



## D6.3

### Assessment report and impact analysis

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#### Abstract

This deliverable provides an overall assessment of the HEIR platform from an end-user perspective. Pilot sites report on user experience, technological & operational acceptance, and impact assessment, based on their experience with the platform. Along with feedback from external stakeholders, conclusions are drawn, and suggestions are made for future improvement.

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## **Executive Summary**

This report follows the execution of the HEIR trials and provides an overall assessment of the HEIR platform and an impact analysis, from an end-user (pilot sites) perspective. It also analyses the feedback collected by external stakeholders.

User experience is assessed using the well-established User Experience Questionnaire (UEQ), as it looks in detail at all aspects of the user experience but also allows for the HEIR platform to be benchmarked against other solutions, by providing an overall user experience index.

The acceptance of the technology is then assessed, identifying issues that arose during the trials, assessing stability and reliability, and comparing with any existing solutions. In terms of operational acceptance, end users report on their intended use of the HEIR platform and the requirements to do so.

In terms of impact, end-users report on the recorded and predicted impact that the use of the HEIR platform might have on their organizations, as well as on patients themselves.

The report also includes a detailed analysis of the feedback received from external stakeholders, following the training sessions organized at the facilities of all four pilot sites.

Conclusions are drawn that can help in future development and improvement, for maximum adoption by future users.

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## List of Abbreviations

CUH	Croydon Health Services NHS Trust
HIS	Health Information Systems
HYGEIA	Diagnostic and Therapeutic Center of Athens HYGEIA
KPI	Key Performance Indicator
ML	Machine Learning
NHS	National Health System
NOKLUS	Haraldsplass Deaconess Hospital
NSE	Niversitetssykehuset Nord-Norge HF
PAGNI	Panepistimiako Geniko Nosokomeio Irakleiou
PAF	Privacy Aware Framework
RAMA	Risk Assessment of Medical Applications
UEQ	User Experience Questionnaire
UX	User Experience

# 1 Introduction

## 1.1 Scope and objectives

With the aim of further improving the HEIR platform but even more so the experience of its future adopters, in the context of task 6.3 the pilot users were asked to provide their assessment, but also to estimate the potential impact, both on their organizations and on the patients themselves.

We start with a detailed analysis of the user experience as this is always the determining factor in accepting or rejecting a platform. We used the User Experience Questionnaire (UEQ) which examines aspects of attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty, but also provides tools for data analysis as we have described in D6.1 *HEIR Demonstration – Initial Execution & Evaluation*. We analyse the results from the second round of UEQ questionnaires, which followed the successful deployment of the HEIR platform in all four pilot sites.

We then examine the technology acceptance of the HEIR platform by pilot users, seeking to identify any issues that need improvement that would allow for even more seamless integration, and identify strengths and weaknesses, also compared to current cyber security solutions in use at the pilot sites. This is complemented by the operational acceptance, were pilot users report on their intended use of the HEIR platform and the requirements, either organizational, technical, or human resource, to do so.

Although the pilot use cases focused on specific modules of the HEIR platform under specific conditions, end-users were asked about the recorded and predicted impact that the platform may have on department responsible for cyber security, across the organization, and indirectly, on patients themselves. This is just an initial assessment of the foreseen impact and should be revisited after deployments to future early adopters of the platform.

Additional to the assessment made by the end-users, this document also analyses feedback collected by IT and non-IT experts in medical centres and hospitals, during the training sessions organized at pilot site facilities. To this end, specific questionnaires were created to assess the usefulness of specific HEIR modules as well as the overall perception and to highlight any missing functionality. Furthermore, we report on the comments and suggestions received by the members of the External Advisory Board.

Conclusions are drawn to support future improvement, long-term sustainability and exploitation of the HEIR platform.

## 1.2 Document structure

Section 1 (“Introduction”) sets out the scope of this document and describes the objectives of the assessment and impact analysis. Section 2 (“End-user assessment”) analyses User Experience, Technology & Operational acceptance, and Impact Assessment. Section 3 (“Feedback from stakeholders”) reports feedback collected from field experts in hospitals and medical centres during the training sessions and from the External Advisory Board. Conclusions from all sections are drawn in section 4 (“Conclusions”).

### ***1.3 Relation to other deliverables***

- The evaluation plan was set out in D6.1, together with a first user experience assessment, and a limited list of impact KPIs that could be addressed at that time. The final list of all impact KPIs can be found in D7.4 *Dissemination strategy and activities, engagement and business opportunities – P2*.
- While this document also presents the assessment of the HEIR platform by external experts as collected during the training sessions, the assessment of the sessions themselves is presented in deliverable D7.10 *HEIR training for experts and non-experts*.
- The operational acceptance elements presented hereto are related to the individual exploitation plans, listed in D7.8 *Exploitation strategy, training material and activities - P2*.

## 2 End-user assessment

### 2.1 User Experience

In section 5.2 of deliverable D6.1, we presented the rationale for selecting the User Experience Questionnaire (UEQ) for properly measuring and evaluating the user experience<sup>1</sup>. For completeness of this document, we simply repeat that the UEQ addresses the following six (6) usability and user experience aspects:

- a. **Attractiveness:** Overall impression of the solution. Do users like or dislike?
- b. **Perspicuity:** Is it easy to get familiar with the solution? Is it easy to learn how to use?
- c. **Efficiency:** Can users solve their tasks without unnecessary effort?
- d. **Dependability:** Does the user feel in control of the interaction?
- e. **Stimulation:** Is it exciting and motivating to use the solution?
- f. **Novelty:** Is the solution innovative? Does it catch the interest of users?

To properly measure these 6 aspects, the UEQ uses corresponding scales - each scale comprised of items describing the aspect - with a total of twenty-six (26) items, structured as in Figure 1. *Attractiveness* is a pure valence aspect. *Perspicuity*, *Efficiency* and *Dependability* are pragmatic quality aspects (goal-directed), while *Stimulation* and *Novelty* are hedonic quality aspects (not goal-directed). The *Attractiveness* scale has 6 items, all other scales have 4 items.

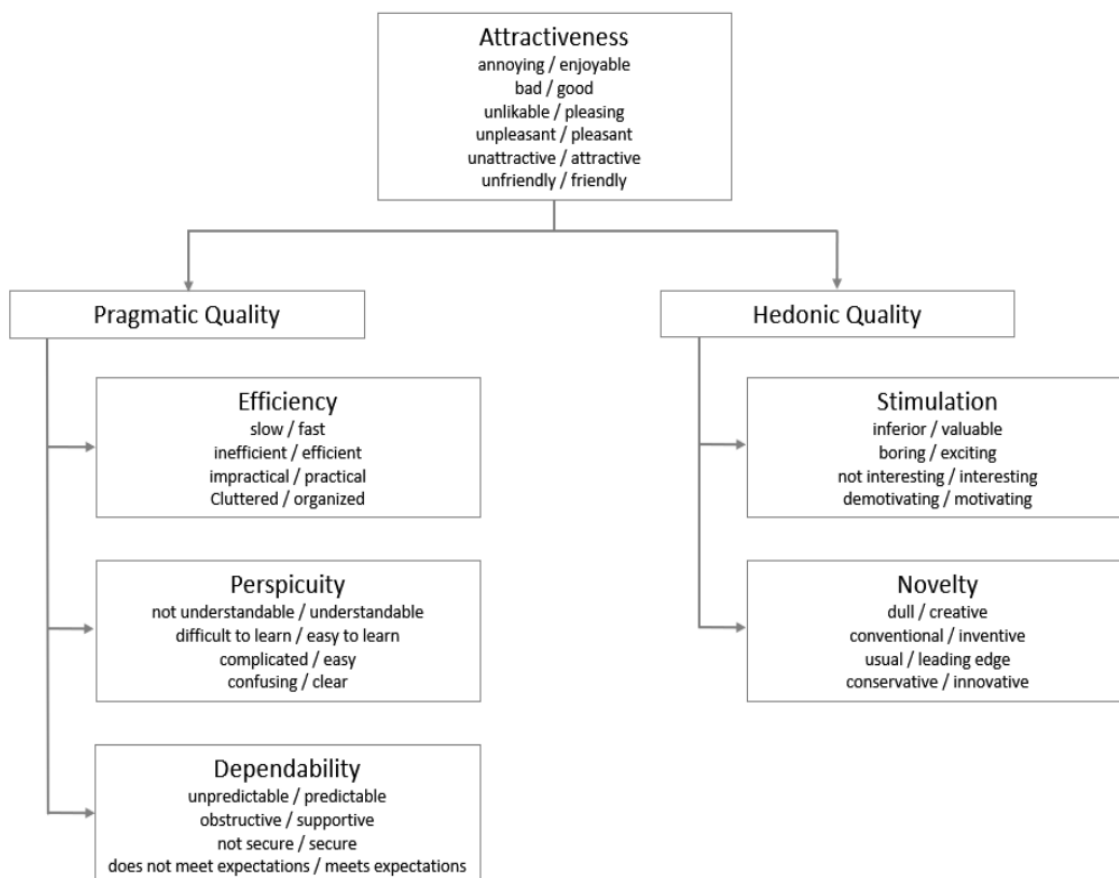


Figure 1: Scale structure of the UEQ: Aspects and items describing each aspect

<sup>1</sup> Detailed information on the construction of the UEQ can be found in [www.ueq-online.org](http://www.ueq-online.org) and references within

These twenty-six items are accompanied with six (6) more questions which ask for the importance of the UEQ scales for the participants and allow for a single KPI to be calculated that can be interpreted as an overall UX impression.

The actual questionnaire is displayed in Figure 2:

- The items have the form of a semantic differential, i.e., each item is represented by two terms with opposite meanings. The UEQ uses a seven-stage scale to reduce the well-known central tendency bias for such types of items, ranging from attractive to unattractive.
- To minimise answer tendencies:
  - the order of the items is random
  - the order of the terms is randomized per item, i.e., half of the items of a scale start with the positive term and the other half of the items start with the negative term
  - The items are scaled from -3 to +3. Thus, -3 represents the most negative answer, 0 a neutral answer, and +3 the most positive answer.



