Running a FIRST Team

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- 10 years of FIRST experience
- Lead Mentor for Team 1114, 2004-present
  - 7 regional championships, 2 regional finalists
  - 2006 Waterloo Regional Chairman’s Award
  - 11 FIRST judged awards
- 2005 Waterloo Regional Woodie Flowers Award Winner
- Member of the FTC Game Design Committee
- Emcee for the Canadian Regionals
Team Organization

- A FIRST team is much like a business
  - Work needs to be filtered through a hierarchy
  - Too much for one person to do on their own
- A strong partnership is needed between students and mentors
  - FIRST is not a science fair, students are not expected to, nor should they, do everything on their own
- Assign leaders to each sub-team
  - Creates a sense of ownership and responsibility
Running a FIRST Team

Team Organization
Org Chart
Engineering
Marketing & Finance

Managing the Build
The Beginning
The Middle
The End

Fundraising

Miscellany
Suppliers
Shipping
Travel
Driver Selection
Other Tips

Resources

Questions

Sample Org Chart

Overall Authority

Engineering
Design
Strategy
Controls

Marketing & Finance
Promotions
Awards

Function
Scouting
Electronics
Programming

Autodesk
Chairman’s
WFA
Website
Fundraising
Engineering

- “The Robot Team”
- The engineering leader is the overall authority when it comes to all robot related decisions
- Co-ordinates between the three engineering subteams, and ensures areas of overlap are taken care of (crucial)
Design

- Responsible for the mechanical design and build of the robot
- “Makes the robot do what it’s supposed to do”
- Usually broken down into two areas
  - Mobility – the drive base
  - Function – the mechanisms
- Takes design directives from the strategy team
- At competition, responsible for maintenance and upkeep of the robot
Strategy

- Responsible for the strategic design
- “What should the robot do”
- Analyzes the game and determines the game strategy
- At competition, they are responsible for match planning and execution
  - The drivers & coach should be a part of this team
- Scouting
  - Gathering information about opponents to help decide on match plans and alliance selection
Controls

- Responsible for making a mechanically sound robot work
- Electronics
  - Wiring the robot and installation and design of all sensors
- Programming
  - Writing the code that allows the drivers to interface with the robot.
    - (or in the case of autonomous mode, the code that allows the driver not to interface..)
Marketing & Finance

- “The Business Side”
- Often overlooked and neglected
- This section of the team, allows the engineering side to function
- Brings funding, recognition and distinctions to the team
- A great opportunity to expose students to science and technology
- Manages the teams books
Promotions

- Responsible for getting the team publicity in the community and at competitions
- Designs team logos, literature, and anything else to help the team establish a brand
- Fundraising
  - Raise money to finances the operation of the team
  - Much more on this later in the presentation
- Website
  - Essential for publishing team information, for both members and the public
    - FIRST awards the best website at each regional
Awards

• Responsible for the preparations of submissions and accompanying documentation for awards
• Most FIRST awards do not require a submission
  • Having a handout or display for the judges never hurts!
• The Chairman’s Award
  • The highest honour in FIRST
  • Requires a written submission and a presentation
    • Rookie teams are not eligible, but a written submission directed towards the CA will be considered for the Rookie All-Star award
Awards

• The Woodie Flowers Award
  • Awarded to a mentor for distinguished service in communication and inspiration of his/her students
  • Teams select one mentor to nominate
  • Requires a 600 word essay
  • One winner at each regional event, and an overall winner at the Championships in Atlanta

• The Autodesk Award
  • Best animation
  • Best 3D robot design
  • Software is proved in the kit of parts
  • A huge amount of work, very rewarding
Team Organization Tips

- You don’t need to have subteams for each area
  - There’s lots of duplication. Choose based on the amount of students and mentors you have available
- The same goes for the award submissions
  - Don’t bite off more than you can chew
- Try to have a mentor for each subteam
  - Recruit parents, industry professionals, anyone who might be interested.
- Don’t restrict your team to “techies”
  - Lots of different skill sets are required for a successful team
Managing Build Season

- Now that you have a team structure in place, it’s time to get started
- For most of you, this is the largest project you have undertaken
- There is a hard deadline – Ship Date
- The only way to succeed is to manage your time effectively
Timeline – The Beginning

- **Build season** – 6 weeks and 3 days
  - You must stay on schedule. There’s no time to fall behind

- **Week 1**
  - Brainstorming – Days 1-4
  - Design Freeze – Day 5
    - Established robot design
    - Mobility system frozen
      - Frozen means no more changes!!
    - General ideas for all mechanisms
  - Mechanism Prototyping – Days 5-8
  - Build Drive System – Days 5-14
Timeline – The Middle

• **Week 2**
  - Mechanism Build – Days 8-21
  - Programmers Begin Coding – Day 8
    - Can & should start pseudo-coding earlier
  - Robot Controls – Days 8-14
  - Drive System Complete – Day 14
    - Having the robot moving early is crucial!!

