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## **‘KEEPING UP TO DATE WITH THE OLD WAY OF DOING THINGS’ – COMPETENCE MANAGEMENT IN THE UK HERITAGE RAILWAY INDUSTRY**

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### **ABSTRACT**

There are over 200 heritage railways throughout the UK, operated primarily by volunteers. To address recent accidents, the Heritage Railway Association has provided guidance on the management of competence, complementing that of the Office of Rail and Road. However, each heritage railway has its own bespoke approach to this issue. Aspects such as the volunteer culture, the prevailing language, the diversity of skills, qualifications and learning abilities, are all factors to be addressed in managing competence effectively. Here, qualitative research methods have been used in the form of eighteen in-depth interviews conducted with workers at four UK heritage railways. Analysis of this data revealed issues such as the need to transfer knowledge from an aging volunteer workforce to new recruits and the importance of ensuring that competences are portable to maintain the viability of the industry, whilst recognising the special needs of volunteers in this unique working environment. Future work will determine the gap between how volunteers ‘see’ competence and how it is managed today, with the aim of developing a new approach to competence management for the UK heritage railway industry.

### **INTRODUCTION**

The 200-plus heritage railways throughout the UK are carrying ever increasing numbers of passengers (Heath, 2013) whilst being operated primarily by volunteers, often working together with a small paid staff. As well as running vintage trains for leisure and tourism, these volunteers also undertake construction activities in the form of track and infrastructure maintenance including significant new-build works.

Given the nature of the heritage railway industry, safety is crucial; incidents, including a serious injury in 2010 on the Foxfield Light Railway and a fatality in 2012 on the North Yorkshire Moors Railway, have led to competence management being highlighted by the Rail Accident Investigation Branch (RAIB) as a key issue to be addressed by the industry.

All aspects of the heritage railway industry, including construction and maintenance of infrastructure and rolling stock, train operations, corporate management and governance, and the overall project management and delivery of change, require appropriate and effective competence management.

Each heritage railway currently has its own bespoke approach to this issue and the aim of this study is to determine the themes to be addressed by an appropriate industry-wide competence management system. To facilitate this, the unique nature of the industry consisting of a largely volunteer workforce with diverse backgrounds and motivations needs to be understood and fully taken into account.

## BACKGROUND

The ongoing viability of the industry depends on the ability to operate and maintain heritage railways safely and this is also a core expectation of customers. Any change to perceptions could be very damaging and the incident in 2015 at the Alton Towers leisure park (HSE, 2015), where two carriages on a roller coaster ride collided, resulting in significant injuries, serves as a tragic example of the potential impact that such incidents can have on leisure business performance. The need for competent and appropriately trained staff is therefore vital to avoid injuries to customers and workers, and the consequences of such events.

From its origins in the 1950s, with the preservation of the Talylyn and Ffestiniog railways, the number of volunteers within the industry has grown consistently (Rolt, 1953). In 2013, there were 18,528 individuals recorded as volunteers on UK heritage railways (HRA, 2013). The Heritage Railway Association (HRA) estimates that approximately 1500 of these are also involved in civil engineering activities, including maintenance of track and other assets and occasional new construction such as line extensions and new station facilities.

It is vital to understand the unique environment and issues associated with a largely volunteer workforce, drawn from a variety of backgrounds and often working on an informal or “ad-hoc” basis with no effective pre-employment screening in place. The volunteer culture, the prevailing jargon, the diversity of skills, qualifications and learning abilities are all potential limitations or constraints that need to be taken into account for the effective application of any competence management system (Sherratt *et al*, 2015).

This situation contrasts with the UK civil engineering industry, where workers are required to attain formal competency-based certification before recruitment. Furthermore, in the UK mainline rail industry, in addition to an interview and other selection tests, a pre-employment medical screening for drugs and alcohol usage will also be required for safety critical roles as part of the Network Rail Sentinel scheme (NR 2014). It is only after successful completion of all of these stages in the recruitment process that a candidate may be offered a position of employment.

