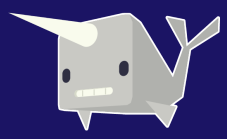
Strategy Whitepaper

2022



3128 aluminum narwhals

Table of Contents (Section 1)

Department Overview

Department History

Team 3128 is organized into five departments:

- Business
- Controls
- Marketing
- Mechanical
- Strategy

Strategy's Founding

Though our team was founded in 2009, we did not have a dedicated department for strategy until the 2015 off-season. Our team's performance, prior to strategy's inception, was largely inconsistent.

The Strategy Department was founded to create a dedicated team that focuses on game analysis, match strategy, and alliance partnerships during competition. Prior to this, we had noticed that most successful teams had a specialized strategy departmentIn order to lift our team to the next level, we decided to create one as well.

Strategy Department
The Strategy Department is responsible for in-depth game analysis, design influence, match strategy synthesis, and both scouting software fabrication and implementation. Given that the Scouting Systems subteam is a part of the Strategy department, all members of the subteam are required to go through a strategy-specific curriculum their first year on the team, meaning that all Scouting Systems programmers are also trained strategists. Furthermore, the Strategy Department works closely with the Drive Team throughout the season.

Why Strategy?

Department Purpose
While all members of technical departments perform game analysis during kickoff, it is beneficial to have a dedicated group of members who devote their time to discovering intricacies of games and relating them to one another, in order to effectively utilize any findings. Ultimately, if the manpower is available, a dedicated department for strategy allows for a much deeper level of FRC analysis; such an element can be the determining factor of an entire competition.

Document Purpose
We decided to create our Strategy Whitepaper for three reasons: supplement the strategy departments of other teams, aid teams who want to become more advanced with their FRC strategies, and to formally document our own department. While the first section of the whitepaper documents 3128's Strategy Department, the second section is aimed towards providing advice and resources for teams who desire to go more in-depth with FRC strategy, taking low-resource teams into consideration as well.

Department Management

Strategy Leadership

The Strategy department has 3 non-competition leadership positions:

- Strategy Department Coordinator
- Scouting Systems Lead
- Curriculum Lead

To some extent, this also includes Drive Coach, as they are usually from the Strategy department and the two interact closely.

Leadership positions are appointed by presidents, mentors, and department coordinators in May, after competition season.

Strategy Department Coordinator
The Strategy Department Coordinator is the leader of the Strategy Department. They handle cross-departmental communications, project management, and leading the department as a whole. They are included in selecting both drive team and travel team members, and generally serve the role of Lead Strategist at competitions.

Scouting Systems Lead
The Scouting Systems Lead is responsible for overseeing the creation and upkeep of our scouting system during the entire season, and creating the schedule for developing new systems. They work closely with the Department Coordinator throughout the entire season.

Curriculum Lead
The Curriculum lead is an integral role, despite it being an “off-season role.” They are responsible for managing the curriculum as a whole - including its scheduling and activities. The curriculum lead does not create the entire curriculum themselves (as curriculum is an off-season project that any Strategy member can work on), but oftentimes personally directs lessons.

Strategy Preseason

PREFACE

Curriculum

Rather than entirely reusing one set of curriculum presentations each year, our department reflects on the previous year's curriculum, and spends the summer changing the layout and content. New strategy members are introduced to a variety of FIRST games and are taught game theory and analysis skills - including how the games relate to each other. As our new members analyze a variety of games, they delve deeper into FIRST, so the curriculum becomes that much more in-depth. They are also given matches from previous years to scout in order to prepare them for off-season and competition events. The end goal of curriculum is to build critical thinking skills and simulate how Strategy members would actually approach a new game and competition itself. Although leadership roles are generally held by veteran members, the curriculum ensures that new members would be able to tackle such responsibilities.

