



AHS Robotics 2011 – 2012 Rapid Prototyping Concept





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Rapid Prototyping Concept



Introduction

Preparations for Kickoff

- Review rules
- Study Hall/Dinners/Meeting Times
- Shop Safety
- Field Preparations
- Overview Rapid Prototyping, Design & Fabrication
- Elements of Success

Kickoff/Q&A

Rules

Strategy Development

Concept Development

Concept Design Selection

Organize teams

Design & Fabrication

Design Review



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Agenda

- 6:00** **Standup Meeting**
- Preps and KO day
- Study Hall
- Sunday work day
- 6:30** **Field**
FTC preps
Shop & Safety Briefing preps
SI Prepare test form(s)
- 8:00** **Adjourn**



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Before Kickoff

- Read Sections 1 thru 6:
 - Go to www.usfirst.org – FRC – Game & Season Info
 - Competition - Competition Manuals and Related Documents
 - <http://www.usfirst.org/roboticsprograms/frc/content.aspx?id=452>
- The password to the remaining sections, 7 thru 11, will be announced at the kickoff meeting
 - Files can be downloaded a few day's before and the password can be used to unlock the files at the meeting.



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Attend Kickoff/Q&A

- Dress Code: Kakis and Skunk T-Shirts
- At the Kickoff they will announce the game
 - Opening comments, and discuss design considerations
 - Review any new features of the kit
 - Announce the Game; name, explain the theme,
 - Play animated video and give design hints
- After the announcement they will conduct a walk through on a practice field and answer any questions
- After the Kickoff meeting team members are randomized and sent to classrooms to discuss what they heard
 - Do not be afraid to share any design ideas, openly brainstorm
 - Test ideas against the rules (so read fast if you have the rules)
 - Meetings are not hosted
 - Tell the new participants these meetings are not hosted
 - Take the lead, or volunteer someone, and support whoever does take the lead





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Study the Rules

- Group Study & Presentation
 - Teams will review assigned sections
 - Prepare test questions
 - Prepare presentation on assigned section key points
- Get familiar:
 - Note the sections and related numbering convention
 - Focus on the game rules
 - Talk with others, ask questions and understand the problem
 - Note conflicting rules or mistakes; these will be address on the web
 - Review Kit of Parts
- Game Walkthrough
 - Real-time simulation
 - Game Features

Study Rules

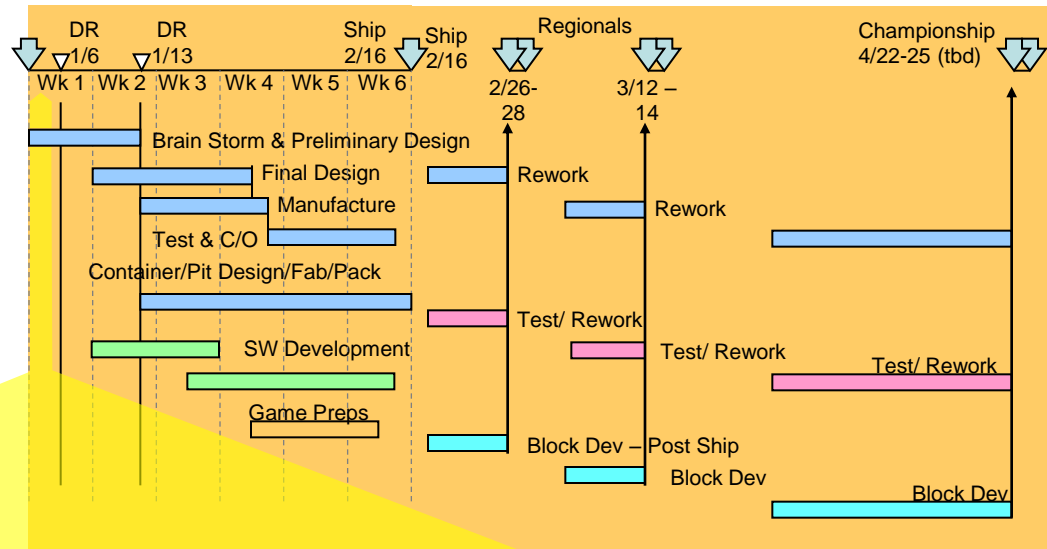
- Review & test
- Game walkthrough



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Less than 5 days:



Sat 1/8/2011

Attend Kickoff/Q&A

- Break into teams
- Attend all Sessions

Sun

Study Rules

- Rules review & test
- Field setup
- Game walkthrough

Sun

Strategy Development

- Strategy Brainstorm
- KPPs: How & What matters

Mon & Tues

Concept Development

- Design Brainstorm
- Development
- Key Features
- Concept Presentation

Weds 1/12/2011

Final Design Concept Selection

- Subsystem Selection and Definition
- Define Subsystem Features
- Define KPPs
- Identify Options

Initial Concept



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Study Hall:

The purpose is to give you an opportunity to study with access to the school computers.

- Study Hall is not mandatory*, don't go if you don't want to study
- Parent volunteers will monitor the room
 - You will be asked to leave if you are disturbing others
 - Don't argue with the parents just go to the cafeteria or hang out outside
 - If you want to study with others and cannot do it without disturbing others in the room move to the cafeteria.

The cafeteria (un-monitored) and the Study Hall are made available by the school and the parent volunteers with some concern. If something happens, the school will be held accountable and we may lose these resources forever. Please respect the school property and those you are sharing them with. Go outside to run or kid around.

* Except as maybe agreed due to grade probation



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Thursday Agenda

- 6:00** **Kickoff and Rapid Prototype review**
- Shop safety briefing
 - Follow up with field, FTC, shop and test preps
- 8:00** **Adjourn**

Remember: Saturday Kick-off starts 7:00AM, Arrive 6:30 so we can sit as a team.



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible after the FRC Kick-off?



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible after the FRC Kick-off?

Includes considerations for drivers, human players, programming, alliance team work, scouting strategy influence, robot design, training/ practice, repair/ replace...

- Everything that gets us ready and wins a match



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible after the FRC Kickoff?

Implies human players, drivers, scouting selection of alliance members, scoring, penalties...

- Everything that goes into determining the winner



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible after the FRC kick-off?

Includes the robot/control/player/repair/replace aspects as soon as possible after kick-off



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible after the FRC Kick-off?

Key to Success:

- Understanding the game and how to win
- Merge the design wisdom with fresh perspectives of multiple participants
- Quickly combine into an executable design



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Problem:

- How do we select the best systems approach that will win matches which leads to the best design approach as soon as possible at the FRC Kick-off

Key

- Understanding the game and how to win
- Merge the design wisdom with fresh perspectives of multiple participants
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Welcome to Rapid Prototyping...



