aspects of land management.

“We've done a couple of YouTube videos about us working with farmers and those have been very well received. I think that would help if we were going out to talk to farm groups, video would help us to get the message across, at least for an introduction into a scheme, or something like that.” (Land management professional 12, <40, Agent/adviser, Non-user)

“Cross-compliant regulations and for example the new farming rules for water, I think that lends itself to social media. It's another way to getting the message out there and even just a helpful kind of reminder to land managers / I definitely think that lends itself to social media.” (Land management professional 12, <40, Agent/adviser, Non-user)

“WhatsApp is generally used for discussion between friends and like-minded people and/or like-minded people who I have a business involvement with” (Land management professional 9, 40-59, Farmer, Moderate engager)

The 'efficiency' of Twitter was clearly valued amongst land management professionals and may go some way in explaining its popularity in the land management community.

It also aligns with land management professionals' desire for information to be delivered as efficiently as possible (as discussed in Section 10.1.2).

"On Twitter, there might be three or four pictures, or / [...] a brief synopsis of what's gone on, I always think that's quite good, quite fun, because then it lets you sort of like reverse engineer, you can go back and find what they are on about" (Land management professional 6, <40, Farmer, Leader)

Videos were also considered to be very useful.

"Video, I find really useful" (Land management professional 8, <40, Farmer, Moderate engager)

"I don't know what the option is, but I keep putting in to YouTube FG12, that's the option code, and video it, then yes, bang it's done. So, I could see usage including what we have just done recently and apart from probably good practice or introducing to new options, like if / if an FG13 came out, option, and they said on Twitter, there's an FG13 and it helps with you know that corner of the field, then that would be useful" (Land management professional 6, <40, Farmer, Leader)

There was some evidence of dislike of Facebook as a 'delivery mechanism' amongst land management professionals. Facebook was felt to fall somewhere in between providing 'short, sharp' snippets of information and more detailed content.

"Things like Facebook [...] I don't think is a very good medium for communicating re farmers because it falls between the quick reminder thing that you can put on Twitter and the kind of article you'd want to put on a web page, information or a video or whatever, so Facebook I think will probably fall by the wayside for this kind of stuff. It doesn't have a good delivery mechanism" (Land management professional 13, 60+, Forester, Passive participant)

"I'm not on Facebook. I can't stand [it] because Facebook is one of those things where people only put on stuff that's really good [...] They share the good bit don't they [...] I'm not on it full stop. But with Twitter it's short and sharp and tweeted isn't it and then you can delve deeper. I always like it when they put a link on it underneath. So you know this was like our day at whatever and we looked at soil structure and then there is a link back to where the funding came from for it or whatever" (Land management professional 6, <40, Farmer, Leader)

Concerns over privacy and personal data were also associated with Facebook, owing to the recent 'Cambridge Analytica' scandal and other negative press. This concern echoes the findings of Chowdhury and Odame (2013) who cited concerns about privacy, security and proprietary rights as determinants of social media use amongst both farming and rural communities.

"I'm not on Facebook. I don't Tweet. And I'm struggling to find a reason to use Facebook. And the example there might be we've / in the last year, set up a local farmer cluster and we do that by email and somebody said, should we have a Facebook page, and most people just said, well, if we do, we're not going to use it, I don't like Facebook for other reasons and that's sort of privacy as much as anything I think" (Land management professional 3, 60+, Farmer, Non-user)

Whilst only one of the 14 interviewees claimed to be utilising forums, the Expert Interview with The Farming Forum suggested a real demand for such services from the farming

community. The trajectory of The Farming Forum – from its inception in 2013 – to having 275,000 readers at time of writing – demonstrates this.

“The Farming Forum has gone from being well not existing, six and a half years ago, to now being the biggest website in farming, I think we serve more pages than anyone else, is testament to the fact that it was something missing in the market. [There was a demand for it.] Yes, farmers wanted to talk to each other” (Digital Media Expert 3)

The case of The Farming Forum reiterates the idea that social media platforms can serve multiple functions for different people in the farming/land management community; the content ranged from technical and academic, to light-hearted and funny. This demonstrates there is no one way of using digital media, nor is there one motivation for using digital media amongst the land management community. The success of The Farming Forum suggests a successful digital media platform will allow for this flexibility, i.e. to be as appealing to as many different types of users as possible.

“We've incorporated news and technical articles in my area. Those articles now get pushed around in the content as well, so as well as reading what maybe your friend J. had for dinner yesterday, or watching pictures of his tractor being stuck, as they got early this morning, there's also a technical article next to it, to allow again increase this concept of knowledge transfer” (Digital Media Expert 3)

Later in the interview, he continued:

“There is a fun side to it and it does provide gravity and light heartedness and it's that social element to it. It's the virtual pub [...] where there's the guy who knows what he's talking about, the know-it-all, who just will talk forever [Yes] Probably doesn't know what he's talking about. There's the drunk guy in the corner spoiling for a fight” (Digital Media Expert 3)

This suggests a successful digital media strategy will offer different ways of engaging with content shared via digital media, produced by a range of stakeholders.

Recommendation 5: In line with the fact that different platforms and mechanisms fulfil a range of different purposes within the land management community, any digital media provision needs to be diverse and offer a range of ways of engaging with it, i.e. avoid focussing on a single type of mechanism or platform. Any provision should be dynamic and flexible in terms of the way it allows participants to engage with it.

9.3 Knowledge transfer / exchange

Objectives: To determine the appetite from the target audience for the ELM digital ‘new media’ solution to incorporate two-way ‘knowledge exchange’

Although there are exceptions (Mills *et al.*, 2019), previous research has tended to demonstrate the use of digital media for the ‘classical process’ of knowledge transfer: that is, single-direction information dissemination (Chowdhury and Odame, 2013; Philips *et al.*, 2018; Kaushik *et al.*, 2018).

Although there were pockets of true knowledge exchange, knowledge transfer was dominant across the experiences of those interviewed. Most notably, two of the Digital Media Experts noted the lack of knowledge exchange across all their digital media platforms:

“I think from our main corporate account it’s more one-directional. But we’re trying to create that conversation at the moment; we’re really trying to work on that. But I think that we almost get that from our, the people who also work [...] in the company. Like we encourage them to almost be our ambassadors” (Digital Media Expert 1)

“{talking about knowledge exchange} Yes, I do see that, occasionally. I don’t see it all that often to be honest but I do sometimes pick up on people having conversations, say they’ve experienced the same thing or what they tried instead. I can’t think of an example off the top of my head, but I do see that” (Digital Media Expert 2)

The land management professionals interviewed reiterated the point that knowledge exchange was not something they were involved in. However, they also expressed a notable enthusiasm towards it – as ‘something they might do in the future’. This suggests there is an appetite for it, but it is yet to be fully realised in the Land Management community. Digital networks represent ‘weak ties’ – which are thought to provide a flexible network for the transmission of ideas and are understood as a key source of new information for land management professionals.

“I think we’re hoping to use it as a little bit of a knowledge exchange because it’s always good to get other people’s views on it” (Land management professional 4, 40-59, Agent/adviser, Leader)

“There’s definite potential for discussion and debating, it’s just something I don’t do [...] I think that would be definitely a way that we’d want to use it in the future” (Land management professional 12, <40, Agent/adviser, Non-user)

Whilst fewer participants reported engaging in knowledge exchange activities via digital media, there was nonetheless evidence of quality knowledge exchange going on. As Mills *et al.* (2019) observed in their exploration of social media for SSM, Twitter emerges from our interviews as the optimum forum for knowledge exchange, facilitating dialogical forms of communication across a variety of topics.

“There are some good like Twitter forums, I think usually now the way that we share information like social media, [...] when you can comment and reply, it is kind of its own discussion as well, so it kind of [...] / do those once a day kind of thing [So is that something that you feel you’d perhaps be interested in sort of taking part in in the future, I mean, sort of discussion forums of experiences [...] agri-environment schemes?] Yes, absolutely, I mean, for example, if there was someone I followed on YouTube or on Instagram and then there might be a comment about a farmer saying well this works for us because of X, Y and Z and you know that information could then be” (Land management professional 8, <40, Farmer, Moderate engager)

“There have been a couple of absolutely fantastic debates on Twitter in the last few months about hedgerow management that actually became very balanced. It started off as quite argumentative but probably got to 150-200 tweets and responses in timelines where people actually came around to agreeing that you do need varied hedgerow management rules that work, but you would / the

person / if you're trying to gather information from it and look from it, you've got to know what you're on about" (Land management professional 4, 40-59, Agent/adviser, Leader)

Structuring interaction and debate amongst land management professionals online could be a way of facilitating such interaction. One example that emerged from the data collection was the concept of AgriChatUK.