Here is a sample of this year's curriculum calendar:

Week	Stage	Week of	Activities	Activities	Comps that weekend?
0	1	9/12	Intro to FIRST/RR introduction	Design Theory	NA
1	1	9/19	Cycles/Parts of a Robot/Rapid React Capstone Activity O-O	Blind Picklist / Strat @ Comp Presentations	
2	1	9/26	Rapid React Human Game :D	Scouting practice (SDR) Capstone	
3	-	10/3	Deep Space Intro/Parts of Bots	cycles (+ scouting practice - continue with SDR)	
4	2	10/10	Prescouting Intro/Practice Scouting	Capstone: paper game (rule removal RR) + Scouting Practice	BatB
5	2	10/17	Cross Department Lectures		NA
6	-	10/24	Game Manual	Driver's guide	~~Tidal Tumble~~
7	3	10/31	Capstone	Scouting :)	Beach Blitz
8	3	11/7	Past games [22-11]	Past games [10-92]	**NA**
9	-	11/14	Mock Kickoff	Mock Kickoff	NA
BREAK		11/21		-	-
10		11/28	Scouting Presentations	Scouting Presentations	
12		12/5	Past Game Analysis/Strategizing	General Strat Presentations	
11		12/12	Project worktime	Project worktime	
13		12/19		-	-

Mock Kickoff

During preseason, we hold our annual mock kickoff as a capstone for new members of our team. The mock kickoff's game is designed primarily by our new members,

with assistance from veteran members, thus solidifying everyone's understanding of game theory and analysis. Mock kickoff is designed not only to put the new members' skills to the test, but to promote cross-departmental teamwork and holistic critical thinking skills, which will be called upon during an actual kickoff.

On Strategy, we aim to simulate how we would approach an actual game - see our section on kickoff for more information.

Preseason Projects

Preseason
Rather than having traditional curriculum lessons planned every day we meet, one day a week we do activities as a whole department to help new members get comfortable with the department's environment. Preseason projects are worked on by veteran members on curriculum days, and progress is tracked daily.

Activities this preseason included:

- Strategy Whitepaper
- Einstein Match Analysis
- Game Design
- Mock Kickoff

Strategy Kickoff/Build Season

Priority List

Upon receiving the game, our team gathers to discuss our priorities - primarily revolving around creating a holistic robot design. The priority list is made by the entire team, including Strategy, and is often revised in the early days or weeks of build season. When creating a priority list, we consider our team's capabilities and resources as a whole, in order to ensure a successful game approach and robot design. Throughout curriculum, Strategy members make at least one priority list

amongst themselves for each new game that is taught: design theory is remarkably present in our curriculum.

Auto Priority List

The autonomous period can award a significant number of points to an alliance. To ensure we maximize our potential for scoring during this interval, it is important to outline the best paths for our Controls department to program. At the beginning of build season, Strategy creates a priority list of autonomous paths that need to be prioritized, and will be used most frequently in a competition.

Game Analysis

Virtually all of Strategy's work during a build season consists of game analysis in various forms. On Kickoff, we use our own database of past FRC games, and the databases of other teams to cross reference the new game with old ones, in order to find continuities which may influence our approach to the game. Following our initial analyses, we spend the majority of build season conceptualizing the game in every way, shape, and form possible - generally through creative and engaging projects (which are included in Section Two)!

Scouting Systems Development

Data Collection Apps

Our strategy department utilizes two main data collection apps:

Match Data Collection App:

This app allows the scouts to collect quantitative and qualitative data during matches on each robot. The data collected is then uploaded into our database.

Pitscouting App

The Pitscouting app on google forms is used before and during matches to collect data on each robot which is also uploaded into our database.

Data Viewer App

All the data from the data collection apps are displayed in the viewer app. The viewer app consists of tables that organize data, and other functions like charts and search features.

Previous Scouting System White Paper

*Disclaimer: The information included in this White Paper is not up to date without our current scouting system software

Prescouting

Before competitions, prescouting imperative to acquire intel on teams with which your team shall be competing at the upcoming competition. This not only helps one gauge a team's competition, but also provides valuable data to utilize while strategizing for the first few matches of the day, when scouting data is not yet sufficient to entirely rely on. Strategy members enter information about each team on a document with descriptions of a robot's general performance, previous competitions, consistency, and abilities. This data is collected by scouring The Blue Alliance (watching previous matches and recording quantitative data), team websites, socials and videos.

