Scouting Management and Strategic Techniques

Jocelyn Baird
Scouting Captain 2013-2014

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Agenda

- Overview of scouting
- Components of a scouting system
- The 971 scouting system
  - Quantitative data
  - Qualitative data
- Scouting leadership
  - Stands management
  - Stands ⇄ Pits communication
  - Applying data
- Picklisting 971 style
- Eliminations Scouting
- Leadership and sustainability practices
- Questions, open discussion

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What is scouting and why does it matter?

What is Scouting?

- The process of observing competition robots in order to collect and apply data for strategic gains.

- Types of scouting
  - Prescouting
  - Pit Scouting
  - Quantitative competition data
  - Qualitative competition data

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Why does it matter?

- Relevant in all stages of a competition
  - Not just about the picklist

- Seeding doesn't tell a robot's individual story
  - Most reliable for outliers (top and bottom)
  - Pretty random for middle

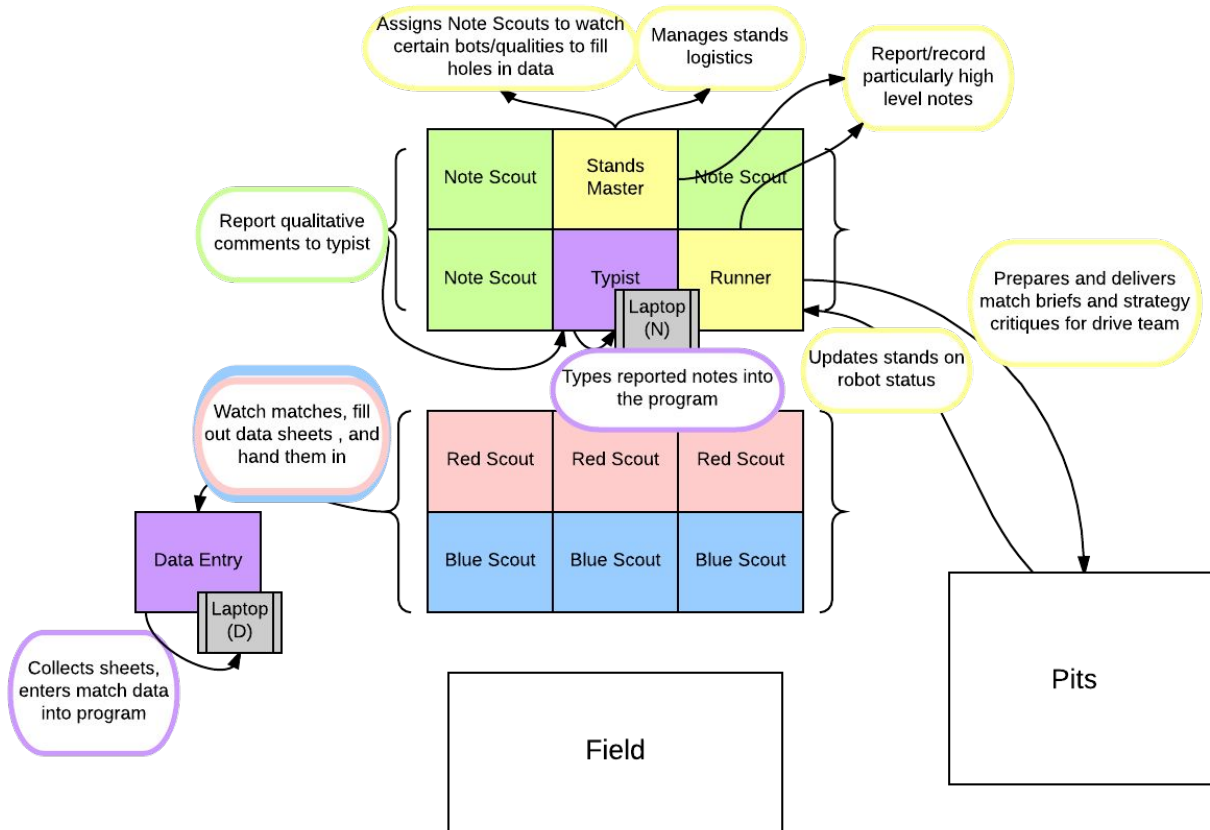- Different types of scouting tell us different things

