# Koil

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## Problem and solution overview

Every day we use many computers of different form factors to get our work done yet there are still things that none of them can do. An ipad is great for playing angry birds or sharing a video but it is a pain to carry around. We can carry our phones around but as soon as we try to consume some real data through it, its size becomes a big limitation

Koil is a device that overcomes these limitations of fixed size devices. It is a device that can change its size based on user needs. As the name suggests it is a scroll like device which the user can unwind up to a poster size display screen and then wind back to fit in her pocket.

We imagine that the simplest interface for this device would be through voice command. It will also be touch enabled for achieving more complicated tasks.

In order to show the power of Koil we have chosen an app to help football coaches. This app exploits all the features of Koil that make it unique like resizability, mobility, robustness, connectivity and presentation capabilities.

## Paper prototype description, with overview shot and close-ups

Our prototype includes screens and controls of the football app for Koil. We have identified the following main features of the Football app:

- Game video recorder / player
  It is a simple video recorder which allows for saving metadata about a game video and sharing videos with other coaches. A coach can annotate a video with critique for players. They can upload game videos to a central repository which can then be archived and shared with other coaches.
- Roster
  This feature allows coaches to define player positions for games and practices.
- PlayBook
  These are descriptions of the plays in the playbook, showing the assignments and motion of each player.
- Player Profile
  This feature displays a player's profile including his basic information like name, age, position etc. along with data pertaining to his performance like stats over time, rating, annotations in recent games, attendance etc.
- Coach Schedule
  This feature enables a coach to set appointments on his calendar for various activities during the day like practices, lectures, coach meetings, games etc.

- Drills
  The feature lets coaches search through a web-based set of drills for a given practice based on the goals for the day. It also allows a coach to add new drills they have created and tag it with its qualities so that other coaches can search for it and use it in their practices.

*Note: The app connects to a web-service to store/retrieve the data needed for operation. It is built on top of a back end database storing data on game videos and annotations, player and coach profiles, drills, play cards, Rosters etc.*

## Testing Method

We conducted our tasks with two different High School Assistant football coaches and a volunteer coach for his sons' U-7 two-hand touch team. Ryan Wagoner is a linebacker and defensive assistant coach at Interlake HS. Colan Sewell runs elite HS football camps for the Barton Academy for local HS football players. Our third participant is Charlie Borberg whose son plays in a two-hand touch league in Bellevue.

In addition, to help with our design and application navigation, we interviewed Jordan Flowers, who is a defensive back and wide receiver skills coach at Redmond HS. He provided valuable feedback about the flow of our application and made several feature request which we will consider for the next release of the Football Coaches app on Koil. Some of his feedback touched on the organization of the playbook, how to assign players to a play and give each formation a depth chart. He also had many great features for our next version, such as real-time video playback and the ability to create plays using the Koil.

We brought the Koil to our participants' office to maximize our time with the participant. Our process was fairly simple. We first explained our product, how the participant isn't being tested and some about the Wizard of Oz testing method. We then asked the participant to read through the tasks one at a time, and then to proceed attempting to accomplish the task. We would only provide assistance when the user got stuck or didn't understand the task. One of us would take notes while the other would perform the computer operations.

## Tasks

**Task #1:** You're a local high school football coach, and you need to schedule a new coaches meeting for 4pm today.

**Task #2:** You're a local high school football coach. After practice, you need to assign the depth chart for the "Trips Counter Curl" pass play. You also wish to show this play against different defensive formations.

**Task #3:** You're a local high school football coach. After the game film is uploaded to the Koil, you need to identify the offensive play, defensive formation, down and distance for a play in the 3rd quarter. In addition, you wish to send this play as viewing material to your starting QB, Ben Burner.

## Testing Results

**Ryan Wagoner**

Ryan Wagoner is a defense coach at Lake City High. We interviewed him in his office.

We started by explaining to him the idea of Koil and that the device it touch and voice enabled.

Task 1: Schedule an appointment
- Ryan correctly hits the "+" button at the bottom of calendar to add a new appointment
- Again not able to tell when Koil is in listening mode
- Start and End times are difficult to do with voice - he would prefer a DateTime picker.

Task 2: Set a starting lineup to a play
- It was not obvious that you can drag and drop player on to the play screen.
- It would be good to have player numbers appear on the play screen,
- He loved the button which can reverse an action.
- There was only clear and cancel buttons but no save button. We were planning to do Auto-save but Ryan wanted at least a confirmation that it has saved the data. We like this idea and plan to include a visual cue to indicate when Koil is saving / has saved.