Driver's Guide

A driver's guide is a manual for drive team during competition, which includes a brief overview of the game, important rules to know, and general match strategies. Its main purpose is to quickly teach anybody how to effectively play the game, though it also helps members of Strategy plan out cycles and verbalize tactics for defence and gameplay.

Competition

Competition Roles

At competition, the Strategy team has 11 main roles. There are 6 (ideally 7 or 8) **scouts**, who are trained in using the scouting software and have a great deal of experience in scouting and match analysis. Their job is to not only perform initial pitscouting on the first day of competition, but also scout every qualification match. They heavily contribute to our picknight, as they compile data on each team, allowing Strategy to picklist with reliable information.

One **Scout Organizer** (aka. Scout God) is in charge of managing scout schedules, as well as ensuring scouts have occasional breaks. The Scout Organizer also is in charge of scanning in the scouts' data QR codes into the database via the Data Uplink App. They may serve as an auxiliary scout if need be, but mainly is tasked with fixing the scouting app and uplink app should the programs have technical problems. After the first day of competition, the Scout Organizer (sometimes alongside other members of strategy leadership) is in charge of determining clearly faulty data and ordering match re-scouts if needed.

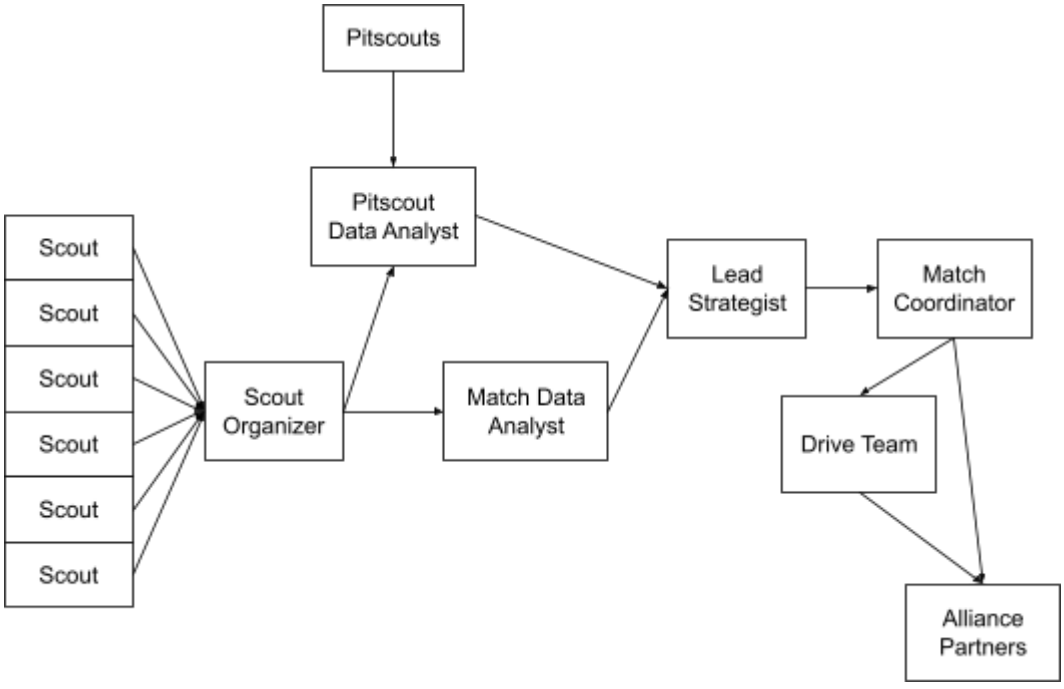
One **Pitscout Data Analyst** is in charge of managing the pitscouting effort at competition. On the first day, they lead the initial pitscout of all teams present. Throughout the day, the Pitscout Data Analyst constantly monitors scouting data (mainly qualitative data) to identify teams that warrant a pitscout, or that could potentially need Aluminum Assistance. They are in charge of directing free members (likely pit crew that are off rotation) to pitscout the teams and collect their data once they are done. Before matches, the Pitscout Data Analyst works with the Lead Strategist and Match Data Analyst to formulate match strategy. They may also assist with fixing the backend scouting systems at competition (database and analysis app) in case of technical issues.

