Project P:
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Dan Higgins
Daniel.higgins@gatech.edu

The interface as it currently exists

The interface that I have chosen for a redesign is Garmin's multisport training watch with GPS and wrist heart rate technology. In addition to the physical watch, an application is provided for storing and analyzing the activity data. This watch has been awarded best GPS Multisport watch by Wearable.com for multiple years, and it consistently wins head-to-head comparison tests by well-established independent magazines (Runners World) and video bloggers (rizknows.com, dcrainmaker.com) Add although I am aware of potential biases that I may bring I am also aware that **I am not my user**. I do however feel it is important to note that I have many years of personal experience training with this watch and I also have experience with a few of this watch's competitors. With this information, I can say that this watch has many fantastic qualities, but it also has a few rough edges in the interface that could stand to be improved.

Let's start with *what works well* as this list is substantial. We will not cover all aspects of the watch; instead, we will focus on a few key design elements and discuss each in the context of *what makes it work well*.

It is clear that the **user experience** provided by the watch keeps the **individual** user at the center of all task activities. You can open a brand-new watch and easily use all of the main features without configuring anything. You don't even need to set the time or date as these features are automatically synchronized with GPS when the watch starts. Here we see an excellent use of the design principle of **simplicity** as the basic watch functionality is intuitive to use and easy to understand regardless of the user's experience level. The operation of the watch has a rapid **Learning Curve** as there are only four buttons that provide the **affordances** to operate the watch and no touch screen. The absence of the touch screen is intentional as the designers have taken the

Participant View when making this design decision. That is the user "must be able to actually interact with the system in the context where they need it." (Joyner 2107) If a user is actively Running, Swimming, Biking, etc. they cannot easily make use of a touch screen. Instead, large buttons are used with their function clearly stamped into the bezel (Up, Down, Start/Stop, Back/Lap) A fifth button powers on and off the watch and provides a backlight but does not otherwise significantly affect the operation of the watch. This design philosophy creates an **invisible interface** for the novice user the moment they put on the watch they can interact with it in a natural way. The invisible interface is not limited to the novice user as the watch also offers tremendous configuration capabilities for the expert user to maximize the efficiency of the more complex tasks. We will discuss weakness in the next section but **"Let your interface teach"** which is a design technique for invisible interfaces is not represented well on this watch.

The user experience is further enhanced by expanding the scope beyond the **individual** to include the **group** and **societal** levels. This UX is achieved through the mobile application that captures and analyzes all of the data from any activity executed on the watch. (i.e., Run, Swim, Bike, Hike, Ski, Paddle Board, etc.) The user's data can be shared with group members desiring to participate in friendly *competitions* or to gain the support and *feedback* from others in the community while trying to obtain a new PR (Personal Record). In addition to the group level, we can also look at the societal level as this watch, and this category of fitness devices has an aspirational goal of creating a healthier lifestyle for everyone.

Let us now take a look at *what doesn't work well* and *why it does not work well*. As with all design's compromises must be made to strike an appropriate balance. With the multisport watch, a balance is required based on various needs. We list a few examples here: The user's desire for data for their specific sport or activity, the user's level of understanding of the data, the current state of the art in fitness sciences (e.g., how to best interpret the data), the accuracy of the performance measurements (e.g., chest strap heart rate vs wrist heart rate) and the availability and cost of new technologies. All of these needs create a tension which is not always solved optimally.

One of the reasons why the design of this watch is less than optimal is the **Expert Blindspot** as the watch provides little in the way of teaching the user why the use of one setting is preferable over another or even what a particular setting means. This feeling of requiring a need for expertise in activity settings and options can lead to **Learned Helplessness.** For example, when setting up the monitoring for an activity like running, you have well over 100 metrics to choose from, and all the metrics carry the same weight in the interface from a selection perspective. As a novice, you likely understand metrics like distance, lap distance, time and pace. As an intermediate user, you probably understand more sophisticated metrics like VO2Max & HRR (Heart Rate Reserve), and as an advanced user, you likely understand and can use metrics such as Vertical Oscillation and Ground Contact Balance. However, the interface treats all these metrics with equal weight and importance leaving the user confused and resistant to try and customize the watch beyond its basic settings.