• **Week 3**
  - Begin Autonomous Testing – Day 15
    - Most *FIRST* autonomy only involve the chassis
Timeline – The End

- **Week 4**
  - Mechanism Integration – Days 22-28
    - Wiring is not a quick job

- **Weeks 5-6**
  - Robot Done – Day 29
  - Testing & Perfecting – Days 29-40
    - Not as easy as it sounds
    - Weight Reduction
  - Driver Training – Days 29-40
    - “Practiced drivers make bad robots win, and unpracticed drivers make good robots lose”
Timeline – Loose Ends

- The Last Few Days
  - Decorations
  - Parts Inventory
  - Photographs
  - Packing The Crate
  - Celebration

- General Tips
  - Perfectionism can kill the schedule
    - “Never let perfectionism get in the way of getting a good job done”
  - Your real lives are more important than FIRST!
    - Your family and marks come FIRST!
      - “All robots and no sleep make Johnny go crazy”
Fundraising

- *FIRST* is an expensive venture
- To ensure the best possible experience, funds must be raised
- Contact local businesses, teach them about FIRST
  - Send out promotional packages
    - Interactive DVD’s are great items
    - “A picture is worth a thousand words”
  - Displays at community events, shopping centres
  - Monetary donations are great, but so are in-kind donations
    - Parts, tools, even space
Fundraising

- Small scale projects also work
  - Car washes, selling chocolates, silent auctions…
- Team membership fees are a good way to create initial funds
  - Can be refunded if fundraising is very successful
- Every person you know is a potential donor, leave no stone unturned
  - Work your connections!
- Get prospective sponsors out to an event
  - Fundraising can happen year round
Miscellany

- In any project of this size, there are always areas of surprising importance which are overlooked
- Remember, this project is probably bigger than it seems
Suppliers

- Building a FIRST robot requires various materials and parts
- A local supplier of parts is essential
  - Stores such as Canadian Bearing and Metal Supermarkets should be approached early
    - Develop a good rapport with the owners. Many tend to give discounts for educational projects like FIRST
- Walk through the aisles of Home Depot
- Ordering online
  - McMaster-Carr and SDP-SI have almost every robot part you could dream of
    - Beware of the costs of shipping and duty
    - High value of the Canadian dollar is very beneficial
Shipping

- More important and difficult than it sounds
  - If you show up at a regional, and your robot isn’t there, you aren’t going to do too well
- Put one adult in charge, who will track the robot shipment with vigilance
- Know all shipping regulations, especially those involving weight and dimensions
- Leave extra money in the budget in case of an emergency
  - Trust me, they happen…
Travel

- Much like shipping, if you’re not careful it can become a huge difficulty
- Book all hotels and flights early!
  - As soon as you qualify for Atlanta, start phoning airlines
  - It’s cheaper to fly out of Buffalo than Toronto
- Bussing to Atlanta can be cost effective
  - Bus pool with another team
- If you’re commuting to a local event, consider hotels for the key team members
  - Drivers, human players, coaches, key members
Driver Selection

- *FIRST* is like auto racing, events are not always won by the best robots, rather the best drivers
- Too important to be left to the last minute
  - Drivers need time to practice, and adjust to the pressure of the role
  - I prefer to have drivers picked before kickoff, but **never** any later than day 14
Field Roles

- **Driver (x2)**
  - Responsible for all robot operation
  - Roles are usually divided with a Pilot and an Operator (Controls arms, pickup systems, etc)
  - Overlap can exist

- **Field Coach**
  - Responsible for planning match strategy, and communicating the strategy during the match
  - The overall decision maker on the field
  - Needs to understand the game inside and out
Driver Qualities

- **Maturity**
  - FIRST competition are stressful events, with loud music and thousands of screaming fans – the pressure is immense – your driver must be able to handle pressure
  - Dependability comes with maturity. You cannot afford to have a driver who will bail on you at the last minute
  - Consider students who’ve been through high level competitions – e.g. varsity athletes
  - Remember, maturity cannot be taught
Driver Qualities

- Communication
  - Must be able to listen to instructions from the co-driver, and more importantly the two coaches
  - The inability to follow pre and in match strategies will result in losses

- Skill
  - Driving a FIRST robot requires top flight hand-eye coordination
  - A good understanding of spatial relations
  - Aggression – you cannot be afraid to mix it up
  - Notice how skill comes after maturity and communication?
Field Coach Qualities

- Fast Thinking
  - Driver’s have to be watching the robot at all times, they can’t watch the whole field
  - It is up to the coach to be aware of everything happening on the field
  - Like the offensive coordinator of a football team, the coach calls the plays
  - Needs to be aware of and calculate the score quickly
  - Many matches have been won and lost by good and bad coaching
Field Coach Qualities

• Authoritative
  • The field coach must have the respect of his/her drivers
  • The drivers have to listen to the field coach without question – this is crucial in short 2-minute matches
  • The field coach must be able to get the team’s point across in the pre-match strategy sessions
    • Teams are very pushy in these sessions, without a strong field coach, you’ll end up with a plan that does not suit your team
  • I highly recommend that you choose an adult as a field coach
    • The only alternative is your most mature, strong willed and intelligent high school student
Other Tips

- Have more than one teacher involved
  - \textit{FIRST} is a huge project, it can be too big for one teacher to administrate

- You don’t have to do everything
  - Know your limits, do not try and exceed them

- Ask for help
  - There are many very able and willing people out there.
  - The FIRST community is very tight knit, and loves helping
Other Tips

- **FIRST is a year round program**
  - Fundraising, prototyping and promoting can and should go on 12 months of the year

- **Stay healthy**
  - The 6 week build is incredibly exhausting, if you overwork yourself, you will suffer

- **Read the Rules**
  - Not knowing the rules is a great way to shoot yourself in the foot with a grenade launcher

- **Have fun!!!
Resources

• General Resources
  • www.firstrobotics.uwaterloo.ca
  • www.chiefdelphi.com/media/search/papers

• Fundraising
  • www.usfirst.org/4vol/resourcectr/

• Suppliers
  • McMaster-Carr – www.mcmaster.com
  • SDP/SI – www.sdp-si.com
Questions?

- kkanagas@gmail.com
  - Contact if you need advice or help
  - I’m more than willing to try and visit your school or send someone else who can