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Components of a scouting system

Objective

A good scouting system **gathers quality information**, **organizes it**, and **applies it strategically.**

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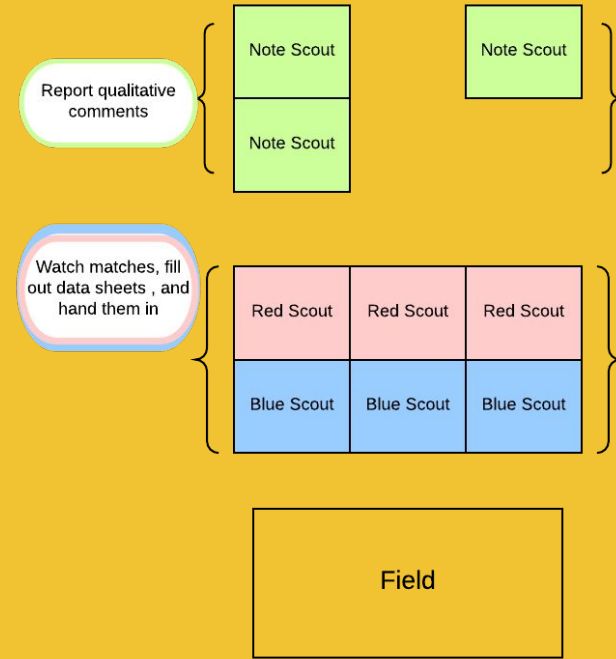SPARTAN ROBOTICS

The 971 scouting system

Scouting: Competition Day Process

Assigns Note Scouts to watch certain bots/qualities to fill holes in data

Manages stands logistics

Report/record particularly high level notes

Note Scout	Stands Master	Note Scout
Note Scout	Typist	Runner

Laptop (N)

Report qualitative comments to typist

Types reported notes into the program

Prepares and delivers match briefs and strategy critiques for drive team

Updates stands on robot status

Watch matches, fill out data sheets , and hand them in

Red Scout	Red Scout	Red Scout
Blue Scout	Blue Scout	Blue Scout

Data Entry

Laptop (D)

Collects sheets, enters match data into program

Field

Pits

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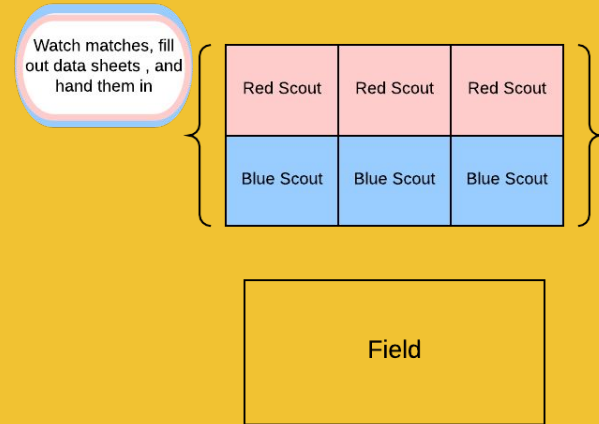# Gathering Quality Information

- Quantitative data
  - Binder Scouts
    - 3 Red
    - 3 Blue

- Qualitative observations
  - Note scouts
    - As many as you can get

Report qualitative comments

Note Scout

Note Scout

Note Scout

Watch matches, fill out data sheets , and hand them in

Red Scout	Red Scout	Red Scout
Blue Scout	Blue Scout	Blue Scout

Field

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Quantitative Data

- Gathering
  - Binder scouts
  - 6 Binders
  - 1 data sheet/robot/match

- Quality Control
  - Training
    - Mandatory pre-comp
    - Rules Quiz
    - Practice w/ clips
  - "How to Scout" sheets
  - Engage scouts