The watch also lacks **Flexibility** in how the users actually configures activities. The nested menu interface is easy to understand and use, but with so many metrics it is too easy to get lost. For example, you may desire to use an Intensity Factor Metric, but actually finding this Metric can be a challenge. Here we see the principle of **discoverability** failing. "The principle of discoverability advocates that functions be visible to the user, so that they can discovered, rather than relying on learning them elsewhere" (Joyner 2017)

Another category of design flaw are **errors** that occur while using the watch. "Any user error is a failure of the interface to properly guide the user to the right action." (Joyner 2017) The errors come in two types the first is the **slip.** One slip that often occurs is selecting the wrong operation as the watch is very responsive to button clicks, a user can easily go one beyond the intended menu item and click enter when they actually wanted to click on the item above one actually selected. This slip is usually not a problem as the interface allows you to simply cancel or go back. This action is unfortunately not the case with the *Power Off* menu item. Here, if you make a slip and intend to place the watch in *Do Not*

Disturb mode but instead go one menu item past do not disturb and click enter the watch powers off. The second error is the **mistake** that can occur while using the interface as the user's **mental model** does not match with the interface. "A mental model is a person's understanding of the way something in the real world works. Using mental models, we generate expectations or predictions about the world" (Joyner 2017). This error can happen while starting an activity. If you go to an activity that requires GPS (e.g., Running) and hit Start, then immediately start your activity you will find you have made a mistake. As the first click on "Start" does not actually start; it places you in the Running activity and acquires a GPS lock. You must hit the *Start* button a second time to actually start the activity. To be clear that this is a mistake and not a slip the button we are talking about is the *Start/Stop* Button, yet you must click Start and then Start again to start your activity. But your mental model would likely tell you if you click the button a second time you would be stopping the activity.

Interface Redesign

<u>Redesign Feature 1</u>. Add a submenu indicator to the navigation screens.

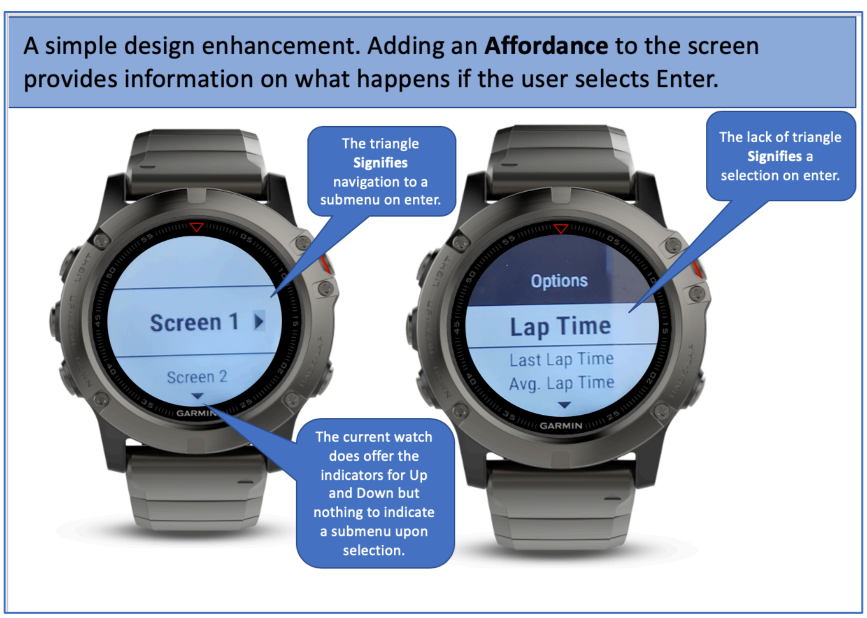

Figure 1

<u>Design Feature 2</u>. On initial configuration, after the user enters their personal data. The system uses the person's Height, Weight and Gender to calculate a Body Mass Index (BMI) then uses the BMI and the selected Activity Class to preconfigure the watch and the default activities with appropriate settings for this user. An example would be to set larger fonts and increase the backlight intensity for users above a certain age. Additionally, the watch provides and preconfigures a basic, intermediate and advanced configuration for the different BMI / Activities classes. All default settings are fully adjustable but provide a configuration starting point based on preliminary knowledge of the user.