Task 3: Film review and feedback
- Ryan picked the right options on the home screen namely "videos" to do a film review.
- It was not obvious to him how the video would scroll
- He asked for an option of selecting various plays. This is a feature we might consider in our revised UI.
- He also felt that there should be a prompt for voice input - again a good idea for the revised version.
- If he wants to match a play to a formation or if he needs to make a play while watching a video, it is not easy to context switch between the play card screen and the video screen.
- For sharing a message a prompt should be shown when Koil is ready for voice input.

**Colan Sewell**

Coach Sewell is familiar with the competing service hudl.com and frequently uses hudl.com to splice game film, create highlight videos and publish those to potential coaches. Upon we explained our goals with Koil, Coach Sewell expressed interest for such device to use on the field and being able to call plays and edit/create new plays on the fly.

We started with task #2 where the coach needs to assign players to a designated play. He first went into the Roster looking to assign players to a formation. However, we didn't expect the user to navigate through the roster, we expected the user to first navigate to the play book, select the play, and then assign players. He explained that he has positions (X, Y, R, H) where the players are typically assigned a letter, and that letter changes position in different formations. For example, the R players in a single back is the TE, whereas the R position is the 3rd receiver in a Trips formation. Usually this R player is the same person, this makes it easier for the coach to assign players to a letter instead of each play. He was also expecting to tap on a position, and have a popup appear for him to select multiple

players to fill out a depth chart. Our implementation doesn't support depth charts. I had to inform him that drag-n-drop is supported and then he easily figured out that he could drag a player from the right pane and drop them onto a position on the play card.

During task #3, Coach Sewell quickly found the film library, and selected last week's game. However, we need to change the dates of the home screen and the film library to be in sync so "last week's game" is not ambiguous.  The next issue encountered was locating the "play in the 3rd quarter", as our timeline doesn't list the quarters, only the play sequence number, the formations, outcome, down and distance. He was able to use the voice commands to annotate each of the columns of the play. He said he would like to see some inference icon, such as a microphone to inform him that the Koil was listening.

After he grew familiar with the "Wizard of Oz" effect, he was able to quickly create the new coaches' meetings for task #1. He tapped on each of the fields for the new appointment popup, spoke his information, the Koil confirmed each, and he tapped done. This was a very quick and easy task for him to perform.

## Charlie Borberg

Coach Charlie occasionally helps with his sons' football team. His son is still in two hand touch league, and the coaching involvement is clearly less than that of High School or College.  He is not familiar with the competitive products such as Hudl or Krossover.

We started with Task #2, and Charlie immediately selected the PlayBook. It took him a while reviewing the PlayBook to locate the offensive Trips formation, he seemed a bit perplexed as the PlayBook screen can be overwhelming. Once he located the "Trips Counter Curl" play, he attempted to select on the circle representing a player. Nothing happened. He then tapped on the players name on the right pane, nothing happened. At this point, Charlie is stumped, I had to jump in and explain that the Koil supports drag and drop. He then immediately dragged a player onto the respective position. He continued this for all open positions. He asked where the save button was, this is a problem with our revision of our UI.

I then asked Charlie to perform Task #1. He paned the home screen for a while (5seconds or so), until he tapped on the calendar. Nothing Happened, as we don't expand the calendar or take the user to a more detailed calendar view. He then selected the "add event" plus sign. On the new event screen, he was expecting a on-screen keyboard to appear. I told him that the Koil had advanced natural language processing. He then stepped through each of the fields, telling the Koil the subject, participants, location and date/time for the coaches meeting.

## Interface Revision Sketches

After reviewing the results from our user study, we revised our design to become more intuitive for the common areas where our participants stumbled.