Watch matches, fill out data sheets , and hand them in

Red Scout	Red Scout	Red Scout
Blue Scout	Blue Scout	Blue Scout

Field

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Quantitative Data

- Creating data sheets
  - Analyze game
    - Types of scoring
    - Estimate critical factors
      - Ex. Hanging, gears
  - Start broad then refine
    - Watch early competitions
    - Reflect on system after first regional
      - Talk to scouts

- Possible modification
  - Start narrow, then expand

Auto:

Movement	
Maintient	
High Goals Made	
Low Goals Made	
Hoppers Opened	
Gears Scored	

Team #

_____

Match #

_____

Binder   R1   R2   R3   B1   B2   B3

Scout Name _____

Teleop:

High Goals Made	
Low Goals Made	
Hoppers Emptied	
Gears Scored	
Climb	

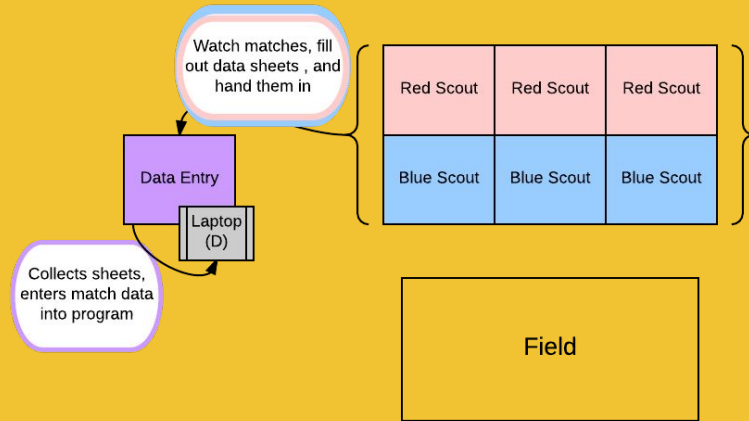| Driving | 1 | 2 | 3 | 4 | 5 |
| Fouls | | | | | |

	No Show
	Never Moved
	Died
	Broke
	On/Off

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Quantitative Data

- Organizing
  - Data sheets to data entry
    - 1 person
    - 1 laptop

- Custom program considerations
  - What we want to have quick access to
  - Variables we want to compare
    - Boolean vs. Numerical
  - Simplicity
  - Offline storage

Matches

MATCH	SCHED	RED ALLIANCE			BLUE ALLIANCE				
1	-	2135	846	5171	1868	841	4171	lineup	notes
2	-	100	6039	1967	2035	4990	2468	lineup	notes
3	-	1351	253	2643	3482	4255	6059	lineup	notes
4	-	5027	2489	2367	5677	2473	4186	lineup	notes
5	-	751	5104	6688	6665	972	6036	lineup	notes
6	-	256	4904	4159	581	604	2813	lineup	notes
7	-	668	5924	192	670	114	254	lineup	notes
8	-	299	6619	115	199	5773	5728	lineup	notes
9	-	5026	8	6418	6380	1280	5940	lineup	notes
10	-	5905	5737	971	766	6410	852	lineup	notes
11	-	2468	5104	1967	1351	2813	5171	lineup	notes
12	-	6059	4186	751	6688	100	4159	lineup	notes
13	-	5924	6036	2473	2643	299	846	lineup	notes
14	-	2489	6380	4990	841	2367	581	lineup	notes
15	-	6418	6410	4171	199	253	114	lineup	notes
16	-	8	6665	254	5773	2035	5905	lineup	notes
17	-	6619	5940	5677	972	668	3482	lineup	notes
18	-	5737	1280	4255	5027	115	4904	lineup	notes
19	-	766	6039	5728	1868	670	256	lineup	notes