## RESEARCH OBJECTIVES

The objectives of this research are firstly to identify the issues that need to be satisfactorily addressed when defining and implementing an approach to competence management that is appropriate for the unique structure and challenges of the UK heritage railway industry, including construction related activities and the management systems that govern them; and secondly to determine whether the contrast of volunteer and professional environments is likely to yield lessons of general applicability to competence management in other volunteer-related activity. Our research seeks to determine, through interviews with heritage railway workers, the themes to be addressed by an appropriate industry-wide competence management system.

## PREVIOUS WORK

Research already undertaken (Baughan and Crapper, 2016) has included a review of applicable legislation and codes of practice including the Health and Safety at Works Act 1974, the Management of Health and Safety at Work Regulations 1999 and, more specifically for the rail industry, the Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS). In addition to legislation, there are relevant codes of practice such as the construction industry’s Construction Skills Certification Scheme and the Network Rail “Sentinel” personal track safety competence scheme. Guidance on competence management for minor railways is also published by the Office of Rail and Road (ORR) and for heritage railways by the Heritage Railway Association (HRA). The Rail Safety and Standards Board (RSSB) also publishes guidance for the rail industry with particular emphasis now being placed on human factors and the integration of non-technical skills into safety critical roles.

Competence management systems from individual heritage railways, publications by relevant professional institutions and examples from other industries have also been considered as part of a general review of books, articles and other publications from the internet and other sources in the public domain.

Finally, consideration of all relevant peer-reviewed research has revealed that the competence of managers, particularly in relation to leadership (Muller and Turner, 2010) and addressing non-compliance (Leach et al, 2013), is of significance with workers' perception of leadership involvement in daily work operations affecting the level of safety compliant behaviour (Dahl and Olsen, 2013). This review has also confirmed that human factors, and non-technical skills (NTS) (Bonsall-Clarke and Pugh, 2013) are key factors to be taken into account in managing competence effectively with research demonstrating that NTS such as decision-making and situational awareness underpin safe performance at work for safety critical staff (Russell et al, 2013).

## METHOD

Building on meetings already held with the management of two heritage railways, in-depth interviews were conducted with eighteen workers at four UK heritage railways from late 2015 and throughout 2016. Structured interviews were employed and digitally recorded and transcribed as 'verbatim with dialect' (Gibbs, 2007). Once transcribed, all interview data was input to the NVivo tool, with the creation of appropriate nodes, cases and coding as an aid to thematic analysis. Appropriate models were created as an aid to visualise coding.

The interview questions were structured around a limited number of topics including motivation, the role undertaken and training. Personal competence, competence management processes and their application were also areas used for the grouping of interview questions. The analysis of each these key topic areas is the main subject for this paper and the results are detailed below grouped on a thematic basis. These emerging themes resulting from the interview responses received are then discussed in detail, together with conclusions and the proposed next steps for this research.

## RESULTS AND EMERGING THEMES

### Demographic Data

A total of eighteen UK heritage railway volunteer workers were interviewed as part of this research. Seventeen interview participants were male and one was female. Only two of the participants had a background in the mainline rail industry, with the rest coming from a diverse array of backgrounds, with nine currently in full time employment and seven retired. Analysis of the demographic data for the interview participants reveals that eight of the eighteen, or 44%, were in the 61-70 age category, with a further four participants in the 51-60 age category. Only three of the participants, or 17%, were under 40 years of age.

The interview participants were undertaking a variety of volunteer roles on their respective heritage railways including locomotive, train, station and signalling operations. Infrastructure roles included permanent way, structures, signalling and telecoms. Finally, workshop roles for locomotives, and carriage and wagon, were also represented. Analysis of the demographic data reveals that six of the eighteen, or 33%, of the interview participants possessed over 40 years of experience as heritage railway volunteers. The remaining participants were spread relatively evenly across the remaining years of experience categories except 0-1 years and 51-60 years where there were no participants.

### Motivation / Role / Training

The motivation of volunteer workers is an important factor, as it underpins why they are freely giving up their own time for no financial reward, and this varied considerably across all the interview participants. For many volunteers, there was a sense of contributing to the improvement of something: "Basically with

this line there is so much that can be done, ....., it's a work in progress." For other volunteers, the motivation has arisen through a phase in their life: "to have an interesting and active role in retirement." Finally, for some volunteers the original motivation has altered over time to become something different: "originally, it was an interest in steam engines. I've, now it's just I enjoy what I do but it's sort of changed over the years, as the motives have changed."