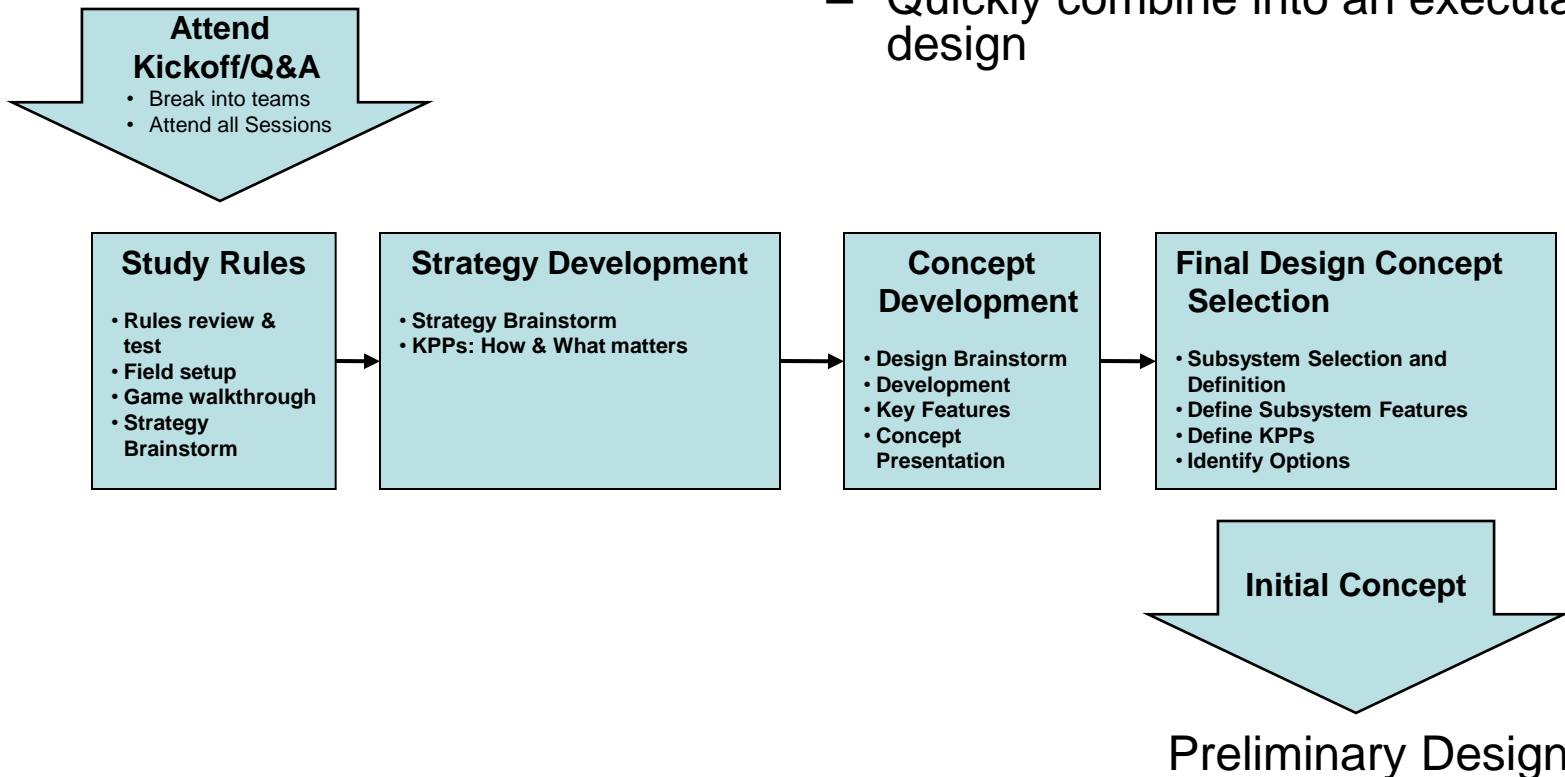
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Remember the Keys to Success:

- Understanding the game and how to win
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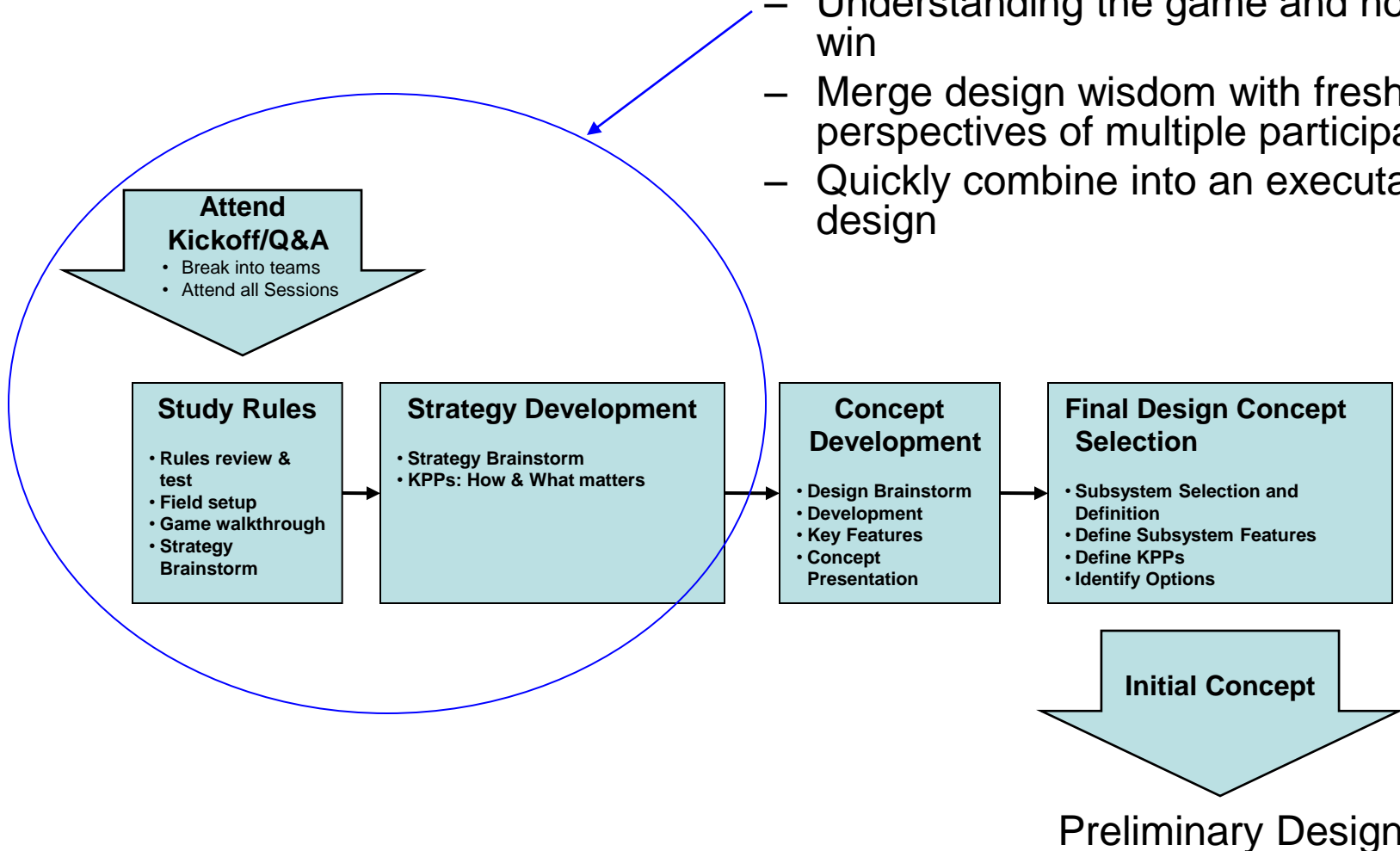
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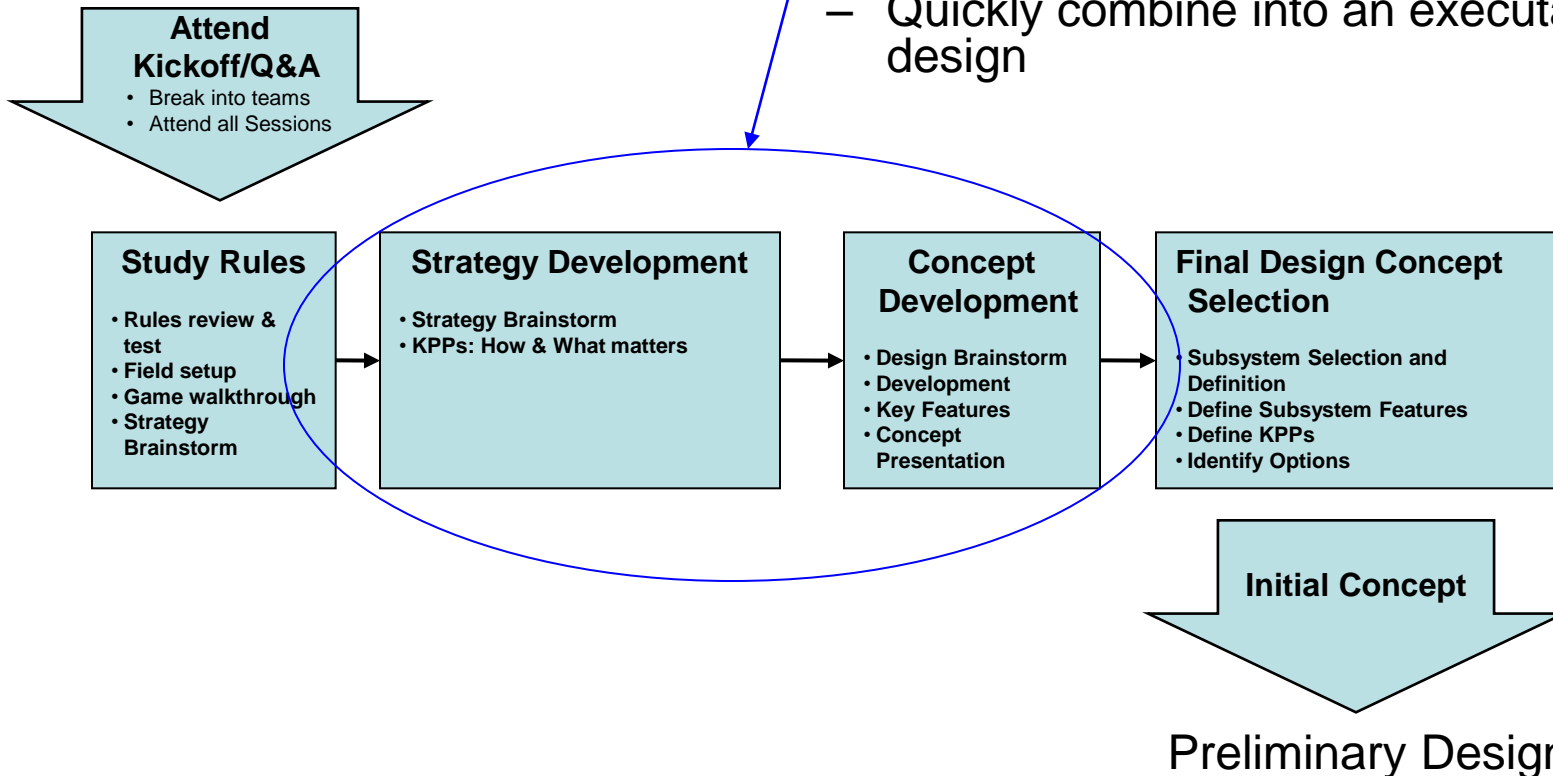
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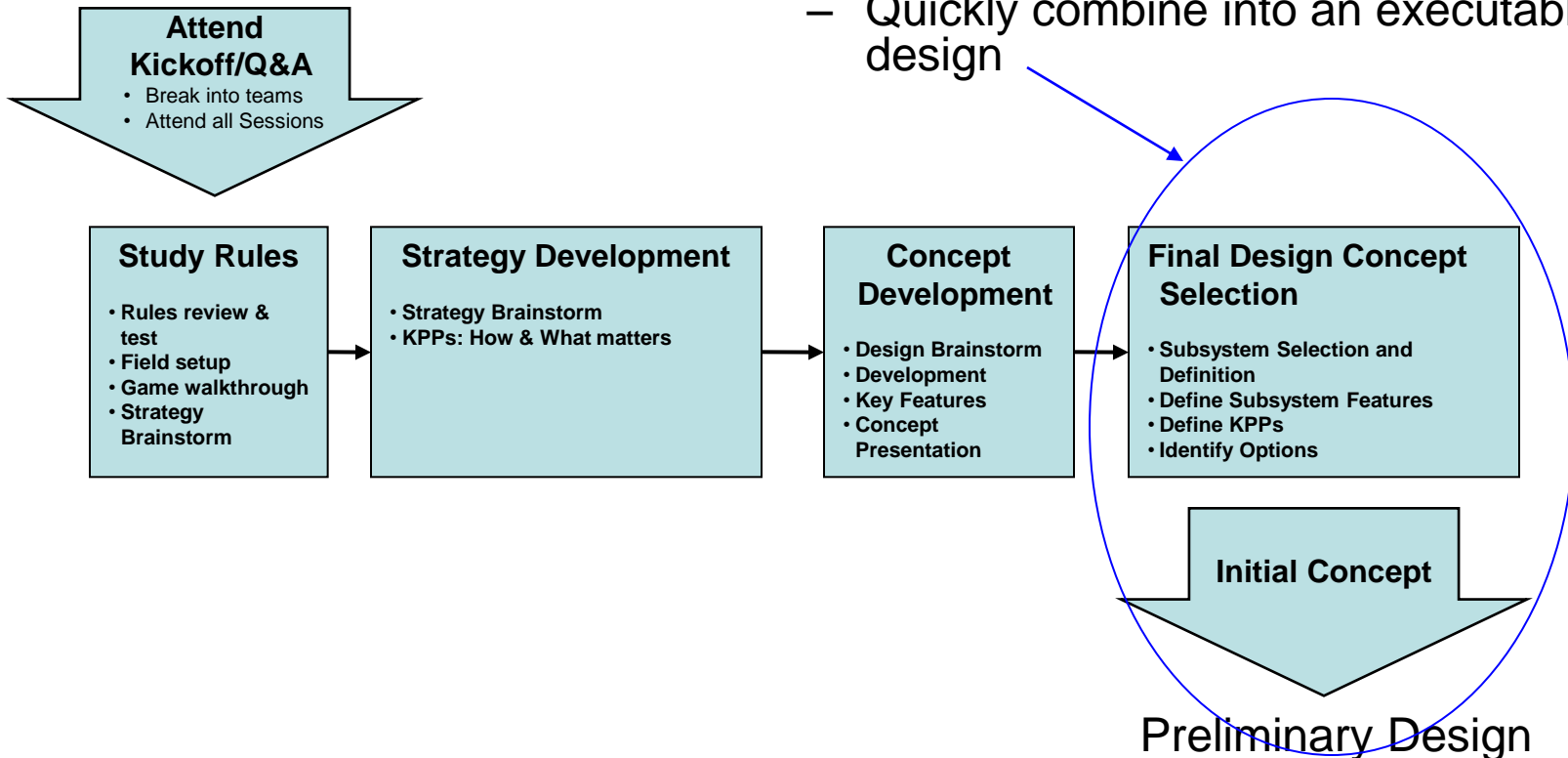
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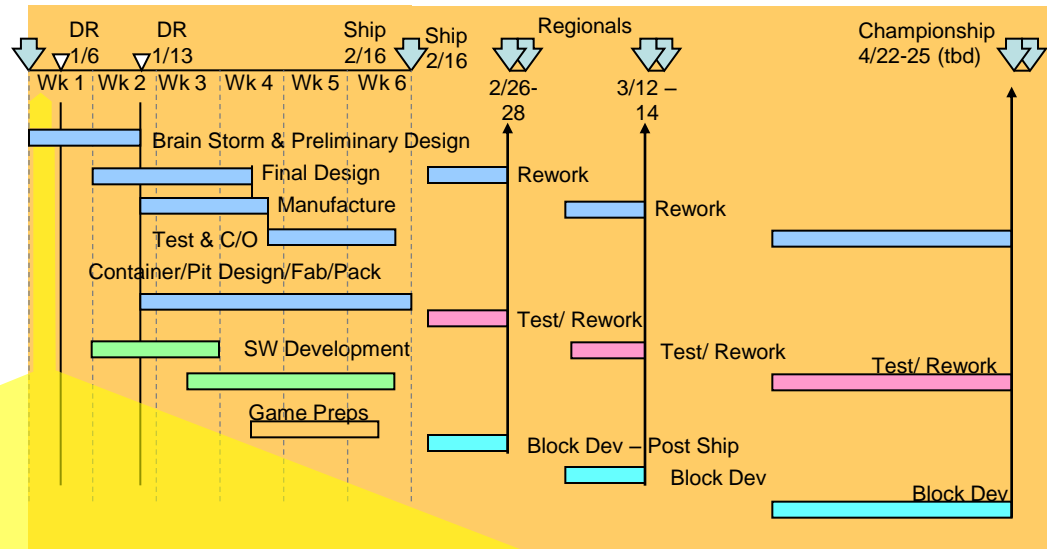