Lineup for Match 41

	AUTO				TELE						
MOVE	HIGH	LOW	HOPP	GEAR	HIGH	LOW	HOPP	GEAR	CLIMB	DRIVING	FOULS

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8 - died in opponent retrieval zone (lots of fouls) yellow card - died before hang
16 - driving in wide circles in the middle of the field during hang
21 - robot broke - died on field not moving
31 - dead in a convenient location
41 - defense, but aimless and no clear goal about who to defend
56 -wasted 20 sec -rip that drive -confuzled
66
71
82

971	10 -balls getting stuck in hopper
971	20 - good auto - successful hang
971	29 - good shooting - hang
971	34 - shooter accuracy broken
971	41

Program Screenshots

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Rankings

P	TEAM⇧	DRIVING	AUTO					TELE					AveC	FOULS/FAILS
			MOVE	HIGH	LOW	HOPP	GEAR	HIGH	LOW	HOPP	GEAR	CLIMB		
1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
2	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
3	114	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
4	115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
6	199	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
8	254	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
10	299	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
11	581	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
12	604	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
13	668	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
15	751	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
16	766	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
17	841	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
18	846	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
20	971	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
21	972	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
22	1280	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
23	1351	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
24	1868	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
26	2035	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0
28	2367	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0

Teams

8	581	972	2489	5026	5940
100	604	1280	2643	5027	6036
114	668	1351	2813	5104	6039
115	670	1868	3482	5171	6059
192	751	1967	4159	5677	6380
199	766	2035	4171	5728	6410
253	841	2135	4186	5737	6418
254	846	2367	4255	5773	6619
256	852	2468	4904	5905	6665
299	971	2473	4990	5924	6688

Program Screenshots

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Qualitative Data

- Gathering
  - Note scouts
  - Notebooks
  - Pick/assigned robot to follow
- Quality Control
  - Hand picked people
  - Training
  - Talkin' robots
    - Extra practice w/ clips
    - Expand thoughts, model language
  - Collaboration
    - Check work
    - Clarify terms
  - Verbal reporting

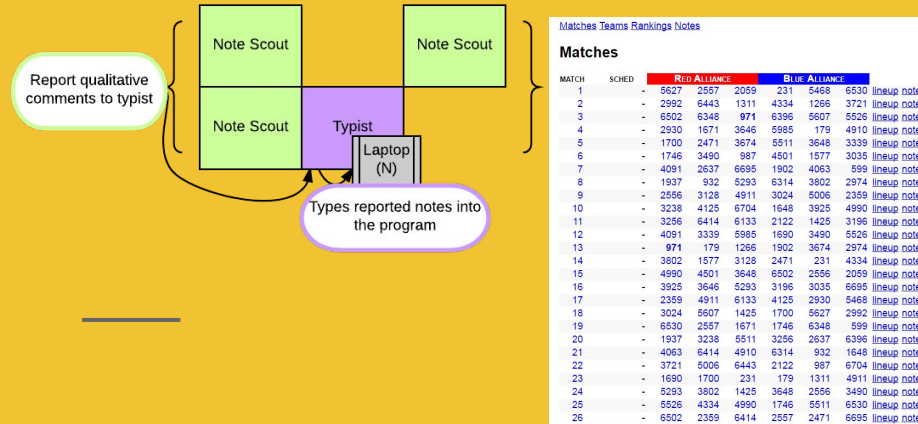Subjective statements backed up by specific observational evidence

Report qualitative comments

Note Scout

Note Scout

Note Scout

Field

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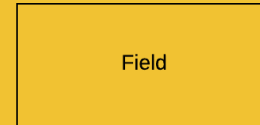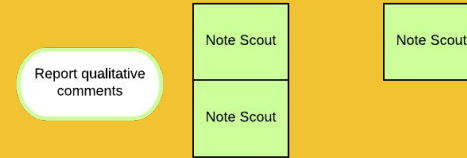
Qualitative Data

