

# Organisational Learning – Applying a Human Factors Approach to Learning from Human Factors Projects in Healthcare

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## ABSTRACT

Human Factors as a discipline provides the theories, methods, and tools to assess work and work systems. Likewise, these theories can be adopted to assess and support change to the way HF work is done, especially when the work environment drastically changes, as has occurred with the pandemic. This would require applying Human Factors theories and methods to the work done by Human Factors specialists themselves, to enhance their own working processes and systems. This paper describes the development and application of the Lessons Learnt Reflection Approach, a tool aimed at capturing aspects that work well at an operational level for Human Factors work within healthcare, with special consideration for the impact of the COVID-19 pandemic. This approach was developed in response to the increased awareness of the limitations that the pandemic created in the work environment and the need to modify methods in response. The CIEHF's guidance "Achieving sustainable change: Capturing lessons from COVID-19" was used to provide the structure and fundamental basis for this approach. This paper will describe the method and application of this approach for three different human factors projects in healthcare, namely (1) understanding the work system changes for a physiotherapy department during the initial response to the pandemic, (2) supporting the procurement process for a large volume general medical device and (3) supporting simulation testing of a commercial medical product.

## KEYWORDS

Organisational Learning, Healthcare, COVID-19

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## Introduction

Human Factors (HF) and Ergonomics is the scientific discipline that aims to understand the interaction of people with other work system elements including tasks, tools and technology, environmental, organisational and cultural factors, to optimise human well-being and enhance overall system performance (Dul et al., 2012). As a result of the fundamental purpose and principles of HF, it is not surprising that this discipline has a lot to offer with assisting the response to the COVID-19 pandemic with regards to supporting changes in the work environment. The various international HF societies have provided support in a range of forms since the start of the pandemic including webinars (e.g. International Ergonomics Association Webinar: Preparedness and Pandemic (IEA, 2020), ISQua webinar: Human Factors Systems Approach and the COVID-19 Healthcare Crisis (ISQua, 2020)) and providing advice regarding the sudden changes in the different work systems. During the initial response to the COVID-19 pandemic in 2020 in the United Kingdom, the Chartered Institute of Ergonomics and Human Factors (CIEHF) developed a process for the rapid generation of guideline documents (described in Hignett et al., 2021) that was used to generate content on a variety of topics associated with working during the pandemic (e.g.

children working at home, nationwide vaccination roll outs) as well as supporting healthcare systems respond to the pandemic (e.g. ventilator design and usability testing, and procedure guidance for routine tracheostomy care and ventilator emergency care). These documents were made freely available on the Institute's specific COVID webpage (<https://covid19.ergonomics.org.uk/>).

Despite HF specialists extensively supporting the work in healthcare during the response to the pandemic in a variety of ways (e.g. Carayon & Perry, 2021), the way work was done by HF specialists also inherently had to change as a result in the change in the healthcare environment due to the pandemic. Namely the COVID-19 pandemic created not only challenges in the workplace in general, but also created challenges to HF work being conducted in the healthcare environment. Examples of some of the complications and changes to the healthcare work environment that affected HF work included that unnecessary non-clinical staff were not allowed in the hospital, the need for and effect of social distancing and the availability of frontline staff to participate in projects (Wooldridge, Carman, & Xie, n.d.).

Just as HF was primed to support the sudden changes in the work environment in the different industries due to the pandemic, so too are the theories applicable to support change to the way HF work is done itself. Furthermore, on the premise that 'good ergonomics is good economics' (Hendrick, 1996), it also follows that one can apply the HF methods and theories to the underlying way work is done to conduct HF research and projects to ensure it is efficient. This is an important consideration due to the numerous challenges HF faces with regards to becoming integrated into the healthcare domain. For example, the time urgency of improvement projects within healthcare, the limited number of HF experts within healthcare organisations to deliver this work and the limited understanding of what HF is and can offer (Wooldridge et al., n.d.). The focus of this paper is on a reflective approach that emerged during the COVID-19 pandemic for reflecting on work underlying HF projects in healthcare to enhance the HF team's efficiency. This paper will describe the method and application of this approach for three different HF projects in healthcare.

## **Method**

The COVID-19 pandemic, not only saw extreme changes to life, the way work was done and organised but also prompted reflection on numerous levels regarding the changes, how work was done and how work could be done. During this reflective period and as a result of HFE research emerging from the response to the COVID-19 pandemic, the Trent Simulation and Clinical Skills Centre identified the need to develop an approach to reflect on the work of their HF team to enhance the way of working and document the aspects that worked well for the different HF projects they were involved in. This reflective approach aimed to qualitatively evaluate the work of the HF team on HF projects within healthcare to promote learning. This approach essentially aims to apply HF theories and an HF approach to understanding the work of conducting HF research and projects within healthcare. This section will first describe the context, namely the centre where this approach was developed and their work, followed by a description of how this approach was developed.

