The Compass Alliance Pathways: Scouting

When considering scouting at a robotics competition, think about it like in the business world. It is important to be aware of what other groups are doing to be successful. At competitions, scouting is important for many reasons. Scouting data can be used to identify the teams that are performing well, while also playing a crucial role in alliance selections for the elimination rounds. This data can also be used to display your team in a positive light to other high-qualified teams. Finally, scouting data helps emphasize teams that have solved problems effectively, allowing a resource to talk to so your team can grow and improve.

Level 0: Stepping Stones

1. Scouting is the act of recording data while watching matches or match videos with the intention of using the data to compare your robot with the others at the competition.
2. This scouting data can be used in many different ways. The most common would be preparing for matches or strategy for alliance selection.
3. There are multiple kinds of scouting: pre-competition scouting, pit scouting, and match scouting. If you wanted, you can even scout the elimination rounds. You can read more about this topic in FRC 3476 Code Orange's Scouting 101 guide here.
4. How do you plan on scouting at a competition? There are many ways to approach the idea of scouting and it often depends on what works best for your team. For some ideas, feel free to look at Hall of Fame team FRC team 2614 MARS's Scouting Process and Database guide.
   a. To add on to this idea, FRC team 1678 Citrus Circuits has uploaded in-depth scouting whitepapers for each game from 2015-2018, explaining   how to understand and utilize a tablet-based electronic scouting system.

Level 1: Pre-match Scouting

1. Look at the game and determine what characteristics you want to watch for. This will vary depending on the current game, but having an idea of what you are watching for will be very beneficial for your team.
   a. A strong starting point is to ask yourself, or your team, what data are you hoping you get out of a match? This will tend to lead back to the specific objectives of this year's game.
   b. It is also important to consider what specific data is important to your team. This is similar to the above idea, but tends to be more specific from team to team. Each team sets their own game plan early on, and that would require a different kind of collected data later in the season to strengthen that planned strategy.
   c. Finally, do not forget to consider what kinds of robots would compliment your own. Every team chooses to approach the specific game a certain way, and

having three identical robots does not always work in your favor. Keep in mind the other aspects of the game, and watch for robots who can perform them well.

2. There are three main times teams should consider scouting: pre-competition, pit scouting, and match scouting.
   a. For scouting before a competition, the main point is to get a sense of what your future competition will look like. You will be able to adjust your strategy in response to what you see other teams doing in their competitions. It is also extra beneficial if some of the teams you are watching will be in your future competition. You will then have the ability to have more data on that team for your competition.
   b. Pit scouting is the first way to gather information on your teammates and opponents. You go around before matches start and ask each team to tell you about their capabilities. Although there is no visual evidence yet, this gives a good starting point for the data you will be collecting from the matches.
   c. Match scouting by far is the most important. It is where you finally get to see the robots in action. It is important to gather as much as you can during matches, because it will be your most accurate and relevant data.

Level 2: Match Scouting

1. There are two main types of data for match scouting: quantitative (pure numbers and statistics), and qualitative (viewable, but intangible) data.. Each group tends to approach the idea of scouting in a different way.
2. Quantitative data is hard number data. They scored X points. They ran X cycles. Etc.
   a. For your quantitative scouts, you should create a scouting data sheet, where your scouts input the data you are looking for. This includes autonomous points, tele-op points, and endgame points.
3. Qualitative data is much more difficult to represent. However, identifying teams that play defense well, drive 'smart', or simply play the game slightly differently, can be beneficial to your overall analysis of teams.
   a. Qualitative data can also be used to verify or correct any anomalies in the quantitative data. If a well-performing robot suddenly scores 0 points in one match, a qualitative report could show a connection issue, dead battery, or other reason for an unusual match.

Level 3: After Match Scouting

1. After a match is finished and the scouting data sheets are filled in, the data should be entered into a computer for analysis. Teams will have to determine their input and data storage that works best for them.
   a. Excel can be used to store the data, and create simple charts and pivot tables once enough data has been added.
   b. Tableau is a data visualization software that is included in the kit of parts.

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      i. 3663 - CPR uses Tableau effectively to create their elimination alliance strategy, and they share their data with other teams via printouts at competition.

      ii. 4096 Ctrl-Z creates rich visuals with Tableau: http://team4096.org/resources/papers/scouting/

  c. Teams are also working constantly to develop android and ios mobile apps for scouting. You should get in touch with local teams, or the Chief Delphi community to get connected with an android, ios, or tablet based app.

      i. Often times teams work together to create such an app, for example there is The Green Alliance.

      ii. Krawler App: https://www.team2052.com/frckrawler/

3. Once data has been entered into the system, you can start building charts and graphs to help visualize the data, and share it with your drive team for match preparation. This data can also be used to present to other teams that may want to pick you during alliance selection.

  a. Your drive team can use scouting data to prepare for an upcoming match. If you have data about a team that you will be facing, you can use that when formulating your match strategy.

  b. During alliance selection, the top 8 qualified teams will hand-select their alliance partners. Your scouting data can be used to promote your teams capabilities, or if you are one of the top teams, your data can be used to help with your team selections.

Level 4: Using Scouting Data

1. Recording scouting data is great, but it becomes the most important when it is being used to form strategy. Whether that strategy is for a specific match or for the competition as a whole, this specific data can make all the difference.

  a. Firstly, rank the teams. Look at all the data you've collected and see where every team stands among each other, and also compare that to their current rank in the competition.

  b. Second, look at where you fall in that list of teams. What are your strengths? What are your weaknesses? How can this data help your team's performance? Scouting data is huge when it comes to adapting a strategy mid competition.

  c. Finally, keep your data with you. If you are communicating with another team and trying to figure out the right way to play your upcoming match, if you can show them the data that supports your strategy plan, it creates a better platform for your strategy to be successful.

2. The FRC 1114 Simbotics Seminar on Scouting and Match Strategy covers collecting a variety of scouting data points as well efficiently translating scouting data into effective match strategy.

Appendix A - Revision History

Revision #	Revision Date	Revision Notes
1.0	Feb. 2018	Initial Release
2.0	Sept. 2018	Improved formatting Added revision history