- Organization
  - Custom program
    - Note scouts report to typist
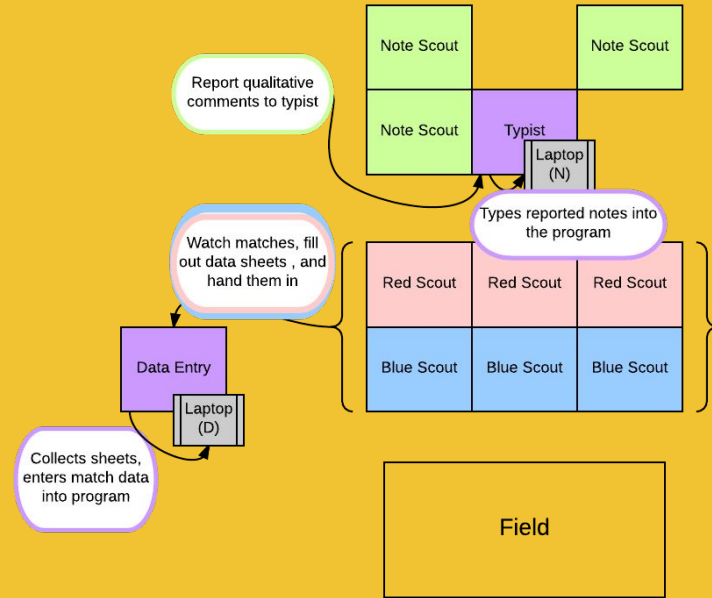 - Team Pages
    - Maintained by head scout(s)
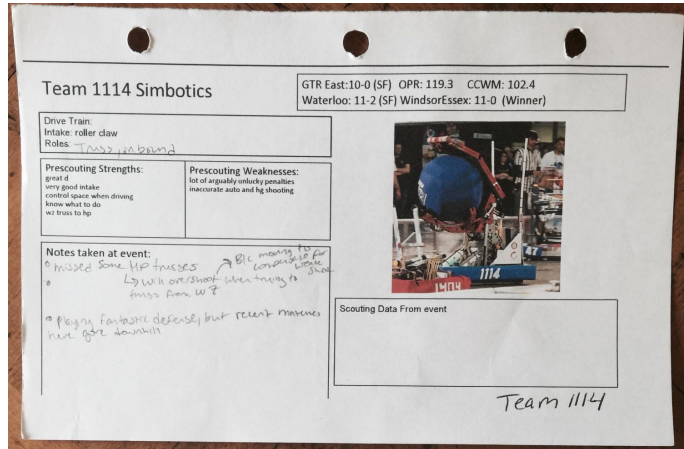
2 - 6 balls in auto - couldn't line up to climb — 2
23 - passive gear mech, gear shuttling, but they are pretty slow — 3
32 - driving is jerky, doesn't seem to be sure about where they are going — 3
41
46 - shoots fuel in auto, misses them all - overturns to try and get away from other alliance defense - really small hanger that's hard to latch onto — 3
62 — 1
69 -easily defendable, wide robot — 2
85 - didn't know how to drive very well, didn't know how to turn very well - overturning, doing unnecessary things that weren't helpful — 3
92 — 2
103 - playing good defense — 2
11 -fast climb (3 sec) -slightly above average driving — 2
18 - gear is late in auto, not enough time to place it. retrieval zone side — 1
24 - fast driver - fast climb — 1
36 - playing defense on opponent getting to rope, what they should have done, good - smooth transition of defense from ally to them — 1
51 -smashed into ally -went to retrieval zone and crossed field before realizing they didn't have a gear — 3
59 -worked with ally to smush an opponent and bring them into retrieval zone for penalty - REALLY fast gear intake but not very secure — 1
68 -good cycles — 1

Note Scout   Note Scout
Note Scout   Typist
Report qualitative comments to typist
Laptop (N)
Types reported notes into the program