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<p>1. The following 26 measurements address six usability and user experience aspects: <b>Attractiveness, Efficiency, Perspicuity, Dependability, Stimulation, and Novelty</b></p> <p>2. The order of the measurements is random. <b>More importantly</b>, the order of the items (i.e. if the positive term is left or right in an item) is randomized in the questionnaire to minimized answer tendencies</p> <p>3. <b>For each measurement, just put a symbol or letter in the respective column (1 -7). Make sure to fill-in all 26 measurements</b></p> <p>4. The six aspects addressed may not have the same importance for all users. Therefore in the 2nd questionnaire on the right, state the importance that each aspect has for you.</p>																																																																																																																																																																																																																																																										
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Figure 2: UEQ questionnaire

### 2.1.1 Results

At the time D6.1 was submitted, with the HEIR platform only partially deployed in PAGNI and NSE/NOKLUS environments, three (3) responses were collected from personnel who were not sufficiently familiarised with the platform, therefore it was not possible to draw reliable conclusions.

For this deliverable, the HEIR platform has been deployed to all four (4) pilot sites, giving the involved staff enough time to gain hands-on experience. However, we should note that not all HEIR modules have been deployed in all pilot sites and that each pilot site focused on a distinct use case, which may have impacted the user experience differently. Nevertheless, all eleven (11) responses were used collectively to arrive at a unique assessment of the user experience for the HEIR platform.

For processing the results, we make use of the UEQ's analysis tool<sup>2</sup>, starting with Figure 3, where respondents rate the importance of the six (6) user experience aspects. All five aspects are rated as important, with *Novelty*, *Dependability* and *Efficiency*, marginally standing out.

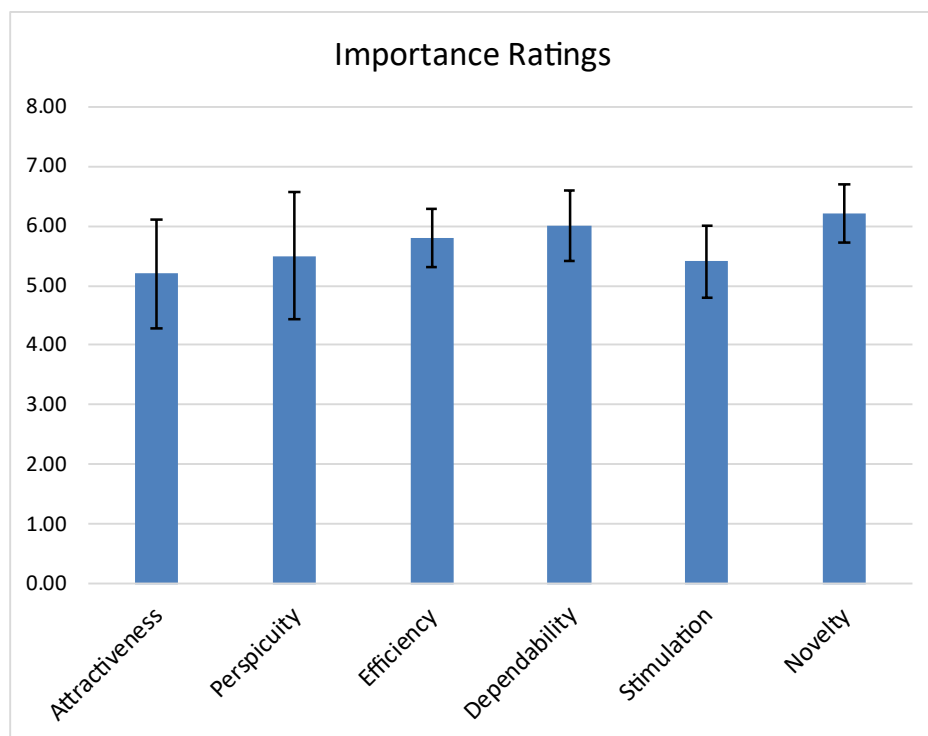


Figure 3: UEQ results - Aspect importance

Figure 4 displays the means of the scales. According to the UEQ handbook<sup>2</sup>, values between -0.8 and 0.8 represent a more or less neutral evaluation of the corresponding scale, values > 0.8 represent a positive evaluation and values < -0.8 represent a negative evaluation. Due to the calculation of means over a range of different persons with different opinions and answer tendencies (for example the avoidance of extreme answer categories) it is extremely unlikely to observe values above +2 or below -2.

<sup>2</sup> [www.ueq-online.org](http://www.ueq-online.org)

All six aspects have received a positive evaluation from the respondents, in descending order: *Dependability* (1.66), *Stimulation* (1.59), *Novelty* (1.57), *Efficiency* (1.34), *Attractiveness* (1.24), and *Perspiciuity* (1.02).

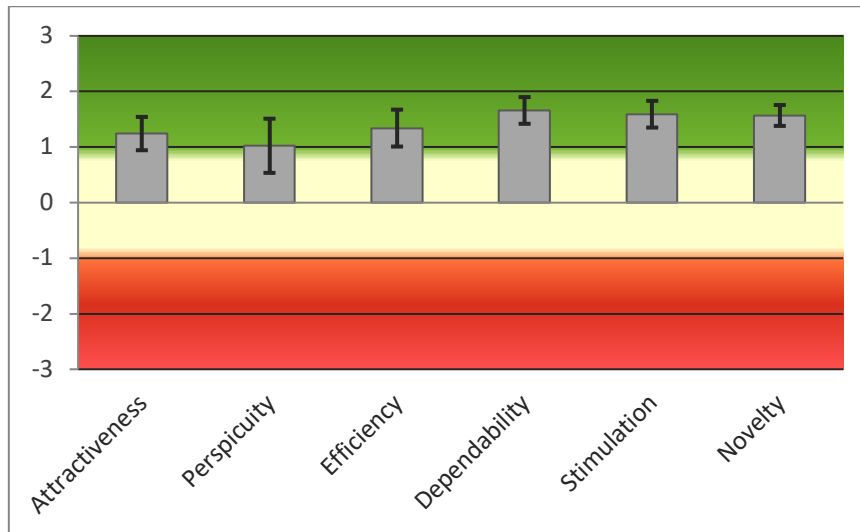


Figure 4: UEQ results – Aspect means

Figure 5 allows us to analyse the scale means more deeply, by providing the means of all twenty-six items. The item bars in Figure 5 are coloured according to the aspect they belong to.

It is surprisingly positive that none of the items receives a negative rating, which we would only expect from a solution mature enough to enter the market. The HEIR platform seems to excel (mean  $\geq 1.5$ ) in thirteen (13) items, with top ratings as *secure* (2.3), *valuable* (1.9), *good* (1.9), and *innovative* (1.8).

On the other hand, it's neutrally rated (mean  $\leq 0.8$ ), but not negatively, as being *complicated* (0.5).

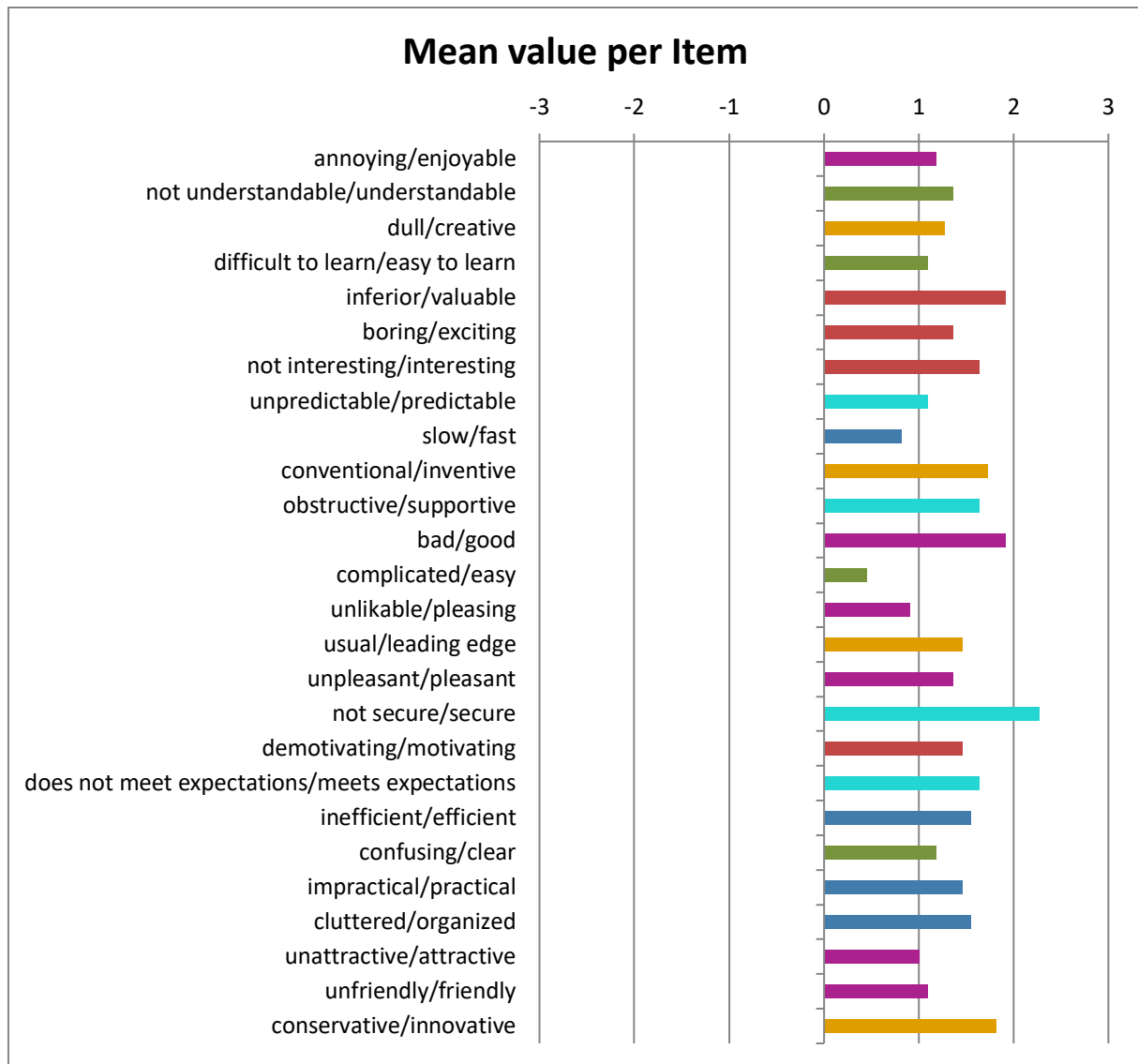


Figure 5: UEQ results – Item means

To get a different perspective on the quality of the HEIR platform, we can compare the measured user experience to the results of other established products, from a benchmark data set containing quite different typical products (business software, web pages, web shops, social networks). The UEQ offers such a benchmark, which contains in the moment the data of 468 product evaluations with a total of 21,175 participants.