One **Match Data Analyst** is in charge of managing and analyzing match data as it is received from the scouts. They analyze trends in the data in order to formulate accurate predictions of robots' performances and capabilities in our team's next match. They present 'bios' of the robots we are with and against in our next match to the lead strategist and are heavily involved in match strategy creation. They are also in charge of fixing the backend scouting systems at competition (database and analysis app) in case of technical issues.

One **Lead Strategist** is in charge of directing the strategy effort at competition, and is generally the Department Coordinator. They select Strategy's travel team, manage the department at competition, lead match strategization efforts, picknight, and represent the team during alliance selection.

One **Match Coordinator** is in charge of facilitating communication between the team and our alliance partners. They go to the stands to receive the next match's strategy and robot 'bios' from the Lead Strategist. Then, the Match Coordinator goes with the Drive Coach to communicate the strategy to other teams in the upcoming match. After finalizing the strategy, the Match Coordinator updates the Lead Strategist and then speaks with the Pit Master and Technician about our priorities for the next match and the auto we will be running. After matches, the Match Coordinator is also in charge of debriefing the match with Drive Team and gathering updates on the status of the robot to report back to the team.

DATA FLOW



Scouting

Scouting is a key part of strategy. Each scout is assigned a robot position to scout during qualification matches (ex: one scout might be scouting the first robot on the red alliance each game). While scouting, scouts analyze all aspects of the robot that they are assigned and collect valuable data for strategy creation that will synergize with potential alliance partners and hinder a team's opposing alliance. For example, in Rapid React, scouts collect data on how much the robot scores, how it scores, whether it plays defence or not, its auto, the climb, and anything else they notice about the robot during the match. Scouting can be done manually, with pen and paper, though scouting apps largely expedite the process. We pride ourselves in accurate data, so we make sure that scouts have large amounts of practice before each competition. This includes scouting offseason competitions via livestream to fully prepare our scouts. Additionally, we scout week 0 competitions, which give the entire department a basic idea of point ranges in a match. During build season, we simulate the game via a "human game", where people simulate robots. These activities help prepare us for competition season.

Pitscouting

Pitscouting is a different form of scouting where scouts or other team members interview other teams at their pits. The information gained from pit scouting is vital to creating accurate match strategies, and can help guide the formation of our picklist. It is important to ask good questions that will provide quantitative data as Qualitative data is much more subjective and can end up being misleading, as teams might have inaccurate opinions of their performance. For example, asking a team what climb level they have is much less subjective than asking them if they are good at climbing, as their perception of a good climb may differ from yours. Pit Scouting can be used in between matches if a team's performance changes for any reason. If a robot suddenly dies in a match, it is important to figure out why it happened and whether they will be fixed quickly or not. For example, if a robot suddenly stops working in the middle of a match, it could be a connection issue, which is not a big deal, or a broken drive train, which would be harder to fix. With good pitscouting data, you can avoid picking teams that are currently broken or not performing at their expected capacity.

Drive Team

All drive team members are required to have basic knowledge in strategy, whether as their main department or a subdepartment. All drive team members need to be prepared for quick thinking and high pressure, as they will be the only people directly interacting with the robot during matches.

3128's drive team can be split into four unique roles:

The **Primary Driver** is the robot's main driver, who may have extra controls depending on the game. They are less concerned with the entire alliance, and instead prioritize being more focused on our individual robot and each cycle.

The **Secondary Driver**'s job varies from year to year. Sometimes, they will take on additional actions in actually controlling the robot, and in other years they act as more of a backseat driver to tell the driver where to go. In this case, the drive coach will take on more of an administrative role, managing the entire alliance. The driver and co-driver require an incredible amount of chemistry, as they will be under an immense amount of pressure during every match, and they need to perform each time.

The **Drive Coach** is the student in charge of managing the drive team. They are a team member with at least one year of experience with strategy as their main department. The coach helps pick the drive team members and runs drive practices. During competition, the coach is responsible for talking to the other teams with the match coordinator as well as any strategy changes that happen mid match. They communicate with alliance members and relay information to the drivers.

The **Human Player** is the most flexible drive team role. Based on the needs of the game, the human player may be chosen based on physical capability or specific strategy knowledge.

