

Framework for Evaluating Human Performance Technologies – A Decision Making Tool



Executive Summary

In recent years we have seen a significant increase in the number of available connected health technologies for measurement of human performance and behaviour, whether the target measurement variable is a biomechanical or physiological marker of performance. This increased availability leads to great opportunity but it also creates significant confusion for researchers and industries who are attempting to select appropriate technologies with respect to specific application scenarios. This exercise can be particularly challenging when application requirements are not clearly defined and/or when there is insufficient in-house expertise to perform a comprehensive device evaluation. Moreover, when a device is selected, the rationale for this choice may not be clearly documented, making it difficult to justify a decision or revisit decisions in the future.

At present there are no standardised methods for identifying, evaluating and comparing the numerous devices available in the connected health market with respect to specific application scenarios. This piece of research aims to develop and provide a flexible framework to help researchers and/or industry partners to evaluate if a device is fit-for-purpose based on their particular application requirements. Whether these requirements are in the context of a clinical trial, a pilot study, or a connected health service, when one or more devices are evaluated, the outcome should reflect a systematic and rigorous evaluation, albeit a desk-based one.

This framework intends to guide the user through the desk-based evaluation process and consists of three core steps:

- 1. Application requirements definition** – this step prompts the user to define their application requirements. This enables a more targeted device search while allowing the user to clearly judge whether selected devices are fit for purpose;
- 2. Device identification** – this step helps the user conduct an efficient and yet comprehensive web search in order to identify available devices that match application requirements;
- 3. Device evaluation and comparison** – this step guides the user through a comprehensive device evaluation process. Devices are evaluated according to six different domains: Background Information; Cost and Supply Information; Regulatory Compliance; Scientific Evidence; Technical Evaluation and Human Factors. Where there is more than one device being evaluated, the tool will also assist users to compare devices to each other in order to determine which devices best satisfy application requirements.

Project Leads

Brenda Reginatto
e: brenda.reginatto@ucd.ie
Patrick Slevin
e: patrick.slevin@ucd.ie

Collaborators

ICON, S3

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The methods described in each step can be applied in sequence or in isolation, depending on the needs of the user. By the end of this process the user should be able to more confidently select devices worthy of field evaluation, while having the rationale for their choice clearly documented using the templates provided.

This framework was developed by ARCH researchers in consultation with experts in the different evaluation domains. Researchers have engaged with industry members throughout the development process to ensure the proposed tool attends to real user requirements. Framework performance was assessed by a group of external researchers using two hypothetical application scenarios. Lessons learned through this process include:

- Clearly defining application requirements at the beginning of the process was perceived as very beneficial. Not only because it enabled a much more targeted and efficient device search, but also because it has the potential to prevent users from compromising study/service design and implementation at later stages due to a poor device choices. There was a consensus that the more specific the description of the application requirements at the start of the process the easier the identification and evaluation of devices becomes;
- There was a sense that the proposed device search strategy saved time while reassuring users that a comprehensive search was conducted. The outcome of the search reflected devices that were fit for purpose, identified at a point in time;
- The device evaluation and comparison template was considered a very useable and comprehensive tool. It was felt that the framework highlighted areas of evaluation that users would not have considered otherwise. Using the template was also deemed useful for identifying areas where external expertise is required in order to fully evaluate and compare different devices; another benefit of completing the evaluation template was that it might also help further inform study / service requirements as the user may be exposed to unforeseen requirements that impact device selection.

The next steps...

Future steps include making the framework available to a wider audience and obtain feedback regarding its use and performance in different user scenarios. This will enable the authors to improve the usability of existing templates.

Companies with a commercial interest in these connected health opportunities or who are intertested in collaborating with ARCH should contact the Project Co-ordinator on info@arch.ie or call 01 7165400.