## **Context**

The Trent Simulation and Clinical Skills Centre (TSCSC) is a training and education centre based within a large NHS Hospital trust. The centre aims to provide value that contributes to enhancing patient care and organisational learning through several programs of work. A range of educational courses are provided by the centre for healthcare staff to develop staff and team expertise, as well as simulation-based training. In addition to this, HF support is provided to various internal projects that include improvement projects, service reviews and procurement projects. The TSCSC team consists of management staff, administration staff, three technicians, ten fellows and clinical trainers, and two HF Specialists who both have a master's degree in Human Factors with one

completing a doctorate degree in HF. As the team is relatively small, offers a wide range of services, both providing training and supporting projects within the trust, the need was quickly identified to ensure the resources are used as efficiently and effectively as possible.

### ***Lessons Learnt Reflection: Method Development***

As a result of the pandemic and emerging HF research, during the course of 2021 the TSCSC team started to develop a reflective approach to better understand the work underlying the HF projects of the centre. The tool, the Lessons Learnt Reflection (LLR) approach, aims to provide a standardised approach to capturing aspects that work well and good adaptations that emerge in response to unexpected challenges at an operational level for HF work within healthcare. Furthermore, to enhance the learning for the centre, learning that occurred across projects that had very different scopes and topics needed to be captured using a standardised approach. The three key contributors to the development of the LLR approach were the increased awareness of the limitations that the COVID-19 pandemic created in the work environment, a reflective paper the author contributed to on the need to modify HF methods in response to the COVID-19 pandemic (Wooldridge et al., n.d.) and the CIEHF's document "Achieving sustainable change: Capturing lessons from COVID-19" (Sujan, Bowie, Smyth, & Rashid, 2020).

The CIEHF's document (Sujan et al., 2020) provided the main structure for the LLR approach. This is one of the rapid guideline documents created in 2020 and focused on means of capturing the changes to practice and the improvements made in healthcare during the response to the COVID-19 pandemic. The guidance was developed using the principles of systems thinking and organisational learning (Sujan et al., 2020). Using the two interconnected structures of the organisational learning framework proposed in the CIEHF document (mindsets and actions), the scope for learning for the centre was defined using the mindsets and general questions were generated for each of the five actions (listed on the right side of Figure 1). The application of the mindsets for the context of learning for the centre have been described in Table 1.

Table 1: The mindsets outlined by the CIEHF document on organisational learning (Sujan et al., 2020) and the focus for the Trent Simulation and Clinical Skills Centre.

<b>CIEHF Mindsets</b>	<b>TSCSC Focus</b>
1. Learning goals	The purpose of the learning was to enhance and understand the functioning of the centre and how the HF projects are delivered with the current resources within the team. This included identifying: <ul style="list-style-type: none"> <li>• what worked well in these projects.</li> <li>• methods and approaches that may need to be developed further</li> <li>• potential considerations for additional phases for these project</li> </ul>
2. Learning is for everyone	The reflective activity should involve all TSCSC staff that contribute to the HF project that is being evaluated.
3. Learning speed and depth	Although each project evaluated to date has been unique, the aim of these sessions was to explore longer-term operational changes and document aspects that could have application to a wide range of projects and considerations for future HF projects.
4. Learning from everyday work	Although the projects were unique, for some staff, these projects form a considerable portion of everyday work. This approach was adopted to new projects coming into the centre to better understand this type of work, with a focus both on challenges and aspects that worked well in these projects.
5. Learning is formal and informal	This method was used as a means of capturing previous informal learning in a more formal structure, to build and grow upon previous experience and create more robust processes.

The discussion guide developed for this approach is depicted in Figure 1. This included three sections, namely capturing a project overview, project specific information, and specifically considering the impact of the COVID-19 pandemic on the project. The project overview captured the project aim and documented work-as-done in the form of the project description of the work that was completed for the project. The second section on project specific information was generated using the prompts listed for the actions from the CIEHF document. This section of questions aimed to explore work-as-done, trade-offs and adaptations, understanding how the learning can be practical, the resources required and identifying how this learning can feedback into the work of the centre.