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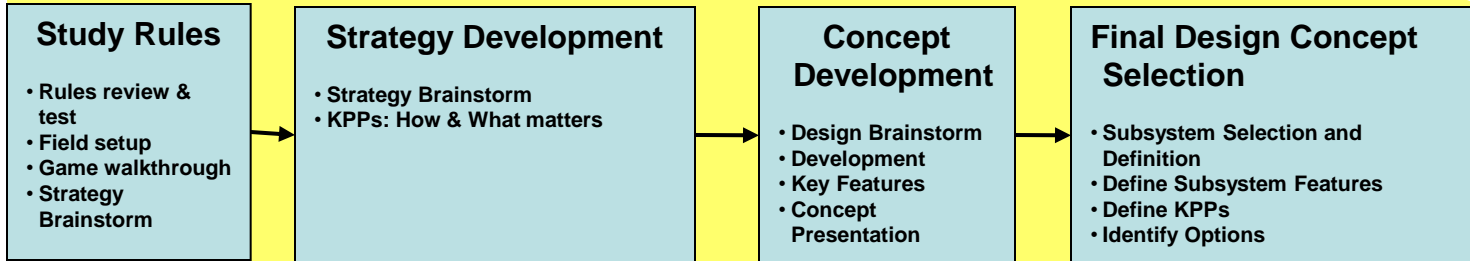


Less than 5 days:



Attend Kickoff/Q&A

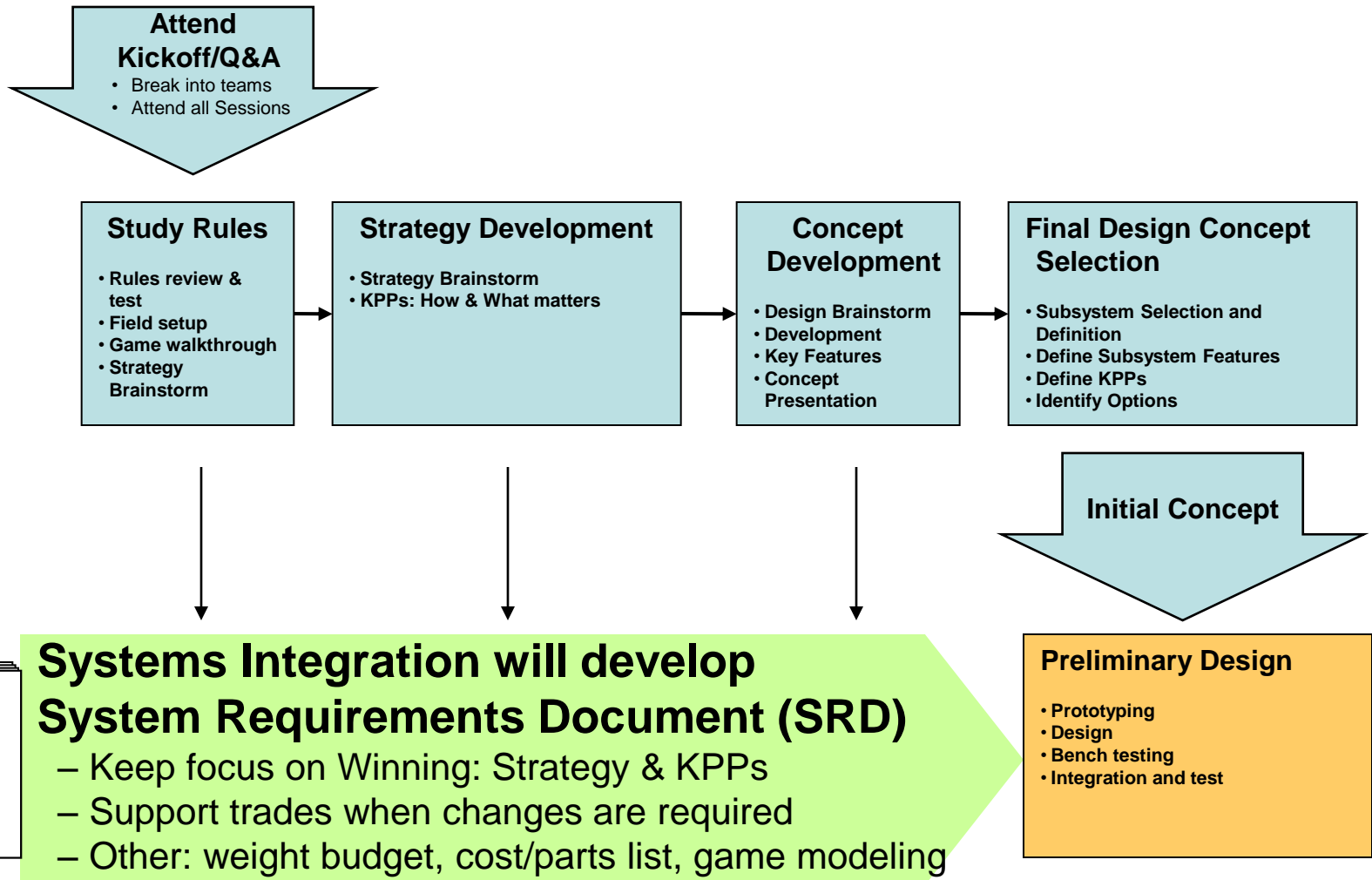
- Break into teams
- Attend all Sessions