	<p>'AgriChatUK' is a weekly Twitter thread which invites Twitter users to "share thoughts and opinions on every farming topic" every Thursday at 8pm. It started in April 2011 and aims to facilitate discussion amongst farmers on Twitter. The central aim of #AgriChatUK is to give members of the agricultural community a place to share ideas, debate issues and connect to others in the industry. Although the topics/themes are set by the AgriChat team, it is an open and public forum. Topics/themes have included soil health, drones, diversification and succession planning.</p>
<p>Image source: http://www.agrichatuk.org/</p>	

There was definite feeling amongst those that either participated in some kind of knowledge exchange (actively or passively) that doing so could make them vulnerable to online abuse (see Section 10.6.4 for a more detailed discussion of this). It is important to note that fear of making oneself vulnerable is *actually deterring* participants from engaging in knowledge exchange; some suggestions for fostering a safe online environment – and thus encouraging knowledge exchange – are presented in Section 10.6.4. Closed WhatsApp groups (typically including peers/friends/colleagues) provided an alternative to public knowledge exchange; allowing exchange without concerns around online vulnerability. *Given the fact group members are typically recruited from small pools of (like-minded? geographically concentrated?) peers/friends/colleagues might the level of knowledge exchange be limited in comparison to opportunities provided by public platforms such as Twitter, YouTube or Instagram? Equally there may be incidences where groups limited to local members may be particularly useful, i.e. where they are dealing with local issues such as local pests/disease concerns or relating to a particular microclimate.*

"I find useful to be on that WhatsApp because other people have problems and I can help them or mostly it's them helping me. [Okay.] So if there's something wrong or something comes on the screen, I can WhatsApp, and very rarely (do) you not get a reply from about six people saying, we just do this [...] [How do you get sort of involved in a WhatsApp Group, because it's obviously a little bit more behind closed doors?] Yes, no, you're effectively / usually invited. [Okay.] It's a case of / we go to a meeting and we're in a group and they decide that WhatsApp is the easiest way of doing it" (Land management professional 5, 60+, Farmer, Leader)

As depicted in the above quote, WhatsApp groups are typically a digital manifestation of an existing offline group, comprising of individuals that already know each other or people that have attended the same meeting/are interested in the same topic. In this sense, WhatsApp groups can be seen as a 'digital extension' of this offline group; allowing communication to continue after meetings or events.

As was the conclusion in the literature review and remains true here, digital media – particularly platforms such as Twitter, YouTube, WhatsApp and Instagram – offers a clear and definite potential for knowledge exchange. Facilitating ways for land management professionals and other members of the community to participate openly, safely and without fear emerges as a priority for any digital media policy or platform design for Natural England / Defra.

Key point 2: Whilst knowledge transfer remained the dominant method of engagement for participating land management professionals, there is a burgeoning appetite for knowledge exchange. Carefully designed platforms and mechanisms (i.e. that safeguard participants from online abuse) would likely increase participation significantly.

Recommendation 6: Engagement in knowledge exchange could be fostered by means that help land management professionals feel they can participate in open and honest (public) exchanges, safely. This could include policed or monitored forums.

Recommendation 7: Further engagement with The Farming Forum team and a better understanding of The Farming Forum as a platform for knowledge exchange is recommended. The Farming Forum are an example of best practice in terms of knowledge exchange in the land management community.

Recommendation 8: Facilitating knowledge exchange can be done through structuring discussions on Twitter. AgriChatUK is a good example of this. Any Natural England / Defra digital media strategy could include developing a similar model or approach or exploring collaboration arrangements.

Recommendation 9: Closed groups e.g. hosted on WhatsApp or Facebook Messenger could provide a safe platform for knowledge exchange ideally suited to discussion of topics that are particularly contentious or problematic, e.g. where there might be animal welfare issues or TB. They may also suit groups dealing with local issues. They can be seen as ‘digital extensions’ of offline interactions.

9.4 Products

Objectives: To understand target audience usage of digital ‘new media’ products to identify which are likely to be the most effective ways of disseminating information to the target audience for each of the different levels of the ELM guidance

Focus Group participants were asked to review four different digital media products, including (see Section 8.4 for more details on these products):

- Video – High production value
- Video – Low production value

- Video – Professional (whiteboard) animation
- Podcast – Variable quality

The products were chosen by Natural England and were intended to broadly reflect the different types of digital media products available and currently utilised in the land management context.

In the most part, this section draws on this discussion, but also include references to products made in other parts of the data collection i.e. the land management professional interviews.

During the Focus Group, the different products elicited strong opinions and a strong consensus around what worked (and also, what did not) emerged over the course of the discussion. A summary of the key terms and adjectives associated with each product are presented in Figure 11; the comparison between Products One and Two are particularly telling.

Product One: Video - high production value	Product Two: Video - low production value	Product Three: Professional animation	Product Four: Podcast - variable quality
<ul style="list-style-type: none"> •'too slick' •'very sleek' •'very slick' •'well-made' •'lots of money' 	<ul style="list-style-type: none"> •'shakey' •'valuable content' •'far more real' •'interesting to a farmer' •'getting straight to the information' 	<ul style="list-style-type: none"> •'quite useful' •'very useful' •'explainer' •'educational' •'visual' •'(useful for) 'solving a particular task' •'key phrases' 	<ul style="list-style-type: none"> •'it needs to be high quality' •'need much better microphones'

Figure 11 Summary of terms and adjectives associated with each product

9.4.1 Product One: Video – High production value

Product One was **universally unpopular** across the group. Although the production was recognised as being 'slick' and professional, this should not be confused with positivity towards it (one participant described it as 'too slick', Focus Group Participant 2). The reaction to the video was particularly strong. Some participants found it amusing about how 'out of touch' it was with the realities of farming and as a consequence were confused about its purpose. In short, it was felt to have lacked authenticity, and forced a stereotypical view of farming and land management.

Focus group extract

Focus Group Participant 2: That felt very slick, very aimed at consumers to me [...] (40-59, Other)

Facilitator: Yes it was very sleek

Continued...

Focus Group Participant 2: I was just holding my head in my hands. And you had a Theresa May moment walking your fingers through the wheat (40-59, Other)

The professional production, specifically the switching between different scenes and filming styles, was felt to be the hallmark of public-oriented, promotional material, and by default unnecessary for engaging with those within the industry.

Focus group extract

Focus Group Participant 1: It's chopping, you know, changing very quickly wasn't it? From one, the first thing, then talking about something else [...] (40-59, Farmer)

Focus Group Participant 6: It was promoting them more than anything
Facilitator: Yeah I felt like it was training to promote, you know (60+ Farmer)

Focus Group Participant 2: [...] that surely isn't aimed at farmers it is surely aimed at trying to tell the general public what a great job we do with the environment and whatever (40-59, Other)

The unpopularity of Product One is best understood in comparison to Product Two, which was its antithesis.

9.4.2 *Product Two: Video – Low production value*

There was some initial concern about the shakiness of the camera and footage, but this was attributed to the time at which it was recorded. Participants noted that – produced in 2015 – the shakiness of the footage is likely to be a product of the smartphones being used at the time. Participants suggested that, although only four years on, technology now allows for homemade videos to be much more professional in appearance.

Focus group extract

Focus Group Participant 1: Quite a lot of camera shakiness (40-59, Farmer)

Focus Group Participant 7: It was 2015 (40-59, Other)

Later in the interview ...

Focus Group Participant 7: I would bet that same farmer now has a 'DJI gimbal' (smartphone stabiliser) [...] They're about £300, and we produce video that's ten times better than that [...] (40-59, Other)

Facilitator: But it is interesting because 2015 doesn't seem that long ago, but in technology, it's huge

Continued...

Focus Group Participant 7: The gimbals we have now were £4000 back then, they're £300 or maybe less now (40-59, Other)

Given the call for (some) improvements in quality, it could be that Natural England / Defra support land management professionals in creating this content, by either providing/subsidising the hardware or training/guidance for creators on how to use it/communicate with it.

Although it was felt there was room for some improvements in quality, the video was felt to be of far more interest to farmers and land management professionals, owing to its authenticity, credibility and relevance. The desire to improve the quality (specifically the shakiness) of the video should not be interpreted as a desire for the overly polished quality of the first product. With only a minor improvement in video quality, the content itself (unscripted, 'real farming' footage), was deemed to be extremely valuable, relatable and of interest to the farming/land management audience, and beyond.

Focus group extract

Focus Group Participant 2: It's far more interesting as a farmer though, I'm far more likely to watch that (40-59, Other)

Focus Group Participant 4: It's getting straight to the information, isn't it? (60+ Farmer)

Focus Group Participant 5: It's real, it's much more real (40-59, Farmer)

Focus Group Participant 3: It's quite good, the farming blogs and things are becoming more and more popular on YouTube and things. It's not just farmers watching this (<40, Adviser/Agent)

Focus Group Participant 2: You could sleek it up a little bit without damaging it. A bit of stabilisation would make it a little more easy on the eyes, but it's far more real and it's far more real and far more like... it's the same thing it's like farmer talking to farmer. He's just there with the tractor guys (40-59, Other)

Focus Group Participant 5: It's not all sort of pre-scripted and... It's just him talking (40-59, Farmer)

The popularity of the style of Product Two reflects the credibility, salience and legitimacy associated with farmer-to-farmer communication (Ingram *et al.*, 2016), i.e. it is simply a farmer showing other farmers how to carry out a specific task. Although participants were asked to focus on the style of the product, as opposed to the specific nature of the content, it would also appear that the **practical content** of the video was particularly well-received.