The home screen didn't change much, we did find that our text headings weren't consistent throughout the Koil.
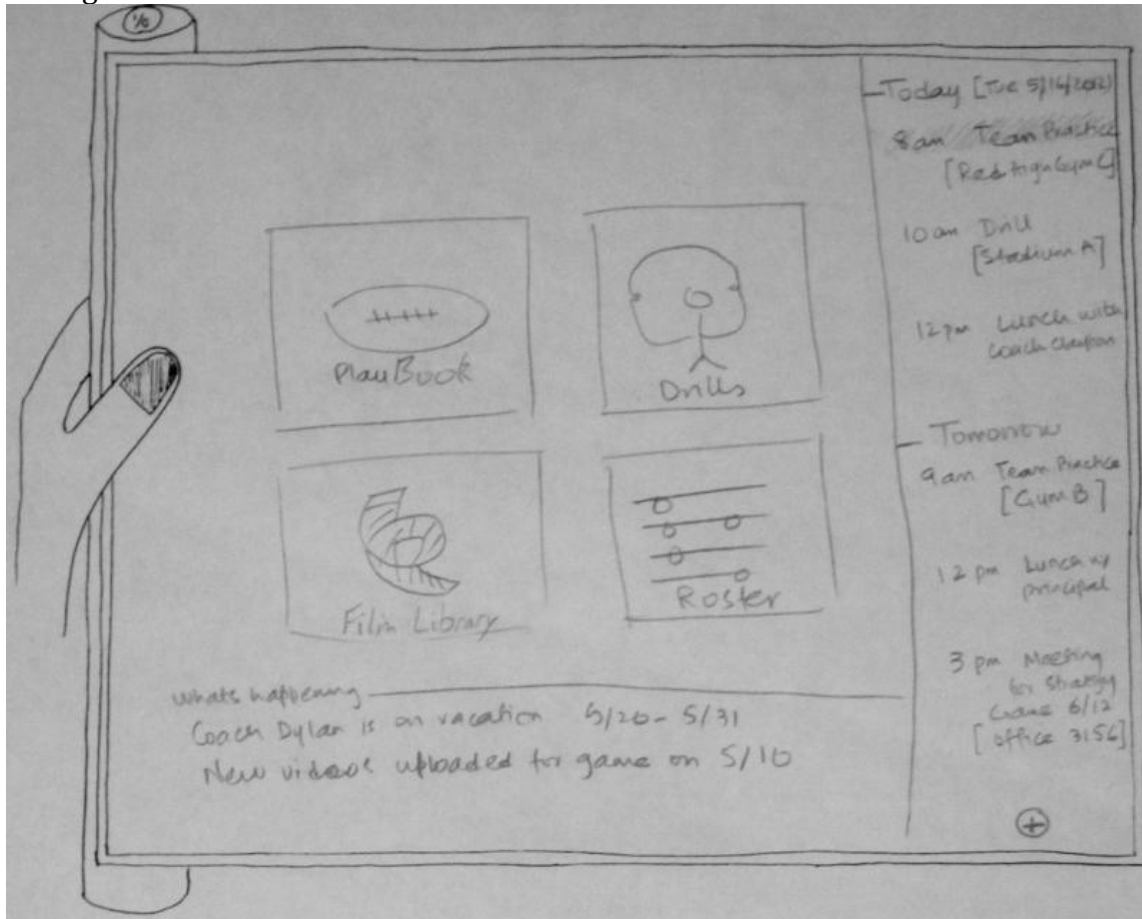


**Figure 1 - Home Screen**

The Playbook changed substantially, instead of dividing the offensive plays into Run/Pass, we categorized them by formation (I, Pro-Set, Trips, etc).
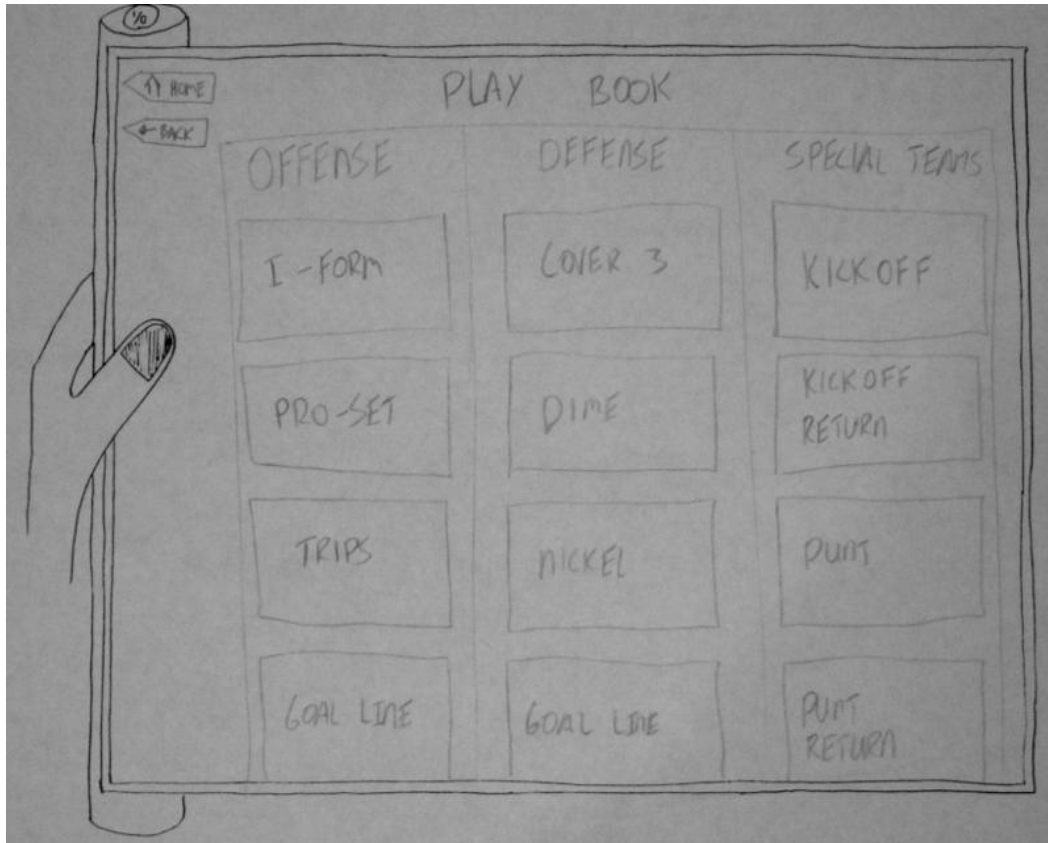