Matches Teams Rankings Notes

Matches

MATCH	SCHED		RED ALLIANCE			BLUE ALLIANCE				
1	-	5627	2557	2059	231	5468	6530	lineup notes
2	-	2992	6443	1311	4334	1266	3721	lineup notes
3	-	6502	6348	971	6396	5607	5526	lineup notes
4	-	2930	1671	3646	5985	179	4910	lineup notes
5	-	1700	2471	3674	5511	3648	3339	lineup notes
6	-	1746	3490	987	4501	1577	3035	lineup notes
7	-	4091	2637	6695	1902	4063	599	lineup notes
8	-	1937	932	5293	6314	3802	2974	lineup notes
9	-	2556	3128	4911	3024	5006	2359	lineup notes
10	-	3238	4125	6704	1648	3925	4990	lineup notes
11	-	3256	6414	6133	2122	1425	3196	lineup notes
12	-	4091	3339	5985	1690	3490	5526	lineup notes
13	-	971	179	1266	1902	3674	2974	lineup notes
14	-	3802	1577	3128	2471	231	4334	lineup notes
15	-	4990	4501	3648	6502	2556	2059	lineup notes
16	-	3925	3646	5293	3196	3035	6695	lineup notes
17	-	2359	4911	6133	4125	2930	5468	lineup notes
18	-	3024	5607	1425	1700	5627	2992	lineup notes
19	-	6530	2557	1671	1746	6348	599	lineup notes
20	-	1937	3238	5511	3256	2637	6396	lineup notes
21	-	4063	6414	4910	6314	932	1648	lineup notes
22	-	3721	5006	6443	2122	987	6704	lineup notes
23	-	1690	1700	231	179	1311	4911	lineup notes
24	-	5293	3802	1425	3648	2556	3490	lineup notes
25	-	5526	4334	4990	1746	5511	6530	lineup notes
26	-	6502	2359	6414	2557	2471	6695	lineup notes

Team 1114 Simbotics

GTR East:10-0 (SF) OPR: 119.3 CCWM: 102.4
Waterloo: 11-2 (SF) WindsorEssex: 11-0 (Winner)

Drive Train:
Intake: roller claw
Roles:

Prescouting Strengths:
great d
very good intake
control space when driving
know what to do
w2 truss to hp

Prescouting Weaknesses:
lot of arguably unlucky penalties
inaccurate auto and hg shooting

Notes taken at event:

Scouting Data From event

Team 1114

Checkpoint

- We have covered the **gathering** and **organization** of **quality data**
 - Quantitative
  - Qualitative

Scouting Leadership

- Standsmaster
  - Manages stands logistics
    - Materials
    - Behavior
    - Data Quality Control
  - Assigns special data collection missions
    - Ex. "Team xyz is in the next match, tell me how well they drive under defense"
 - Encourages robot talk
  - Edits picklist

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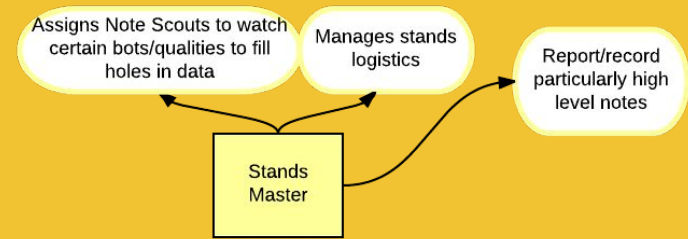
Scouting Leadership