Initial Concept



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Attend Kickoff/Q&A

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Study the Rules

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 - Review Kit of Parts
- Game Walkthrough
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 - Game Features

Study Rules

- Review & test
- Game walkthrough



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Saturday Kickoff

6:30AM Arrive – team should stay together and sit together

7:00AM KO start

After Presentation, go to discussion teams

Review the rules tonight



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Sunday Agenda

9:00 Introductions, opening comments, break into groups:
Workshop, Field, Rules

9:15 to 1:30 Kitbot workshop

9:15 to 11:00 Field setup

9:15 Group rules study

- Break up into teams, 4 groups, ~6 kids each, to review:
 - 1) Section 3: The Game
 - 2) Section 4: 1.0 thru 4.3.6
 - 3) Section 4: 4.3.7 thru end
 - 4) Section 5: Tournament
- Review assigned section
- Review Kit of Parts
- Prepare 5 minute presentation and 4 test questions

10:30 Group rule presentations

- Each group presents section review
- Turn in 5 questions (~30 total)

11:00 Game simulation / walk through

- Individual from each group simulate robot on field



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Sunday Agenda (Continued)

12:00 Meet in teams - Strategy Development

- Break into strategy teams
- How to win / How do we play; offence, defense, teaming, ...
- Key features to a winning strategy
- Define KPPs - What matters, how do we win?

(~12:30 Lunch – Working)

1:30 Out brief Strategy concepts

2:30 Concept Development

- Break into 6 concept teams
- Sketch concept, prepare mission scenarios, control concepts
- Define interfaces and power/actuation strategies (motors, actuators, sensors...)
- Define key feature(s) that win the game

4:00 Adjourn

- Take home test – Open book



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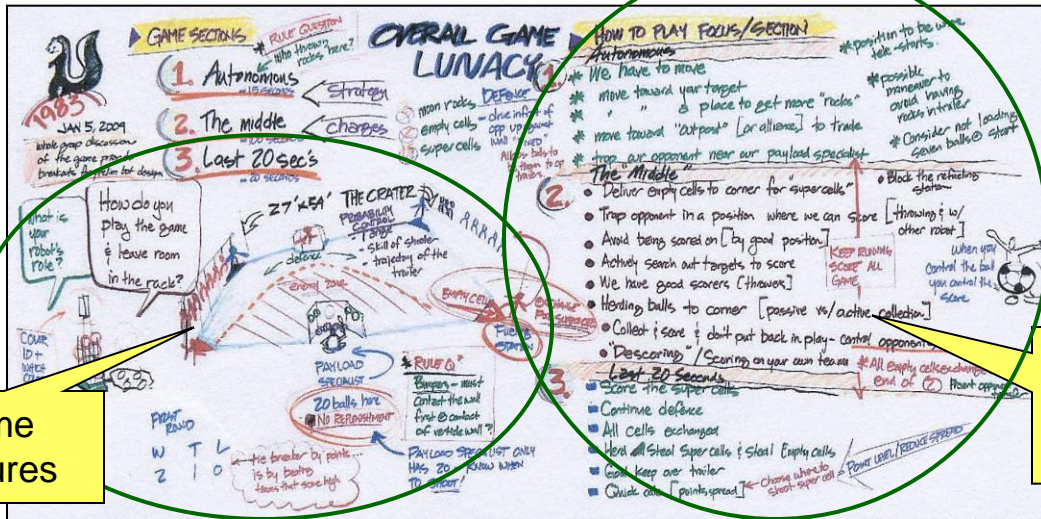


Strategy Development

- Strategy Brainstorming
 - How do we play?
 - Offense/ Defense/ Teaming
 - Autonomous/ Middle/ End
 - Competing strategies – how will they defend against us
- Review and combine ideas
- Key Performance Parameters (KPPs)
 - What must it do to win?
 - Speed, weight, turn, push, shoot,
 - Range, accelerate...
 - Review and combine

Strategy Development

- Strategy Brainstorm
- KPPs: How & What matters



Game Features

Auto/Mid/End Game Strategies w/overarching KPPs



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Monday Agenda

- 6:00** **Continue Concept Development**
- Sketch concept, prepare mission scenarios, control concepts
 - Define interfaces and power/actuation strategies (motors, actuators, sensors...)
 - Define key feature(s) that win the game
- 7:00** **Each Team Outbrief concept**
- Overview of concept
 - Features that win the game
 - Power/actuation requirements (how many motors?)
 - Function of each unit
 - Discuss options to improve
- 9:00** **Adjourn**



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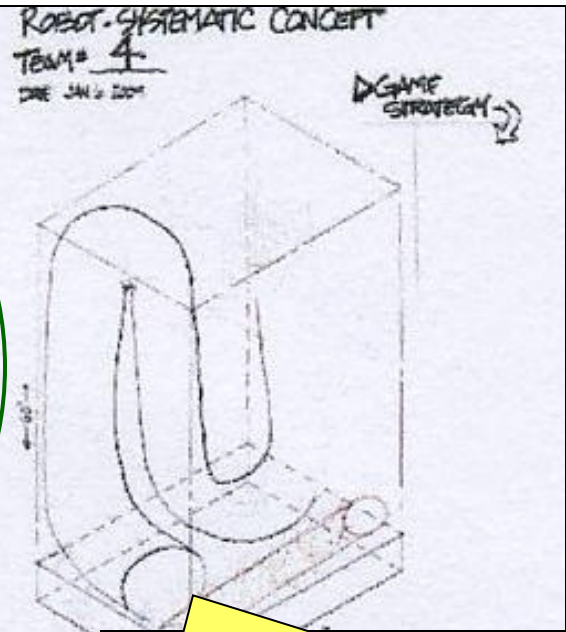
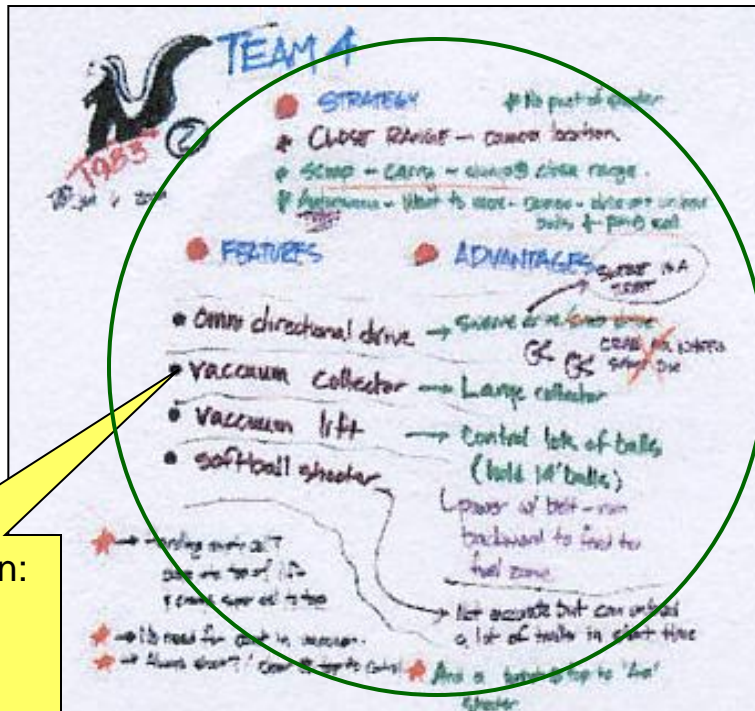
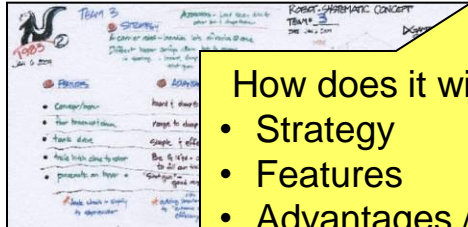
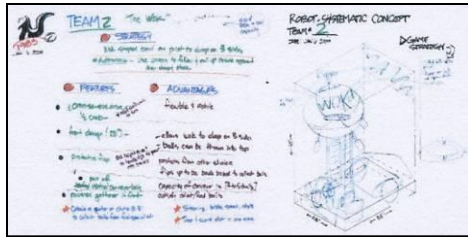
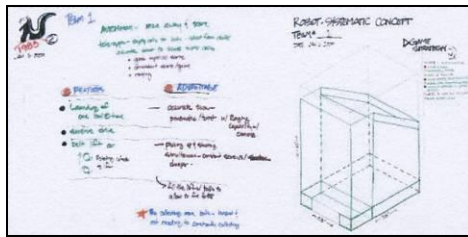