The HEIR platform achieves a total rating of 1.42 (std:0.35, confidence:0.20). This is quite positive result, especially assuming that most of the products in the benchmark data set are at a more mature level. Regardless, the HEIR platform is rated as *good* in *Dependability*, *Stimulation* and *Novelty*, *above average* in *Efficiency* and *Attractiveness*, and *below average* in *Perspicuity*. Interpretations of this comparisons are also displayed in Figure 6.

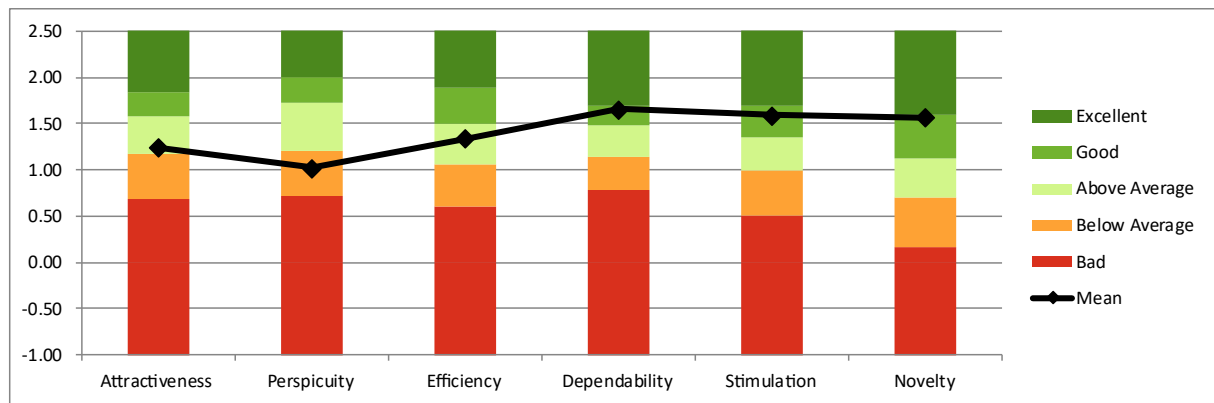


Figure 6: UEQ results - Benchmark

## 2.2 Technology & Operational Acceptance

In this section we examine the technology acceptance of the HEIR platform by the pilots and look for the technical and organizational prerequisites for its future permanent use.

Regarding the technology acceptance, the pilots were asked to respond to any problems they encountered with the installation as well as the integration into their existing infrastructure, to assess its stability and reliability, to identify strengths and weaknesses, to evaluate the key modules of HEIR and compare the overall platform to current cyber security solutions. The questions asked did not address user experience, as these aspects were approached by the User Experience Questionnaire, so this set of questions should be considered complementary to the UEQ<sup>3</sup>.

In terms of operational acceptance, the pilots were asked to envisage future use of the HEIR platform and to list those requirements that would make the adoption of the platform smoother by its initial users. The aim of this first recording is to identify those parameters that need to be addressed in an updated version of the business plan towards commercialization.

It should be noted that the pilots' answers are based on their experience, which however is limited to different components per pilot and specific use cases. Overall conclusions are drawn in section 4.

<sup>3</sup> This is one of the reasons that we did not use the Technology Acceptance Model (TAM) since it predicts the acceptance based on the perceived ease of use and perceived usefulness, therefore overlapping with the UEQ.

## 2.2.1 CUH

<b>Technology Acceptance</b>
<b>Did you encounter any technical issues whilst using HEIR?</b>
At the Croydon pilot site, a separate isolated network was built for testing the components of HEIR. This arose as it is not possible to insert a test platform into live patient system. For the various components that were installed and considered working, then no technical issues in using them by the relevant team member.
<b>How well did the HEIR solution integrate with your working system and processes?</b>
As outlined above, the HEIR system was never integrated into the live working environment. It was housed in an isolated server, with replicated working medical device system, the team 3 monitor in place. In that regard the system worked well together with no conflict noted.
<b>How do you rate the reliability and stability of the HEIR platform?</b>
The platform was stable in regard to RAMA score calculations, both local and global. The anomaly detection module was installed and difficulties in lack of an API from the device manufacturer was noted, that hampered integration of module into a direct feed. The data though could be obtained via the local temporary storage set up within the device system. This culminated in the ability of the anomaly detection and machine learning module to function, identifying the test normal and abnormal signals as designed, with the results clearly displayed. Thus, HEIR could be relied upon to be able to detect abnormal signals arising from a compromised medical device.
<b>What do you consider to be the strengths and weaknesses of the HEIR solution?</b>
<p>We consider the strengths of the system to be:</p> <ol style="list-style-type: none"> <li>1. Potential benchmarking and identification of at-risk computers within the virtual network</li> <li>2. Potential detection of cybersecurity threats such as denial of service, malware insertion</li> <li>3. Potential detection of abnormally functioning devices within the system reflecting a compromised medical application</li> </ol> <p>In regard to weakness of the system, then potentially it does not deal with emails, a major source of cyberattacks, including Scams and phishing attacks</p> <p>As the whole system was not tested on site, and our focus was on the anomaly detection associated with medical devices, then our comments are restricted to this particular aspects of the HEIR solution: in that regard the machine learning functioned as expected and was able to detect abnormal and normal parameters used within the training program: a step in the right direction for increasing cyber security of medical devices. The weakness noted in this project is that medical device manufacturers remain cautious in engaging with cybersecurity protection software companies, and until a more open access to medical device software is possible, then any attempts to try to protect medical devices by an external third party is going to encounter issues of system integration of such software solutions</p>

<b>How do you rate the following modules of HEIR?</b>
<ul style="list-style-type: none"> <li>• Thread Hunting: - this module was not tested on this site</li> <li>• Anomaly Detection: this functioned as expected and was able to detect normal and abnormal signals generated by the Team 3 device as defined</li> <li>• Observatory: this was functioning based on the data feeds. It is useful but commercial products produce similar displays readily available and similar in performance</li> <li>• Privacy Aware Framework: this was not tested on this site</li> </ul>
<b>How does HEIR compare to your current cybersecurity solution?</b>
<p>Unfortunately, we did not use HEIR in a live environment. Therefore, no direct comparison can be made. That said, there are commercially available products that are working in the same modalities as HEIR: these competitors would need to be tested alongside the HEIR platform for direct comparison. At present the Trust uses a commercial product that does not have the same modalities as HEIR, making comparison difficult.</p>

<b>Operational Acceptance</b>
<b>What are the organizational/technical/data requirements which your organization would consider before using HEIR?</b>
<p>Croydon is part of the wider NHS. This complex product needs to satisfy NHS digital advisers as well as Trust IT director in an easy to understand manner and display technical superiority to commercial products before the Trust can be in a position to consider the use of this product.</p>
<b>What skills/human resources do you consider would be required for HEIR to be implemented at your organisation?</b>
<p>The skills required would be someone with basic IT security skills, as well as advanced network capability skills to manage this system. At least one full time person needs to be assigned to the role, with back up cover arrangements for secondary staff support for holidays etc.</p>
<b>How do you envisage ongoing use of HEIR?</b>
<p>The current test package is not suitable for ongoing use at this site, except as a test environment. However, if it gets developed into a fully working system, with NHS approval for purchase, then it may be acceptable for use at this site.</p>

### 2.2.2 HYGEIA

<b>Technology Acceptance</b>
<b>Did you encounter any technical issues whilst using HEIR?</b>
<p>The HEIR platform has been deployed to a test environment, accurately replicating the sub-section of the IT infrastructure responsible for the operation of the “my-Ygeia” application, that the patients use to access, manage, track, and share data, contained in their Personal Health Records (PHRs).</p>

<p>Minor issues were encountered during deployment at early stages, mainly of connectivity between the various HEIR components, however that have all been resolved.</p>
<p><b>How well did the HEIR solution integrate with your working system and processes?</b></p>
<p>As mentioned above, the HEIR platform has been deployed in a replica of the system supporting the “<i>my-Ygeia</i>” application. Therefore, we do not expect any integration issues once we decide to proceed with the deployment in the production environment.</p>
<p><b>How do you rate the reliability and stability of the HEIR platform?</b></p>
<p>In terms of stability, no problems were encountered. Regarding reliability, the HYGEIA use case focused on the use of the HEIR Cryptographic Checker (HCC). In several - but not exhaustive - tests performed, HCC managed to detect the elements that are susceptible to cryptographic attacks. Up to this point, reliability has been assessed as positive.</p>
<p><b>What do you consider to be the strengths and weaknesses of the HEIR solution?</b></p>
<p><b>Strengths:</b></p> <p>A promising feature of the HEIR platform as HYGEIA is concerned, is the global RAMA score. As one of hospitals and diagnostic centers of the HYGEIA Healthcare Group (HHG), it is quite useful that through the use of the global RAMA, the team responsible for cybersecurity could easily receive indications that one of the units/departments/components across the group, is more prone to attacks compared to the others.</p> <p>A second strong feature, although not deployed in the HYGEIA environment, is the Privacy Aware Framework. We evaluate this as a potential prerequisite for future use of the HEIR platform in the production environment (also check our first response in the next table for Operational Acceptance).</p> <p><b>Weaknesses:</b></p> <p>It is not a weakness, but rather a lack of detailed knowledge of how the various modules of the HEIR platform would work in real scenarios. It would also serve a more automated installation process.</p>
<p><b>How do you rate the following modules of HEIR?</b></p>
<ul style="list-style-type: none"> <li>• Thread Hunting: Not tested in our use-case</li> <li>• Anomaly Detection: Not tested in our use-case</li> <li>• Observatory: Not tested in our use-case</li> <li>• Privacy Aware Framework: Not tested in our use-case</li> </ul>
<p><b>How does HEIR compare to your current cybersecurity solution?</b></p>
<p>To provide such an answer would require us to test more of the HEIR modules mentioned above.</p>