Focus Group Participant 2: as a farmer it's a bit wish-washy and irrelevant, whereas the content there, if I wanted to do something like that, it would be valuable content (40-59, Other)

When directly compared, there was a clear suggestion that this kind of informal, low production value, practical and informative product was where Natural England and Defra

should focus their efforts in supporting agri-environment behaviours. Typically, low cost, creating Product Two-style materials may enable producers of such content to create more outputs that could align with different farming types, landscapes, contexts etc. which will in turn be even more relatable.

Focus Group Participant 2: Consider as well the difference in what those two videos probably cost to produce, one has basically cost nothing to produce effectively, the other one probably had a several thousand pound production budget. So, in terms of Defra or Natural England's money, you could do so much more of that type of content for the same amount of pounds as one slick actually fairly irrelevant video (40-59, Other)

The discussion highlighted the importance of issues of authenticity and relatability.

Recommendation 10: Video content should be low production, authentic and relatable, e.g. vlog style. Collaboration with 'farmer champions' will be essential to deliver this in an authentic way.

9.4.3 Product Three: Video – Professional animation

The third product – a professional animation/sketch – was well-received but was felt to have a more limited range of uses. Specifically, they were felt to be useful when wanting to understand something abstract (i.e. something they may not be able to see or test for themselves) or complicated (i.e. something that they might not typically understand).

Focus group extract

Focus Group Participant 2: I find those type of videos, the explaining videos, quite useful when I'm wanting to solve a particular task, and that kind of explainer is quite good then. But don't find it very interesting to watch about that sort of thing (40-59, Other)

Focus Group Participant 7: I find those videos quite useful if you're trying to get across some more complex subjects, or get that information over there. Knowing this I think this is probably more school. But the actual layout they're talking through is highlighting the key phrases, and for somebody who's studying towards something it would be really useful (40-59, Farmer)

Focus Group Participant 5: It's actually good to have it more than one way, because it's much more visual (40-59, Farmer)

Focus Group Participant 2: If I wanted an explanation on how a nuclear reactor works, that's how I'd like it explained to me. If I'd want to see how to bail a meadow, I like the last one {talking about Product Two} (40-59, Other)

Similar style videos were utilised by The Farming Forum but not to teach about specific technical practices or complex ideas relating to farming/land management. Instead, they were used to support farmers with the technical aspects of digital media, e.g. 'how to post a

picture' on The Forum. This reminds us that there are a vast number of potential uses for digital media in the farming/land management community.

Focus Group Participant 2: We use these sort of thing{s} on the forum, cos we get like common help questions like "how do I post a picture?". And then you can make a 30 second one of those that's "this is how you post a picture". Or "How do I register". They're short, sweet and kind of like that. And they work for that, but they're not interesting beyond a minute (40-59, Other)

This alternative use might be a practical way of supporting those land management professionals interested in and starting out with digital media. However, one land management professional's perspective on this suggested that Natural England / Defra do not need whole channels dedicated to this kind of material.

"On the GOV.UK website they have all the information, loads and loads of pages, but Defra have got their own YouTube channel, [...] when am I going to [...] watch a video of someone telling me about how to fill in a stewardship scheme. Okay if it's a link on a page on the website, do they really need a dedicated channel, I don't think so" (Land management professional 10, 40-59, Forester, Passive participant)

Whilst this reflects his experience, it is important to note that others – perhaps those who have undergone complex AES applications – may have valued (and been aware of) this extra support. It is also worth noting the breadth of the materials on the Defra YouTube channel; this could suggest there is scope for better of promotion of these broader materials.

9.4.4 Product Four: Podcast – Variable quality

The podcast was received very differently to the videos (Products One, Two and Three). Participants noted their preference for the lower quality, authentic production associated with Product Two did not apply to the podcast, which they felt needed to be of good audio quality. Even on full volume and playing through high quality speakers, one participant claimed he missed certain parts of the dialogue.

Focus group extract

Focus Group Participant 2: The thing that's interesting is I think we're about to completely contradict what we said about the videos, so I think for a podcast to work, it needs a much higher production quality [...] You need much better microphones so you can actually hear, so you're not 'what's his name, what's he saying' (40-59, Farmer)

Focus Group Participant 4: I missed that bit (60+ Farmer)

Facilitator: It's on full volume as well

Focus Group Participant 2: So, I think literally the complete opposite of what we just said about videos, where we said actually perhaps a lower production quality is better, in this case, if you're gonna make that work I think it needs to be high quality (40-59, Other)

There was also significant criticism of the presenter – ‘He wouldn’t make Radio 1 would he?’ (Focus Group Participant 2) and ‘that guy was sending me to sleep in 30 seconds’ (Focus Group Participant 2). It was felt a more dynamic and/or professionally-trained presenter would have made a significant difference to its appeal.

One participant referenced a podcast that he listened to regularly. For him, the fact that the presenters were independent and therefore not trying to push a specific agenda was appealing. Notions of independence, neutrality and authenticity emerged here.

Focus Group Participant 3: One of the podcasts I listen to religiously now is Farmer Armour and that’s kind of been put together really, really well. [...] The production’s good but it’s certainly not polished, I mean they’re getting better and better as they progress on. But you want to listen to it, there’s interesting subjects, very varied the presenters aren’t trying to push an agenda or anything there just letting the information pass to us (<40, Adviser/Agent)

The discussion highlighted the importance of audio quality to podcasts and similar products.

Recommendation 11: Any audio digital materials need to be of the highest audio quality.

9.4.5 Other notable products

As part of the land management professional interviews, one land management professional talked specifically about the options finder tool – which he suggested was a revolutionary tool in the context of agri-environment decision making. The fact the pdf was interactive and fully functional whilst offline, alleviated concerns about availability of internet connection in the field. The fact users were able to “actually take it out, on farms” on a tablet, and use it there and then in the field was also a key benefit.

“The best thing NE, the RPA have done, and it was actually the RPA, there is a really, *really, really* good [...] It’s an online options finder tool, so basically, what they’ve done, you know the / option finder tool online, they have created an **interactive pdf**, so that when you’re out on farms, and somebody says what about option number or thing, it’s an offline grant finder tool [Okay, so can be used offline as well?] Yes and that’s the beauty of it. Now it took us ages and ages and ages to get them to do it and the people that did it, [...] and it’s fantastic. It means that you can go out on farms and a lot of the advisers are now using tablets and iPads and you can talk / you don’t have to have a printed paper copy of all the options stuff, which is what we all wanted, but you can actually take this out, on farms, and you can search it, so if the farmer says well tell me about an option for / you can find it, you can share and look at it and you can actually talk people through it, it’s really, *really, really* good” (Land management professional 4, 40-59, Agent/adviser, Leader)

Was this digital media product an inherently good one? Or is its perceived success owing in the most part to its offline functionality in the absence of reliable, highspeed internet on the move? If internet connectivity remains a difficulty for land management professionals, it seems pertinent to suggest efforts should focus on the creation of accessible/functional

offline digital media materials for use on the move and in the field. However, if development in internet connectivity and provision continues, then the offline functionality would not be such a priority for digital media materials.

Recommendation 12: Digital media products should be created with technological limitations in mind – particularly levels of internet access and variable internet speeds.

Recommendation 13: Any digital media strategy should accommodate for and be able to adapt to improvements in hardware and internet connectivity. This may mean auditing or measuring land management professionals' access to hardware/technology types or high-speed internet (via primary data collection or secondary data sources e.g. Ofcom) and allow digital media materials to be designed in line with this.

9.5 Trends

Objective: To map out trends in use of digital media by the target audience, to provide trajectories of likely engagement in digital media at each stage of the ELM programme.

The literature reviewed depicts nothing short of an explosion in digital media use amongst land management professionals (e.g. LaBoeuf *et al.*, 2012; Bogdanou *et al.*, 2013; Mills *et al.*, 2019) which is anticipated to continue. This was reflected in the narratives of those interviewed who anticipated that interest in and use of digital (and particularly social) media was going to increase as younger people in agriculture – confident in the use of technology and digital media – were 'coming through'.

"I'm 55, and I would hope that there are younger people in agriculture who have grown up with nothing other than social media and/or digital communications and I suspect that it would come as second nature to them for digital communication to be their first choice" (Land management professional 9, 40-59, Farmer, Moderate engager)

"I think it will increase because as the other generation takes over and the generation using digital media are those people then it's going to increase isn't it. Their sons are coming through and as you go down the generations it'll be more and more so" (Land management professional 11, 60+, Agent/adviser, Non-user)

"I think especially with people who have been like / who have had social media in their life since their teens, they are used to using it, so I do think that will be the way to go, definitely in the future" (Land management professional 12, <40, Agent/adviser, Non-user)

"I don't think social media will plateau any time soon" (Digital Media Expert 2)

One Focus Group participant described the current period as one of an 'evolution' between traditional and digital options which was only set to continue towards an almost full immersion in digital methods of communication. The following dialogue between Focus Group participants suggests the 'digital revolution' has not even started yet; Focus Group

Participant 2 – in his mid-40s – noted how digitally-oriented generations were yet to come through.