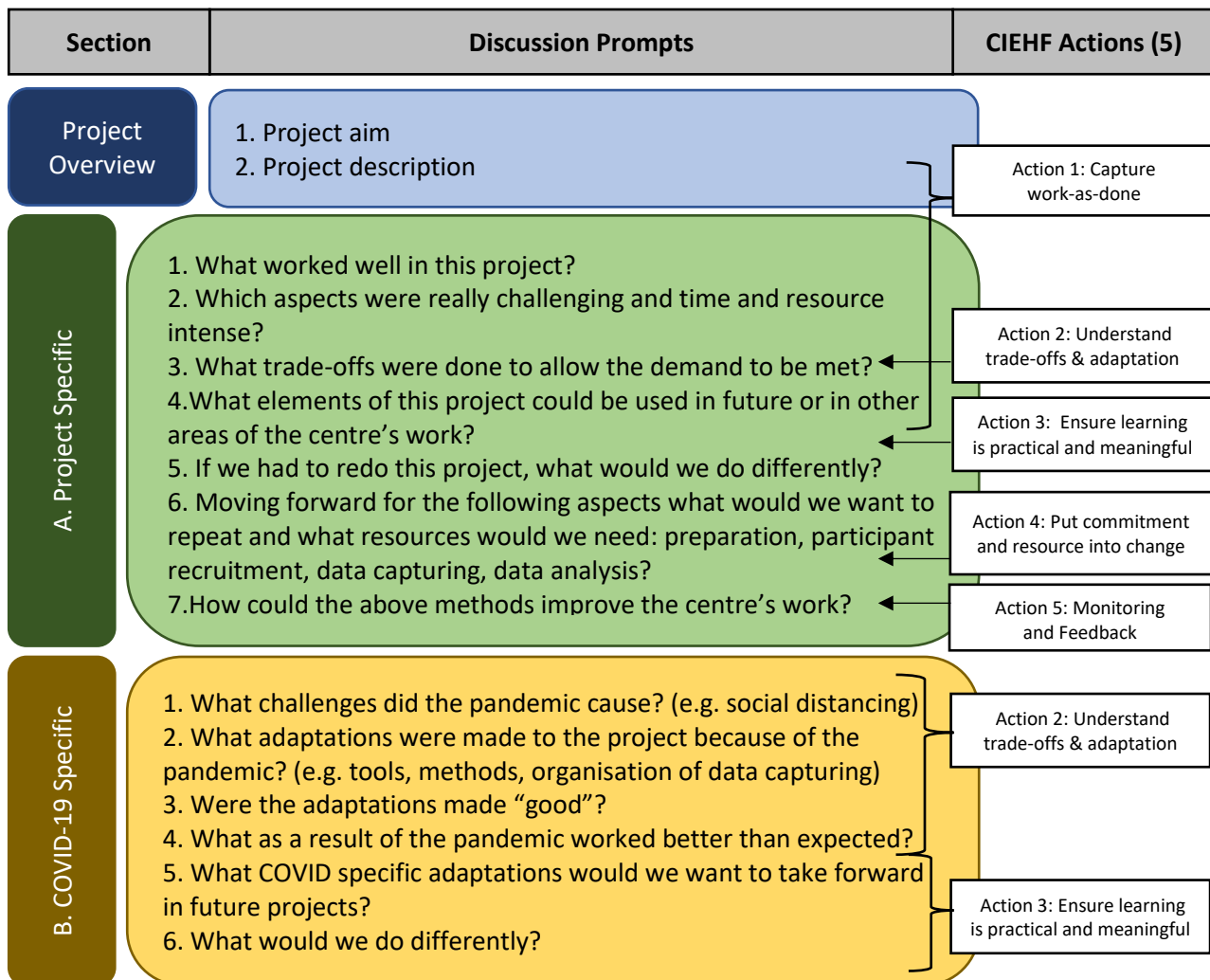


Figure 1: Lessons Learnt Reflection: Discussion Guide

The third section consists of questions aimed at exploring the effect of the COVID-19 pandemic on HF research and projects in healthcare. The questions associated with this section were generated as a result of the increased awareness of the limitations that the COVID-19 pandemic created in the work environment and a reflective paper on the need to modify HF methods in response to the COVID-19 pandemic that emerged from a session at the 2021 International Ergonomics Association Triennial Congress (Wooldridge et al., n.d.). The COVID-19 pandemic created not only challenges in the workplace in general, but also created challenges to HF work being conducted in the healthcare environment. The core questions used to evaluate the effect of the pandemic on the HF projects were adopted from the approach used to generate the paper by Wooldridge and

colleagues and were minimally extended for this approach. These questions explored two specific CIEHF actions in more detail, namely understanding trade-offs and adaptations and ensuring learning is practical and meaningful.