<b>Operational Acceptance</b>
<p><b>What are the organizational/technical/data requirements which your organization would consider before using HEIR?</b></p>
<p><b>Organizational:</b> HYGEIA's use case focused on the part of its IT infrastructure supporting the "<i>my-Ygeia</i>" mobile application, which is relatively new but has the potential to act as the main entry point for homecare services that HYGEIA is planning to offer. Additionally, HYGEIA would also be interested in the future utilization of the Privacy Aware Framework. However, the realization of these intentions require:</p> <ol style="list-style-type: none"> <li>1) HYGEIA to identify the services and the supporting IT components that will need to be protected by the HEIR platform</li> <li>2) HYGEIA to identify the data policy elements (data fields, per role/position, per department) that the Privacy Aware Framework will point to</li> </ol> <p><b>Technical:</b> Complementary to the above, the realization of these intentions require:</p> <ol style="list-style-type: none"> <li>3) The maturity of the HEIR platform to TRL 9</li> <li>4) The existence of supporting services for the HEIR platform</li> <li>5) An automated installation process across departments</li> </ol> <p><b>Data:</b> HYGEIA would be interested in using the Anomaly Detection Module which assumes the existence of an enriched data set for the ML algorithms to be trained. This was not possible during the pilot test, as the application used by HYGEIA to extract the relevant data from its systems is that of an external provider and its modification could not be implemented in time. But it has been included in the future upgrades of the IT systems.</p>
<p><b>What skills/human resources do you consider would be required for HEIR to be implemented at your organisation?</b></p>
<p>The existing IT team is sufficient for the proper implementation of HEIR. However, and with the aim of implementing HEIR in all hospitals and diagnostic centres belonging to the Hygeia Healthcare Group, the core IT team will also need to organize training sessions, based on the material presented at the training days, near the end of the project. This should be done in consultation with the Human Resources department.</p>
<p><b>How do you envisage ongoing use of HEIR?</b></p>
<p>Once the above requirements are met, the next step for HYGEIA will be to deploy HEIR to the production system that supports the "<i>my-Ygeia</i>" mobile app. Before that, as mentioned above, the Machine Learning module should be functional in the HYGEIA environment to allow for increased security. For future implementations, an analysis will precede that will prioritize the remaining systems that need support.</p>

### 2.2.3 NSE/NOKLUS

<b>Technology Acceptance</b>
<b>Did you encounter any technical issues whilst using HEIR?</b>
<p>Due to security concerns, as NSE is part of the University Hospital North-Norway, it was not possible to accommodate the components of the HEIR solution in the technical infrastructure of NSE. In close cooperation with the University in Tromsø (UiT), it was agreed to house the individual components in Microsoft's Azure, while the necessary licenses were also provided by the UiT.</p> <p>As of this deliverable NSE/NOKLUS are experiencing the technical issue, that the audit history of the HEIR client is not visible/loading as intended. Furthermore, the HEIR client is not (yet) adapted to work with the Cloud Environment provided.</p> <p>The use-case related Privacy Aware Framework (PAF) is running as intended.</p>
<b>How well did the HEIR solution integrate with your working system and processes?</b>
<p>In our case, the HEIR solution is not integrated into our system but runs on Microsoft's Azure. See the previous answer.</p> <p>An assessment is not possible against this background as the HEIR solution is not part of our working system and processes.</p>
<b>How do you rate the reliability and stability of the HEIR platform?</b>
<p>During our use, we could not make any negative experiences regarding reliability and stability, aside from the technical issue mentioned above. The PAF is up and running as intended.</p>
<b>What do you consider to be the strengths and weaknesses of the HEIR solution?</b>
<p><b>Strengths:</b></p> <p>The envisioned Risk Assessment of Medical Applications (RAMA) is easy to grasp.</p> <p>The further development of the Privacy Awareness Framework could be of interest to any of the approx. 60 central health registries and medical quality registries that exist in Norway.</p> <p>The solution itself promotes the importance of Cybersecurity and with it, the interest in pursuing further research in this area.</p> <p><b>Weaknesses:</b></p> <p>A deep(er) background knowledge is necessary to fully understand the solution and the individual functionalities.</p> <p>The practical benefit of the solution is difficult to assess due to the multitude of different rules and laws (such as the handling of data and data protection in various countries, certifications, etc.), especially in the healthcare sector.</p> <p>The interaction with systems or solutions currently in use has not yet been sufficiently researched.</p>

As of this deliverable the HEIR solution has not been tested in a real/practical environment. However, this is necessary to draw further conclusions.

**How do you rate the following modules of HEIR?**

- Thread Hunting: Not tested in our use-case.
- Anomaly Detection: Not tested in our use-case.
- Observatory: Not tested in our use-case.
- Privacy Aware Framework: The PAF is one of the most exciting achievements within the project. Although the current development is still in its initial stages, it offers a basis for further development in a variety of ways. Such as - for example - for the transfer of user-gathered data such as body weight, physical activity, hearth rate, sleep patterns, blood pressure, peak expiratory flow (PEF) for asthma, etc. Such functionalities could improve and enhance the work of national registries.

**How does HEIR compare to your current cybersecurity solution?**

A comparison cannot be made because we do not operate in a healthcare environment and therefore have no means of comparison.

Further it should be noted that existing laws and guidelines as well as various security concerns from IT departments regarding the use of cloud-based solutions for sharing patient data, hinder the use of such a solution for registries.

**Operational Acceptance**

**What are the organizational/technical/data requirements which your organization would consider before using HEIR?**

First of all, a fundamental understanding of the functionality as well as the necessity of the solution must be created. As this is a very complex project, a comprehensive explanation is necessary.

In addition, the applicable legal and technical regulations for the implementation of such a solution must be taken into account. As stated above the use of such a solution is currently not feasible, due to various security and data-handling concerns.

**What skills/human resources do you consider would be required for HEIR to be implemented at your organisation?**

To use the HEIR solution with maximum efficiency staff with a deeper understanding of IT and IT-Security as well as law (related to working with patient data) and medicine is required.

**How do you envisage ongoing use of HEIR?**

The HEIR Solution in its current state is not yet suitable for further operation. However, it offers a solid foundation for further developments and adaptations. It is therefore necessary, to also develop a better understanding of the complexity of the solution as well as the resources required.

## 2.2.4 PAGNI

<b>Technology Acceptance</b>
<b>Did you encounter any technical issues whilst using HEIR?</b>
The overall processes included in the HEIR solution were carried out without any issues. Our hospital has implemented the HEIR platform concurrently with the actual working environment.
<b>How well did the HEIR solution integrate with your working system and processes?</b>
The HEIR solution was seamlessly integrated throughout the use case. The PAGNI HEIR environment consists of two dedicated Servers 2 Desktop VMs, Virtual Machines (with the same configuration as the existing PCs in the Hospital), along with four productive workstations from different departments of the hospital that the HEIR components are deployed. Moreover, clinical departments were involved in the HEIR project gain added value from the HEIR solution.
<b>How do you rate the reliability and stability of the HEIR platform?</b>
We did not establish any negative experiences in accordance to the reliability and stability of the HEIR platform, throughout our use
<b>What do you consider to be the strengths and weaknesses of the HEIR solution?</b>
The major advantage of HEIR solution is the holistic approach of protecting our HIS system and the workstations, simultaneously.
<b>How do you rate the following modules of HEIR?</b>
<ul style="list-style-type: none"> <li>• Thread Hunting: Was demonstrated it in the MTR and it was implemented through the HEIR Network Module (HNM). The HNM has the ability to identify malicious traffic on the network and it functions smoothly from the day was installed.</li> <li>• Anomaly Detection: Through analyzing and evaluating the overall security status of the hospital IT system, the HIS platform's data privacy and cybersecurity were significantly enhanced. The introduction of the HEIR vulnerability analysis module, SIEM monitoring tools and forensics analysis, enhanced visualization tools, and RAMA calculator have benefited the operation of the platform.</li> <li>• Observatory: Not tested in our use-case.</li> <li>• Privacy Aware Framework: Not tested in our use-case.</li> </ul>
<b>How does HEIR compare to your current cybersecurity solution?</b>
The HEIR solution, which combines numerous technologies, is our company's first cybersecurity-focused solution. It is a valuable resource for us.

<b>Operational Acceptance</b>
<b>What are the organizational/technical/data requirements which your organization would consider before using HEIR?</b>

<p>The basic requirements of the organization to use the HEIR solution include a fundamental understanding of the functionality of this solution and its requirements, and since this is quite a difficult undertaking, a detailed explanation to the participants/users is required. In addition, the applicable legal and technical factors of the hospital, for the implementation of such a solution, must be taken into account, while its use should also be aligned with various security and data management regulations.</p>
<p><b>What skills/human resources do you consider would be required for HEIR to be implemented at your organisation?</b></p>
<p>A basic requirement would be for the staff (ITs/non-ITs) to have knowledge of the overall IT components and/or a greater grasp of cyber-security and a basic understanding of the general data protection regulations (GDPR).</p>
<p><b>How do you envisage ongoing use of HEIR?</b></p>
<p>Through the ongoing use of the HEIR solution, more use cases could be included as well as HEIR modules, resulting in a more comprehensive assessment of the hospital's cyber security status.</p>

## 2.3 Impact assessment

In addition to the Technology & Organizational acceptance, in this section we explore the recorded and predicted impact that the use of the HEIR platform can have on the department of the pilots responsible for cyber security, across the organization, and indirectly, on patients themselves.

These responses should be viewed in the light that they come only from people who have had some experience with the HEIR platform, for a relatively short period of time, in discrete use cases and under specific conditions. Although they may give a first and possibly biased - due to the role and position of the respondents - impression, they provide an initial indication of the impact of the HEIR platform. Overall conclusions are drawn in section 4.

### 2.3.1 CUH

<p><b>Describe, in broad terms, the impact recorded for the IT-staff of your organisation. List and justify the factors that contributed (negatively or positively) to this impact.</b></p>
<p>During the trial at the Croydon site, the technical teams as well as the non-technical teams were impressed by the performance of the modules displayed. The ease of use, and clear displays being some of the highlights seen within the trial. In regard to a wider impact, then the HEIR project was restricted to the R&amp;D office in a segregated section. This meant that non-project staff members were not able to view the trial platform, and thus, the impact on them limited.</p> <p>The negative issues encountered were a lack of a fully functional system being displayed, so a sense of ‘does it all fit together’ lurks in the background.</p> <p>There were also some experience of the technical team in other commercial products that they felt performed some of the roles demonstrated, but in a better format.</p>

**Describe, in broad terms, the impact recorded for your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

There was limited exposure of the organization to the HEIR platform, as it was restricted to the R&D team in a segmented server within the Trust.