Focus group extract

Focus Group Participant 2: At the moment we're in the phase of evolution between the two, and I think it's important. And I don't think Natural England are considering or Defra are considering there should always be that, 'I would like the paper' option. Because we've got that generational difference. But, I'm in my mid-40s I'm a dinosaur. The generation below (40-59, Other)

Focus Group Participant 5: You're no dinosaur (40-59, Farmer)

Focus Group Participant 2: But the generation below us, seriously, they have... I was at Sunday lunch with a friend of ours' a 16 year old lad, he did not believe me when... he thought the internet was like gas and electricity, it's always existed. He could not comprehend how the world worked before, and this is a kid that's grown up and this has always existed. It's totally normal. You think another ten years from now, when they start to run businesses, or go into management. In the same way that we still kind of go paper, they're not going to understand the paper bit. Their handwriting will disappear (40-59, Other)

This idea that the trend in digital media use would continue to advance was strongly mirrored in other responses across the cohort. It was anticipated that the current older generation would be the last to be characterised by a disinterest in digital media and IT illiteracy. Younger generations were perceived to possess an almost natural prowess for technology that would inevitably increase the demand for digital media in agri-environment decision making as time goes by.

"I do know some farmers [...] they don't use computers or anything at all and okay I guess that's one their last generation that are going to be like that [...] I would guess as younger generations move in to management, it would increase [Okay] Because / they are more sort of comfortable using digital media and probably less comfortable not using it. [...] at the school where I work it's / all the kids have iPads and of course now it's part of the teaching and if they didn't have one they wouldn't be able to learn in the same way" (Land management professional 7, 40-59, Institutional land manager, Passive participant)

Whilst there was this overarching trend towards digital media use and demand for digital media products, there was still some suggestion from the cohort that the digital media content would need to be 'done right', e.g. well-designed and executed.

"If it was done right [...] I could see it increasing" (Land management professional 9, 40-59, Farmer, Moderate engager)

There was some feeling that digital media and digital forms of communication would entirely replace traditional methods.

"I think ultimately it will more than likely replace. I imagine we'll move away to video conferencing and video interviews backed up by digital presentational material and I would have thought that the role for face-to-face umm information

gathering or dissemination will decrease” (Land management professional 9, 40-59, Farmer, Moderate engager)

In contrast, Land management professional 1 felt that it would *not* ever outstrip more traditional methods of communication; it might instead represent a ‘level share’ of the communication methods.

“And it's going to take 10, 20, 30 years even for the next generation to be fully au fait with every / I have farmers’ sons who are in the business in their 50s and still don't use digital media, so it's going to be a long long time before it becomes I'll not say becomes a prime source because I think it's probably getting towards umm a level share” (Land management professional 1, 60+, Agent/adviser, Non-user)

One land management professional was hesitant about the burgeoning role of digital media in agri-environment decision making. He recognised the use of digital platforms such as YouTube for hobbies such as knitting or DIY tasks, but felt that this only held so much value when it came to managing a tract of land, which is inherently more complex. Nonetheless, he did think that ‘the digital side’ was something that warranted further effort to explore.

“There's a big yes to that and a big no {to digital media for land management}. The no part is that if you think about current channels and current methods of delivery, yes, you might have YouTube tutorials on how to do bits of things, because everybody goes to those tutorials now for plumbing things, or knitting techniques or whatever they choose to do. When it comes to / a piece of land that you look after the digital side I think really needs exploring” (Land management professional 13, 60+, Forester, Passive participant)

There was recognition that bodies such as the RPA and Defra were increasingly utilising digital platforms. One Agent/adviser felt that this might mean they are relied on as ‘interpreters’ of digital media for many of their clients.

“I think it has to, as the RPA and Defra are going further and further down that route, its use is only going to increase and where we see ourselves is, as an interpreter almost, so we can access that digital media that clients perhaps can't or won't” (Land management professional 2, 40-59, Institutional Land Manager, Low level engager)

It is important to consider that whilst the general trajectory of digital media use might be an upward one, it also changing *within* this trajectory, i.e. the way in which digital media will be being engaged with might change as time goes on. The Digital Media Experts interviewed made this point with reference to different digital media platforms, i.e. different platforms might experience different trajectories owing to the fact they serve different purposes and different audiences.

“[And in the sort of last, sorry, in the next 5 years rather, where do you see digital media, social media going?] I think that probably differs... for different. Sort of Instagram will be very different to Facebook. I think Twitter's kind of growing, in my opinion, but I can see it gaining more popularity. And I think perhaps as... especially in agriculture, I mean you might have seen it a bit differently but with the... As the kind of newer, the younger farmers are coming through, I think they're utilising more technology” (Digital Media Expert 1)

“{talking about digital media usage amongst the farming community} Yes, definitely, I think it can only get bigger and better hopefully. I think especially platforms like Instagram, that’s definitely like a growing area for us and with the younger audience that tend to use Instagram” (Digital Media Expert 2)

It is difficult to draw a single conclusion with regards to trends from such a range of responses and any claims about numerical trends would need to be supported by quantitative data. On balance, however, there seems to be a general understanding that as a younger generation of land management professionals, for whom digital media and technologies are second nature, come through into management positions with decision-making responsibilities, there will be a larger demand for digital media communication and products. If this the supply of digital media content is to keep up with anticipated demand, there would need to be the necessary advances in technology – particularly in relation to internet connectivity.

Key point 3: Demand for digital media products and mechanisms is anticipated to increase with younger, more technologically-minded persons ‘coming through’ into Land Management roles.

Key point 4: Improvements in high-speed internet connectivity should be a priority to support the anticipated increased demand for digital media products.

9.6 Barriers to engagement

Objective: To understand barriers to digital media use

9.6.1 Internet/connectivity

Questions relating to internet connectivity yielded a total of 30 ‘references’ (sections of coding in NVivo) across the 14 interviews and single focus group; this indicates that participants were highly motivated to discuss the issue. On average, interviewees spent 4 per cent of the interviews discussing internet connectivity, with some individuals spending a much larger proportion (e.g. Land management professional 5- 9.73 per cent; Land management professional 10- 6.74 per cent; Land management professional 13- 5.87 per cent).

As emerged in the literature review, the issue of internet access has moved beyond a question of ‘access versus no access’, but more about accessing suitable speeds and bandwidth. There was some notable positivity around internet access and associated improvements.

“[Okay. So do you use a sort of / a broadband connection or are you 4G or a bit of both?] Both. 4G when I’m not in indoors and we have ultra-fast broadband in the house. [Brilliant, okay, so it’s really not an issue for you then? / and you presumably have sufficient bandwidth to get on things like YouTube and teleconferencing and that’s really not a problem, would that be correct?] That’s correct, yes, no problems at all” (Land management professional 9, 40-59, Farmer, Moderate engager)

“So, when I'm working at home, broadband. When I'm working in the office, broadband and Wi-fi. When I'm out on farm I / it's surprising how much good phone coverage there is” (Land management professional 4, 40-59, Agent/adviser, Leader)

Focus Group Participant 4: “[...] it is getting better”

Equally, there were individuals for whom any kind of internet connection was out of the question:

“{talking about internet connectivity} Rubbish around here. [Okay. And is that sort of high-speed broadband that you are unable to access?] Yes. [Yes. And similarly, assuming 4G then is out of the question as well?] That's completely out of the question” (Land management professional 14, <40, Agent/adviser, Low level engager)

“I think one of the key things is to improve the mobile / [Yes [...] / do you have any sort of issues, presumably phone signal might be one?] I think broadband / the speed of broadband in rural areas and phone signals is really / is the key to the future, this kind of future, it would be useful” (Land management professional 2, 40-59, Institutional land manager, Low level engager)

In one case, unreliable internet connectivity forced a land management professional and her colleagues to rely on printing documents. Whilst the ultimate solution to this would be to ensure universal access to reliable, high-speed internet (both in the office and on the move), in the absence of this, digital media tools should be designed with offline use in mind too (see Section 10.4.5).

“We're in an area where we don't always have internet signal so often it's before we go out and we print out the pages for the clients, the ones that we think they'll be interested in.” (Land management professional 12, <40, Agent/adviser, Non-user)

Developments of mobile (4G) coverage were recognised by a number of participants, but using 4G as an alternative to broadband was seen as expensive and prohibitive in terms of amounts of data.

“What we're doing now is we're paying £80 a month but we're getting 4G coming down, which means I can get speeds now up in the 30s, which is you know ten times faster than what I was getting, and I think I'm limited to 500 gigabytes a month, which sounds a lot, but it's surprising when you are sending a lot of data with fields and things, surprising how you start winding that in, but that's more than enough and if we want to you know look at films and stuff, as well at home, there's enough bandwidth to do it, so I'm paying that amount” (Land management professional 5, 60+, Farmer, Leader)

There was a culture of ‘tolerance’ towards basic levels of internet access amongst many land management professionals. Many reported their internet access was ‘fine’, but relatively-speaking, they were experiencing very poor speeds or unreliable coverage. This does show there is a strong desire to use digital media – i.e. *despite* what many (non-rural users) would consider as intolerable – land management professionals were persevering.