Drive Team Selection

The team presidents and lead strategist, as well as other members of leadership, work together to choose the drive coach. This year, we have started doing "open drive practices", where we send out a sign up sheet, and anyone can come drive the robot. This gives leadership a basic idea of who is interested in the drive team and allows

new members to get a taste. Off season events give people real world experience, and will usually solidify the couple of members who are truly interested. Tryouts are then held that test the driving skill, physical capabilities, and communication skills. The remaining 3 drive team members are then chosen based on the potential for growth and their coachability. Past drive team members are never guaranteed a spot on the drive team as we like to keep it open. Chemistry between driver and co-driver is also key when selecting drive team members.

Drive Practice

Drive practice primarily consists of drilling obstacle courses and working on communication between drivers. We will ensure the intuitiveness of controls, practice cycles, and perform any actions that will be done in an actual match.

Match Strategy

A proper approach to match strategy is empirical to optimal performance at competition, as a singular miscalculated match can cost an entire regional. Given such, we aim to execute the process of match strategy as thoroughly as humanly possible: data is compiled by the Match Data Analyst, and they discuss with the Pitscout Lead and Lead Strategist. The Lead Strategist is responsible for directing the discussion and making a final decision. We generally aim to have a completed match strategy at least ten matches in advance — we begin the process by noting “robot archetypes,” i.e the capabilities of every robot in the match, analyze win conditions and how to capitalize on them with our resources. The Lead Strategist then conveys the final strategy to our match coordinator, who confers with the drive team and other teams.

Eliminations Strategy

Strategization for elimination matches is similar to strategization for qualification matches, though our alliance is a constant, deeper collaboration and communication is a primary goal. The Strategy team continues to scout into elimination matches in order to gather data on how alliances are performing up to their latest match - Strategy leadership generally confers directly with 3128 drive team and alliance partner drive teams in order to formulate the best match strategies. Given our generally high level of robot data at competition, we aim to make initial strategic

analyses and suggest them to our allies, with whom we will discuss their capabilities and the best course of action.

Reflection

Functional Parts

Through the entire season of implication, we found some aspects of the newly integrated system of E-scouting and Pitscouting particularly useful in the entire strategy making decisions.

For E-scouting, the digitalized system of scouting rendered us an easy entry to the database compared to the traditional paper scouting. Scout lead can now conveniently enter the data into the database using the QR scanner. Another advantage it provides to us is the instant update of the database that the Match Strategist can adjust strategy based on the newly inputted data in matches just before our team's matches begin.

In terms of accuracy, the system also made profound improvements. The digital system offered scouts an advantage during the match that they do not need to be distracted by jotting down the data. This had been an issue back in years when Team 3128 remained in paper scouting. The intensity of the competition required high concentration for scouting throughout the matches. If scouts frequently sketch down match results, errors become frequent in the data. But with the newly integrated system, with the hot keys implemented(see section: scouting), scouts can remain focused on the actual matches and produce high-quality results.

Beyond the improvement of quality and efficiency of data, the Match Predictors also offered an additional reference towards the strategy making during the match. By comparing the previously imported data, the Match Predictor feature can predict the result assuming all teams on both alliances play offense during the entire game. Although more informative features such as "what happens if we put a robot on defence" have not developed yet, the match prediction indeed assists the Match

Strategist on decision making, especially during contingent situations in which the match comes up soon and no precise strategy has been determined yet.

For Pit-scouting, the in-person gathering of data before competition begins offered insights into the robot performance that were almost inconceivable during matches such as the center of gravity, vision, and maximum abilities (those might not fully expressed either because they are on defence, being defended, or in repairment of some feature). Those data, in addition to the normal data acquired through E-scouting, dealt ambivalence during some strategic decisions such as the choice of defence between two robots with similar scoring ability (in this situation, those with high center of gravity will be our primary target because they are more easily to be defended).

Future Steps

Last summer, we reorganized our scouting system to be easily developed and maintained. One weakness of the frontend app is that it is specific to each game, and changing it to work with other games takes both time and effort which could be reallocated to other work. Creating scouting applications which can be refactored with ease is a primary goal this coming season, and we aim to have our software fully complete within the first weeks of build season.