As such, the comments from the R&D team of clinical and technical staff was muted to the sessions they had in investigating the various modules of the HEIR platform.

In that regard the team was impressed by the clear visual displays detailing the various functionalities. It enabled drill down to abnormal functioning areas in the virtual system to help isolate concerns.

However, despite clear displays, the complexity of the actual display needed to be understood. A steep learning curve was encountered, that had a negative impact on experience to date.

In regard to the machine learning and anomaly detection component that was tested on site, it did perform as expected in ability to pick up anomalies as expected, creating a positive impact for the organization.

**Given the use of the HEIR solution across your IT-infrastructure, what do you consider would be the impact on the patients within your organization?**

At present the HEIR modules being developed would potentially have an impact in:

1. Increasing cybersecurity detection, culminating in save guarding system to enable health care to continue safely
2. Help secure data protection
3. Enable early detection of malfunctioning medical devices that may be compromised, reflecting increasing cybersecurity capability to protect patients

### 2.3.2 HYGEIA

**Describe, in broad terms, the impact recorded for the IT-staff of your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

The IT-staff of the HYGEIA were satisfied by the HEIR platform and specifically of the HEIR Cryptographic Checker (HCC) module. The solution showed how it can scan and assess the cryptographic capabilities of the systems under monitoring, such as encryption algorithms, protocols, keys, and certificates.

However, they also raised questions and concerns about the implementation and operation of the solution. For instance, they wondered how the solution would interact and integrate with other production systems and applications, and what kind of impact it would have on their performance and availability. They also asked about the training and support that would be provided. They suggested that more pilot testing and validation of the solution should be done in our hospital environment, involving different types of systems and users.

In summary, the demonstration session had a positive impact on the IT-staff, although not fully persuasive or conclusive, as there were still some issues and challenges that need to be resolved before the solution can be deployed effectively.

**Describe, in broad terms, the impact recorded for your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

Since the HYGEIA use case was focused on the HEIR Cryptographic Checker module, no organization-level impact has been noted beyond those mentioned above. Administrative and medical staff were also present at the demo session and were really interested in using the global RAMA and the Privacy Aware Framework, both of which are seen as potentially impactful as they provide functionality not currently covered by existing applications. This however cannot be validated at this time.

**Given the use of the HEIR solution across your IT-infrastructure, what do you consider would be the impact on the patients within your organization?**

The impact of the HEIR platform and specifically the HEIR Cryptographic Checker module on patients in our hospital is not straightforward or definitive to assess at this point. HEIR could enhance the protection and confidentiality of patient data, as well as the availability and reliability of medical systems and devices. These benefits can ultimately improve patient trust and satisfaction with our hospital, especially in cases where patients interact directly with such an application, such as the "my-Ygeia" mobile application. With homecare services offered through this app, patient trust is a determinant and therefore, we do expect a positive impact, but we cannot quantify it at this time.

### 2.3.3 NSE/NOKLUS

**Describe, in broad terms, the impact recorded for the IT-staff of your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

A concrete assessment is difficult; due to the large amount of information and the fundamental complexity of the project as well as IT security in general, the staff - even with relevant background knowledge - felt overwhelmed in places and unable to classify the information.

However, the introduction to the topic and the importance of cybersecurity as well as, the high-quality training videos were highlighted as positive and a basic understanding of the HEIR project itself could be gained.

**Describe, in broad terms, the impact recorded for your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

A concrete assessment is difficult; due to the large amount of information and the fundamental complexity of the project as well as IT security in general, the staff felt overwhelmed in places and unable to classify the information.

However, the introduction to the topic and the importance of cybersecurity as well as, the high-quality training videos were highlighted as positive and a basic understanding of the HEIR project itself could be gained.

**Given the use of the HEIR solution across your IT-infrastructure, what do you consider would be the impact on the patients within your organization?**

The use of the so called “Privacy Aware Framework” offers a wide range of possible benefits for patients:

1. The Privacy Aware Framework may provide a solution that gives individuals with diabetes access to their own data in the Norwegian Diabetes Register for Adults
2. With help of the Privacy Aware Framework individuals with diabetes can send data securely from their Continuous Glucose Monitoring devices directly to the Norwegian Diabetes Register for Adults.
3. The Privacy Aware Framework could be used to allow researchers access to data from linked medical registries.
4. The Privacy Aware Framework could make collecting data directly from individuals with diabetes more secure.

#### 2.3.4 PAGNI

**Describe, in broad terms, the impact recorded for the IT-staff of your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

The impact felt by both our organization's IT -staff and colleges from other hospitals' IT departments was significant. The information they provided, the inquiries we received, and the findings of the surveys we conducted made this quite evident.

**Describe, in broad terms, the impact recorded for your organisation. List and justify the factors that contributed (negatively or positively) to this impact.**

The impact felt by our organization's non-IT staff was also positive. Cybersecurity is a not so well-known field to them but simplicity of the presentation to that specific audience was the key to get many inquiries and start discussing about cybersecurity awareness and strategies in general. Also, the findings of the surveys we conducted made this quite clear.

**Given the use of the HEIR solution across your IT-infrastructure, what do you consider would be the impact on the patients within your organization?**

In general, HEIR solutions lead to a more secure HIS platform, which is beneficial for the patients.



### 3 Feedback from stakeholders

#### 3.1 Training sessions for IT and non-IT experts

As part of the evaluation activities, but also with the aim of supporting long-term sustainability, a set of training sessions was organized, targeting both IT and non-IT experts in medical centres and hospitals. One of the goals of these sessions were for participants to assess the usefulness of specific HEIR modules, provide their overall perception, and highlight any missing functionality<sup>4</sup>. They were also asked to rate the relevance and usefulness of the content presented, as well as the organization of the sessions themselves, for future improvement.

To this end, two separate questionnaires were constructed, for IT and non-IT experts, each containing two sets of questions for assessing the HEIR platform and the session itself. The questionnaires<sup>5,6</sup> were built using the EUSurvey<sup>7</sup> online survey-management system, available in English and in Greek, with the Norwegian experts using the English versions. The latter are also included in the Annex of this document.

The HEIR solution assessment is presented as follows, while the assessment of the session themselves is presented in D7.10<sup>4</sup>.

##### 3.1.1 HEIR solution assessment from IT experts

**Q1:** Does your job involve managing cybersecurity systems and/or responding to cybersecurity incidents?

**R:** Out of 32 participants, 12 (37.5%) answered ‘yes’ to this question

**Q2:** If ‘yes’ to Q1, how does HEIR's Threat Hunting Module compare to your existing solution?

**R:** 7 out of 12 IT experts consider HEIR’s Threat Hunting Module is better than their existing solution

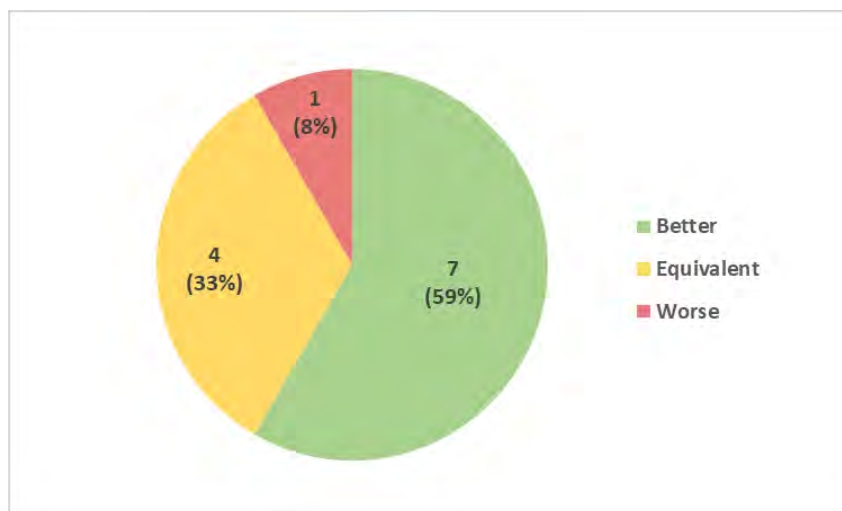


Figure 7: IT expert assessment on Threat Hunting Module

<sup>4</sup> The methodology, organization, content and assessment of the training sessions are addressed in D7.10 *HEIR training for experts and non-experts*

<sup>5</sup> <https://ec.europa.eu/eusurvey/runner/HEIRInfoDay2023IT>

<sup>6</sup> <https://ec.europa.eu/eusurvey/runner/HEIRInfoDay2023nonIT>

<sup>7</sup> <https://ec.europa.eu/eusurvey/home/welcome>

**Q3:** If 'yes' to Q1, how does HEIR's Anomaly Detection Module compare to your existing solution?

**R:** 50% of the 12 IT experts consider HEIR's Anomaly Detection Module is better than their existing solution

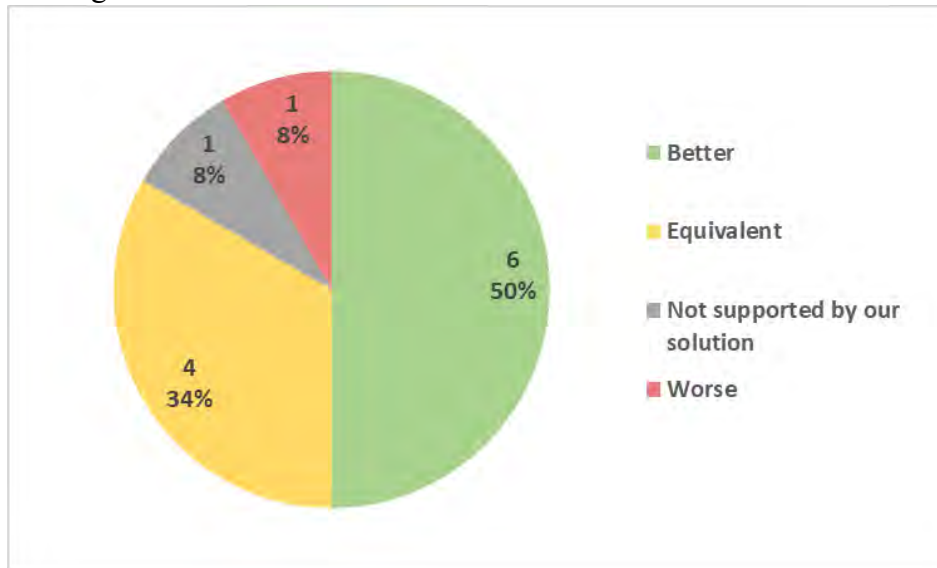


Figure 8: IT expert assessment on Anomaly Detection Module

**Q4:** How useful is the HEIR's Observatory for aiding risk assessment and determination of remedial actions?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not useful) to 5 (very useful). Out of 32 responses, 22 (69%), are in favour of HEIR's Observatory.