This approach proposes that the mindset table (Table 1) be completed prior to the reflective session by the project lead and the discussion guide (Figure 1) is then to be used as a flexible template for a semi-structured focus group session on the reflection of the HF project. Prior to the start of the discussion, the mindsets for this learning activity would be shared by the moderator with the participants to ensure the goal for the reflective session was communicated to the entire group. This would then be followed by the moderator guiding the discussion using the questions from Figure 1. It may be that as a result of the discussion, the questions that feature further down the list in Figure 1 are addressed in the responses to earlier questions. As a result of this, the moderator may choose to explore these topics as they arise and therefore exclude the later questions.

### ***Applications***

This approach has been applied to three different HF projects that the TSCSC team were involved in during 2020 and 2021. For each LLR session, one of the HF specialists acted as moderator and the session was conducted through MS teams. Using the recording function, the session was recorded and a summarised report using the structure of the discussion guide was generated following the session. This was then sent to the project team members that participated in the session for sense checking.

### **Results**

For each of the three projects, a brief overview has been provided including the project aim and team resources needed for the project. This is followed by a summary of the key learning for the centre from each project. The results section concludes with an evaluation of this approach and future work required for the LLR approach.

#### ***Project 1 – Understanding the work system changes during the initial response to the pandemic***

The aim of this study was to capture the changes and adaptive ways of working during the initial NHS response to the COVID-19 pandemic (April 2020) within the physiotherapy department at the Trust. The objectives included depicting the changes in the work system and new ways of working using a systems perspective, capturing staff's experiences of work during this time, and compiling considerations for future 'waves' of this pandemic. The TSCSC team for this project consisted of two HF specialists and one clinical educator that worked clinically as a physiotherapist. This project adopted an explorative approach and collected qualitative data through eight online focus groups conducted with a total of 26 therapy staff between July and August 2020. Although the project was initiated by the TSCSC team and done in collaboration with the therapy department, the method design, data capturing, and analysis were done by the TSCSC team. Additional information on the results of this project are available (see Carman, Evans, & Miles, 2021).

During the preparation for the reflective session, it was identified that as this project was born out of the need to understand the changes to work due to the pandemic, the questions outlined in section B (COVID-19 Specific) of the LLR discussion guide were selected to be asked first instead of the project-specific questions (section A). As a result of the discussion that emerged based on these questions, numerous questions from section A were addressed without the need to ask these questions specifically. The reflective session identified that due to the pandemic, the format and organisation associated with focus groups was considerably affected and needed careful consideration. As this project was designed at the time whereby the changes in the healthcare environment had already started, these were considered when selecting methods and organising the

data capturing schedule. This was the first project in the centre to conduct focus groups online, which had the benefit of being able to access staff for their perspective on the current work situation while working around the limitations created by the pandemic. This highlights the CIEHF actions of capturing work-as-done, the trade-offs required, and adaptations made.

Additional aspects that worked well due to the pandemic included that other work within the TSCSC centre had been postponed which meant the TSCSC staff were more available for this project and due to the online nature of the project meetings this project was set up relatively quickly. The limitations identified in the reflective session were the format the results were presented in to both the management team and the staff that participated. This included that although at the time online access to staff was preferable, the feedback of the project results may have had a better impact if they could have been delivered as an in-person discussion session. Similarly, the structure of the report may have been too cumbersome to apply the findings to the next wave, and perhaps the findings should have been translated into more practical approaches. These benefits and limitations highlight key aspects for the CIEHF actions of ensuring learning is practical and meaningful as well as monitoring and feedback for future projects.

### ***Project 2 – Supporting the procurement process for a large volume general medical device***

This piece of HF work supported the procurement process for the supply of a general medical device used in every ward across the trust. This project required the team to assess 25 models for nine product categories and compile hospital staff's perspectives on the usability of these devices and consider of how they would fit within the current work system. The TSCSC team for this project consisted of two HF specialists, four clinical educators, administrative staff and the technical team. The TSCSC team were responsible for developing an approach to assess these products both in the simulation centre and on the wards. A combination of qualitative and quantitative data was captured and analyzed, and these results were presented back to the larger project group that consisted of representatives from procurement, medical engineering and clinical teams. The number of resources and testing required for this project makes it one of largest HF projects undertaken by the TSCSC team to date.

As this project was designed and initiated prior to the pandemic and therefore the pandemic had an effect on the project rather than being a specific design consideration (as with Project 1), the LLR discussion guide was applied as it is depicted in Figure 1. The reflective session for this project was targeted for one specific phase of this project, namely the simulation testing done for these products conducted in October to November 2020. For the reflective session, the majority of the TSCSC project team participated in the session.