**Figure 2 – Draft #1: Playbook**
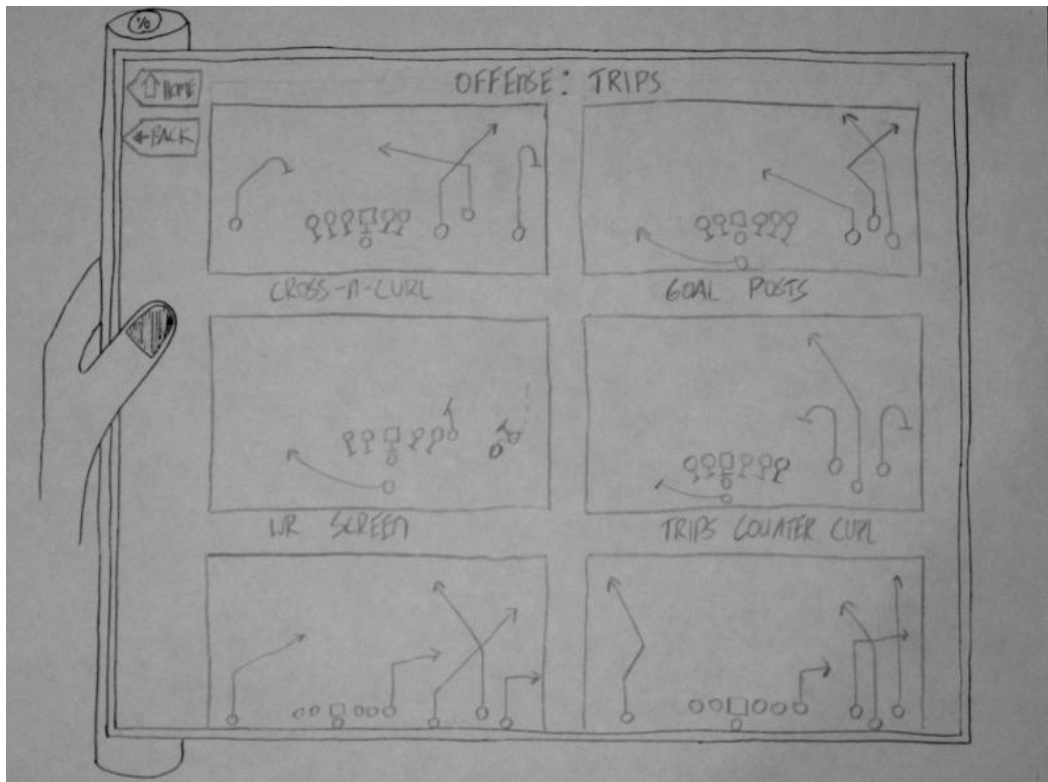
**Figure 3 - Revised Playbook**



**Figure 4 - Plays in Playbook**

The play cards were re-designed to alleviate the confusion setting the starting lineup. After meeting with the coaches, it was determined that coaches refer to the starting lineup as "depth charts" and like to have