12:00-12:05

CS/EE/ME 75 – Formula SAE Electric
28 September 2015

Guillaume Blanquart — ME

Azita Emami — EE

Richard Murray — CDS

Engineering and Applied Science
California Institute of Technology

Meeting Goals and Agenda

Goals

- Provide an overview of the 2016 Formula SAE Electric competition
- Review the course structure for CS/EE/ME 75 and describe how to participate

Agenda

12:05 Goals, Agenda, Notetaker

12:10 2016 Formula SAE Electric review (Rob Anderson)

12:20 2015 CSVC proof-of-concept activities (Rob Anderson)

12:30 CS/EE/ME 75 course overview and organization (Richard, Guillaume, Azita)

12:50 Q&A

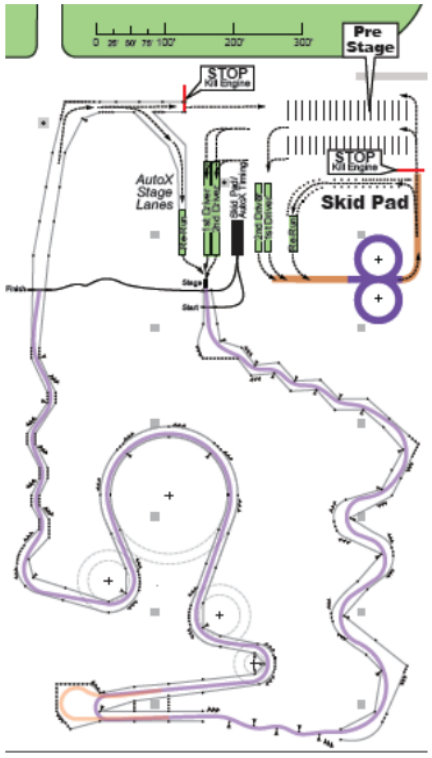
12:55 Adjourn

Notetaker: _____

- Record notes and action items from meeting; post on confluence

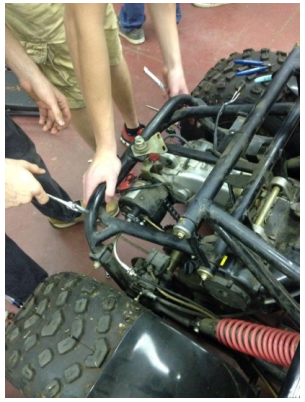
Formula SAE

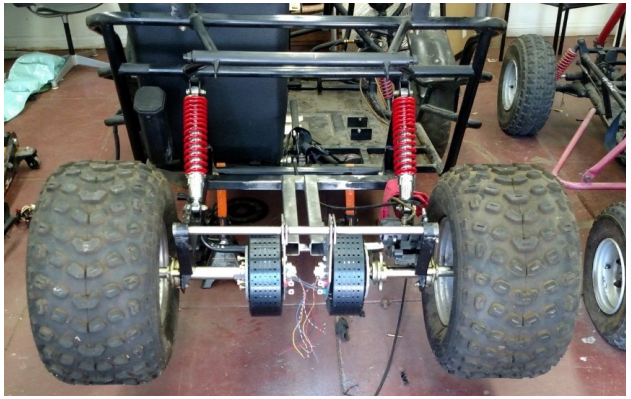
- Competition Background
  - Scope
  - Purpose
  - Events
    - Technical Inspection
    - Dynamic Events
      - Acceleration- 75m in 4.0s
      - Skid Pad 2 x 00 (30m diameter) in 5.5s
      - Autocross - 800m in 70s
      - Endurance – 22km – 4 hours (30mph)
      - Braking
    - Static Events
      - Design Report
      - Business Report
      - Cost Report