“I received something today, pictures of something that I'm working on at the moment and I would love to be able to sort of tap, the picture comes up, but again, visit people in / I do voluntary work as well, in working in offices, and they

just press a button and up it comes straight away and I think, God, that would take me about three minutes to get that and for all those little bits of three minutes here and two minutes there and a minute there, it probably adds about 20/30 minutes a day to my office time. [...] I have a page always open at solitaire and download something and while it's downloading play a game of solitaire” (Land management professional 3, 60+, Farmer, Non-user)

“No, it's fine. I can access websites. I can send emails. Some of the obviously / when you're communicating with Defra, or the RPA, they want lots of photographic evidence and this, that and the other, and so we put in under stewardship and so you know as our phones improve and our / the size of all of our photos increases, you are therefore sending more data all the time, so that slows things down quite a bit I find. Yes. But it's still within tolerable limits. It's not like it takes half an hour to send an e-mail or anything” (Land management professional 10, 40-59, Forester, Passive participant)

Combined, broadband and 4G are amounting to ‘tolerable’ levels of internet access. In the most part, land management professionals had some internet access but at current levels it is not sufficient to expect everyone can access all digital media materials (as YouTube or webinars which require high download and upload speeds, and symmetrical connectivity). Ultimately digital media is wholly reliant on reliable internet access and sufficient speeds. The virtues of digital media are many and varied, but without internet access, they mean very little; the following excerpt summarises this.

Focus group extract

Focus Group Participant 2: We offer people the choice of digital or paper, and actually a lot of people take it digitally, on an e-reader or whatever. And digital is better as well, because it's more interactive. Once you get used to it, you can click on articles, see a video (40-59, Other)

Focus Group Participant 6: That's as long as you've got coverage (60+ Farmer)

As mentioned above, just over a quarter of the 22 participants cited some kind of connectivity issue as part of our pre-interview screening process. Interestingly, in the case below, the land management professional – who did not state any problems in the screening process – described experiencing some issues with reliability in the interview. It seems that expectations around rural internet access are typically so low that relatively poor service is tolerated. This example reveals a discrepancy between the quantitative assessment of connectivity issues and the actual realities of their connectivity. On a methodological note, this suggests that, owing to this ‘tolerance’, poor internet service amongst the Land Management community may be being underreported.

“[you haven't listed any sort of broadband speed issues or connectivity problems, is that the case?] Nothing too serious. I mean our broadband does drop out occasionally, we get [...] well my office is at home so probably just more to do with the broadband package I've got than where I am, / Yes, so no huge issues. Nothing major” (Land management professional 7, 40-59, Institutional land manager, Passive participant)

More work is therefore needed to understand rural internet provision in more detail; understanding the audiences' ability to access the internet will help inform digital media product design.

Key point 5: Improvements in high-speed internet connectivity – both broadband and 4G – are needed to facilitate digital media use.

Recommendation 14: A better understanding of levels of internet access is needed. As internet access has moved beyond 'access/no access', a more nuanced dataset is required. This will allow digital media materials to be designed more sensitively, i.e. compressed versions of content for individuals without access to high-speed connections.

9.6.2 IT literacy

Despite not emerging consistently across the dataset, it is important to consider the role of IT literacy and how it is likely to vary across the target audience. The following quote from a smallholder emphasises this point and also the importance of suitable hardware to access digital media resources.

Focus Group Participant 5: But you're all big farmers doing big things, using your computers a lot. Whereas for someone like me who's a little smallholder who's got a few sheep, I like a bit of paper that I can look at to say that's what it means and work out actually that, what they've sent me means. Because I'm not very good at reading computers, and my computer's desperately slow (40-59, Farmer)

Whilst there is scope to provide training to land management professionals who are not confident in using computers (such as the 'Getting Citizens Online' programme in Ireland), and assisting land management professionals' access improved/suitable hardware, it is important to also not force this change amongst those who would simply prefer to receive agri-environment materials in the traditional way. Asked for a final, take-home comment at the end of the Focus Group, one participant made the following plea:

Focus Group Participant 3: Don't forget the traditional forms as well (<40, Adviser/Agent)

Whilst there may be individuals who simply do not wish to engage with digital media, amongst low level users there might be opportunities to foster interest and develop skills. One Digital Media Expert suggested 'subtle training' for land management professionals could potentially be an effective mechanism:

"I think if there was sort of training, it would almost have to be the sort of thing where they don't know that they're being trained. [Yeah that's true.] If that makes sense? Because I think if you were to offer it as a service, say. I don't think that many would want to take that up. But if you kind of like almost ease them out if it slowly, the use of social. I think even with like really simple competitions, people will see, oh I'll enter this competition on Twitter, and that might be their first step into [...] being active" (Digital Media Expert 1)

9.6.3 Hardware

As per the literature, Jespersen *et al.* (2014) cite a lack of access to appropriate and sufficiently rugged ‘farm proof’ hardware and tools as a key barrier to social media use in the agricultural context. Whilst there was some appreciation of the limits of conventional hardware amongst the cohort, there was limited evidence to show that it was hindering digital media use. Many participants utilised screen protectors and robust or waterproof cases for mobile devices (e.g. Land management professional 13, Land management professional 3) which were seen as inexpensive and effective workarounds to afford some protection to these devices whilst outside and undertaking land management. Although an option that participants talked about, more substantial ‘ruggedisation’ to make hardware ‘farm proof’ was felt to be costly and inaccessible.

“{talking about hardware} It's certainly not outside-proof” (Land management professional 14, <40, Agent/adviser, Low level engager)

“I have all of those devices. I have laptops, tablets, phones, but the phone is generally the only digital device that I would take with me outside and even that can be perilous enough at times” (Land management professional 9, 40-59, Farmer, Moderate engager)

“And you have to go to specialist providers if you want ruggedisation, as it's called, and then what you find is that you have to do it for every new phone and the phones are coming out every six months [...] / a good waterproof case is the best option I think” (Land management professional 13, 60+, Forester, Passive participant)

Dissatisfied with the robustness of typical hardware, one participant talked about acquiring a specialist ‘farm proof’ Caterpillar phone which, in addition to being almost ‘indestructible’, had particular features/tools that were of use in the farming context.

“I've gone on to a Caterpillar phone. [Oh, I'm not aware of one of those.] Indestructible / well / not indestructible, I have broken them before [...] [Okay, okay. So that kind of works for you then?] Yes, it's tougher than a phone and [...] / what's the rating that you need to ask for / [I wouldn't know] Is it IT or / MT or something like / military protection or military grade. [Okay.] Yes, it's a military sort of phone. [Yes.] And the best thing about it is it's got / this is the best thing, it's got thermal imaging on it. [Oh wow, okay. That's / so yes, you don't get that on your average iPhone?] Yes, it's great for doing jobs down the farm” (Land management professional 6, <40, Farmer, Leader)

Those using specialist hardware were in the minority across the cohort; the discussions suggest that – in most cases – bespoke ruggedisation is not needed, and that accessible and affordable ‘farm proofing’ options are in the most part sufficient for current digital media use. *However, as 4G coverage is increasing and technology is developing, the ways in which land management professionals are able to consume digital media is changing. If improvements in internet connectivity do eventually allow for truly mobile working/in-field working for land management professionals then perhaps there will be more a demand for ruggedised hardware.*

9.6.4 Vulnerability of engaging

As well as concerns around privacy and security (see Section 10.3), many land management professionals were also put off engaging in social or digital media because of a fear of opening themselves up to online abuse.

“We used to end up with farmers, other farmers, actually having digs and I just thought (a) it's not my job, (b) I don't care. Not worth the hassle. Yes, what is any of this achieving, you know, I'm taking five minutes out of my working day that I pay myself / you know I pay myself to work and I'm actually corresponding with somebody who is an absolute dipstick” (Land management professional 6, <40, Farmer, Leader)

It is interesting to note the issue of online vulnerability has not been picked up in previous investigation into the subject, despite being a key barrier to use amongst this cohort. Whilst Land management professional 5 felt digital media offered an opportunity for **knowledge exchange**, he also noted that this can lead to difficulty and ultimately vulnerability online.

“Sometimes, you get some quite heated discussions going with people that are very adamant about one thing, and then someone will say, ‘well, hang on, that doesn't work like that at all, because what about this, I did this, and that worked, so I don't understand how you've managed to get what you're saying is working, so how do you do it?’, that sort of thing [Okay. And do you get involved in those discussions or do you tend to watch them unfold?] Well if it's political I keep right out of it. [Okay, that's] / Because [...] once or twice I've really wanted to say something (laughs) but I've just decided, no, I'm / I'm not going to go down that route **because that's just opening up to all sorts of things**. I mean, at the moment, I've never been targeted by anybody who you know / I don't know, badger lover, or whatever it happens to be, [...] but you know I'm trying to sort of pick something out or animal welfare or something and I think that is a bit of an issue [...] It feels that we shouldn't really stir up too many of these sort of extreme groups. [...] You get a conversation going, I mean, I know the Glyphosate thing was a bit of a hot topic, and [...] actually I haven't really got involved in the badgers really, I have my views, but I'll keep quiet on that one” (Land management professional 5, 60+, Farmer, Leader)

Concerns over online vulnerability and abuse were closely associated with knowledge exchange platforms, and would go some way to explaining why engagement in knowledge exchange is limited (Chowdhury and Odame, 2013; Philips *et al.*, 2018; Kaushik *et al.*, 2018) as concluded in Section 10.3).

