**CHALLENGE STATEMENT #08**

1. **Challenge Owner Index and Pseudonym**

   **#08 – I3Hub**

2. **Challenge Statement**

We are a medical training institute that specialises in using simulation modality to enhance skills and competency in healthcare professionals. The institute has recently adopted serious games of various forms (e.g.: web browser based, AR, VR) to enhance individuals' skills and knowledge.

The institute has developed serious games with different game developers, where game data are presented differently in each game. Owing to the lack of common parameters for measurement across the games, meaningful data analysis on individual performance is not possible. Difficulty in tracking a learner's progress hinders individual's learning growth in an organisation as it is not possible to determine effectively where the learning gaps are. Thus, we may still continue to run programmes that may not promote proper skills improvement in the long run.

We hope to have a solution that has the ability to extrapolate game records from different platforms in a more coordinated and efficient way, so that the trainers can do a cross-games analysis of individuals' progress, identifying learning gaps and allowing customisation of training programmes that best suits the individual learners. When individuals' knowledge and skills are enhanced, these competencies will translate to better patient safety and care.

3. **About the Challenge Owner Organisation**

I3Hub is a medical training institute that specialises in using simulation modality to enhance skills and competency in healthcare professionals. The institute has one of Singapore's largest simulation facilities and delivers a broad spectrum of quality simulation training programmes in technical and procedural skills, Pre-Hospital and Disaster Management, Surgical Skills and Simulation, Faculty Development and Crisis Resource Management over the various medical specialty in the AMC.

4. **Define the Challenge**

**Current Situation**
With technological advancement, there is an emerging trend to develop innovative training & teaching delivery in Healthcare sector through the use of serious games. Currently, the institute has a wide array of game modules that are developed by different game developers and in various forms (browser-based on computer, mobile app and augmented reality on tablets, virtual reality and mixed reality head-mounted devices).

Game developers use different parameters for tracking, thus game data are also presented differently in each game. There is no solution in the market that can combine data records of

different games together for analysis. This becomes challenging for trainers to review the results, identify the learning gaps and implement solutions. Currently, users (learners, trainers) have to log on to multiple platforms and navigate across different interface to access and play the games as well as collecting data for evaluation and analysis. This negatively impacts learners as performance analysis is fragmented and does not provide a holistic profile, meaning that guidance and feedback are limited in scope.

Data analysis on individual performance is not possible since there are no common parameters for measurement across the games. Currently, trainers have to manually pull out and filter the records first before reviewing the individuals' results. If trainers were to compare a learner's skills and knowledge across a few games, trainers have to set aside time to identify parameters to measure before combining training records of these games together. This is time wastage and inefficiency as the time that trainers spent on this process could be better utilised in clinical areas that are more critical.

### Past & Current Solutioning Efforts

The institute has attempted to use learning management system (LMS) such as Wizlearn to decipher the game logs. However, the existing LMS infrastructure doesn't support the complexity of serious games data nor enable trainers to select games for cross-game analysis. There is no interest from Wizlearn to venture into R&D in this field.

The game developers which the institute has approached do not have a solution that enable us to connect game records from different games together nor the ability to pull data from each of them for performance analysis. The game developers instead propose for us to use their data engine or they could pull out the records for us when we need to. By using their data engine poses a strong security breach as their data engine might not be secured. The enhancement of data security is expensive which game developers are not willing to invest in.

Game developers continue to extract game logs manually for the institute. The raw data format for the game developers varies. Thus, there will be back and forth discussion to finalise on the type of information that we need, resulting in the delay on receiving the data. The process is labour-intensive and the consolidated results is not meaningful to create a significant impact in a staff's performance since there are limited parameters that are similar across the games for comparison. As a subject matter expert, we are not able to coordinate the learning holistic for learners.

The institute continues to use the basic training platforms of different game developers and manually collate the results.

### Challenge / Gap / Unrealised Potential

The value of using serious games lies in the ability to assess learners remotely and capture data points that are not readily apparent in face-to-face training. Trainers may see limited value in using serious games as a training model if the game data continue to be treated in isolation. When there is no connectivity of the games to determine skills progress over time, over many related different games, trainers are unable to generate meaningful performance analysis. There will be frustration from the trainers as they have to continue mining data manually.

Unless it is compulsory to attempt the game, learners may lose the motivation to play the game since it is cumbersome to access different sites to just play and access training results. There is no intrinsic motivation for the learner as they don't really see any value. As there is no data on the

individual learning styles, the strengths and weakness of each learner, trainers are also unable to understand whether the current mode of training and methodology is suitable and effective for them.

## 5. Targeted Learners / Users

Users includes:
1. Clinicians (Medical and Surgical Specialists)
2. Medical Trainees (Medical Students, Residents)
3. Nursing
4. Nursing Trainees
5. Allied Health Professionals
6. Allied Health Trainees
7. Healthcare administrators

The institute has approximately 20 serious games that are played by 5000 – 7000 users per annum. The solution can be scaled up to other healthcare institutions and other industries that need to extract data from serious games for performance analysis & learners' needs and profile.