backup players defined as well. We added a depth chart screen to make it more intuitive that you can drag and drop a player from the roster onto the depth chart. Once the positions are defined, the play card displays the number of the player.
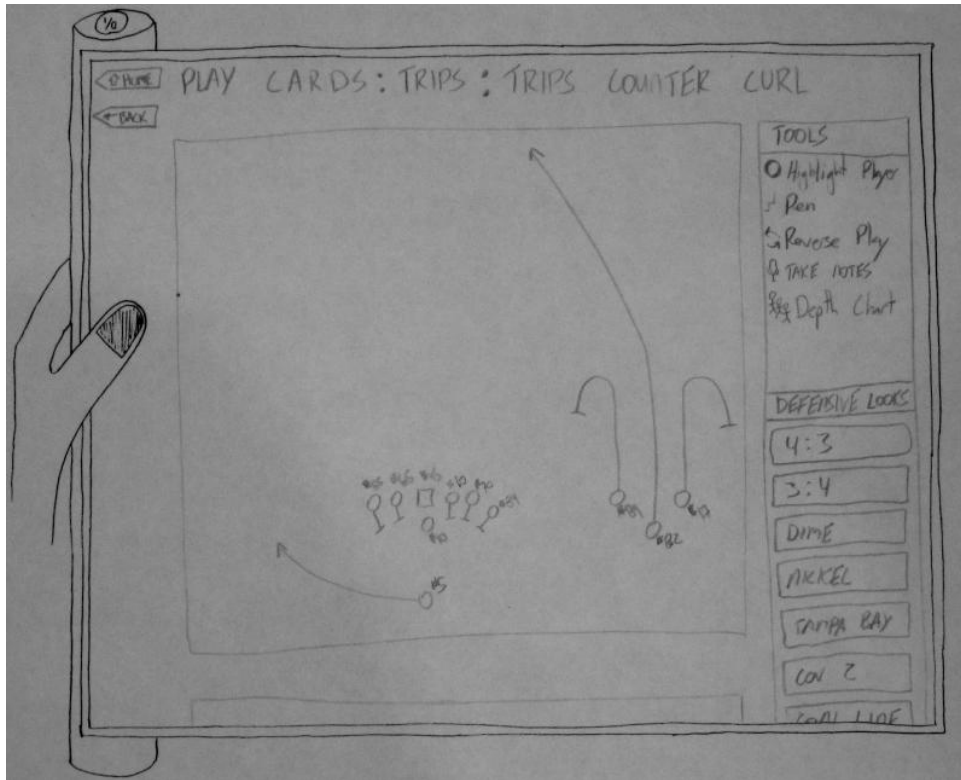
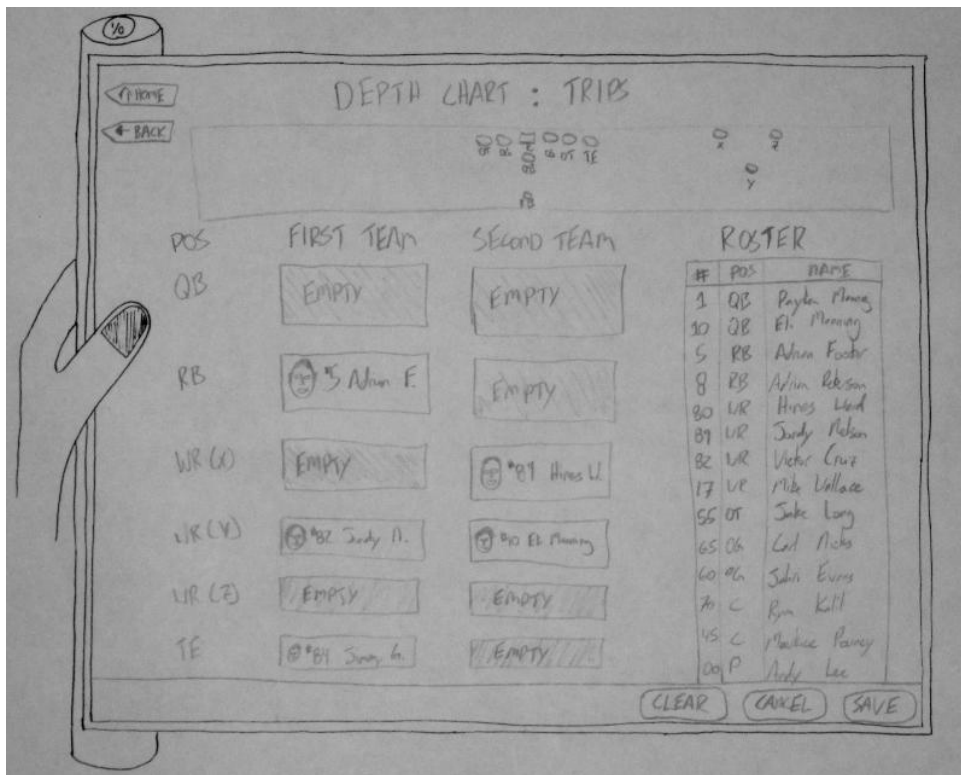**Figure 5 - Draft of Playcard**