“On the occasions that we have invited discussion it's not gone well. You sort of get hijacked by individuals and we'd rather not be involved with them” (Land management professional 2, 40-59, Institutional land manager, Low level engager)

“No, I'd rather it was just the first one {referring to knowledge transfer} [.....] it's just going to end up being like a sort of comments bit on You Tube, with abuse and rubbish” (Land management professional 6, <40, Farmer, Leader)

Whilst this fear did not stop the use of digital media entirely, it did stop them from participating fully in knowledge exchange. Their (and others') decision to ‘keep quiet on that one’ is potentially hugely damaging to participating in knowledge exchange and the benefit that is known to come from that (Mills *et al.*, 2019). This fear could also go some way in

explaining the “limited two-way communication behaviour among social media users” observed by Chowdhury and Odame (2013: 109) and warrants both further research effort and the establishment of mechanisms to promote positive interaction and protect users from negative responses. For example, one of the Digital Media Experts interviewed explained the way they ‘police’ the interactions across their social platforms.

“So, I think trolling in general is quite a big topic at the moment, on social media, but as well with activists. We usually say hide the comment or delete the comment, not to argue, but almost to create a conversation with them if they wish to. But they don’t have to. [No. Okay, that’s interesting.] Its how they feel. [So are responses sort of policed then, in a way, so you guys would pick up on something inappropriate and delete it?] Yeah, so if we found like a comment that was more like an activist comment, we would try to... we would hide it and not actively engage with it. But farmers tend to want to engage, and speak up for like the kind of arguments, and everything” (Digital Media Expert 1)

Other examples of mechanisms for policing/monitoring online content should be explored from other (relatable) contexts; this would enable Defra / Natural England to develop an appropriate policy and approach towards policing any interactive platforms.

Any digital media strategy might need to provide alternative (closed) forums for contentious topics or issues to be discussed in order to provide safe(r) spaces for discussion.

10. Concluding remarks

This report is a qualitative analysis of land management professionals' digital media preferences and behaviours. It has drawn on interviews with 14 land management professionals, a Focus Group with eight further land management professionals and interviews with three digital media 'experts' associated with the agricultural/land management industry.

Informed by a critical review of the literature, the data collection sought to engage with a broad range of land management professionals and it was broadly successful in doing this, recruiting 10 out of the 12 'types' of land management professional proposed as part of the segmentation approach.

There are clear lessons to be learnt from the land management professional and expert narratives presented here, firstly, in terms of our (academic) understanding of digital media preferences and behaviours, but also, critically and practically, in terms of informing a successful future digital media strategy. The following summary is offered by way of a conclusion and should be supplemented with the list of recommendations which can be found throughout the text and as part of the Phase 2 executive summary.

The empirical data has documented how the **role of age** – which emerged as a strong determinant of digital media use in the literature review – was not having such a significant influence on use of digital media tools and platforms amongst this cohort. The relationship between digital media use and age is (becoming) more nuanced with different ways of engaging with digital media that are accessible and open to almost anyone. As a consequence, we recommend that any digital media strategy should avoid making rigid assumptions about who is interested in digital media use. More quantitative analysis of digital media behaviours might help further elucidate this relationship.

There was a **great deal of enthusiasm towards digital media use** and – even amongst non-users – there was a genuine appreciation of what digital media can offer. One of the key 'benefits' of digital media, according to the participating land management professionals, was the potential 'efficiency gains'.

Despite notable enthusiasm for digital media, there was an adamant – even amongst digital media advocates – that digital media **should never** replace more traditional methods (e.g. face-to-face meetings, paper manuals) entirely. A ratio of **80 per cent digital to 20 per cent traditional** emerged as optimum, although there was some suggestion that digital media could represent a larger percentage *if* it meant the traditional resources and means were much improved. The idea that digital media would replace more traditional methods was feared by some who cited legitimate concerns over internet connectivity, hardware and IT illiteracy. With this in mind, a 'blended' approach, which utilises digital media as one tool in a well-equipped toolbox, should be worked towards.

The theme of **trust** emerged strongly in the discussion of digital media use, particularly with reference to social media content. Where decisions related to payments or official agri-environment scheme requirements, participants generally avoided engaging with unofficial/unverified sources. Whilst a preference for official sources is understandable in this context, it potentially limits engagement with innovative and pioneering content. We have recommended supporting/training land management professionals to have more confidence in engaging with 'other' sources, as well as providing safe/official sources for land management professional knowledge exchange, e.g. a bespoke ELM monitored forum. Given the resource implications of hosting and managing this kind of knowledge exchange space, it may be necessary to consider opportunities to work with partners to deliver this.

The data has revealed the diversity of platforms being used by land management professionals. In short, **different platforms fulfilled different purposes** and for different people. Any digital media strategy should therefore incorporate different platforms and mechanisms, rather than just focusing efforts on creating content for one.

In line with previous research, evidence of true **knowledge exchange was limited**. In the most part, participants were deterred by the possibility of becoming subject to online abuse or 'trolling'. However, there was a clear appetite for knowledge exchange amongst the land management professionals interviewed and we contend that, if safe spaces were created, land management professionals would be keen to participate.

Of the products that were tested, the difference between Product One (high production video) and Product Two (low production video) was most telling. Land management professionals clearly favoured Product Two – a farmer 'vlog' – owing to its authenticity, relatability and its (potential) functionality. Any digital media strategy will need to prioritise collaboration with 'real life' farmers and other land management professionals in order to produce this kind of content.

In line with previous discussion in the literature, land management professionals believed **digital media use was set to increase** as younger generations were coming through. Although digital media use in general is on a clear, upwards trajectory, there will be patterns *within* this, e.g. some platforms such as Facebook may decrease in popularity, following in the footsteps of platforms such as Bebo and MySpace. Critically though, internet connectivity will need to keep pace with increasing demand for digital media in the land management context, if digital media is to reach its full potential.

As has been widely reported in the literature, **internet connectivity** was a big talking point in the data collection. There was some evidence of the picture improving (as reported elsewhere), but equally examples of complete failure. Ultimately, current levels of internet provision are precluding some land management professionals from engaging with, and ultimately benefitting from, digital media. Sadly, there was evidence of a culture of 'tolerance' towards unsatisfactory internet provision developing and, as a consequence, a possibility that connectivity issues are being unreported. A better understanding of exactly what connectivity land management professionals have access to is now more important than ever – particularly as the debate has moved on from 'access/no access'. As above, the issue of online vulnerability also emerged as a significant barrier to digital media usage – particularly participating in knowledge exchange. Other issues, including levels of IT literacy and computer access also emerged as potential barriers.

The empirical data has demonstrated a clear appetite for digital media, although this should not be confused with a desire to replace all 'traditional' means of support and engagement. Whilst digital media offers huge potential for the agri-environment arena, its use is currently (severely) limited by a number of ('solvable', or at least 'improvable') problems, such as poor levels of high-speed internet connectivity, vulnerability to online abuse from participating, and a distrust of some online sources. Any digital media strategy would need to focus on making incremental improvements to solve these issues or, where such improvements are not made, be sensitive to these limitations. Above all, digital media should not be seen as a silver bullet for agri-environment decision making and communications, but a useful tool that should supplement and complement more traditional methods. Any strategy should also consider the fact that digital media (and demand for it) is dynamic and rapidly evolving.

11. References

Note the references in bold are the 29 identified as part of the literature search

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Appendix 1: Segmentation proposal for behavioural analysis

[as proposed to Natural England in June 2019]











Land management professionals; interviews and focus group

Given the significance of age to digital media usage, as per the above literature, we suggest segmenting the target audience in part by age. This will enable us to verify the nature of this relationship but also explore further how different age groups are using digital media.

Whilst the literature has hinted at a relationship between role/land management professional type and digital media use, the impact of this is yet to be fully expounded. Furthermore, the frameworks presented at the beginning of this review (Mills *et al.*, 2017; Dandy, 2012; AHDB, 2018) all highlight the heterogeneity of modern-day farmers, other land managers and foresters; we cannot expect a farmer to respond to digital media provision in the same way as a land agent or institutional land manager (such as those employed to manage local council land).

By combining age and role/land management professional type variables and seeking to recruit participants across the **12** categories (as per Table 14), we hope to get an **even spread of opinions on and experiences of digital media usage** across different members of the target audience. This is important given the absence of non-farming related voices in research to date, particularly the absence of private foresters (owners as opposed to employed managers). These 12 individuals will be selected using the details they declare on the Participant Registration Form.

Table 14 Proposed segmentation approach

	Land manager type			
	Farmer	(Private) foresters	Institutional land managers (incl. agriculture & forestry)	Agents and advisers
Under 40*				
40-59				
60+**				

*Note we have deliberately chosen an under 40 category to reflect the EU definition of a young farmer

**Note we have deliberately chosen a 60+ category (as opposed to the more traditional 65+ categorisation) owing to the fact we want to talk to institutional land managers who are likely to have retired at 65+

As outlined in Box 3 (Section 1), we use the term land management professional as an umbrella term to cover all of the land management community; 'land manager' refers to the following four 'roles': (i) farmer, (ii) private foresters, (iii) institutional land managers, and (iv) agents and advisers.