With only one exception, all of the interview participants said that they understood the requirements of the role that they were undertaking at the heritage railway: "to have a good, sound knowledge of the job and to be able to manage people effectively and know how to relate to passengers, customers, visitors generally." In some cases, there was real clarity about the requirements for progression: "well, to become a guard, you have to, you have to go through a training, a training programme, and, you effectively act as a trainee with a qualified guard for a period of time." However, one participant stated that things were less specific and of a more general nature: "it's a difficult one that really because it sort of appears. Oh, some of it is experience and knowledge."

Training of volunteer workers is a key element contributing to competence for a role and, most of the interview participants indicated that they had received training for the role that they were undertaking: "various training, bits of training, over the years mainly to do with track laying, and driving works trains" which in some cases lasted a significant period of time: "The requirements are to do a signalman's course which with the practical side of it roughly takes eighteen months to two years." For some participants, the training received was of a less structured nature: "just on the job training really." One participant, however, felt that they had not received any training at all and had sought to learn themselves: "well, I've had on the job experience but I've had to pay for the chainsaw course myself. That was done several years ago. Five years ago I think. Basically just picking up what people are telling me really."

These results indicate a diverse array of motivations, a general understanding of the requirements for the role generally underpinned by training, albeit often 'on the job'.

### Personal Competence

As part of the structured interview, participants were asked to explain their understanding of the term 'Competence Management'. Most participants claimed an understanding: "Competence management! It's to ensure that people have the right competency for the job they have but those competencies are kept up to date, by means of training, and assessment, and I think also motivation is an important thing." This understanding also included the responsibility for themselves and others too: "Ensuring that, first of all myself, and then the people for whom I am responsible, have the knowledge and confidence, and basic ability to perform their roles." One of the participants wasn't sure of their understanding although in high level terms it could still be seen as in line with the principles of competence management: "Basically the right person for the right job, I would have thought. Well you've just hit us with that one there now." Finally, one participant expressed their understanding of competence management in terms of the consequences, or outputs of being competent: "I presume it's, it's, to, so that you do know what you are doing, and you can plan your work out, plan your men out, your team, and make it all come together, and, so at the end of the day we've got a good job." The interview results therefore indicate an awareness and understanding of competence management across all participants suggesting that the need for such processes and systems is recognised.

With respect to how they know that they are competent for the roles that they undertake at their respective heritage railways, most participants conveyed that they knew they were competent for role they undertook, citing compliance with documented standards and / or procedures: "Well, I need to look at the rule book and, make, make sure that I am complying with the rule book and if I don't know I ask," or through some form of assessment: "Well I'm, I know I'm competent by the fact that I did the exam." One participant only felt able to explain their competence through the fact that they had not been responsible to date for any incidents where a lack of competence might have been a factor: "How do I know? Well, we've had no mishaps." Of great interest is the interview response from one participant who felt that they

were able to determine their competence themselves without the need for competence management processes or systems: “Honest, personal appraisal is the answer to that.”

### Competence Management Processes

Awareness of competence management processes was high amongst the interview participants, particularly assessments: “Continuous assessments, when people begin to doubt their competency, like, you do get it, it’s not heard of as much but you have the older firemen that maybe actually get off a day and go ‘I can’t do this anymore’” and formal management systems: “You’ve heard of HOPS (HOPS, 2009)? We use HOPS for everything, the whole railway uses HOPS and has done for a little while.” One participant responded: “Mainly to do with use of machinery, etc” whilst another just wasn’t aware: “I don’t know about that.” These interview results suggest that volunteers are aware of the existence of processes relating to competence management.