## 6. Solution Partner and Deliverables

We are looking for a Solution Partner that can enable us to connect game records from different games together and gives us the ability to pull data from each of them so that we can have a more accurate picture of the learning progress of learners across the games.

The solution partner should have experience in delivery training and assessment solution :
- Generate reports of individual learning profiles in order to provide customisation of programmes for our learners in the future.
- Able to connect the data from the various games to establish a particular competency.

The solution partner should have experience in providing services in the Healthcare industry and to be familiar with healthcare PDPA and cybersecurity policies.

## 7. Expectations of Solution

i.      Solution should allow trainer to run analytics of learners' needs across games, thus providing a holistic and comprehensive assessment of their competency & their learner profile.
ii.     Solution should provide the trainer to connect across different game data for an assessment of a learner's competency in a particular skill.
iii.    Solution should have the capability to connect across the different game data on the patterns across different professional groups, specialties, age groups, seniority, etc.
iv.     Solution needs to support secured multiple user access (learners, administrators, trainers).
v.      Trainers should be able to review the results, identify the learning gaps and implement revision to training programmes.
vi.     Solution needs to support data extraction from various platforms (browser-based on computer, mobile app and augmented reality on tablets, virtual reality, and mixed reality head-mounted devices).

vii.        Solution needs to comply with healthcare ethics and regulatory laws and policies.

## 8. Measures of Success

We will select a solution based on:

- The feasibility and application of the solution in healthcare setting
- The accessibility and interactivity of the solution from the perspective of the learner/user
- The potential to scale the solution across hospitals / industries
- The extent of options available for persistent learner profiles / performance analysis

We will evaluate the proposed learning solution based on:

- Feedback from Users (administration team, IT team, Subject Matter Expert Team)
  - Looking at usability/acceptance of solution from each User group
- Use a few games to test performance of solution on data extraction and analysis
  - Including learner profile support across applications
- Functionalities of the proposed solution
  - Looking at the ease of use as well as how the requirements are met

**Expected observable outcomes:**

Organisation Perspective

- The institute can use the solution (ability to conduct proper learning analysis by selecting the appropriate games) to gain insights on trends and learning behaviours across different profession, disciplines and age groups and come up with a training roadmap that is driven by staff (based on game results) and tailored for staff (design programmes that caters to the respective learning styles and learning gaps).

- Collectively, the organisation will have a pool of future-ready, well-trained and capable healthcare professionals to deliver quality patient care.

Learner Perspective

- Learners will gain greater self-awareness of their learning styles (eg: Visual, Auditory, Kinesthetic). Eg: Learner A: If I cannot learn effectively by wearing a VR head set (due to giddiness) but I can learn better through browser based games, I can feedback to my supervisor to identify training modules that are browser based to improve my learning journey.
  Eg: Learner B: As there is no trainer guiding in a serious game, I may lose interest easily. Recognising that I have short attention span if I am not guided by a trainer, I can find ways to over this learning barrier.
- Learners will have a stronger learning experiences due to targeted performance analysis guiding them and overcome the steep learning curve more effectively. When a learner gets clarity on where the learning gaps are by being able to view their training logs across the games he/she has played, they can quickly explore alternatives to learning to overcome the steep learning curve that is prevalent in new hires / newly promoted staff.
- Learners will feel more engaged and motivated with their learning from wider libraries of relevant training modules.

Trainer Perspective

- By understanding the learners' learning styles, trainers can develop more curated programme for the learners based on the best method of teaching. (eg: the right mix of digital and physical modalities.)
- Data collected allow trainers to make more informed decision in designing better serious games for the learners.
Eg: MCQ, case study and re-arrangement of steps are examples of assessment questions. To test learners' knowledge on hand hygiene safety, trainers can gather which assessment approach to use after analysing the game data.
- Trainers can pull and leverage on data from other games to aid in either a particular assessment of a learner.
Eg: Learner A is a nurse in an emergency department. It is essential for all nurses in emergency department to practice hand hygiene and be competent to operate an infusion pump. In the traditional training setting, Learner A has to perform the tasks in front of the Trainer. This requires resource planning (identifying a training site, source of infusion pump, trainer availability) and coordination of schedule. With serious games, Learner A can attempt the serious games s at any day and time & the results will be captured.

Under the current circumstances, we will need to develop 2 modules (one on hand hygiene and one on operations of infusion pump) in a single game in order to use the same parameters for assessment. However, hand hygiene is a universal workshop that every healthcare professional will attend. In our illustration, Learner A would have already completed the game separately. As such, the trainer only has to develop a module on infusion pump and capture that data. With the solution where the trainer can pull and connect data from different games, the trainer can now easily and quickly evaluate performance of Learner A and determine if Learner A is competent or required further training remedial to improve her skills.

**Expected measurable outcomes:**
- Able to connect at least 2-3 games for data mining
- Common parameters to be incorporated for at least 2- 3 games for assessment
- User satisfaction of 70% on a 5-point Likert scale