For clarity, what we mean by institutional land managers is outlined in Box 9. Note there may be overlap between categories and categories are open to interpretation.

Box 9 Defining institutional land managers

Institutional land managers
 We define an institutional land manager as someone that is employed on behalf of an institute in a land management role, e.g. for a conservation charity or a county council or school. Unlike a farmer or private forester, they may have more a defined '9-5' role and are unlikely to own or rent the land themselves.

At this stage, we would anticipate a relatively even spread across the following 'digital media usage pathway' (Figure 12 and Table 15). Note all recruited participants will be subject to a qualifying (screening) questionnaire¹⁷.

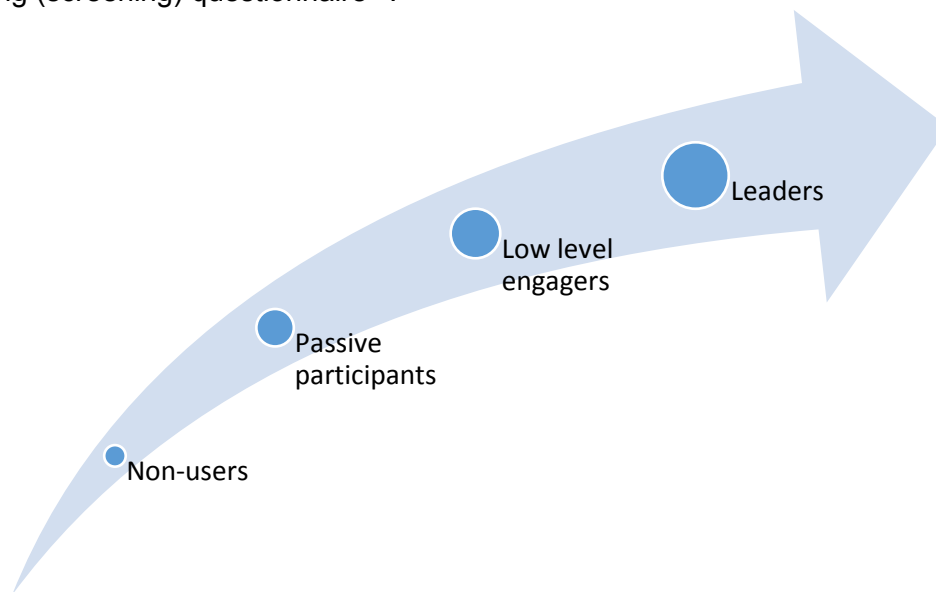


Figure 12 Digital media usage pathway

Table 15 User types

<p>Non-users These members of the target audience have never engaged with digital media.</p>
<p>Passive participants Passive participants are members of the target audience who may observe/watch/listen, but do not actively participate in activity on digital media and associated platforms.</p>
<p>Engagers Including:</p> <ul style="list-style-type: none"> • <i>Low level engagers</i>: These members of the target audience may engage at a low level, e.g. once a week, sharing links to news stories, commenting on posts/videos and re-Tweeting or liking. • <i>Moderate engagers</i>: These members of the target audience may engage at a moderate level, e.g. 3-4 times a week, sharing links to news stories, commenting on posts/videos and re-Tweeting or liking. <p style="text-align: right;">Continued...</p>

¹⁷ The pre-interview questionnaire will be a short (1-2 minute), conversational assessment of the participants' digital media use

Leaders

Leaders are pioneers/champions/influencers in the digital media world. They create and curate content and engage in two-way conversations (knowledge exchange).

In the final stage of recruitment – and after auditing our recruits' digital media use via the pre-interview questionnaire – we will seek an additional **4-6 participants**, with the aim of ensuring coverage of all the usage types listed in the 'digital media pathway' diagram. For example, if we are lacking in 'full engagers', then we will seek to recruit at least one. This phase of the recruitment will be more intuitive and may involve discussions with Natural England advisers to identify user types.

Digital media expert interviews

Running parallel to phases one and two, will be 4-6 interviews with social media experts. Picking up on the ideas of credibility, salience and legitimacy, we wish to understand from advanced digital media users what – from their experience – makes a good digital media post (for example, Tweet, Instagram post or Facebook live). This will give a **different perspective** into (effective) digital media use (what works, what does not work), the outcomes of which will inform any ELM digital media strategy.

These are likely to include social media managers for arm's length groups as well as notable individuals on Twitter.

Appendix 2: Participant registration form

Environmental Land Management (ELM) – Digital Media Research (2019) – Participant Registration Form

Your contact details			
Name		Mobile phone	
Business name or name of organisation		Email (if applicable)	
Business address			
Postal address (if different from above)			

Q1 – Which of these best describe your business?			
Farming		Other business or organisation	Put a Y against all that apply (add clarification if necessary)
Arable		Other farming business	
Lowland livestock		Charitable organisation	
Upland livestock		Environmental organisation	
Mixed cropping		Forester	
Dairy		Agronomist	
Beef / sheep		Land agent / adviser	
Horticulture		Government organisation	
Pigs / poultry		Other	

Q2 – What technology do you use in your business?			
	Put a Y against all that apply		Put a Y against all that apply
Laptop		Smart phone (Apple or Android)	
Office computer		Normal mobile phone (not a smart phone)	
Tablet		Other (please specify below)	
Digital technology in cab (e.g. in tractor, harvester etc)			

Q3 – Do you have any particular challenges using or downloading digital media products?	Put a Y against all that apply
Broadband speed	
Other connectivity problems	
I prefer not to use a computer or laptop	
Other (please describe)	

Q4 – Would you like to be considered to take part in further research at a later date (in 2019, 2020 or 2021) on ELM scheme design, ELM guidance or ELM digital media products?		
Yes		If you express an interest in participating in further ELM research, then you will be contacted in due course by either Natural England or Defra colleagues to discuss your possible involvement. You will be able to decline participation at any time.
Maybe		
No		

Q5 - If you answered 'Yes' or 'Maybe' to Q4 above, please indicate which months of the year you may be available to take part in research.										
Please enter either 'yes', 'maybe' or 'no' against each month (so we don't trouble you when you are very busy).										
January			April			July			October	
February			May			August			November	
March			June			September			December	

Q6 – If you are (or have been) an agri-environment agreement holder, please indicate which sort of agreement(s) you hold (or have held).

Countryside Stewardship	Put a Y against all that apply		Environmental Stewardship	Put a Y against all that apply
Mid Tier			Entry Level Stewardship	
Higher Tier			Organic Entry Level Stewardship	
Facilitation Fund			Upland Entry Level Stewardship	
Hedgerows and Boundaries grant			Higher Level Stewardship	
Woodland Tree Health grant			Organic Higher Level Stewardship	
Woodland Management Plan grant			Other scheme (please specify below)	
Woodland Creation grant				
Historic Building Restoration grant				

Q7 – Which age bracket are you in?

Under 40			40-59			60+			Prefer not to answer
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Permission to use your data

The attached 'ELM Guidance: Customer Research - Privacy Notice' sets out how the data captured on this form will be used by Natural England.

Please return this form to Natural England:

- by email to: ELM-Guidance-research@naturalengland.org.uk or
- by post to: ELM Guidance Team, Natural England, County Hall, Spetchley Road, Worcester WR4 2NP

Thank you for taking the time to complete this information.

Appendix 3: Pre-interview (qualifying) questionnaire

Pre-interview (qualifying) questionnaire

Hello. I'm [your name] from the CCRI. We understand you have recently agreed to be part of this research into digital media use for ELM; thank you for that. So we are just calling today to firstly, book a 30-45 minute slot for the interview, and also just **very quickly** clarify a couple of things about you, so we can make sure we have a good mix of participants.

1. Do you use any form of digital media in relation to the land you manage?

Yes go to (a) No go to (b)

(a) **If yes**, what platform/type:

- | | | | | | |
|-----------|--------------------------|--------------|--------------------------|--------------|--------------------------|
| Twitter | <input type="checkbox"/> | Yammer | <input type="checkbox"/> | LinkedIn | <input type="checkbox"/> |
| Facebook | <input type="checkbox"/> | ResearchGate | <input type="checkbox"/> | Forums | <input type="checkbox"/> |
| Instagram | <input type="checkbox"/> | Google+ | <input type="checkbox"/> | Farming apps | <input type="checkbox"/> |
| YouTube | <input type="checkbox"/> | Wordpress | <input type="checkbox"/> | Other(s) | <input type="checkbox"/> |

- If Other(s), please give us examples
- Is any of this digital media use part of 'secret' groups?

Yes No

(b) **If no**, please tell us which category best describes you:

"I am completely disinterested in using digital media and don't anticipate this will change"

"I am curious/interested in the use of digital media and am keen to potentially explore this in the future"

"I have previously used digital media and did not find useful"

2. **How would you describe your digital media use in terms of frequency, level and type of use?** [Try to allocate to one of the four categories below as part of a general conversation. If asking this general question isn't enough, you can follow up with the 'questions to assess use']

Leader: Do you very regularly use digital media? Do you feel heavily involved? Do you start discussions or posts? Do you post different forms of media and participate in two-way conversations with other users?