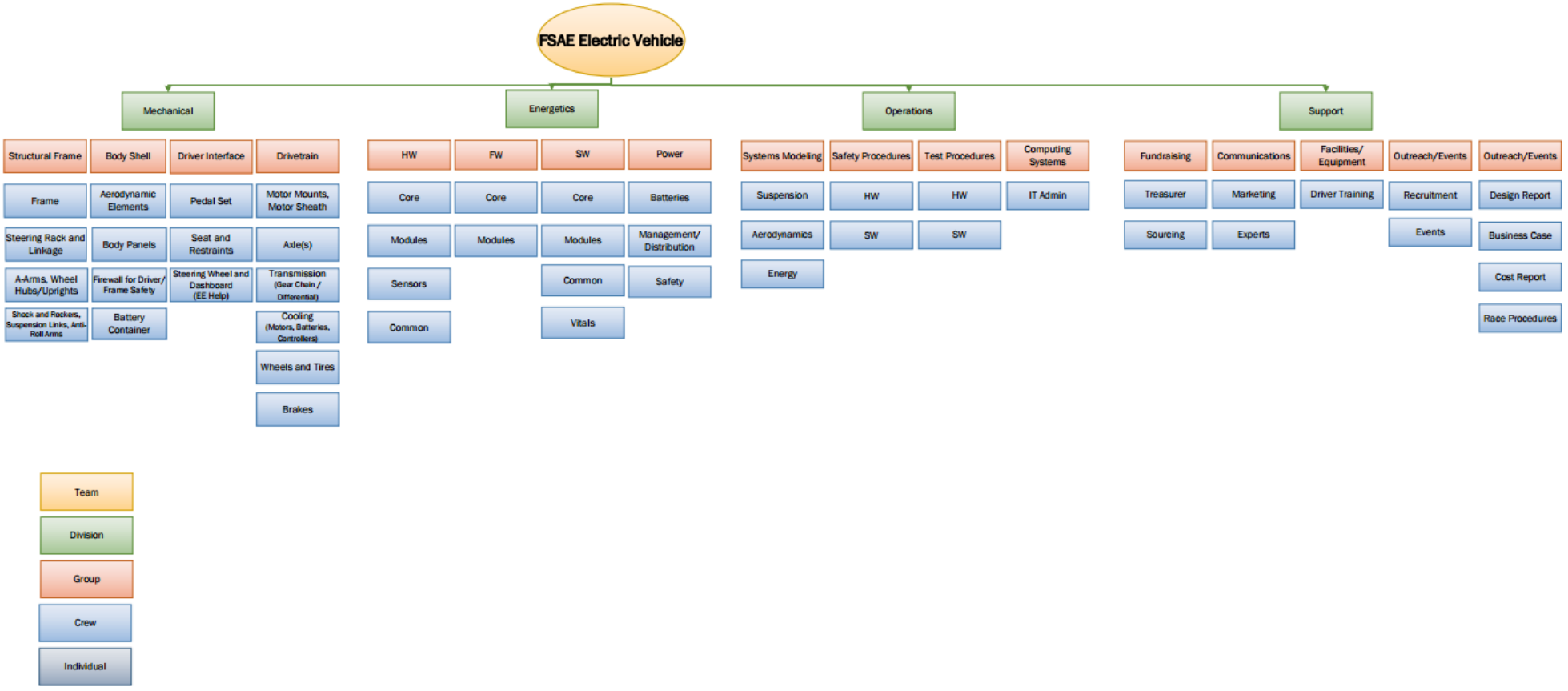
CSVC Background

- Formed Fall 2014
- 1st Year
  - Power-train prototyping on existing frame
    - Motors
    - Controllers
    - Batteries
    - Frame Modifications
  - ME 100 – 8 students
  - SURF – 3 students
- 2nd year
  - IPT: Integrated Product Team
  - Summer – planning for CS/EE/ME 75
  - Build complete FSAE Electric Vehicle
- Future work
  - Fuel Cell or other types of vehicles
  - Smart Transportation
  - Autonomy
  - Sustainable Charging

