![tableau SOFTWARE]

Tableau for Robotics:
Collecting Data

WHY WE COLLECT DATA

Collecting data is core to any scouting strategy - without properly collecting data, there is no way to get insights from your scouting work. This whitepaper focuses on collecting information efficiently by designing a form for scouts for eventual easy data input.

When people think of scouting they picture a row of students taking notes on paper and then entering it into a database. This phase, called "data collection" is just a small part of scouting, it is important to design it in a way that is fast, accurate and intuitive.

The quality of the data you collect is one of the biggest limiting factors in analysis. If your data is full of holes or inaccuracies, it will be hard to get enough credibility to convince people with your data. However, if you gain a reputation for accurate and comprehensive data, you will be valued as an alliance partner for it.
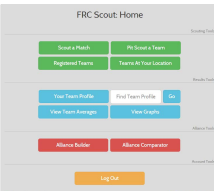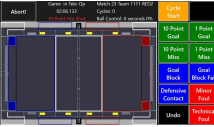
DATA COLLECTION TECHNIQUES

Just as there are a lot of different ways to take notes, there are many different ways to scout a match.
Each method has pros and cons. Almost all scouting methods fall into one of these five categories.

Method	Cheap	Dependable	Easy to set up	Flexibility	Intuitivity	Power
Laptop Scouting	OK	OK	OK	OK	OK	Good
Scouting Apps (Tablet/Phone)	Bad	OK	OK	OK	OK	Good
Paper Scouting	Good	Good	OK	Good	Good	OK
Scouting App (Website)	OK	OK	Good	Bad	Bad	OK
Pure Notes	Good	Good	Good	Good	Good	Bad

Note: This table assumes you are using an app or website made by someone else. For these methods, dependability is lower because of batteries and internet connectivity issues. This graph should also change with time, as scouting is a relatively young part of FRC and is likely to become more intuitive and powerful later as teams develop better tools.

The table below goes into a little more detail about each one of the scouting methods previously mentioned.

Scouting Method	Example	Description	Advantages	Disadvantages
Scouting Apps		Using a mobile device (tablet or phone) with an app another team has developed to scout.	• Powerful • Already created • Can share data • Lots of choices • Saves you effort	• Not flexible • Hardware costs • Technical challenges (bluetooth, internet)
Paper Scouting		Using paper scouting sheets, scouts fill them out by hand each match. Data can be stored digitally or in a folder.	• Inexpensive • Easy to make • Customizable • Quick to make • Quick to train	• Lacks power of digital scouting • Hard to organize • Requires transcription
Scouting Website		Using any internet-connected device to access a website that acts like a scouting app	• Any device • Inexpensive • Secure data	• Requires internet • Not flexible
Laptop Scouting		Digital scouting, but on a laptop instead of a tablet.	• Easy device • Flexible • Customizable • Provides raw data	• Battery power • Cons of scouting apps
Pure Notes		Taking qualitative notes on other teams' robots.	• Very easy • Can be digitalized • Does not take many people	• Not powerful • Cannot run analytics on the information

MATCH SCOUTING

In this whitepaper, we are going to focus on paper scouting because it is both easy to create and is still very powerful. If you would like to find out more about the other types of scouting, many teams post their apps to Chief Delphi.

In the previous whitepaper in this series, we created a table of how teams might want to track different actions, and what data type would be appropriate to use. We want to take that table and turn it into a scouting sheet. A scouting sheet is a form designed for input during a match. A typical scouting sheet holds the notes on one robot per match. This is what a sample scouting sheet might look like for your team:

A blank scouting sheet

A completed scouting sheet

Every form is designed to be as accurate as possible. However, because scouts are taking their data in real-time, it is not practical to make them continually erase and rewrite a number down every time a robot does an action. That is why the entire left side of the example sheets is essentially a large area for scouts to take notes in. The form elements on the left side of the sheet let a scout take tallies as the events happen without having to erase anything. After the match is over, the tallies, checkboxes and options are copied over to the right side of the form as a number. This allows anyone to quickly enter the data without having to recount the tallies and checkboxes.

Building a scouting sheets involves moving around a lot of text boxes and tables. Because of the inherent formatting difficulty using these elements creates, scouting sheets are usually built in programs designed to deal with formatting, like Microsoft Publisher or Adobe InDesign.

Once you leave space for collecting team and match number, a good place to start would be to fill in the right side of the form. By copying your list actions to look for into the right side of the sheet before you add in any form elements, it is easier to not forget anything.

After you finish the right side, it is important to put the right form element for each field you want to collect data on so your scouts can take notes accurately. The table below give examples of form elements that are ideal for collecting each data field type. Putting the form elements in the same order helps scouts when copying over the data at the end of a match.

Data field type	Form element	Example
Count	Space for tallying	Action: [ ]
Short list	Circle the option	Action: **A B C D**
Boolean	Single check box	Action: ☐
Rating	Circle the option / number	Action: **Good Average Poor**
Notes	Space to write	Notes: _____ _____ _____
Location	Grid of game field, collect x and y	X: ____ Y: ____

If your scouts are having trouble finding the fields they are looking for, consider organizing the fields by period. This way, the scouts can move down the paper as the game progresses without having to worry that they are accidentally recording all of their shots in the autonomous category. Also, putting related fields next to each other (like hits and misses) helps scouts by reducing the distance they have to move their pencils.

Feel free to deviate from the example sheet as much as you want, but try to keep it organized. Besides organization, there are other ways to make sure your data is free of errors. The easiest one to do is assign two extra members to Quality Assurance. These QA roles make sure the data is free of any glaring errors, the tallies are copied over correctly, and the data is legible. After the data is QA'd, the sheets are sent away to data entry and storage.

PIT SCOUTING

Match scouting sheets traditionally only collect information on robot performance. The data is collected each match because a robot's performance usually changes a bit each time it plays. However, some important features of a robot don't change from match to match. These features, like number of drive base motors for example, can be collected once at the beginning of the regional and don't need to be on our match scouting sheets. To scout these important fields, we need a pit scouting sheet.

Because these pit scouting fields only need to be collected once per regional, it is easiest to find the robots in the pits (hence the name). Another advantage of collecting data in the pits is how close you can get to the bots. When we collect pit scouting data, we can give our scouts a simpler form because they aren't pressed for time.

A pit scouting form can be as simple as a list printed onto a piece of paper with blank spots to write in the responses. For example:

Team number: _____

Number of wheels: _____

Has transmission? ☐

Has a blocker? ☐

Wheel type?   Traction   Mecanum   Omni   Other

With scouts working in pairs, it is realistic to pit scout a regional event in about an hour.