Key elements of work-as-done identified, that also represented adaptations, that contribute to ensuring learning is practical and is feedback (elements to take forward for future projects) included learning from previous phases of this project. This resulted in elements of this phase being streamlined so that numerous products could be assessed in one day. This was achieved by generating standardized questionnaires, refining the testing schedules, and preparing the team well in advance for the longer data capturing days. Challenges included the extensive data analysis that was required and recruiting and communicating with participants. For a later phase of this project, the team developed a method of streamlining the data analysis so it was less time consuming. This last example highlights the CIEHF actions of putting commitment and resource into change and monitoring and feedback. The simulation sessions required healthcare staff from various departments to participate and as these were held during the pandemic, there were times it was difficult to recruit staff to participate in this project. An unexpected benefit of the pandemic, similar to Project 1, was that due to education courses being cancelled with the TSCSC Centre, TSCSC staff were more available to work on this project and the centre facilities were available.

### ***Project 3 – Supporting simulation testing of a commercial medical product***

This piece of HF work supported the testing of a commercial product to assess its suitability for use in clinical practice within some parameters set by the company themselves. The product assessed was a medical product for specific clinical applications and the TSCSC team assisted with the simulation-based testing for variations of this product. The TSCSC team involved in this project included one HF specialist, one clinical educator and two technical staff. The TSCSC team were required to work with the client team to determine the different simulations that were possible for this product during one planning day, then provide support for the data capturing on one testing day and provide documentation on the testing method. This was a new type of project from the TSCSC team (a different type of product evaluation in comparison to Project 2), a new way of combining the expertise of the team and a new application of the resources of the centre.

Similar to Project 2, the LLR discussion guide was applied as it is depicted in Figure 1. The reflective session identified that although initially a more structured simulation session had been planned, the team (in agreement with the client) changed to a more flexible approach that enhanced the interaction with the client. This highlights the CIEHF actions of work-as-done and adaptations. Additionally, as a member of the TSCSC team had a clinical background, this provided an important perspective with regards to the planning and preparation for the simulation testing. On the testing day, a clinical staff member joined the group, which the client found beneficial. The planning day also assisted with setting appropriate expectations from the client team regarding available equipment and establishing and documenting contingency plans with regards to team cover of unavailable staff on the testing day. Aspects that were more resource intensive than expected included the generation of the final report, but this may have been as the format had not been pre-determined. Aspects the team felt they would do differently in the future included developing specific questions for the client to be addressed in the planning phase, develop a more formal agenda for the planning day and create a report template. This represents both the CIEHF actions of ensuring learning is practical and meaningful and monitoring and feedback.

### **Conclusion: Lessons Learnt Reflection Tool – Evaluation and Future Work**

This approach provided a structured yet flexible tool to capture lessons learnt for conducting HF work within healthcare. For the three projects, the moderator amended the questions during the session to prevent repetition as some questions were already answered during the discussion of others. The discussion guide was further used as the analysis template and provided the structure for the final report. The final output, in addition to the answered questions, was a summary of key elements to consider for future projects.

Upon reflection of the application of the LLR tool, as the centre had no previous means of documenting this type of learning, this approach has the potential to provide a formal and independent way of capturing adaptations and aspects that work well across different types of HF projects. With a small team and if the learning is not documented, one risks losing knowledge either as a result of a loss of staff or over time. Furthermore, this form of reflection – namely understanding the way HF teams work to identify ways of making their project work more efficient has not been explored in the centre before. This is essential as the number of HF specialists in healthcare are very limited and the request for work often outweighs the available capacity. By enhancing the efficiency of the work of small HF teams, hopefully more work could be provided and assist in embedding HF in healthcare more.

A potential advantage of this tool is that it provides a standardized approach to extracting key learning from HF work in healthcare, irrespective of the type of project. However, this tool needs further development and assessment of its 'usability', 'validity', 'reliability' and impact of the outputs of this approach. Limitations of this tool include the limited application to date and a lack of

translating the findings into documented next steps for the centre to ensure the learning is ‘closed looped’. Furthermore, the ‘usability’ and ultimate output of this approach has not yet been assessed. These limitations are predominantly as a result that the tool is relatively new within the centre and the LLR sessions have only been held since the June 2021. To address these limitations, some of the next steps in the development of this tool would be to document and track the changes and suggestions that emerge from these sessions and their application in future projects, compile evidence from the outputs of this tool as well as document the associated improvements in the process or results. The TSCSC team also aims to expand this method to include project partners from other workstreams or departments to capture their perspective and to enhance collaborative work. This will then hopefully provide the opportunity to capture the impact and difference HF has made on these projects.

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