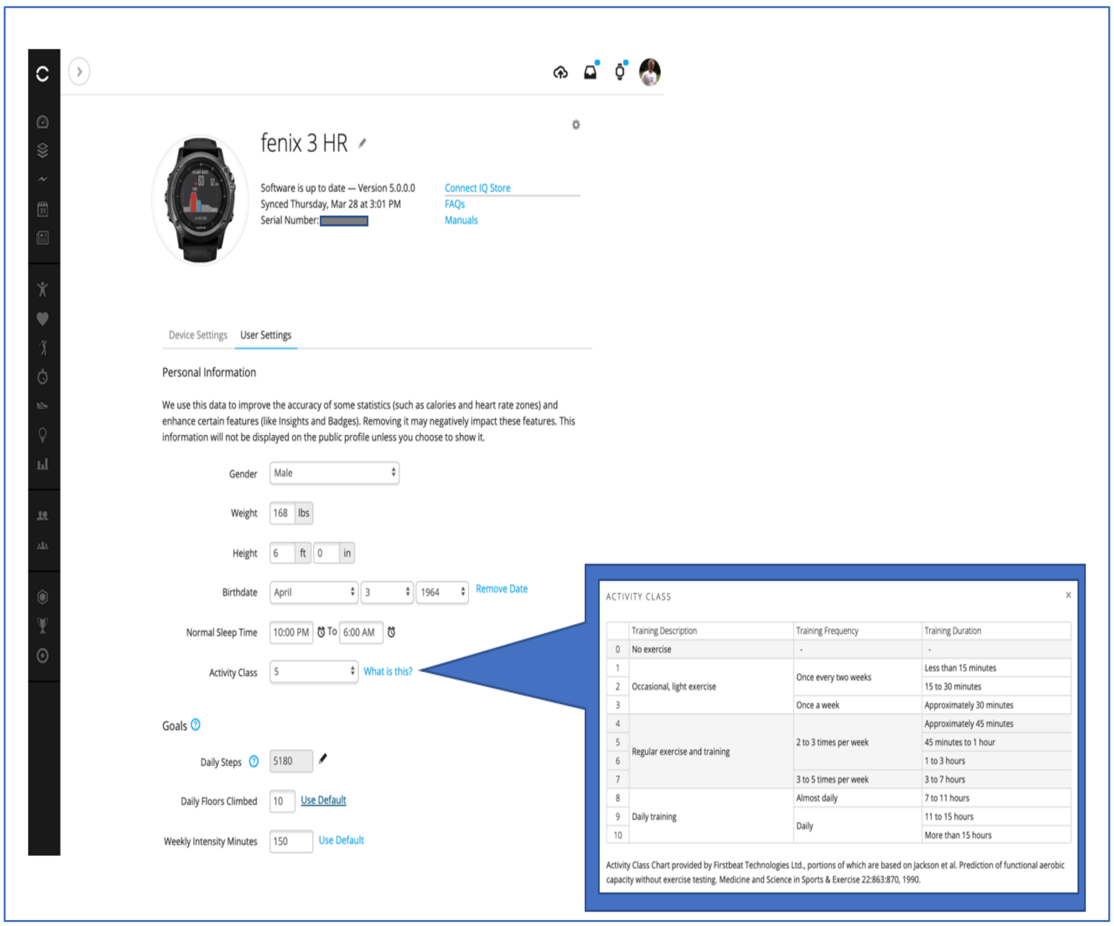

Figure 2

<u>Design Feature 3.</u> Allow the user to configure the watches Activities from the Connect App. The current watch only provides basic configuration from the application and no Activity configuration.

Allow Drag and Drop of Layout Screens also allow reordering of the layout screens by Drag and Drop. (i.e., The ordering is the order that the screens are cycled through on the watch face when you click the *Up* and *Down* buttons.)