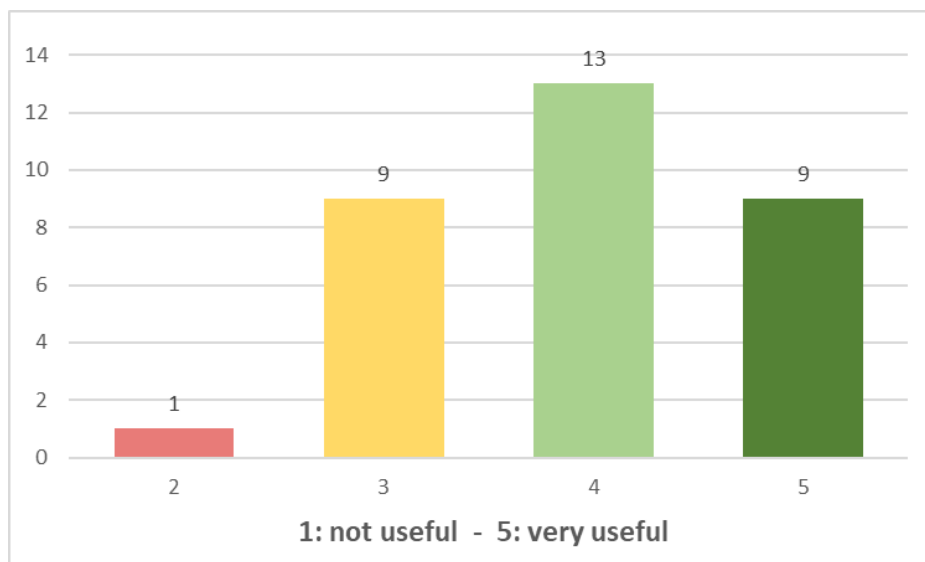


Figure 9: IT expert assessment on Observatory

**Q5:** How useful do you consider the functionalities of the Privacy Aware Framework to help define who is entitled to access the data in your department?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not useful) to 5 (very useful). Out of 32 responses, 24 (75%), are in favour of HEIR's Privacy Aware Framework.

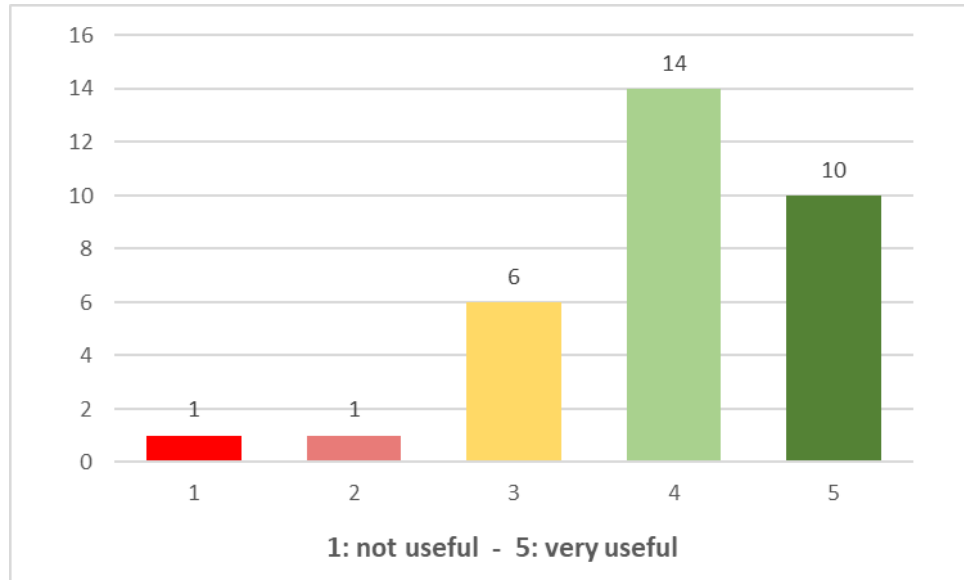


Figure 10: IT expert assessment on Privacy Aware Framework

**Q6:** Do you feel that your performance in your daily IT tasks would be enhanced with the HEIR solution installed?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not enhanced) to 5 (very enhanced). Out of 29 responses, only 5 (17%) consider that the HEIR solution will not, moderately, or significantly, enhance their performance.

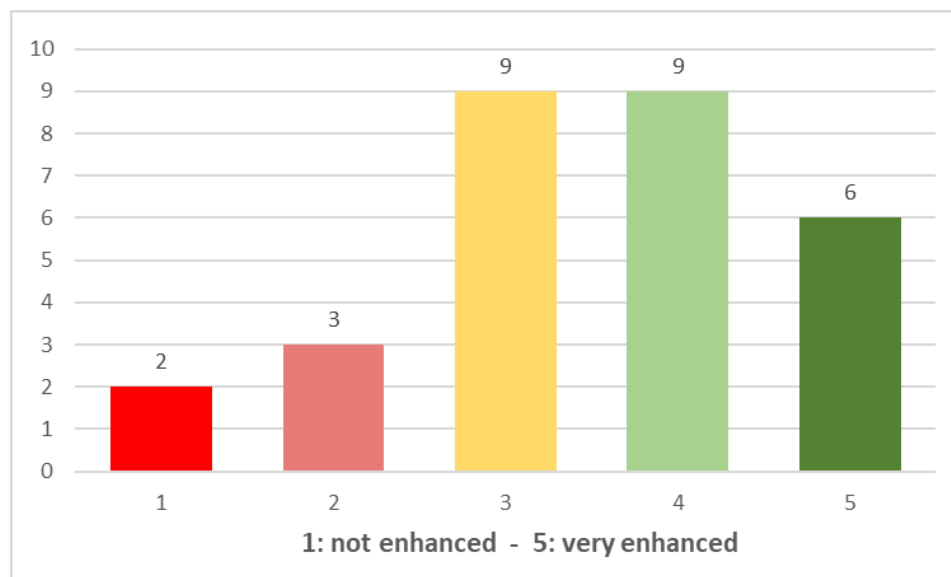


Figure 11: IT expert assessment on performance improvement in daily tasks

**Q7:** What is your overall perception of the HEIR solution?

**R:** Responses were in the form of a Likert scale, ranging from 1 (very negative) to 5 (very positive). Out of 31 responses, 20 (65%) express a positive or very positive perception, with only 1 (3%) expressing a negative one.

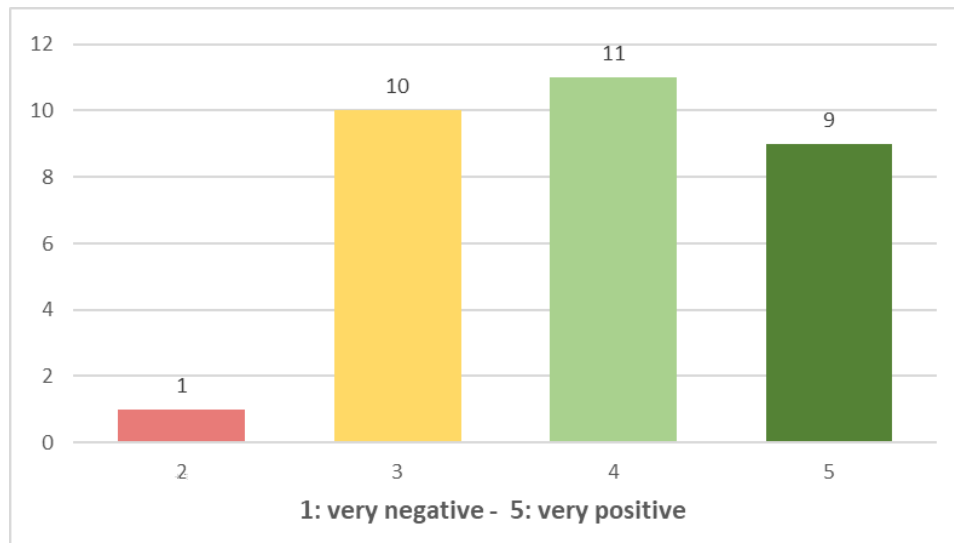


Figure 12: IT expert perception of the HEIR solution

**Q8:** In your opinion, are there aspects that are not adequately covered by the HEIR solution? If so, which ones?

**R:** This was the only open-ended question in this set, the responses provided are listed below:

- ‘Would be great to include a patching solution based on the vulnerability check’
- ‘No’
- ‘The real-world communication even with FHIR is not as smooth as it is presented here (and not only here)’
- ‘FHIR is praised as a panacea to semantic interoperability, yet, there is very much variability in the concrete FHIR implementations, coined as FHIR profiling’
- ‘None that I can think off’
- ‘It needs to send alerts to managers and push notification’

### 3.1.2 HEIR solution assessment from non-IT experts

**Q1:** Please select your domain

**R:** Twenty (20) of the forty-one (41) participants have an administrative role within their organization, with the remaining twenty-one (21) belong to the clinical staff

**Q2:** Have you had experience of cyber security threats in your workplace similar to those presented today?

**R:** Nearly half of the respondents (48%) have experienced such threats, with the higher percentage for administrative staff (53% vs 43%) attributable to the nature of their role.