- Runner
  - Prepares and delivers match briefs for drive team
    - Match strategy
    - Meeting with allies
  - Curates data collection/reports based on what drive team wants
  - Delivers constructive feedback to drive team
  - Updates stands on robot
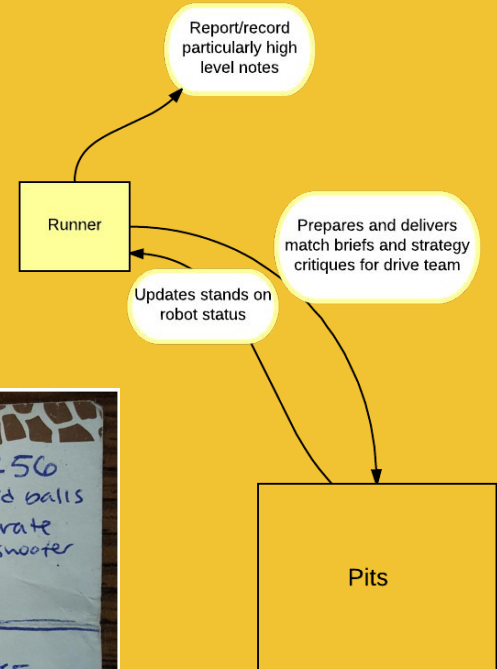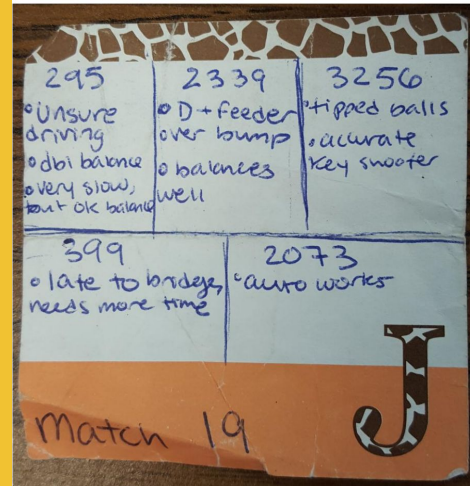
Checkpoint

- We have covered every position in the 971 scouting system
  - Partially addressed applying data

- Dealing with a lack of scouts
  - Bail on scouting less relevant robots
    - Focus on robots you don't know a lot about
      - Mid ranked
    - Match schedule is your friend
  - Adjust how you collect info
  - Ask parents nicely
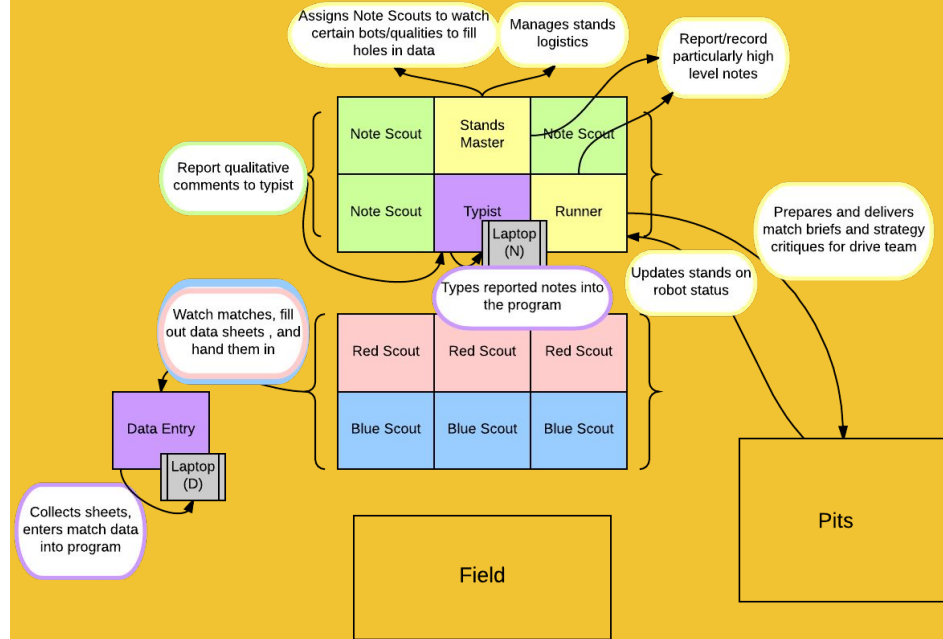
Applying Information

- Picklist
- Match Strategy
  - Feedback for drive team
  - Planning flow of action with allies
    - Play to strengths
  - Address strengths and weaknesses of competition
    - Don't assume allies know
  - Alliance partner robot repairs
    - Must be done well in advance if at all

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How to make a picklist, 971 style

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Picklisting

- Goal: a list of at least 24 teams in rank order of who think you can form the best alliance with

- Prioritize involving new scouts in this process
  - It's hard to teach

- 971 gets the most use out of quantitative data for initial sorts.
  - Fine tuning often relies on qualitative comments.