Concept Development

- Design Brainstorm – Multi Group
 - Team Sketch, Analysis
- Present concepts for review
 - Features, strengths, strategies, drawing

Concept Development

- Design Brainstorm
- Development
- Concept Presentation



How does it win:

- Strategy
- Features
- Advantages / disadvantages

High Level Concepts, "What" not "How"

- Good: Vacuum up the ball
- Bad: Pick up the ball with a Vacuum



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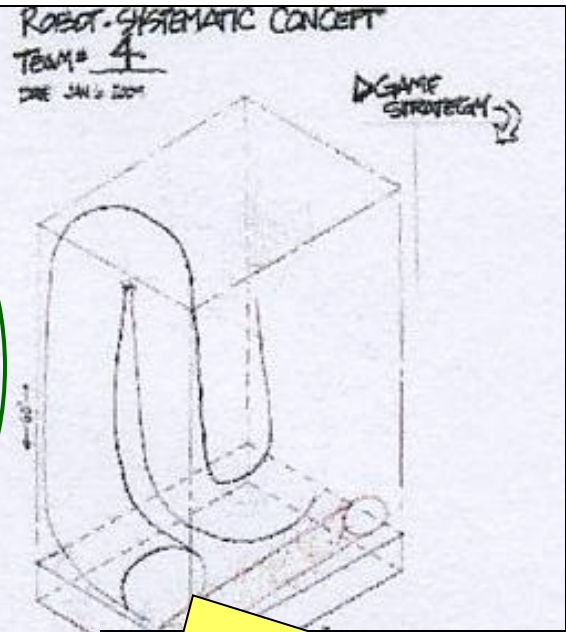
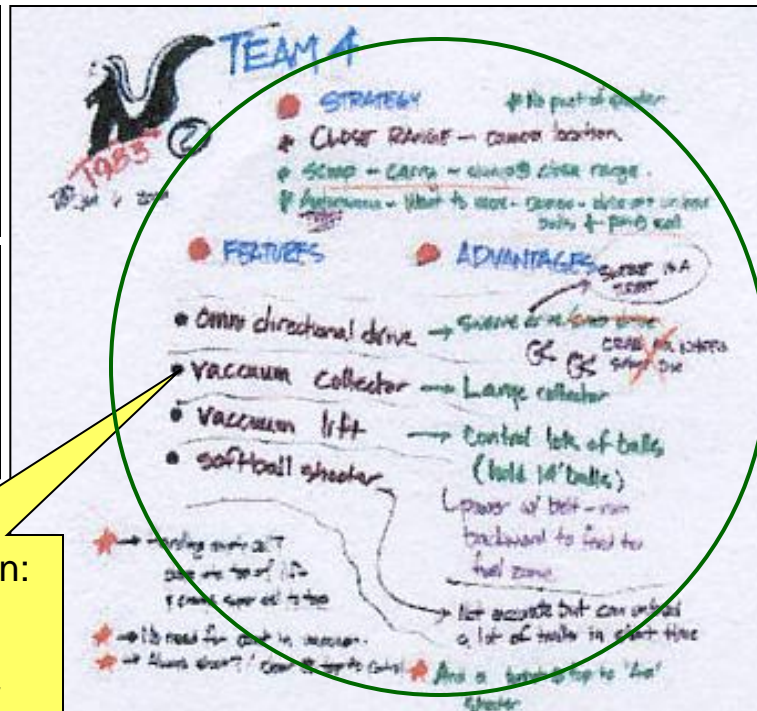
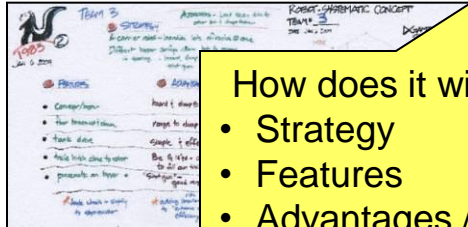
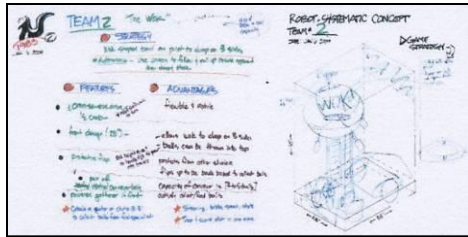
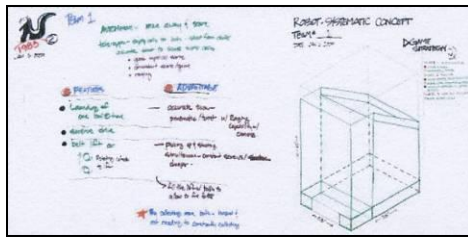


Concept Development

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How does it win:

- Strategy
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High Level Concepts, "What" not "How"

- Good: Vacuum up the ball
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Wednesday Agenda

- 6:00** **Final Concept Selection**
- Define each subsystem
 - Define key features of each subsystem - details should be sufficient to define the action/motion (function) required but not method
 - SI to capture & maintain requirements
- 8:00** **Assign sub-teams**
- Lead mentor and students
- 9:00** **Adjourn**