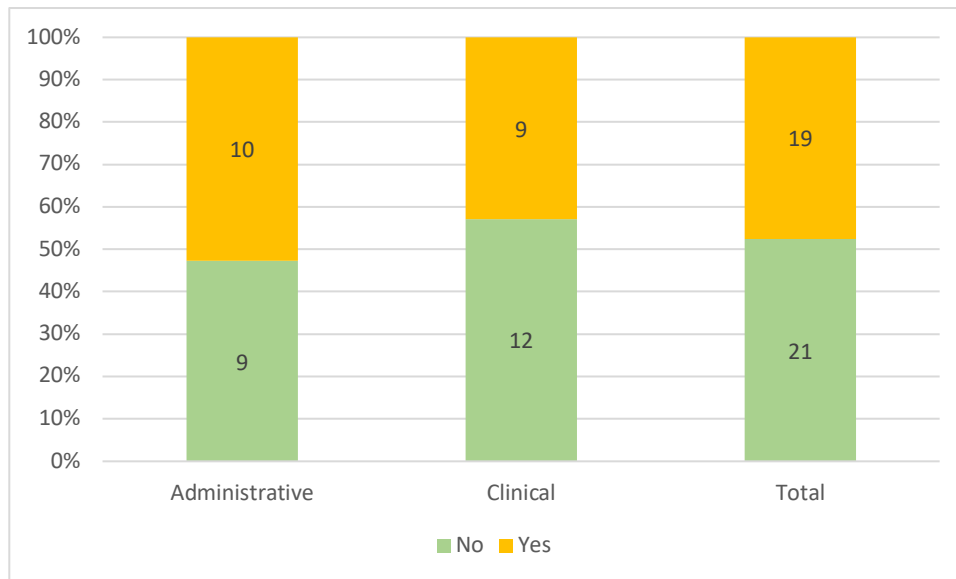


Figure 13: Non-IT expert experience of cyber security threats

**Q3:** How confident do you feel in responding to cyber threats when you now encounter them?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not confident) to 5 (very confident). Out of 39 respondents, 15 (38%), feel they will be in a better position to encounter such threats. It must be noted that this percentage ranges from 26% for the clinical staff to 50% for the administrative staff, a discrepancy that can be attributed to the more technical orientation of the HEIR platform.

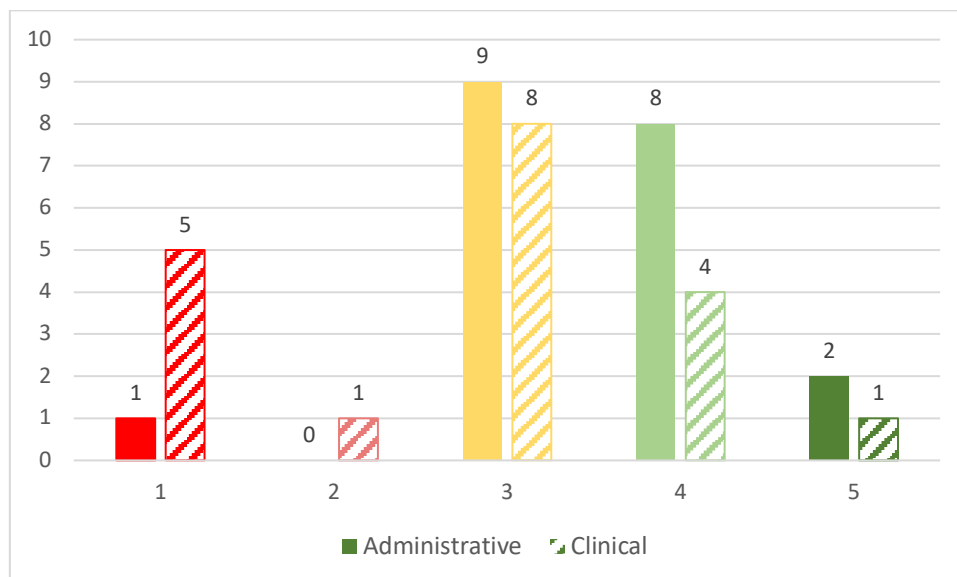


Figure 14: Non-IT expert assessment of confidence with HEIR solution

**Q4:** How useful do you consider the functionalities of the Privacy Aware Framework to help define who is entitled to access the data in your department?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not useful) to 5 (very useful). Out of 40 respondents, 27 (68%), rate as useful or very useful the Privacy

Aware Framework. No discrepancy has been recorded between administrative and clinical staff.

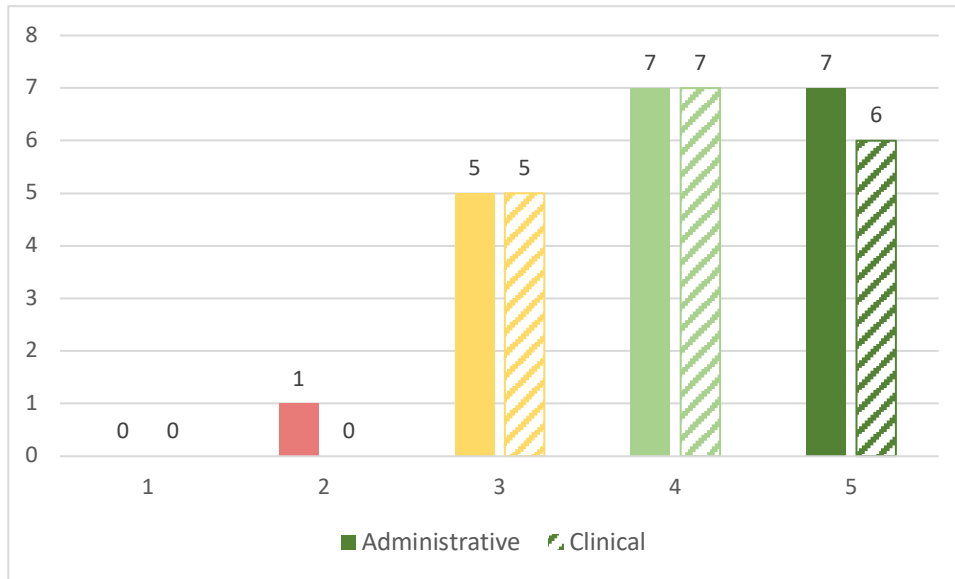


Figure 15: Non-IT expert assessment of Privacy Aware Framework

**Q5:** Do you feel that your performance in your daily IT tasks would be enhanced with the HEIR solution installed?

**R:** Responses were in the form of a Likert scale, ranging from 1 (not enhanced) to 5 (very enhanced). Out of 39 respondents, 28 (72%), expect a positive impact on their daily tasks with the use of the HEIR solution. No significant discrepancy has been recorded between administrative and clinical staff.

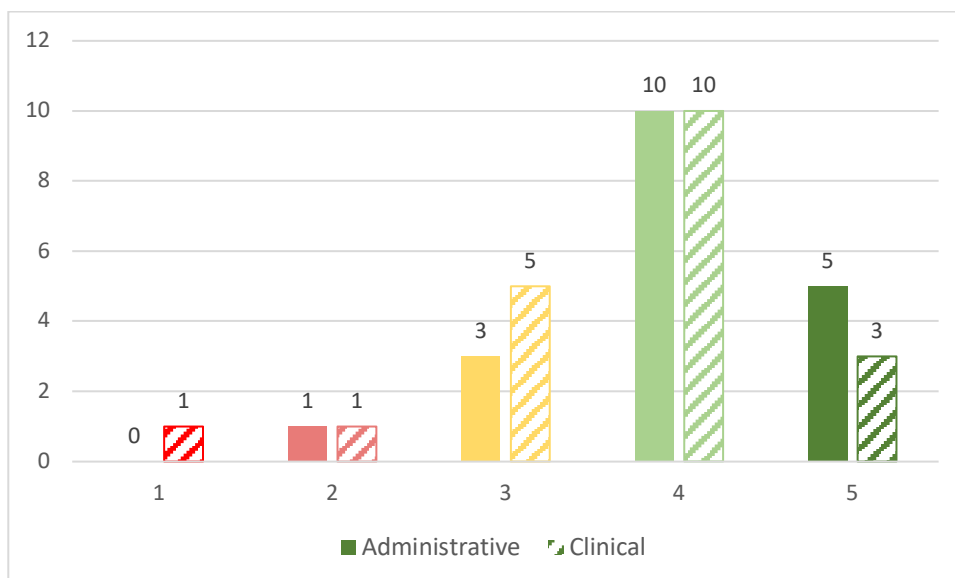


Figure 16: Non-IT expert assessment on performance improvement in daily tasks

**Q6:** What is your overall perception of the HEIR solution?

**R:** Responses were in the form of a Likert scale, ranging from 1 (very negative) to 5 (very positive). Out of 40 respondents, a remarkable number of 33 (83%), express a positive perception of the HEIR solution. There is a slight more positive assessment from the administrative staff, than can be attributed to the more technical orientation of the HEIR platform.

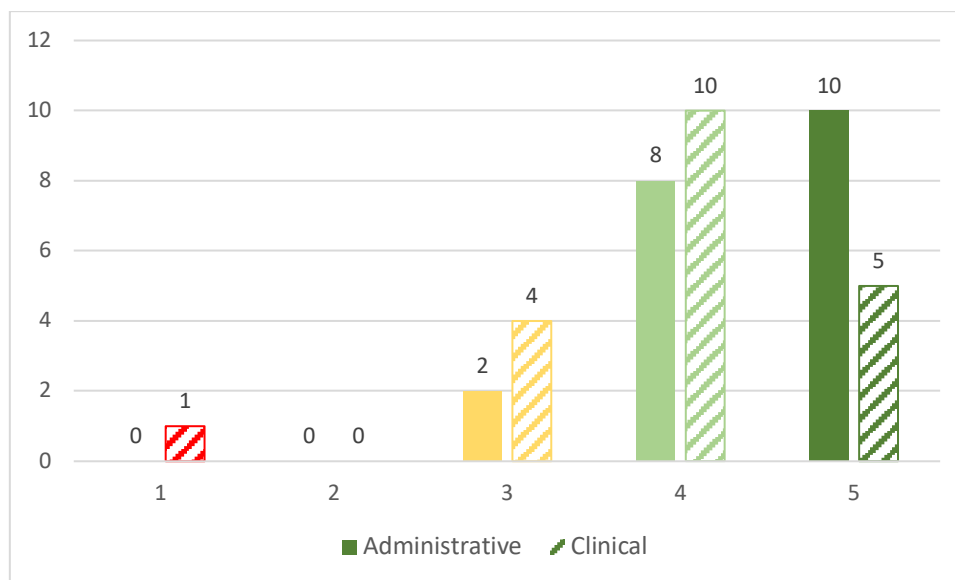


Figure 17: Non-IT expert perception of the HEIR solution

**Q8:** In your opinion, are there aspects that are not adequately covered by the HEIR solution? If so, which ones?

**R:** This was the only open-ended question in this set, the responses provided are listed below:

- ‘As a clinician, I think this was too complicated for me to understand properly, and therefore difficult to answer your questions correctly. I have got a broader understanding of the complexity and threats we should be paying more attention to.’
- ‘Cookies’
- ‘No’
- ‘No, the presentations were adequate’
- ‘I don't know, I just think it helps’

### 3.2 External Advisory Board

The EAB consists of four members in three countries (FR, NO, UK). Two members are Chief Information Security Officers in their hospitals and participate in threat detection and response. One is a highly renowned cybersecurity researcher, with activities in cybersecurity and privacy for critical sectors. The last member is a medical doctor with experience in privacy and ethics issues. The project organized a specific EAB meeting in June 2022 (shortly after the first review) to present the results of the first HEIR prototype and invited the EAB members to participate in the info days held in the UK, Norway and Greece.