The effectiveness of the existing processes was generally viewed as good by half of the participants, with a number of positive responses: “Theoretically they are fantastic, and we do our best to make them work in practice” and contributing to safety: “I think with, with, most of the competences we are safe.” However, one participant was keen to emphasise that his perception of effectiveness was based on their own interaction of the system and that they did not have the necessary visibility to comment on all aspects of the existing processes: “In terms of the formal ones, I mean I can’t comment on how much the recording is done, but yes, I have been called for medicals and been to see the medical officer.” None of the participants suggested that the existing processes are completely ineffective, however some of the participants felt that things could be improved upon: “I’d have to say mixed. They are not all fully understood by everybody involved and everyone responsible for operating them.” The fact that 50% of participants said they were unsure of the effectiveness of existing processes or felt they required improvement could be viewed as a significant issue to be addressed.

Given the perceived need for improvements to the existing processes, participants were then asked what they would like to see improved / done differently. Most interview participants were either unsure or said that change was required: “I think there is still room for improvement with regards to training people. What we are all up against is that everybody is busy” with some participants feeling the need for change was far reaching: “To what’s done now? Yes. Quite a lot of things would be done differently. Would you like me to go through them all? I think everything needs a proper competency. I think everything up to your most high level of roles needs a training book and an exam.” One participant felt that the issue was more about implementation rather than the processes themselves: “I don’t think I would do anything particularly differently except I would get a grip of it. Not me personally but those responsible for, ensuring systems as a whole operate, need to do more to make sure that everybody understands.”

### Application of Competence Management

Whilst the effectiveness and application of existing processes requires improvement, the majority of interview participants claimed that competence management has a positive effect on their overall motivation: “I think, I think that knowing what the competencies are that you need for a particular job does motivate you.” Others were less sure of the motivational benefits: “I don’t know that it does really. I mean it’s not the competence management thing that does piss me off. It’s the I’m way out of date, I’m supposed to have a medical every two years because I’m old, you know, that does piss me off” whilst others viewed it as just part of the working environment: “It doesn’t really. No, we live with it, you know. It’s there, use it, you know and to help you, you know, in your work from day to day, you know. It’s updated and, there to use and there’s no problem with that at all.” One participant did feel though that the level of assessments was a demotivating factor: “Well I wouldn’t say constantly being assessed. I mean I have to, I mean if, if the proverbial hits the proverbial, the railway can be seen to be doing the right thing.”

In terms of whether the application of competence management systems should be the same for volunteer and permanent paid staff, the overwhelming view was that there should be no difference in the

application, with one participant responding: “It shouldn’t differ at all. Staff are staff. Competencies are competencies. Some people get paid for doing them, some people don’t,” and another: “Not at all. Or perhaps it shouldn’t be linked to pay. I don’t think it should be different, any different.” One participant highlighted the key issue that whilst essentially the application should be the same, a different approach may be required: “Essentially it shouldn’t. It may have to be handled slightly differently, because you can at the end of the day tell a member of paid staff something, and if you like order them or instruct them to do something.” This same issue was highlighted by another participant: “Yes, in a way, you know because, paid staff you can tell them what to do, you know, within reason, sort of thing, volunteer staff you ask them really.”

Finally, all interview participants were asked about the importance of competence management to the UK heritage railway industry and all were unanimous in viewing it in a positive light. One participant stated: “Well I think it is vitally important because if we work in an incompetent manner, draw the attention of the Railway Inspectorate and the Health and Safety Inspectorate, the heritage railways are not going to, you know, continue much longer” whilst another responded: “Very, I would say. I mean, you get incidents like there have been at the, like at the GCR for example when they derailed the Ivatt 2 because they didn’t check the trap points when they were authorised to pass a signal at danger.” Of great significance is the response of one participant who suggested that the Heritage Railway Association has a role to play: “As I’ve alluded to before, I think it’s very important. I don’t actually think the heritage railway movement, as such, addresses it enough. It’s left to us to do it ourselves and I think the HRA, which is the umbrella organisation, I think should do more. But I don’t think they are interested enough in the subject.”