**Figure 6 - Revised Playcard**



**Figure 7 - New Depth Chart**
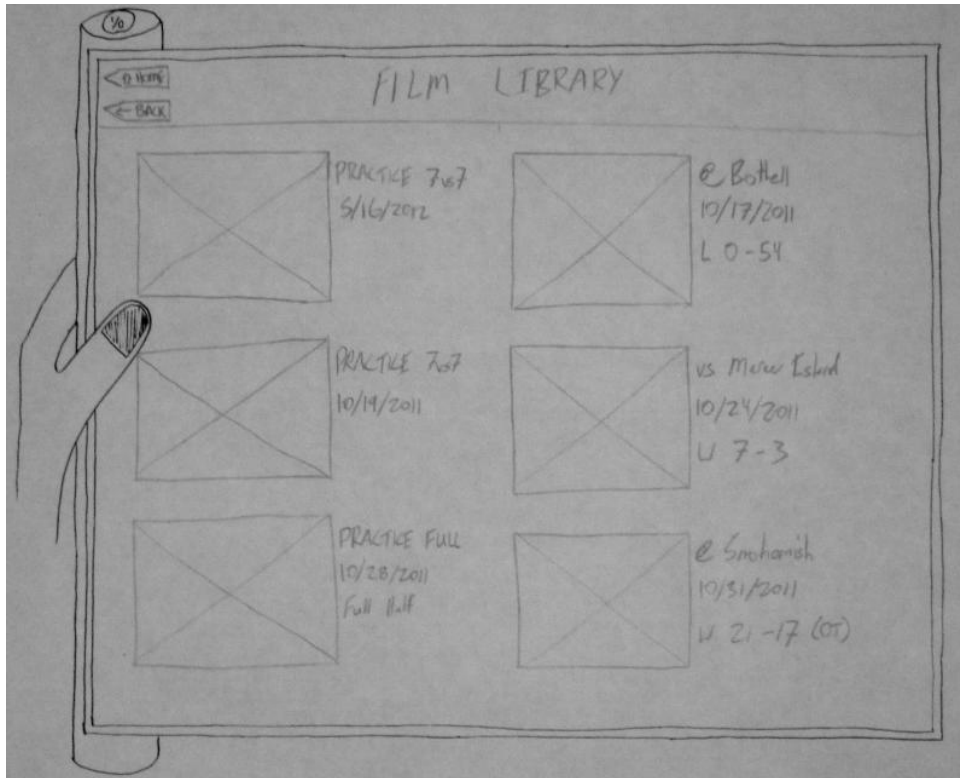
No changes made to the Film Library.

**Figure 8 - Film Library**

The film player was redesigned to be more intuitive. We added a tools pane to help the coach annotate on the play. Beneath the video is play detail information which the coach must enter the information into. We cleaned this up to specify the time remaining in the game, and included a voice listening button which allows the coach to easily identify the play details (formations, down and distance, outcome, etc).