With respect to the threat hunting, three experts expressed interest in the integration of multiple technologies, and in the capability to measure both the vulnerabilities and the impact. The integration in a single platform was considered an asset for deployment and management in hospitals, which are highly constrained in terms of IT staff. The main question raised was the maturity of the HEIR console and GUI, which was considered by the experts more as a risk management tool than an operational console for day-to-day work. The HEIR project shares this vision, especially in the context of the observatory, and of the necessary link between the local and global RAMA. Another question asked was linked to the normalization of the RAMA score, which of course must take into account the maturity level of the organization deploying the HEIR client, such as the number and type of sensors deployed.

With respect to the Privacy Aware Framework, two experts expressed interest in the capabilities provided, which were felt to be at or beyond the state of the art of what is currently available on the market. The experts particularly appreciated the dynamic nature of the Privacy Aware Framework, and the capability to configure policy rules at several levels. The experts emphasized the need for legal analysis of privacy requirements, which HEIR provides in deliverable D7.6 *Legal framework monitoring report – P2*. The two experts asked questions on the consent of patients, which is considered by the project to be out of scope as we encode the consent but do not provide mechanisms for negotiating it. The two experts also raised the question of interoperability, which in the case of HEIR is solved by relying on the EHR-HL7 common format implemented by FHIR servers. One expert raised the question of using blockchain as a logging mechanism, as it maintains data online and potentially in public places, which may be breaching the GDPR. The current mechanism employed in HEIR encrypts only the request, and thus does not include either patient data or requested information, limiting the risk.



## 4 Conclusions

This document includes the assessment of the HEIR platform from end-users (pilot sites) and external stakeholders, with the aim to support its future improvement, long-term sustainability, and exploitation.

End users rated their **User Experience** very positively, feeling that the platform puts them in control of the interaction, is innovative, motivates them and allows them to solve their tasks without unnecessary effort. On the other hand, they find it rather complex and difficult to learn, aspects that should be further analysed and resolved before proceeding to commercialization. Nevertheless, the overall assessment of the User Experience is very encouraging, also after benchmarking the HEIR platform with a large set of quite different products.

In terms of **Technology Acceptance**, the end-users rated positively the reliability and stability of the HEIR platform. No major technical or integration issues are reported, although not all pilot sites integrated the platform in their production environments, and their use cases focused on specific HEIR modules. Therefore, integration should be re-assessed following future implementations. The holistic protection that the HEIR platform offers to HIS systems is its main strength, with the Privacy Aware Framework, the benchmarking and identification of at-risk computers with the RAMA score, and the detection of abnormally functioning devices considered as some of its most innovative aspects. For a more detailed assessment of the Technology Acceptance, end users will need to integrate the HEIR platform into their production environments, but this depends on the requirements listed below.

End users need more hands-on experience with the HEIR platform for its **Operational Acceptance**, and they do not yet possess a deep understanding of its technology and full knowledge of its capabilities. The complexity of the platform, as revealed from the User Experience analysis, is an inhibiting factor in this direction. More training material, supporting services and an automated installation process across departments are some of the requirements identified by the end-users. However, they see the HEIR platform as a solid foundation that under conditions could be an excellent, holistic solution for them to adopt.

In terms of **Impact Assessment** and in accordance with the above, the IT staff involved with the HEIR platform, were very satisfied with the performance of the modules installed for their use cases and believe that the platform could facilitate their daily tasks. They wonder how the platform would integrate with the production systems, suggesting that more testing is needed before a final decision is made. Consequently, no impact on organization level can be safely assessed at this time. One can only speculate about the impact on patients, but end users agree that the extra layer of security that the HEIR platform can offer would lead to increased patient confidence in the privacy and security of their personal data as well as to an increased use of telehealth services.

**Feedback from external stakeholders**, namely, IT and non-IT experts in medical centers & hospitals and the External Advisory Board, has been collected and analyzed. The overall perception of the HEIR platform from the **IT experts** was very positive, reflecting their expectations that it will improve their performance in daily tasks. They consider the Privacy Aware Framework as very useful and in those IT experts actively engaged in cybersecurity systems/incident management, view the Threat Hunting Module and Threat Detection Module as improvements over the solutions they currently use. As with the IT-experts, the overall perception of the HEIR platform from the **non-IT experts** is very positive, making them more confident in responding to cyber threats, with minimal discrepancies between **administrative** and **clinical** staff, attributed to the more technical orientation of the platform. Suggestions were


expressed for improvement such as including a patching solution based on the vulnerability check and sending alerts to managers and push notifications as well as concerns regarding the variability in the concrete FHIR implementations and the communication in the real world. Finally, the experts of the **External Advisory Board**, provided suggestions for extended functionality, expressing the opinion that the project is on the right track, and that several of the technologies developed in HEIR are innovative and offer the capability to improve the cybersecurity posture of healthcare environments.

Overall, both the end users and the External Advisory Board, conclude that the HEIR platform can be an excellent solution for the early prediction and response of cyber security incidents, provided it is sufficiently tested, simplified where possible, supported appropriately and accompanied by detailed training material.

## 5 ANNEX: Training session Questionnaires

### 5.1 For IT experts

# Event Questionnaire



**HEIR**  
a secure Healthcare  
Environment for Informatics  
Resilience

*Dear participants,*

*Thank you for attending today's event!*

*We would greatly appreciate it if you could answer two short sets of questions, to capture your views on the HEIR solution and to improve the content of future events.*

*Sincerely,*

*The HEIR team*

**A. HEIR solution assessment**

1. Does your job involve managing cybersecurity systems and/or responding to cybersecurity incidents?

Yes       No
2. If yes, how does HEIR's Threat Hunting Module compare to your existing solution?

Better    Equivalent    Worst    Not supported by our solution
3. If yes, how does HEIR's Anomaly Detection Module compare to your existing solution?

Better    Equivalent    Worst    Not supported by our solution
4. How useful is the HEIR's observatory for aiding risk assessment and determination of remedial actions?

(not useful)    1    2    3    4    5   (very useful)
5. How useful do you consider the functionalities of the Privacy Aware Framework to help define who is entitled to access the data in your department?

(not useful)    1    2    3    4    5   (very useful)
6. Do you feel that your performance in your daily IT tasks would be enhanced with the HEIR solution installed?

(not enhanced)    1    2    3    4    5   (very enhanced)
7. What is your overall perception of the HEIR solution?

(very negative)    1    2    3    4    5   (very positive)
8. In your opinion, are there aspects that are not adequately covered by the HEIR solution? If so, which ones?

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\_\_\_\_\_

\_\_\_\_\_

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## B. Event assessment

9. How relevant was the event to your role and/or position?  
(not relevant)  1  2  3  4  5 (very relevant)
10. How useful was the event?  
(not useful)  1  2  3  4  5 (very useful)
11. Was the training easy to understand?  
(very difficult)  1  2  3  4  5 (very easy)
12. How would you rate this event compared to your expectations?  
(less than expected)  1  2  3  4  5 (exceed expectations)
13. How well organized was the event?  
(poorly organized)  1  2  3  4  5 (very well organised)
14. Which topics do you consider as the least interesting and which ones as the most interesting?
- Introduction to HEIR  
(least interesting)  1  2  3  4  5 (most interesting)
  - Threat Hunting Module & 1st Layer GUI  
(least interesting)  1  2  3  4  5 (most interesting)
  - Anomaly Detection module  
(least interesting)  1  2  3  4  5 (most interesting)
  - Observatory  
(least interesting)  1  2  3  4  5 (most interesting)
  - Privacy-Aware Framework & blockchain demonstration  
(least interesting)  1  2  3  4  5 (most interesting)
15. How do you think the event could have been improved?

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## 5.2 For non-IT experts

# Event Questionnaire



**HEIR**  
a secure Healthcare  
Environment for Informatics  
Resilience

*Dear participants,*

*Thank you for attending today's event!*

*We would greatly appreciate it if you could answer two short sets of questions, to capture your views on the HEIR solution and to improve the content of future events.*

*Sincerely,*

*The HEIR team*

### A. HEIR solution assessment

1. Please select your domain:
 

Clinical     Administrative
2. Have you had experience of cyber security threats in your workplace similar to those presented today?
 

Yes     No
3. How confident do you feel in responding to cyber threats when you now encounter them?
 

(not confident)
 1    2    3    4    5

(very confident)
4. How useful do you consider the functionalities of the Privacy Aware Framework to help define who is entitled to access the data in your department?
 

(not useful)
 1    2    3    4    5

(very useful)
5. Do you feel that your performance in your daily IT tasks would be enhanced with the HEIR solution installed?
 

(not enhanced)
 1    2    3    4    5

(very enhanced)
6. What is your overall perception of the HEIR solution?
 

(very negative)
 1    2    3    4    5

(very positive)
7. In your opinion, are there aspects that are not adequately covered by the HEIR solution? If so, which ones?
 

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## B. Event assessment

8. How relevant was the event to your role and/or position?  
(not relevant)  1  2  3  4  5 (very relevant)
9. How useful was the event?  
(not useful)  1  2  3  4  5 (very useful)
10. Was the training easy to understand?  
(very difficult)  1  2  3  4  5 (very easy)
11. How would you rate this event compared to your expectations?  
(less than expected)  1  2  3  4  5 (exceed expectations)
12. How well organized was the event?  
(poorly organized)  1  2  3  4  5 (very well organised)
13. Which topics do you consider as the least interesting and which ones as the most interesting?
- Introduction to HEIR  
(least interesting)  1  2  3  4  5 (most interesting)
  - Introduction to cybersecurity  
(least interesting)  1  2  3  4  5 (most interesting)
  - Privacy-Aware Framework demonstration  
(least interesting)  1  2  3  4  5 (most interesting)
  - Threat Hunting demonstration  
(least interesting)  1  2  3  4  5 (most interesting)
14. How do you think the event could have been improved?

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