

# Commonality Analysis

Team 4

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# 1 Context

Your company, Narrow World of Sports (NWS), broadcasts and records all types of sporting events. Some events are low-cost, such as high school basketball games, while other events (e.g., Super Bowl, World Cup) require a lot of planning and processing. NWS sells live broadcasts and recorded events to customers through an online streaming service. Customers may sign up for different levels of service based on the types of features they use. For example, some customers just want to see live events as they might be broadcast on TV, while others want the ability to watch more than one perspective at the same time on split-screen displays.

## 2 Dictionary

- **Stream:** Content sent over a compress form over the internet and displayed to a viewer in real time.
  - **Live stream:** The content is transmitted at the same time (or with low latency) from when is recorded.
  - **Recorded Stream:** The content is previously recorded and get played by the viewers on demand.
- **Picture-in-Picture (PiP):** One content is displayed full screen while other content gets displayed in inset windows.
- **Multi-track:** Multiple, separate streams of sound without defined locations in a sound field
- **Instant Replay:** Immediate playback of a main broadcast. Usually in slow motion.
- **Play Breakdown:** An in-depth discussion about a particular play.
- **Overlay effects:** Is when the main broadcast gets dimmed out and a particular effect appears on top usually to highlight a particular area.
- **Multicam:** Method of filmmaking where multiple cameras record the same subject but from multiple angles
- **Single camera setup:** Method of filmmaking where a single camera records the subject from one particular angle.
- **Embed:** Particular piece of software that is bound to another piece of software.
- **Encoding:** Process of converting data into a specific format.
- **Decoding:** Process of converting an encoded data into its original sequence or data.
- **ShadowPlay:** Program that keeps recording from the last five minutes from the current time. This is a product from Nvidia.
- **HLS:** Live stream protocol that runs over http which provide adaptive bitrate streaming originally developed by Apple.
- **Multi-source stream:** Mixed stream that gets created by using multiple streams as the source.
- **Split-screen:** When a particular window gets divided into two sections and each one displays a different stream.
- **WebRTC:** HTML5 specification that enables real time media functionalities between browser and devices.
- **Localization:** Process of adapting a product's translation to a specific country or region.

### 3 Commonalities

- Every *stream* has at least one camera angle
- Every *stream* has at least one audio track
- Every *stream* requires a source input
- Reusable *decoding* techniques
- Reusable file formats
- Every *stream* will display the game score
- Reusable *encoding* techniques

### 4 Variabilities

- The next pricing tier of the service includes all the features provided from the previous one.
- A *recorded stream* could offer *localization*
- A *recorded stream* is going to be streamed using *HSL*
- A *live stream* is going to be streamed using *WebRTC*
- A *recorded stream* supports *instant replay* on demand

## 5 Parameters of Variation

Link	Name	Values	Max screens at the same time	Price PM
V0	Entry	<ul style="list-style-type: none"> <li>• <i>Recorded stream</i> from the current week</li> <li>• Devices: Browser only</li> <li>• Commentators</li> </ul>	1	\$5.99
V1	Basic	Previous tier feature plus: <ul style="list-style-type: none"> <li>• <i>Recorded stream</i> from the current month</li> <li>• <i>Localization</i> (if supported)</li> <li>• Devices: Android, iOS</li> <li>• <i>Overlay effects</i></li> </ul>	3	\$8.99
V2	Regular	Previous tier feature plus: <ul style="list-style-type: none"> <li>• Recorded previous <i>stream</i> from the current year</li> <li>• <i>Live stream</i> recording from minor leagues (College, Highschool, local games)</li> <li>• <i>Multicam</i> control in recorded streams</li> <li>• <i>Instant replay</i></li> <li>• <i>PiP</i></li> <li>• <i>Play breakdown</i></li> </ul>	5	\$12.99
V3	Fan	Previous tier feature plus: <ul style="list-style-type: none"> <li>• <i>Recorded stream</i> from the last 2 year</li> <li>• Regular <i>Live stream</i> from major leagues. (E.g. Champions league)</li> </ul>	7	\$15.99
V4	Die Hard	Previous tier feature plus: <ul style="list-style-type: none"> <li>• The entire catalog of recorded <i>streams</i></li> <li>• Premium <i>live stream</i> recording from major leagues (World Cup, World Series, Olympics, Super Bowl)</li> <li>• <i>Multicam</i> controls in <i>live streams</i></li> </ul>	10	\$19.99

## 6 Out-of-scope features

- ***Multi-track* volume control:** Enables the user to control multiple track audio in any particular *stream*. E.g In a particular *stream* the user can set the audio of the commentators in a lower volume and increase the audio from the cameras.
- ***PiP* support for *multi-source stream*:** Have a main *stream* open and have a second *stream* from another game in *PiP*.
- ***Multicam* with *split-screen*:** Enable users to do a *split screen* and see two different angles from the game at the same time.
- ***Overlay effects* in live streams:** Add overlay effects for events that are live stream.
- **On-demand live instant replay, using Shadow Play techniques:** During the live *stream* we do not support doing *instant replay* if the stream is a livestream.
- **Support for localization for commentators in live stream:** Offer different languages from commentators.
- ***Multi-source stream* support:** Users watch two or more *streams* at the same time.