#### Knowledge Transfer and an Ageing Workforce

An emergent theme arose around the need to transfer knowledge from an aging volunteer workforce: “Because people are getting older, two in the gang are in their seventies so we need more people to carry on the good work that’s been going on for forty odd years.” There was a perception that it is different today with volunteering being an end in itself rather than people aspiring to undertake a specific role: “You know, being the volunteer has become almost the thing.” If sufficient new volunteers are not forthcoming, there is a view that heritage railways may be forced to contract-out many of the activities that are currently undertaken in-house: “Down the road, there will be so many small contractors and they’ll go round to the preserved railways and maintain their track.”

A related issue that was commented upon was retirement due to the inability to remain competent: “I think increasingly I don’t know whether the system will be robust enough to say “you’re not 63 now, you’re 70. You’re losing the plot a bit and I’m sorry were not going to say you’re any longer competent.” This was compared to the workplace: “It’s not a case of you’ve got to 65 so you retire anymore, is it? How you handle that I don’t know, but you’ve got to” with the legality also being questioned: “You can’t, you can’t discriminate against people over ageism. You can’t do that.”

#### Needs of Volunteers

The specific needs of volunteers was also touched upon in the discourse of many of the participants: “You have to bear in mind that some, some volunteers perhaps only do a few hours a month, other volunteers might be here two, three, to four days a week.” This essential difference, of volunteer availability effectively dictating the time agenda, was also touched upon by this participant: “I think it requires more patience and you can’t just say I want everybody to be competent in this by the end of the month like Network Rail do.” This issue was a common theme.

Participants made the point that an appropriate competence management approach for the industry should be tailored to the specific risks that exist, and not just adopted from the main-line railway environment: “My basic thing is it doesn’t want to be too complicated.”

## Leadership

Many participants expressed frustration with a perceived lack of leadership at a national level: “So, it would be nice if we could have some sort of organisation, be it with the big railway or with training companies, whoever, that we can develop the younger people coming through so we get the skills and training that we need.” Others were quite clear in their view that the HRA should assume this role: “It’s left to us to do it ourselves and I think the HRA, which is the umbrella organisation, I think should do more. But I don’t think they are interested enough in the subject.”

Finally, the unique nature of the heritage railway environment, and the need to gain and maintain

competence in a specialist domain where much knowledge resides with a diminishing pool of senior volunteers, was summed up perfectly in the following participant comment: “You see, I’m 42, I can’t remember the days of signalling and semaphore signals, I remember diesels and electrification. I can’t remember all these other things so we’ve got to keep up to date with the older ways of doing things.”



**Fig. 1 – NVivo ‘Word Cloud’ showing the most common of 48,402 words from interview responses**

The most common of the words contained in the interview responses are shown in Figure 1 with the word

“Erm” figuring prominently, perhaps reflective of the pause needed to consider the complexity, diversity and challenging nature of ‘competence’ within this context.

## DISCUSSION

Analysis of the qualitative data was able to reveal how competence is understood and experienced by those working and volunteering in the heritage rail industry, able to better highlight and illuminate some of the key and issues that need to be acknowledged and addressed by an effective competence management system, bespoke to this specific context.

As context to the interview responses received, the demographic data of the interview participants appeared to indicate a predominately ageing volunteer workforce with many having significant years of experience in their roles. Whilst younger volunteers are joining the industry, they are very much in the minority.

From thematic analysis of the interview results, the motivation of volunteers participating in heritage railway roles appears to be diverse, with no common factor underpinning their desire to dedicate their time to the industry. Most volunteers interviewed appeared to be able to recount some training that they had received in their role although for many this was received on an ‘on the job’ basis.

The interview participants demonstrated through their responses a clear understanding of competence management and why it is important, even if they were not able to describe it in consistent terms. Interestingly though, a number of participants were either unsure or unable to explain how they know that they are competent for the roles that they undertake, suggesting that attention needs to be paid to providing this clarity.

Almost all of the interview participants appeared to be aware of the processes for competence



management that exist at their respective heritage railways, although many felt that these are only partially effective with things to be changed. The need for competence management processes to be appropriate to the industry, and to address the actual risks rather than those imported from the mainline environment, was a theme mentioned by participants.

It was striking to note that almost all participants viewed competence management as having a positive effect on their motivation as volunteers, as long as the processes are seen as adding value and not unnecessarily onerous. However, one emerging theme from the interview responses was that of the competence of aging volunteers and many participants expressed concern and frustration that people may be forced to relinquish roles against their will.