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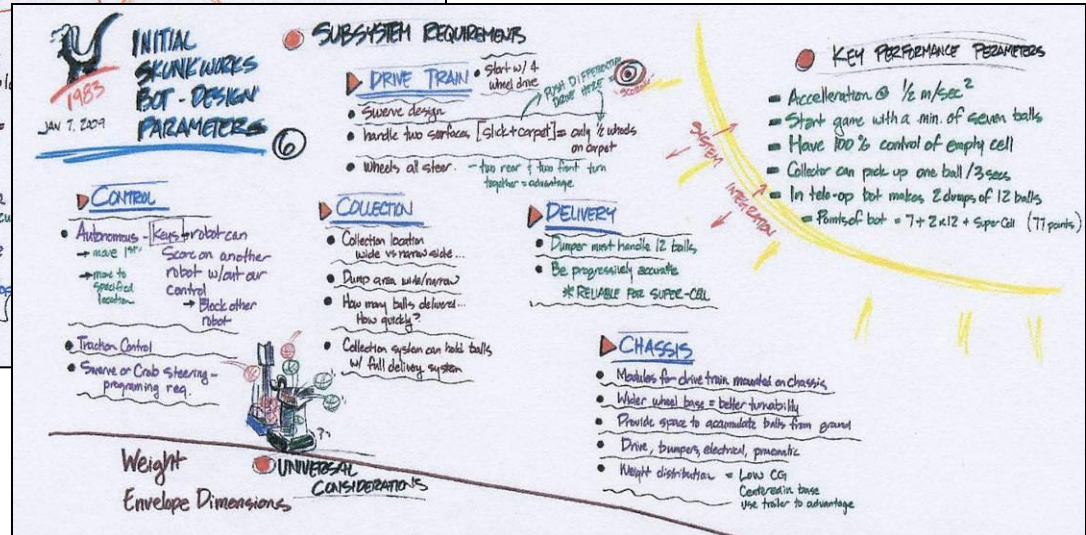
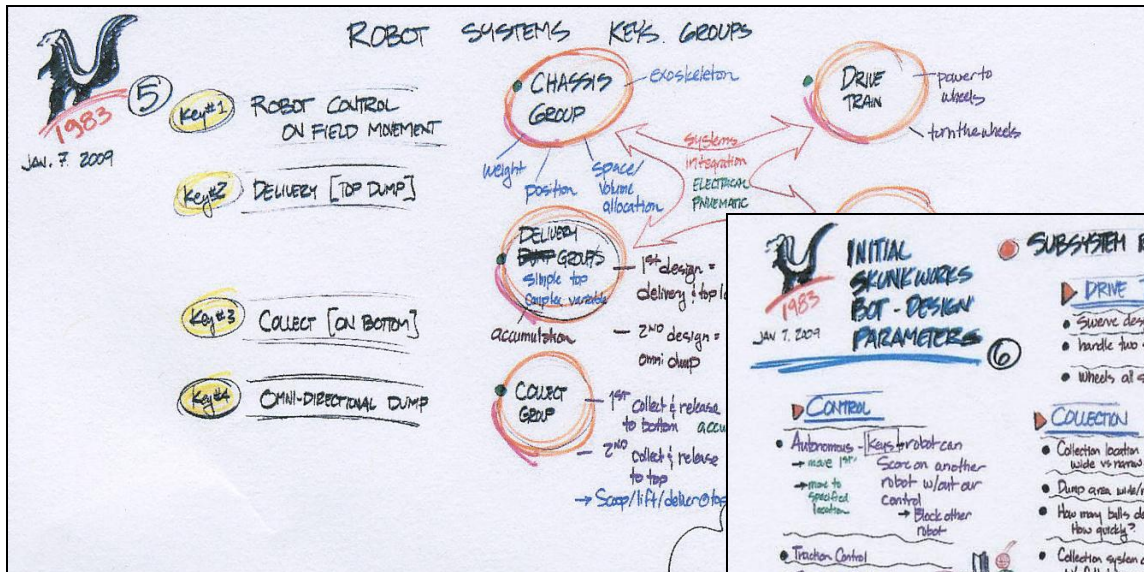
Final Design Concept Selection

- Select concept
- Define Subsystems
 - Name, Features, KPPs
- Define winning system Strategies and options

Final Design Concept Selection

- Subsystem Selection and Definition
- Define Subsystem Features
- Define KPPs
- Identify Options

Initial Concept





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Battle Rhythm:

Mentor/Leader meetings are required to keep focus on the critical elements of team success.

Team leader meeting

- **When:** Prior to each team meeting, or as needed, at 5:30 on week days
- **Chair:** Coach/Systems Integration
- **Who:** Mentors and student leaders from each team
- **Agenda**
 - **Students/Mentors brief status of team, next steps, and help needed**
 - **Review: game play, KPPs, design and related decisions**
 - **Review timeline**

Team Function

Systems Integration/KPPs
Chairman's
CAD
Architecture
Lift
Base
Effector(s)
Mini-Bot
Programming/Control
Electrical
Website
Shop/Safety
Field

Mentors

Gary Miller
Gary Miller
Ken Zaballos
Coach
Ken Zaballos
Ken Zaballos
Tim Dowd
Steve Tarilton
Tim Davis
Jim DeSilva
Julie Zaballos
Steve Tarilton
Mike Shafa
Steven Wright
Campisteguy

Student Leaders

Danny Z.
Sydney M.
Navid S.
Lydia J.
Jennifer M.
Jordan C.
Navid S./Alex C./Franco S.
Jake H.
Thomas D.

Olivia P.
Jennifer M.



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Thursday Agenda

Team reminder, grade checks are due

- 6:00** **Sub-teams mature concepts/design features**
- Refine functional definition
 - Prepare detail sketch of subsystem design: define methods/mechanisms
 - Highlight interfaces and power/actuation strategies (motors, actuators, sensors...)
 - Define prototypes needed
 - Highlight key feature that win the game
- 9:00** **Adjourn**



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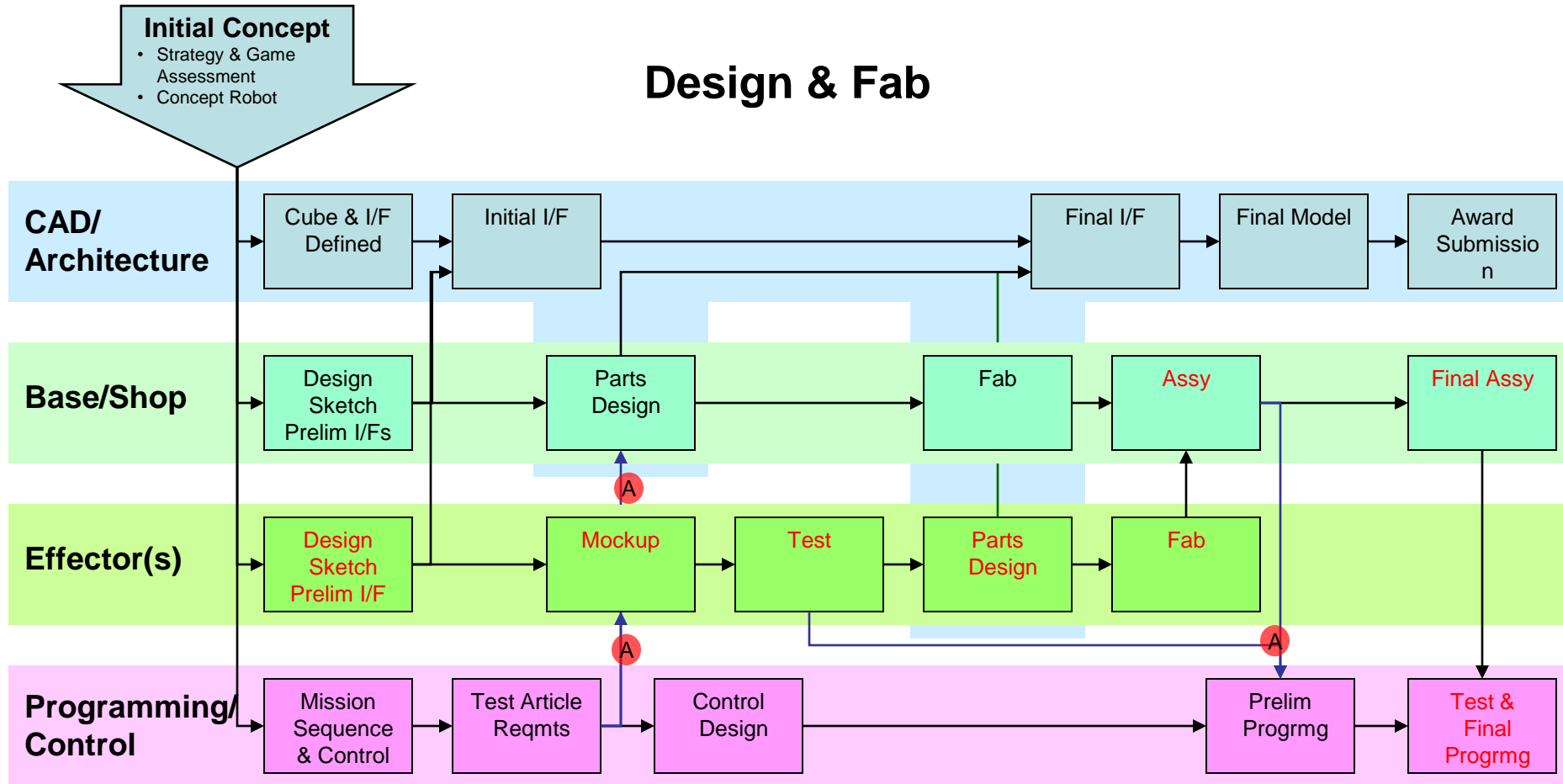
Saturday Agenda