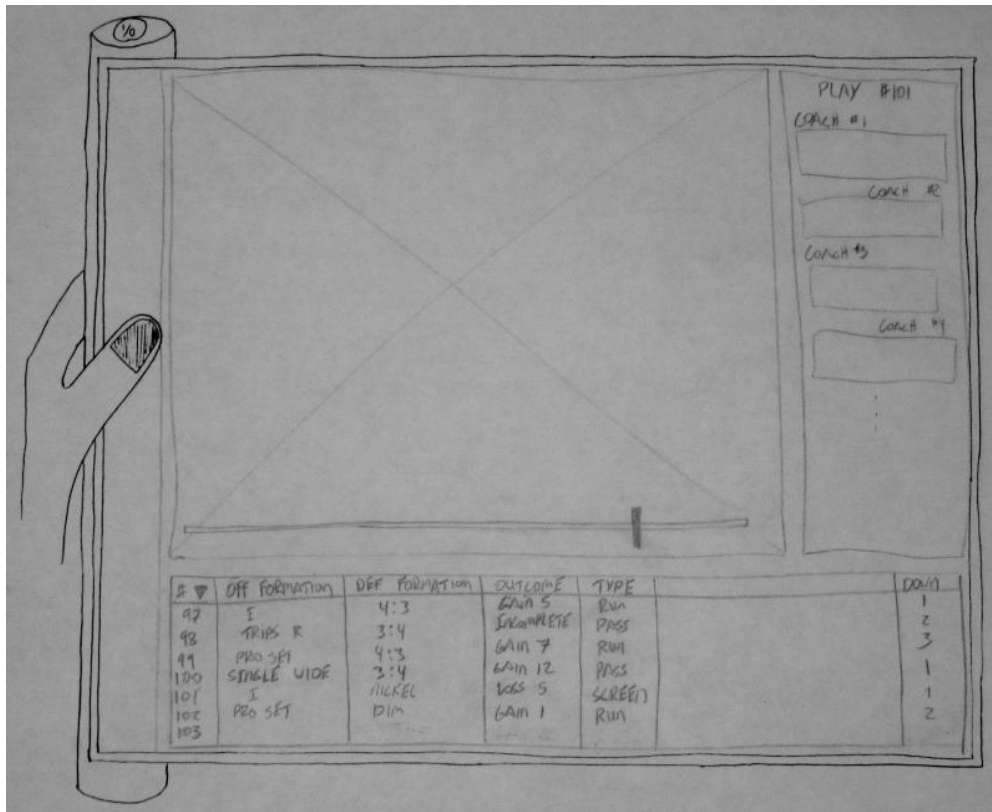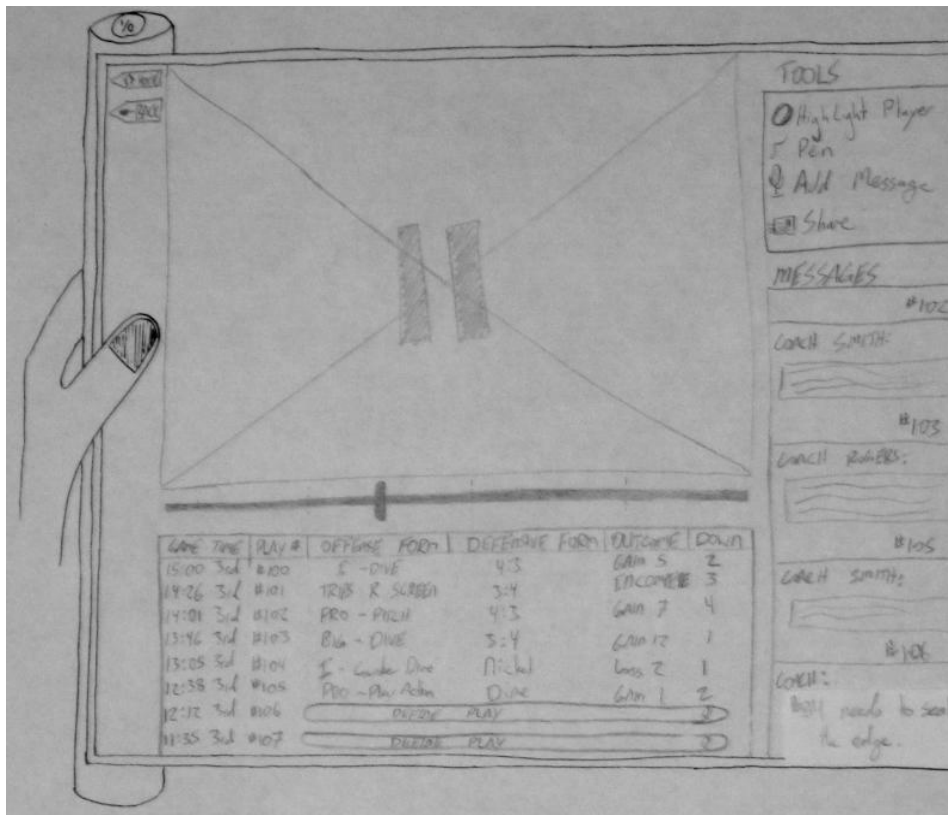
**Figure 9 - Draft of Film Player**



**Figure 10 - Revised Film Player**

Only slight improvements to the Roster screen, we now show more of the player attributes.



**Figure 11 - Draft of Roster**

ROSTER

| POSITION ▼ | NAME ▽ | | YEAR ▽ | # ▽ |
|---|---|---|---|---|
| FB | BOB DOWNS | | SR | 7 |
| RB | BARRY SANDERS | | SO | 1 |
| OT | THE FRIDGE | | SR | 55 |
| QB | BEN ROETHEN | | FR | 15 |
| WR | GARY PAUL | | SO | 12 |
| TE | JONES SMITH | | SR | 22 |
| C | RONNIE TURIAF | | SO | 5 |