Another related theme that emerged from the interview responses was that of knowledge transfer from previous generations of volunteers to the next and how this could be achieved, perhaps on a national basis. Here the role of the HRA emerged as a theme, with some interview respondents feeling that they could do more to take the lead on addressing the whole issue of competence management across the heritage railway industry.

Finally, a theme that emerged throughout the responses is the uniqueness of the heritage railway industry and how important effective competence management is to ensure its ongoing viability.

## CONCLUSIONS

This research has shown that there is currently no common industry-wide recommended approach to competence within this context, even though existing legislation places a legal obligation on UK heritage railways to manage competence in the workplace. Although there is an understanding by both volunteers and permanent staff of the need for effective competence management, variations in how this is understood and articulated suggests this is a complex phenomenon with a number of contributory aspects and barriers, and that any underpinning processes must be appropriate to the unique nature of the UK heritage railway industry and the associated risks.

Volunteer motivation and engagement is key to the future viability of the industry and competence must be managed in such a way as to ensure that this is maintained and, where possible, enhanced. The heritage rail industry must address the approaching 'cliff-edge', as the knowledge currently retained by the founding generation starts to leave the industry, and put in place appropriate measures to ensure that this is transferred to the next generation in a form that is accessible and relevant to the volunteers of today.

It could be suggested that for each railway to be developing their own systems in isolation is a missed opportunity in terms of sharing best practice and ensuring consistency, an ever more important factor as many volunteers work on more than one railway, and in terms of resources is unlikely to be a viable approach in the longer term.

This research matters because it identifies real themes, from volunteers actively engaged in running the UKs heritage railways, to be appropriately addressed in developing a competence management system that will meet the needs of the industry.

## NEXT STEPS

In order to determine the approach for a competence management system that will address the issues highlighted by this research, and that is appropriate to the unique heritage railway environment, it is proposed to undertake further targeted interviews to understand in more detail the specific issues identified from the themes emerging from these interview responses.

In this way, the intention is then to develop a proposal for an approach to competence management that can be adopted and applied on an industry-wide basis, potentially under the auspices of the HRA.

## REFERENCES

- Baughan R and Crapper M (2016) Competence Management in the UK Heritage Railway Industry. ARCOM Conference Proceedings 2016.
- Bonsall-Clarke K and Pugh S (2013) – Non-technical skills for rail: Development, piloting, evaluation and implementation of courses for front-line staff and managers. “4th International Rail Human Factors Conference, United Kingdom”.
- Dahl O and Olsen E (2013) – Safety compliance on offshore platforms: a multi-sample survey on the role of perceived leadership involvement and work climate. “Safety Science” Volume 54.
- Gibbs G (2007) “Analysing Qualitative Data, 1 ed, London: Sage Publications Limited.
- Heath H (2013) Heritage Railways: Steaming ahead. "The Economist"
- HOPS (2009) Heritage Operations Processing Systems – Developed by Gloucestershire and Warwickshire Railway and maintained by Heritage Operations Processing Ltd.
- HRA (2013) "Volunteering", the Heritage Railway Association, <http://bit.ly/1k93jMk> [18 April 2014]
- Leach P, Canham R and Berman J (2013) – Achieving compliance through people: training supervisors to tackle procedural non-compliance. “4th International Rail Human Factors Conference, London”.
- Muller R and Turner R (2010) – Leadership competency profiles of successful project managers. “International Journal of Project Management” Volume 28, Issue 5.
- NR (2014) Network Rail Sentinel Scheme Rules – first issue 06 January 2014
- Rolt, Tom (1953) Railway Adventure, Constable.
- Russell A J, Bailey S and Moore A C (2013) – The introduction of non-technical skills into a train driver competence management system. “4th International Rail Human Factors Conference, United Kingdom”.
- Sherratt, F, Crapper M, Foster-Smith, L and Walsh S (2015) Safety and Volunteer Construction Workers. “Construction Management and Economics” Volume 33 Issue 5-6.