Creating a picklist lies at the intersection of data and intuition.

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Friday Night

- Start by no-picking
  - Sort by driving, discuss
  - Shrink the cohort
- Sort by crucial variables
  - Ex. Driving, climbing, gears
  - Ex. Defense to find a D bot
    - 2 O 1 D
- Sort teams into three groups
- Talk about each
- Create ordered list
- Make a list of teams to get more info on, mark schedule

Goal: a list of 24+ potential alliance partners in rank order AND a list of teams to watch

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Saturday Qualifications

- Note scouts fill in gaps in data
  - Managed by standsmaster
- Continue binder scouting
  - More recent, more important

- Edit picklist
  - List is private
  - Lead scouts move teams up and down as data comes in

- If short on scouts
  - Bail on scouting no picks
  - Bail on binder scouting

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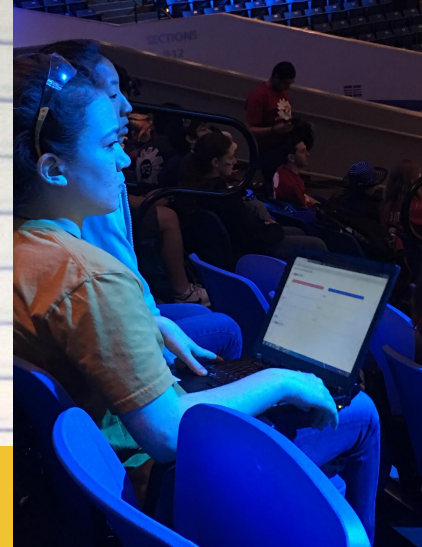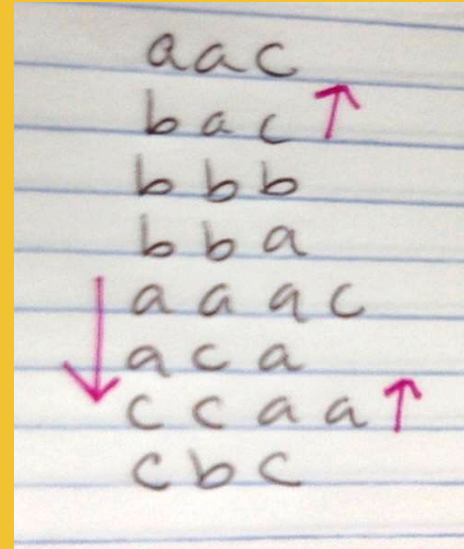
Saturday Alliance Selection

- Finalize picklist
- Designate a representative
  - Experienced scout, not picklist expert
  - Give them picklist

- During selection, consider last second changes
- At selection, hold whiteboard up
  - Representative defers to that
  - Don't do it early

- Hooray, you have an alliance!

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Eliminations Scouting

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Saturday Eliminations

- Bail on binder scouting

- Note scout other alliances
  - Follow sequence of actions
    - Drive patterns
    - Offensive/Defensive roles
    - Strengths/Weaknesses

- Advise drive team

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Leadership and Sustainability Practices

Developing a system

- Scouting begins at kickoff
  - Analyze game

- Create a clear structure
  - Address objectives of **gathering, organizing**, and **applying quality data**
  - Start simple and realistic

- Develop system throughout build season and early regionals

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Management

- Transparent process
  - Show scouts value of data
    - "Field trips"
    - Semi open meetings

- Prioritize training
  - Proactive, not reactive

- Model professionalism

- Celebrate scouting
  - Fully fledged team division
  - Valued contributions
  - Worth working hard for

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Sustainability

- Prioritize engaging new people
  - Personal invitations
  - Presentations to team
  - Conversation is key
- Practice reflection
  - Post competition debrief
  - Seek feedback
  - Improve system
- Documentation
  - Helps you, helps the team
  - Backup store of knowledge
- Train a successor

It does not matter how great your system works for one season. If you graduate and take your knowledge with you, it's back to square one.

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Thank You!

Questions?
Comments?

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