Overall, we are looking to make our Scouting Systems software more intricate during the coming season (and are planning to be more transparent with the development of our software, so be on the lookout for more). For our old system, see our 2022 Season Scouting Systems Whitepaper.

Regarding the process of pitscouting, we may upgrade the system so that real-time status reported by pitscouts or scouts in the practice field will be able to update as their inspection progresses, enabling the lead strategist to be informed of the performance of an alliance before match starts.

As a whole department, our primary goal for the 2023 season is to make ourselves as prepared for competition as possible. With the majority of our Scouting System being refactorable within the first couple weeks of build season, we expect to have a robust and advanced system by our Week 1 regional. Furthermore, our General Strategy group plans to go further in-depth with game analysis and conceptualization than ever before, ensuring that all members have mastered the game as much as humanly possible before competition. As a whole, our department is expected to reach new

heights with the 2023 season, and are extremely excited to get more involved with the FRC community as we progress our department in the coming months. We are planning to post weekly update threads during Build Season in Chief Delphi, so be on the lookout!

3128's Strategy Resources for Other Teams

2022

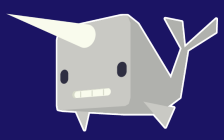


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Table of Contents (Section 2)

PREFACE

Some of these resources were made for us, by us, so they might not be as polished and professional as they could be. The primary focus of some of these documents were to keep new members engaged and to make Strategy not feel like a dry extension of school.

Chronological order of skills taught in curriculum:

Introduction to Rapid React/FRC

Design Theory

Picklisting

Cycles

Scouting

Human Game **(If you have a field setup)**

Introduction to Deep Space

Paper Game **(Deep Space Capstone)**

Introduction to Prescouting

Introduction to Power Up

Driver's Guide

Past Game Database [22-10]

Past Game Database [09-92]

Capstones were new activities implemented this year within curriculum. These cumulative exercises were used to summarize each game, making the new members test their ability to critically analyze the game, and apply the skills they have learned.

Rapid React Capstone

Power Up Capstone

Rapid React Paper Game

How to Use the Curriculum

The current way that curriculum activities are ordered involve the newest game being taught first with extensive scouting practice (replay matches on TheBlueAlliance and have them scout those). That way if you have off-season events the new members will be able to effectively scout or do other roles during them. If this is not a priority for your team and the newest game is on the more complicated side, it may be

advised that you begin with a simpler game and work your way up. However, scouting practice is still recommended. Apart from that, curriculum is designed to teach games in an order of increasing complexity and depth as the curriculum goes on. The curriculum lead should supervise the activities and make sure that new members are active and engaged, ensuring that new members will learn how to effectively navigate new games in the future.

How to Prescout

Prescouting is vital to fully preparing for a competition, as it allows a team to accurately gauge how their performance will measure up to that of others.

We use the template above to organize information about each robot, and ensure that fundamental details are known about each, including:

- **Previous and future regionals**
    - This list makes it easier to get information on robots at a later time
- **Drivetrain type, Shooter/Manipulator type, any unique mechanisms**
    - Drivetrain and Shooter/Manipulator type are vital components that influence robot performance
    - Swerve drivetrains were able to make faster, more fluid cycles in Rapid React; consequently, teams with swerve drivetrains did better(for the most part).
    - Adjustable hoods and turrets were able to shoot cargo from a wider variety of places on the field, so teams were more successful with them.
- **Performance in regionals**
    - This can help gauge a robot's reliability, as well as the rate at which the team can fix problems their robot
- **Capabilities in Auto, Teleop, and Endgame**
    - These details are heavily point-based; to adequately evaluate performance, scout matches from previous regionals, or look at any posts the team has made about parts of their robot.

This information can be found on a team's social media (Twitter, Instagram - usually your best bet for recent updates, Facebook, Youtube, Team website, thebluealliance.com). Additionally, Github and Chief Delphi are good resources for information regarding other teams.

Collected data can be accessed during competition, making it easier to picklist or diagnose any issues with a team's robot (if their drivetrain has broken in previous competitions, for example).