Moderate engager: Do you use digital media 3-4 times per week? Do you mainly use it for one-way interaction, i.e. posting, liking, re-Tweeting or reading/watching?

Low-level engager: Do you use digital media once a week or less? Do you mainly use it for one-way interaction, i.e. posting, liking, re-Tweeting or reading/watching?

Passive participants: Do you observe or watch or listen to digital media content but don't actually participate in activities?

Appendix 4: Land management professional telephone interview questions

Land manager telephone interviews

Hello. I'm [name] from the CCRI. As you may recall from the letter sent to you, Defra have asked Natural England to carry out some research into how land managers make use of digital and social media. The aim of the work is to understand how digital media products such as video or podcasts might support the future Environmental Land Management (ELM) scheme.

We are defining digital media as any digitised content that includes videos, podcasts and social media, but it doesn't refer to written online guidance.

The interview on the call today is likely to take around 30-45 minutes. Just a few 'house keeping' things:

- Check they are happy for the interview to be recorded (reassure them the recordings are only used for the write up and analysis)
- Reassurances around confidentiality and anonymity (GDPR compliance)

Are you happy to begin?

Sources of environmental land management information

1. Can you think of any examples of environmental land management information or guidance that you have referred to in the past?
 - a. Where and when did you read or engage with it? (prompts: on the move, out in the field, in the office as part of your admin)?
 - b. Do you just refer to official NE/Defra/Forestry Commission materials or do you supplement these with anything else?
 - c. Do you use different types of sources of guidance at different times? e.g. when applying for an environmental scheme or grant, or to help with the management of a scheme or grant?
2. What makes you want to read/engage with information or guidance? (prompts: where/who it comes from? how it's presented? easy to access/read/listen to? the type of information/guidance, e.g. whether it's practical advice, case studies or detailed information about the rationale for doing particular things?)
3. What makes you trust information or guidance? (prompts: where/who it comes from? e.g. another farmer/forester, your adviser, farming media, government body, quality assurance? whether it's a formally written document or a more informal style?)

Digital media

[Only ask Qs4-8 if they are a digital media user – see QQ answers]

4. How do you use digital or social media? (prompts: private/personal life or work/professional or both? different types of digital media/different types for personal or work use? what platforms do you use?)

5. Do you subscribe to any podcasts (either farming / land management related or something completely different)?
6. How do you find digital or social media content that is of interest/use to you? (prompt: via friends or colleagues, via organisations e.g. NFU, AHDB etc.; via searches for particular topics; whatever appears in my social media feed)
7. Do you enjoy using digital media in general? Why is this the case?
8. Thinking about land management, are there any examples of digital media that you have found particularly useful? What was it? Why was it useful?

Digital media for delivery of land management objectives

9. Do you think digital or social media is helpful in supporting land management schemes?
 - a. Can you give an example of how this has benefited your (or your clients') practice?
 - b. How do you think it compares with written guidance or face-to-face information?
 - c. Which topics/aspects of land management work lend themselves more to digital formats? (prompt: practical information, rules and regulations, broader discussions, case studies)
10. Imagine you were considering applying for the new land management scheme. How interested would you be in using digital media tools to help you with delivery?
 - a. Do you see this level of interest changing in the future? (prompt: increasing, decreasing, staying the same) – why?
11. Do you see/use digital media as a way of simply **sharing/receiving information** (knowledge transfer) or **discussing/debating/exchanging ideas** (knowledge exchange) or some combination of the two?
 - a. If there was a forum for discussing your experiences (successes or challenges) with the new land management scheme, would you be likely to: contribute; look at what other people post; or not be interested?
 - b. If you could share just one thing on digital media about your business, what would it be? (prompts: e.g. something you're proud of; something you want advice from others on; something that would help others)

Access to digital media

12. What kind of internet services do you use? prompt: broadband, satellite, local masts or 4G? (prompt: how does this differ across locations)
 - a. Do you feel you have sufficient internet bandwidth and reliability to access digital media? (including more 'data heavy' forms, e.g. YouTube)
 - b. Does internet access vary across your farm / land / place of work? i.e. is it consistent across your farm / land / place of work? How does this affect your use of digital and social media?
13. What hardware do you currently use to access digital media? (prompt: smartphone, tablet, computer). Is the hardware you have 'farm proof'/'work proof'?
14. Who do you turn to for IT support? (prompt: family, friends, professional?)

Appendix 5: Focus group schedule/script

Focus group

Welcome

09:30-09:45

Tea and coffee available on arrival from 09:00

Welcome and introductions, including introductory PowerPoint (with aims of the project, a schedule for the day and Chatham House rules).

Provide reassurance regarding GDPR compliance and how their data will be managed.

Opening activity

09:45-10:15

Place your mobile phones on the table. **Question:** what does your mobile phone mean to you? (prompts: making calls or internet access? useful or annoying? do you use it as part of your business? do you use it for social media? do you use it for news or entertainment e.g. to listen to podcasts or watch videos?)

Questions

10:15-11:15

What are your current preferences for receiving any environmental land management guidance and info? Digital online information, paper copy, face-to-face? As a one-off or on an ongoing basis?

What makes you trust guidance and info? (prompt: from a reputable source, from another farmer/land manager, from a trusted adviser, quality assured, use own judgement)

Does digital and social media have potential for supporting delivery of environmental land management objectives? In what way?

How might it replace/supplement more traditional methods e.g. face-to-face or paper copies?

Do you see/use digital and social media as a way of simply **sharing/receiving information** (knowledge transfer) or **discussing/debating/exchanging ideas** (knowledge exchange)? Or a combination?

Are there any barriers to using digital media to support your environmental land management activities? (prompt: internet access, hardware resilience, time constraints, finding useful / reputable information)*

**Facilitator notes: Be sure to establish (i) what the environmental land management activities are, (ii) how digital media could support these activities and (iii) what barriers, if any, are there to them doing that?*

Coffee break and networking

11:15-11:30

Responses to materials

11:30-12:15

Show extracts of five different types of digital media product (2-3 mins on each):

- Example 1 [High production, glossy interview style video]
- Example 2 [Low production, high authenticity, e.g. vlog]
- Example 3 [Whiteboard sketch video]
- Example 4 [Podcast]
- Example 5 [Infographic]

Questions after each [Thinking about the format rather than the content per se]:

- Would you (continue) to watch/listen?
- Would you find this kind of media useful? (prompt: potential for learning or more as guidance? What kinds of information / topics do you think this style would suit best?)
- Do you see this as supplementing or replacing current methods of providing info/guidance? Why?
- What most makes a video/vlog/sketch/podcast/infographic [delete as applicable] interesting or inspirational? (prompt: authentic people that you can relate to; respected experts in the field; practical instructional information)
- When and where would you engage with this material?

Close

Thank all the participants for their involvement and reiterate how useful their contributions have been.

Explain that their comments will be collated (along with comments from other focus group and the individual interviews) and the findings will be provided to Defra to consider for the development of a digital media strategy to support the new scheme.

Appendix 6: Digital media expert telephone interview script

Digital media expert telephone interviews

Hello. I'm [name] from the CCRI. As you may know our earlier contact with you, Defra have asked Natural England to carry out some research into how land managers make use of digital and social media. The aim of the work is to understand how digital media products such as video or podcasts could potentially be used to inform the usage of digital media in Environmental Land Management (ELM).

We are defining digital media as any digitised content that includes videos, podcasts and social media, but it doesn't refer to written online guidance.

We are keen to talk to digital/social media professionals and those running successful digital media accounts/who have a good online presence in the agricultural/land management and environmental spheres. In doing so, we hope to understand (at least in part) what it takes to be successful in the digital media world. We are also conducting interviews with land managers themselves to understand their perceptions of digital media.

The interview on the call today is likely to take around 30 minutes. Just a few 'housekeeping' things:

- Check they are happy for the interview to be recorded (reassure them the recordings are only used for the write up and analysis)
- Reassurances around confidentiality and anonymity

Are you happy to begin?

Introduction

1. Please tell us about the account(s) that you run/manage (e.g. number of followers, following, target audience, purposes, why was it set up? when?)
2. What is required to run a 'successful' social/digital media account? (prompt: frequency of engagement, time/input, curating discussions, posting questions etc.)
3. What kinds of information do you share and why?
4. What kinds of materials/posts do you find results in the most engagement? What's been your most successful piece of digital content? Why do you think that is?
5. What does a successful digital media account look like? (is it lots of followers? good content? regular posting?)
6. Has anything really surprised you about your audience's reaction to digital content?
7. In terms of digital media use, where do you see it going over the next 5 years? i.e. patterns of use, demographics, platforms, content?
8. Do you see digital media as a useful source of land management guidance or information? (prompt: replacement or supplement, expand on why, any limitations?)
9. Is there an appetite among your audience for **discussing/debating/exchanging ideas** (knowledge exchange)? Do you think digital media could/should be a tool for **sharing/receiving information** (knowledge transfer)?
10. If you had one piece of advice in relation to digital or social media, what would it be? (prompt: what about in the context of AE info and guidance?)