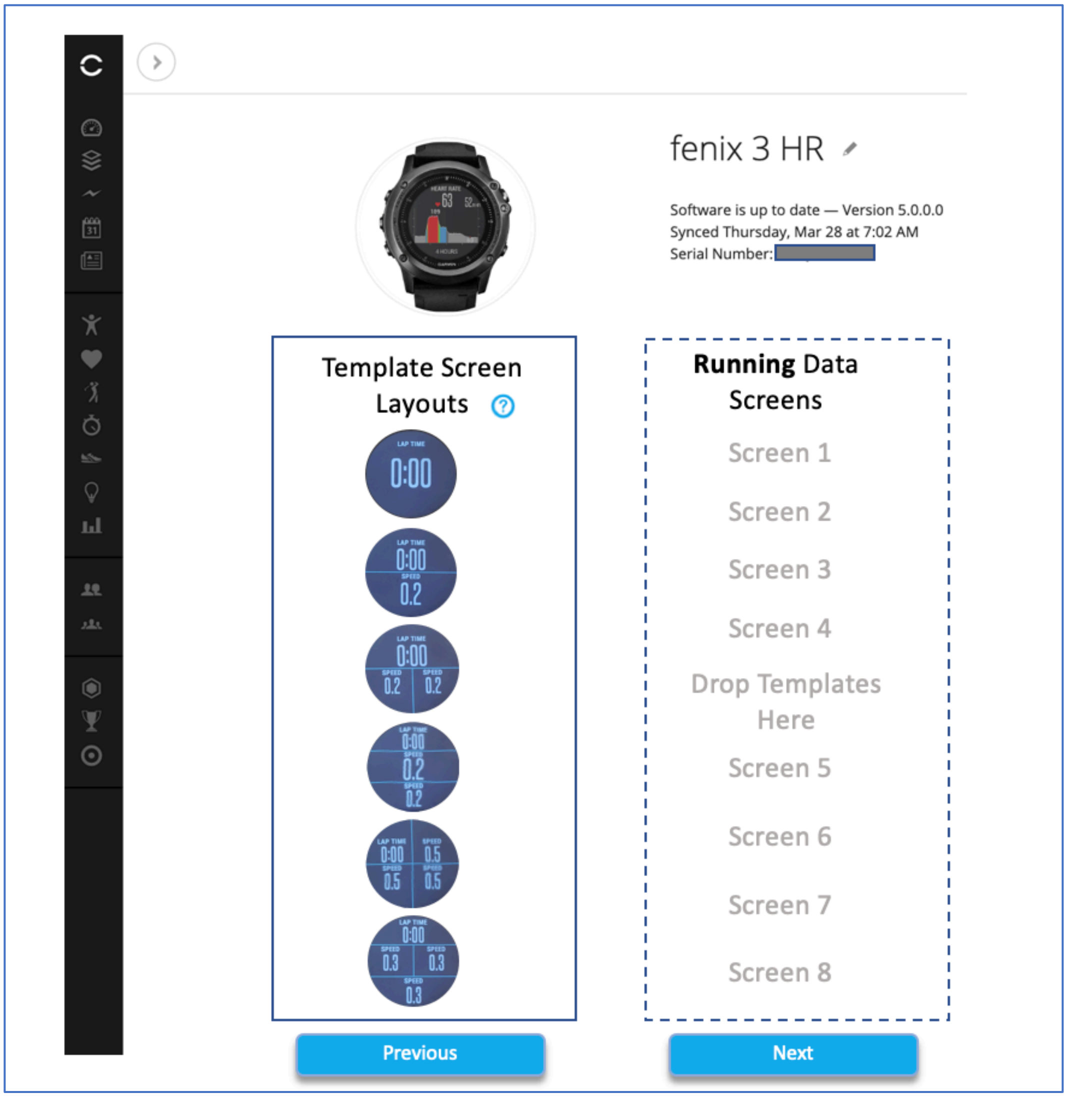

Figure 3

Allow Drag and Drop of the data fields on to the screen layout. Group Data Fields into well organized and collapsible categories. Provide extensive help explaining each data field including how the data is captured and why it is important.