How to Organize Scouting

During competition, it is important to manage your scouts and make sure that they know what they are doing. Before or during the competition, each scout should be assigned a robot position (ex. red 1, red 2, blue 3). The scout head will assign these roles and make sure that scouting data is acceptable throughout the matches, marking matches that need to be re-scouted. It is also recommended to organize your scouts in order from r1-r3 and b1-b3 for scouting input convenience. If possible, having auxiliary scouts to rotate through and give scouts breaks otherwise they will have no time to use the bathroom or eat snacks without skipping matches; in other words, they will die.

When to Strategize?

Generally speaking, it is always a good idea to have a strategy going into a match: provided the manpower to create one is available. Understanding both your own robot's capabilities, along with the capabilities of other teams (with whatever data or observations are provided) is invaluable during discussion of match strategies, as having an alternative view of how to approach a match - as opposed to the discussion being "dominated" by another team - is a useful asset.

How to Interpret Data

Assuming that your team has access to match observations via methods suggested beforehand, supplied data can be analyzed in a myriad of ways. First and foremost, being able to distinguish between data from more recent matches and from older ones - while taking the whole of matches into account (which is primarily useful for the process of forming a picklist), is useful - a robot's current performance should generally be quantified by their performance in their latest match. However, a team's general ability should be taken into account; for example, "elite" teams generally resolve issues more quickly than a rookie team would. Generally speaking, being unsure about a team's current robot status should call for a pitscout (primarily before alliance selection or an upcoming match).

How to Pitscout

The importance of pitscouting is beyond description. Every team who aspires to succeed has to have accurate information regarding the status of robots from other teams, regardless of whether they will be alliance partners or not.

Pitscouting can be divided into two parts: before competition and during competition.

Before the competition starts, after the pits are open of course, the person who is responsible for pit scouting, generally the Pitscout Lead, will distribute teams to strategy members for an initial round of pitscouting. Strategy members will visit each pit and ask a series of questions which will be used to fill out a pitscout form. The data from this initial pitscout can be later used for match strategies. Data includes drivetrain type, robot weight, whatever the mechanical department believes is important, and pictures of the robot for other relevant data analysis later.

Note: There might not be enough time to pitscout all teams at the competition before it begins; assign the remainder of the teams to members with mechanical knowledge who do not have tasks at the moment.

During the competition, if a scout notices that a robot is broken, the scout can report the team to the Pitscout lead, who will then ask a free team member to verify the issue, inquire on the time it will take to fix it, and ask whether they need assistance from another team (if your mechanical department has enough leisure time to do so).

Mark the team's issue in the pit scouting database, and notify scouts to observe whether these teams have fixed the issue. If a team with an impaired robot is either an alliance partner or opponent, keep sending scouts or idle team members to verify their current status and report the issue to the Match Data Analyst or Lead Strategist.

How to Make a Picklist

A picklist is a document ranking all of the robots in a competition. We usually split this into two sections, with the first being dedicated to first picks, and the second to second picks. This list usually is made Saturday night, and is revised every match on Sunday to ensure that we have the most up-to-date information.

When do I brainstorm a picklist?

Generally, we always make a picklist, despite our ranking in a competition. Even if we are not in a position to pick other teams, our picklists might aid our prospective alliance when choosing consequent picks. Whenever we think that we may have a chance of being an alliance captain, we will definitely make a picklist. Even if we think that we will be picked first, having some knowledge of who we might want to pick to compliment us and our partner.

What does a picklist look like?

Here is our picklist from our most recent competition, Beach Blitz. As you can see, there are two separate lists at the beginning of the document, followed by a list of all the robots who got picked. We have people in the stands that will take the list and strike through all robots that get picked. But, robots that we pick wll get highlighted in green. This takes some pressure off of the lead strategist, and prevents them from looking unprepared by picking a team that's already on an alliance.

How do I form a picklist?