**Figure 12 - Revised Roster**

ROSTER

| # | NAME | Position | Height | Weight | Year |
|---|---|---|---|---|---|
| 1 | Peyton Manning | QB | 6'6" | 225 | FR |
| 10 | Eli Manning | QB | 6'5" | 235 | SO |
| 5 | Adrian Foster | RB | 6'0" | 245 | SR |
| 8 | Adrian Peterson | RB | 6'2" | 255 | SR |
| 80 | Santonio Holmes | WR | 6'2" | 225 | SO |
| 39 | Aaron Ward | WR | 6'3" | 205 | FR |
| 82 | Sody Nelson | WR | 6'6" | 215 | JR |
| 81 | Victor Cruz | WR | 6'5" | 225 | SO |
| 55 | Seth Long | OT | 6'7" | 275 | FR |
| 60 | Carl Nicks | OG | 6'8" | 295 | JR |
| 65 | Sebri Evens | OG | 6'6" | 315 | SR |
| 70 | Ryan Kall | P | 6'1" | 185 | SR |
| 45 | Montaine Purney | C | 6'2" | 305 | SO |
| 00 | Andy Lee | K | 5'11" | 175 | SR |
| 84 | Simmy Graham | TE | 6'6" | 225 | FR |
| 51 | Pres Osuna | OT | 6'1" | 195 | SR |

## Video Prototype Overview

We opted for the video prototype to demonstrate the Koil. We used a basic point and shoot camera to take the video of us acting out the scenarios on a field where a football practice is taking place. Our acting skills are worthy of a Oscar, but we won't be submitting our video to Cannes anytime soon.

The actual physical prototype we came across (the 1990's Pad2Go mouse pad) gave us a terrific prop to better explain the Koil. Our users are able to actually touch and feel a device which we envision will be similar to the Koil. Sure, the dimensions may change, but having the user actually be able to physically hold the Koil was a huge benefit.

http://youtu.be/0i74k_0dISw

## How it went

This project was a great learning experience for all of us. It gave us insights on how to validate our UI designs with real users and made us realize the importance of this validation for making a successful UI design. We started with an idea for a new hardware form factor, decided what we imagine it would look like and behave and then picked an app that would exploit the device's potential.
We then came up with 3 scenarios that can be achieved through the app,  discussed the scenarios with some domain users, designed UI sketches that would be involved in achieving the 3 tasks and searched for football coaches (hardest part of the project) who could help us validate the design. We learned a lot of key insights from those user discussions and walkthroughs. Some of our design ideas were well-received but the users also pointed out certain limitations and missing features in our UI design. This helped us come up with a much better revised UI design.

## Challenges and Learnings

One of our biggest challenges was the fact that we were using a **new form factor** which nobody is familiar with. We made some key assumption for the device (like its size, on/off button location, input/output mechanisms, scrolling etc.) and then went on from there. Additionally we decided to narrow down to **one app** from an infinitely broad application base for a device like Koil. After several meetings, discussions and revisions we finally decided on the football app and it worked out great as it was for a group of people very different from us which made us realize how hard it is for UI designers to actually put themselves in user's shoes. It further corroborated the importance of UI design validation. Another key learning from this project was the importance of **user's comfort level** with existing interfaces and how it is hard for them to switch over to a completely new technology, even though the new technology may be better and easier to use. For e.g. the voice-input mechanism of Koil was not considered sufficient by users and they still wanted a keyboard like input for the device. This made us realize that a shift in user's preferred interfaces can only happen gradually. In the beginning it would be better to provide users with something in their comfort zone along with a new option which may come with a little bit of learning (or unlearning) curve but is eventually a superior method. In the next version, once the users are more comfortable with the new technology, the older technology and interfaces can be deprecated.

# Appendixes

## *Testing Notes*

5/16/2012

Ryan Wagoner

TASK #1

Film Player
Abel to identify play in "3rd Quarter"

How to select several plays?
Need Prompt for voice input
Result list for
Arbitrary formation

Outcome
Interception / Fumbles

Ways to select several plays
Share button
Popup for roster
Ask for message (Speech to text)
Submit

TASK #3    Shedule New Meeting

P.9    Needs Microphone Icon to identify
       Selection for coaches
       Time selection is kind of voice
          Add calendar


TASK #2    Set Lineup

          Click on Roster
          Number having one player icon after assignment
        - Where's save?  UI Element Informing User
          Tooltip                    the informating
                                        saved


          General Feedback

          Create Plays

Coach Sewell                                    5/18/2012

TASK #1

    Edit players

    Roster needs back button

    Found Play Load
    —? XYZ
    By position

    By Formation the cycle through plays

    Bubble screen

    Depth Chart for each
      TE =y
        X
    TE = R
    RB = H

Not very defined

TASK #2

Didn't know th game to select

No index to sort by quarter. ? but...

6 Only play number to select right plays

TASK #3        Coaches Median

Voice Control
Good