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| Start | Finish | Author | Description | Reason | Version |
| 02/07 | 22/07 | Alex | Initial Draft of Operational Study | Complete production of feasibility study | 1.0 |
| 26/07 | 27/07 | Alex | Added conclusion and more sections | Study was lacking a finality to it | 1.1 |
| 02/08 | 02/08 | Alex | Revamp Operational Study with focus on each implementation | Previous study had too much redundant information | 2.0 |
| 03/08 | 04/08 | Alex | More focus on how each approach solves the problem | Too much focus on resources before | 2.1 |

The operational assessment aims to cover and answer the following issues about the new system and its different approaches:

* **Process:**How the users will benefit from the new system and its processes. There are three main users: spectators, markers/scorers and the judge however the focus will mainly be on the spectators as different approaches do not affect other users.
* **Implementation**:  How much time, cost and/or other resources each approach will use as well as their physical implementation in the competition’s venue.
* **Evaluation**: Whether the system can work and cover key goals covered in the project scope.

## **Hardware (Original) and Cloud Approach with Web-Based application solution**

The original approach allows users to see a real-time scoreboard of the competition using their portable devices. It will use a custom server to allow users to connect to it and allow them to fetch and update information.

The cloud approach functions similarly to the original but uses the internet and cloud servers instead of a physical server.

**Process**

The spectators stand to see the most benefit from this approach. They will be able to search for and track specific teams as well as the rankings for the entire competition. While these approaches are the most beneficial to spectators, it is restricted to spectators with smart devices.

The cloud approach has similar benefits but is limited by the bandwidth and capacity of the internet access points located in the competition’s venue.

**Implementation**

The cost of the server as well as the time it takes to develop the spectator and judge application makes this approach easily the most expensive. As for other issues with implementation such as the location of the server in the competition, these are almost negligible or easily mitigated.

The cloud approach significantly reduces the cost of the implementation. The limited bandwidth and capacity of the internet access points can be mitigated by the implementation of 4G/LTE modems in the venue.

**Evaluation**

The original approach solves the problem of spectators being unable to see the competitions standing. Furthermore, it allows the users to track specific teams. The system’s hardware will be able to set up a local Wi-Fi network and should be able to set up the Real-Time Online Scoreboard from any location. Overall, the original approach will take the most resources out of all approaches to accomplish but should be able to cover all aspects of the scope.

The cloud approach similarly solves the main problem of spectating the competition but may be hindered by technical issues. In addition, it can only be set up in an area with a somewhat strong internet connection. Overall, the main functionality of the system covers the main scope for spectators however it does not meet the requirements of readymade hardware capable of setting the system up without an internet connection.

## **Physical Scoreboard with and without Cloud**

This approach replaces the user connecting to a server to view a scoreboard on their devices and instead uses a physical live scoreboard that will be placed in view of the spectators at the venue.

**Process**

While the spectators will be able to see how teams are faring in the competition, the ability to track specific teams will be removed. It will also be more limited as not every team will be able to be shown due to size constraints. An additional component to automatically scroll through the scoreboard will have to be introduced to compensate. Furthermore, the scoreboard may affect teams of the competition. This approach, however does have an additional benefit in that all spectators will be able to view the scoreboard and is not limited to smart devices.

**Implementation**

Similar to the approaches above, there is a custom hardware or a cloud approach. The time and cost constraints are also similar. The hardware approach will cost much more to develop. The physical scoreboard’s location and size may also be an issue.

The cloud approach costs less and because users do not have to connect to the access points in the stadium, this approach is less hampered by capacity and bandwidth issues. In addition to this, this approach will take significantly less time overall to develop as there will be less to develop for the spectator’s side.

**Evaluation**

This approach does allow spectators to view the standings in the competition but specific team tracking must be accomplished by either waiting for the scoreboard to scroll or by searching the paper scores for a specific team. Depending on the approach, the system may also be able to be implemented into a hardware solution but the additional need for a physical screen hampers its portability. Overall, this approach has the least amount of benefits to the spectators compared to the other approach and only covers the basics of the scope. However, it is the most feasible of the approaches and takes the least amount of time and cost to develop and implement.

## **Scorer Option**

The system does not benefit the markers and it may even hinder those that are not adept at handling technology. In addition, the cost of supplying a device to each judge is very expensive. An option to get around this is to have the scorers at the competition handle updating the system instead of the markers. This will eliminate the above disadvantages of the system as well as decrease costs of supplying and training the markers.

However, this may raise an additional concern. There are less scorers to update the system which may cause inconsistency in the scoreboard. A solution is to simply increase the number of scorers.