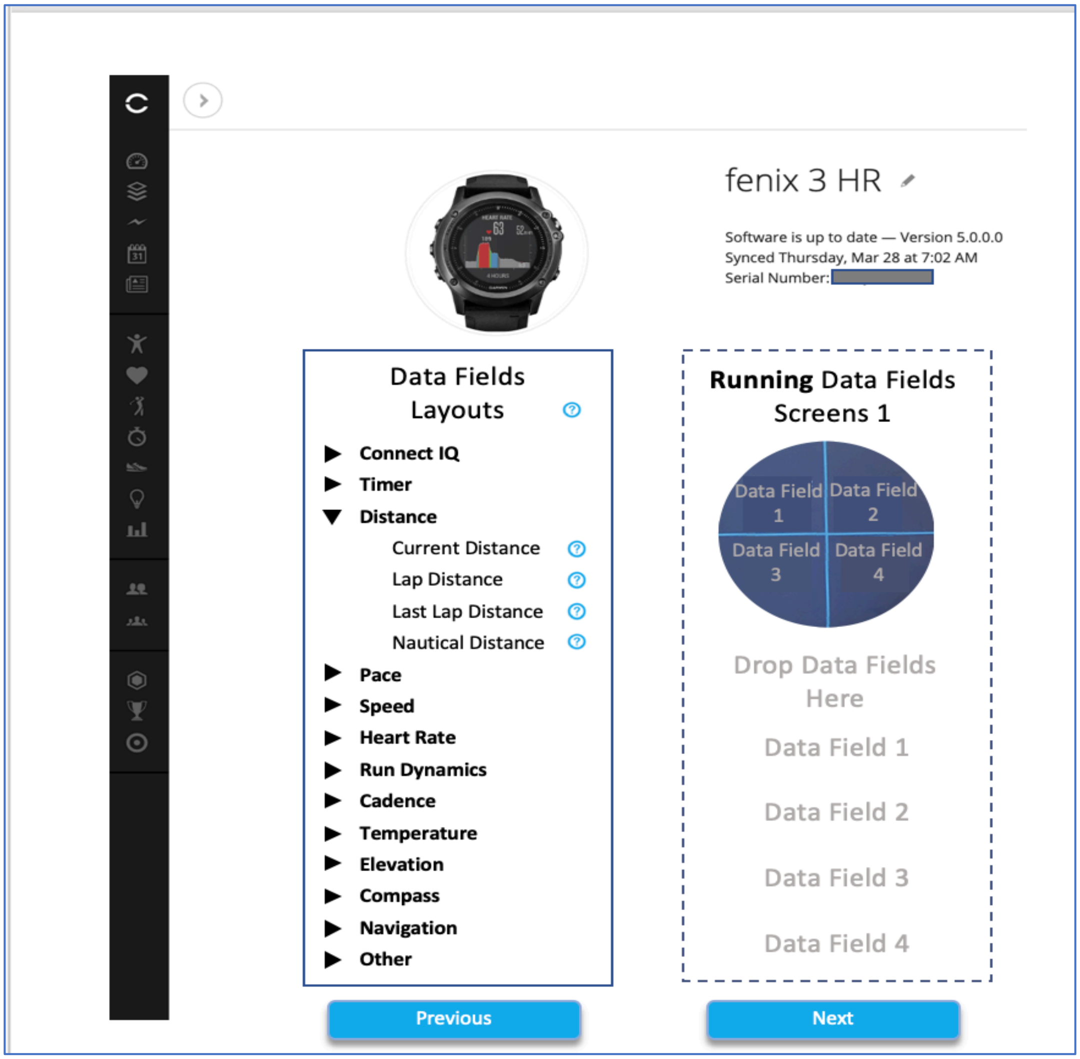

Figure 4

<u>Design Feature 4.</u> Provide Confirmation before powering off the Watch

Figure 5

Interface Justification

Overview:

Our redesign looks to make specific changes to the interface in areas that fail to meet particular critical design principles of HCI.

Justification:

1. Using a **Processor View** of the interface we evaluate our interface with a quantitative perspective. Looking at how quickly the user can complete the task of configuring an activity such as running, biking, swimming, etc. Our redesign significantly simplifies the task by moving the activity to the watches Application. The system offers over 100 data fields that can be captured and rendered on the watch during an activity to do this configuration on the watch can be time-consuming and frustrating as it is often unclear in which subcategory a specific data field resides. By moving the configuration to the application, the interface can take advantage

of the larger real-estate and the additional user interface tools that such devices offer. The redesign maintains the on-watch configuration but adds the **flexibility** to configure on the application. Additionally, the extensive help provided with each data field alleviates the **Expert Blind Spot** of the on-watch experience.

2. Using the **Predictor View** of the interface design focusing on a qualitative perspective. "It must help the user learn what they don't already know and efficiently leverage what they do already know."(Joyner, 2017) Here our redesign builds upon the interface language already presented in both the watch and the current applications providing a **consistency** in controls, visualizations, and layouts. By automatically configuring the Watch the user starts with a configuration that they will be familiar with if they are coming from another multisport watch. (i.e., the familiar setting are provided) Starting with a good initial configuration the user can spend time exploring new options that they don't currently know.
3. **Direct Manipulation** as a design technique is used in the redesign to simplify screen layout as well data field section through the use of Drag and Drop. The user visually selects a screen layout and drags and drops it on the Data Screen list. The Data screen layout, in turn, has a number of data field placeholders which the user can also drag and drop specific data field onto. Additionally, the user can change the order of the Data Screens by just dragging them to a new position on the list.
4. Next, the redesign looks to minimize **errors** and guide the user to the right actions. The redesign provides a **constraint** in the form of a yes/no confirmation before taking the irreversible action of powering down the watch.
5. Next to help bridge the gap in the **Gulf of Execution** we provide a **feedforward** mechanism in the form of a submenu icon. In the current navigation on the phone when you click on an item, you do not know if it will go to a submenu or if the item you are clicking on is a selection item. The only way you find this out is by trying it to see what happens or by remembering it after you have learned what happens. This simple icon is an excellent

improvement to the user experience which eliminates the guesswork and narrows the gap in the Gulf of Execution.

6. Next, we apply concepts from **Visual Perception** to our design. We do this by not relying on color as a queue to accomplish tasks which takes into consideration color-blind people. We do however provide pictures and icons throughout the design to simplify identification of tasks through visual cues.
7. Using **UI Design principles,** we apply *grids* to layout the user configuration screens; we use *white space* and *gestalt principles* to group functional components and provide visual appeal. And our new interface design looks to *reduces clutter* presenting only what is needed when it is needed.

References

Joyner, D. (2017). Human-Computer Interaction. Retrieved from https://www.udacity.com/course/human-computer-interaction--ud400