The method that 3128 uses to form picklists has been proven to be invaluable. Every strategy member is encouraged to participate in pick night (Including the drive team, although they will leave early to ensure they have proper sleep). We will go through our auto-sorted list from our database, and look at the top two teams. We then have a discussion, and decide whether to leave the two robots in the order they are or swap them. Once that decision has been made, we will compare the now second robot (This could be the second ranked robot in our algorithm, or the first), and the third ranked robot. If we think that the third robot is more valuable than the second, we will compare the now second (was third) robot and the first, and switch them if we think it is applicable. We continue in this manner until we have 16 robots in our first pick list. This is hard to visualize, so here is an example with only 5 robots:

List of teams from our database:

1: frc 9999
2: frc 9998
3: frc 9997
4: frc 9996
5: frc 9995

We decide that 9999 is better than 9998, so we will keep the order:

1: frc 9999

2: frc 9998
3: frc 9997
4: frc 9996
5: frc 9995

We decide that 9997 is more valuable than 9998:

1: frc 9999
2: frc 9997
3: frc 9998
4: frc 9996
5: frc 9995

We decide that 9997 is better than 9999:

1: frc 9997
2: frc 9999
3: frc 9998
4: frc 9996
5: frc 9995

We think 9996 is better than 9998, but worse than 9999:

1: frc 9997
2: frc 9999
3: frc 9996
4: frc 9998
5: frc 9995

We think 9998 is better than 9995, so the order stays:

1: frc 9997
2: frc 9999
3: frc 9996
4: frc 9998
5: frc 9995

And there you have your picklist! Now, we just have to do that until we reach a total of 16 robots.

What should I consider when ranking robots?
The main thing we consider when ranking robots is, the ability to score game pieces efficiently. Another big thing that we consider is chemistry and compatibility with our robot and our capabilities. For this year (2022), we were a small robot with okay shooting and a very reliable traversal climb. When looking for alliance partners, we prioritized teams that could shoot very well, and were less worried about them climbing, as we knew we could make up for them in climbing points. Our philosophy for picklisting is: “Find robots that patch holes in your performance, and that have holes that you can patch with your performance”.

What about second/third picks?
Second picks are much more fluid than first picks, and they depend on what alliance number you are. As a higher seeded alliance in 2022, the better strategy was to find a team that could play defence, as slowing down your opponents would provide more benefit than another scorer who is taking away cargo from the two main scorers. If you are a lower seeded alliance in 2022, you would have been better off taking another scorer as a second pick, as you were unlikely to beat the high seed alliances with only two robots scoring.

Of course, there are exceptions to this basic strategy, and every pick has to be thought through carefully, and ultimately, it is up to the team’s representative, for us our lead strategist, to make the final call on who to invite to our alliance.

What to do During Alliance Selection

Alliance selection is the method in which alliances are formed for elimination rounds. This is a vital point in the competition, as mistakes here can cost a team the event win. A video explaining the alliance selection process can be found here. For the most part, the team representative descends the picklist created earlier, picking the team that shows up highest on the list.

What about second picks?
Second picks are slightly trickier, as they require you and your first pick to agree on who you would like. This is when it is helpful to have people you can text or call in the stands, as they can pull up data on teams and send it to the representative. When formulating second picks you should generally aim to fill any gaps in your alliance. For

example, in Rapid React, if your alliance has two strong shooters but neither can climb, a defence bot with a climb would be optimal.

When should I decline?
While declining an offer has a negative stigma associated with it, there are reasons why it would be much preferred to form your own alliance. For us at Beach Blitz, there were two main reasons why we chose to decline to join the #6 alliance. First, we noticed that the team who invited us to join their alliance had their own performance declining throughout day two. If we had not revised our picklist since Saturday night, we most likely would have accepted. In addition, we felt that we had a better chance taking on the #2 alliance as opposed to the #3, which added to the idea of decline. Furthermore, we wanted to move our alliance upwards in order to have a higher chance at securing our desired second pick. Generally speaking, the decision to decline certain invitations to alliances should be decided on beforehand and communicated with your team, in order to avoid accidentally shocking them.

Appendix

Additional Helpful Resources

Penfield Robotics(1511)

Ndsu_bison robotics(4607)

(4150+8027)

1538 Strat Overview

2168 Driver Training

Game Analysis Stats Stuff

302 Scenario Modeling

302 Game Strat

XRC Simulator