- 9:00** **Continue Sub-teams mature concepts/design features**
- Refine functional definition
 - Prepare detail sketch of subsystem design: define methods/mechanisms
 - Highlight interfaces and power/actuation strategies (motors, actuators, sensors...)
 - Define prototypes needed
 - Highlight key feature that win the game
- 12:00** **Lunch**
- 1:00** **System Design Review**
- Review subsystems side by side:
- Each team present design and functional approach
 - Group assessment; concepts, interfaces
 - Review prototyping plans
 - Review resources
 - Define go-forward plans for each team
- SI present / maintain system requirements & game strategy
- 4:00** **Adjourn**



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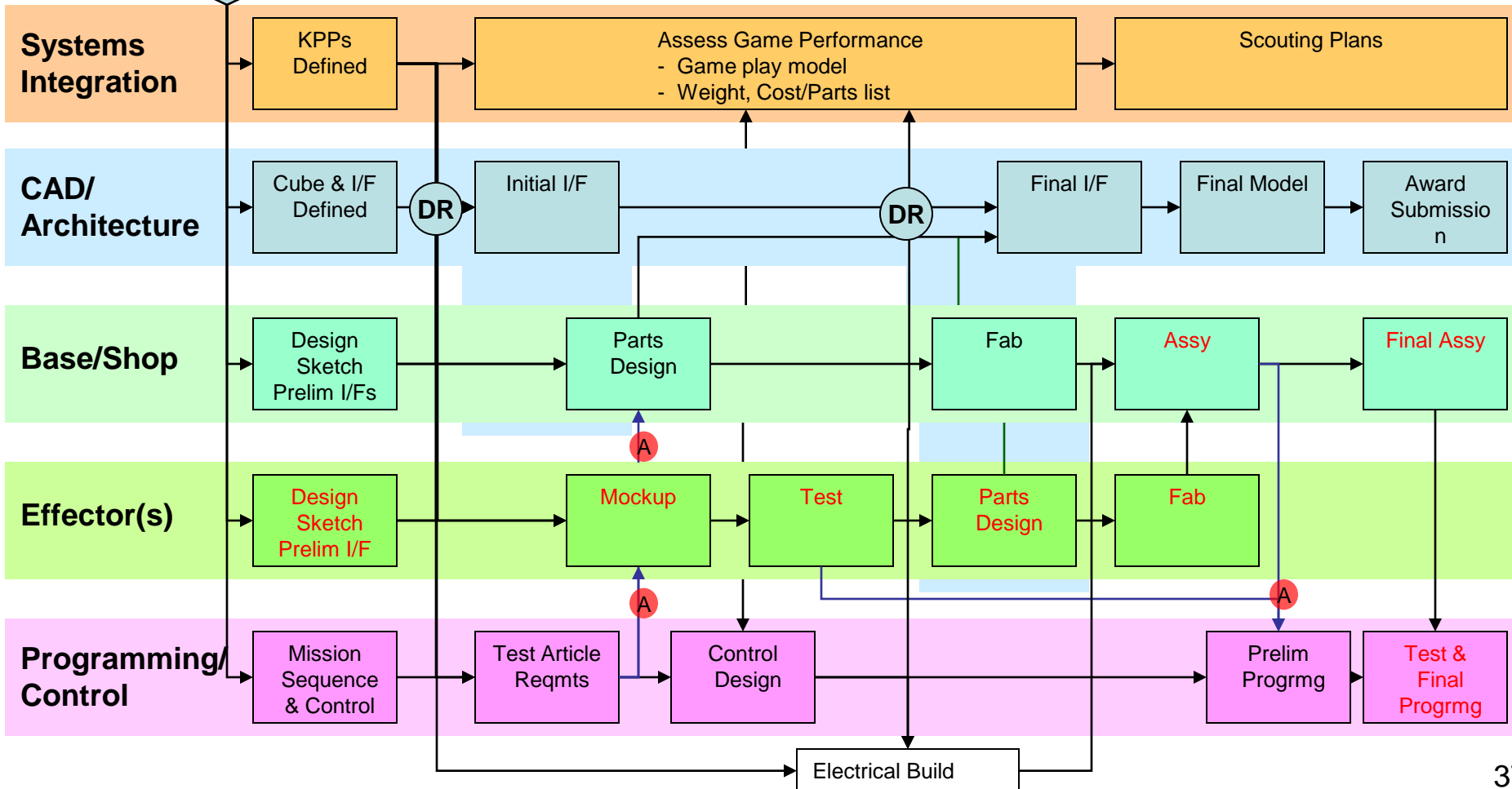
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Initial Concept

- Strategy & Game Assessment
- Concept Robot

Design, Build & Test



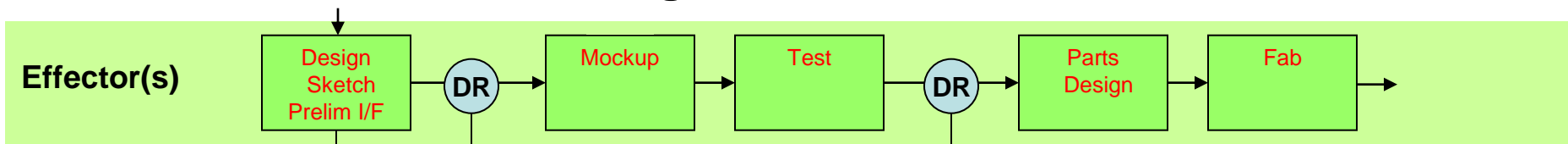


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Design, Build & Test



Design

Mentor lead walkthrough: define functions, desired action, method of movements, required parts, assy concept, materials selection...

- Describe functional definition
- Prepare detail sketch of subsystem design on a large sheet of paper so it can be taken to the design review
- Define methods/mechanisms
- Highlight interfaces and power/actuation strategies (motors, actuators, sensors...)
- Define prototypes needed
- Highlight key feature that win the game

Design Reviews

Mentors and all teams cross read designs

- How win, KPPs
- Concept detail review
 - Concept Sketch
 - Simplicity
 - Manufacturability
 - Power/actuation plans
 - Resource availability
- Integration points
- Go Ahead with design