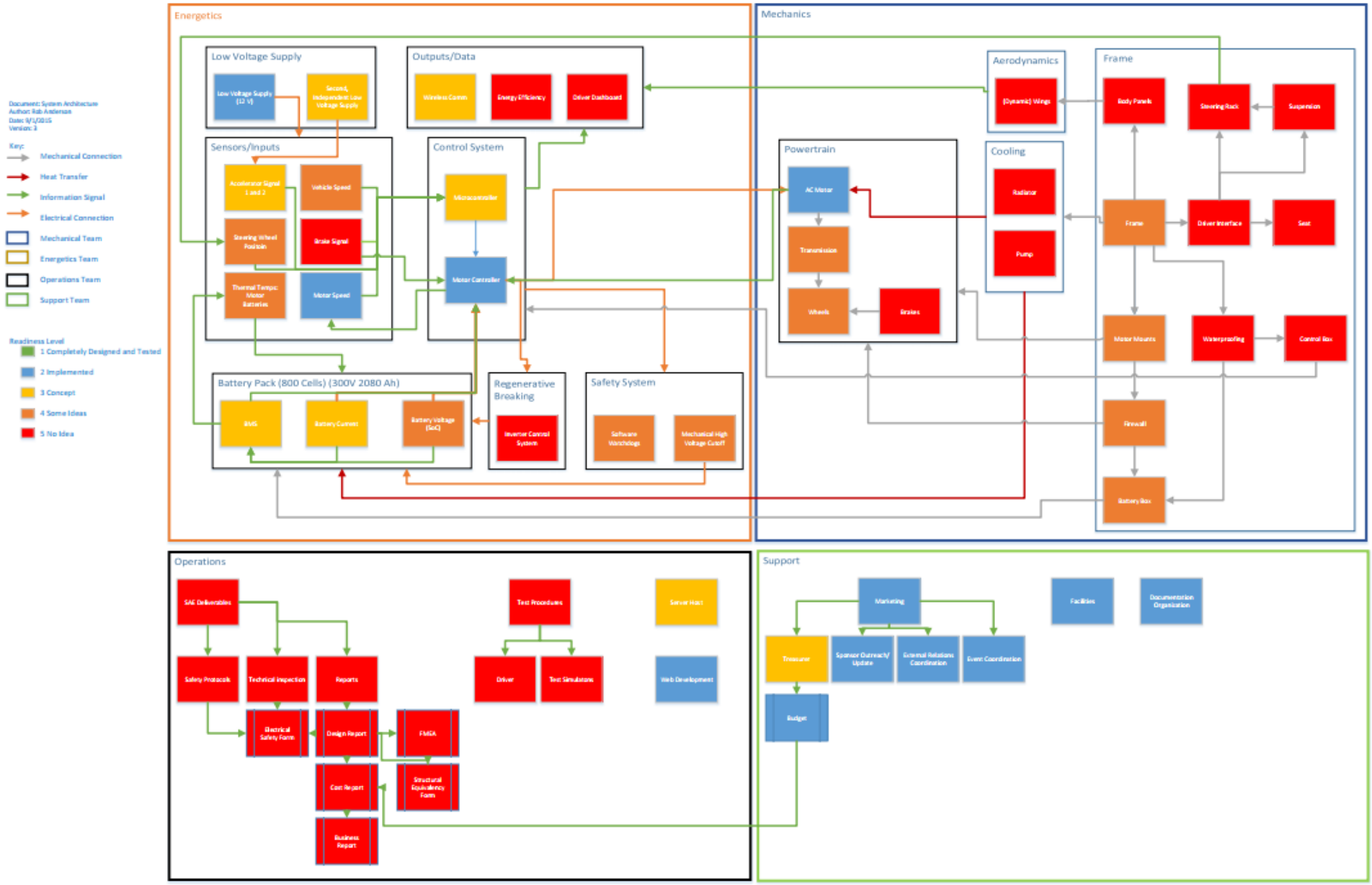




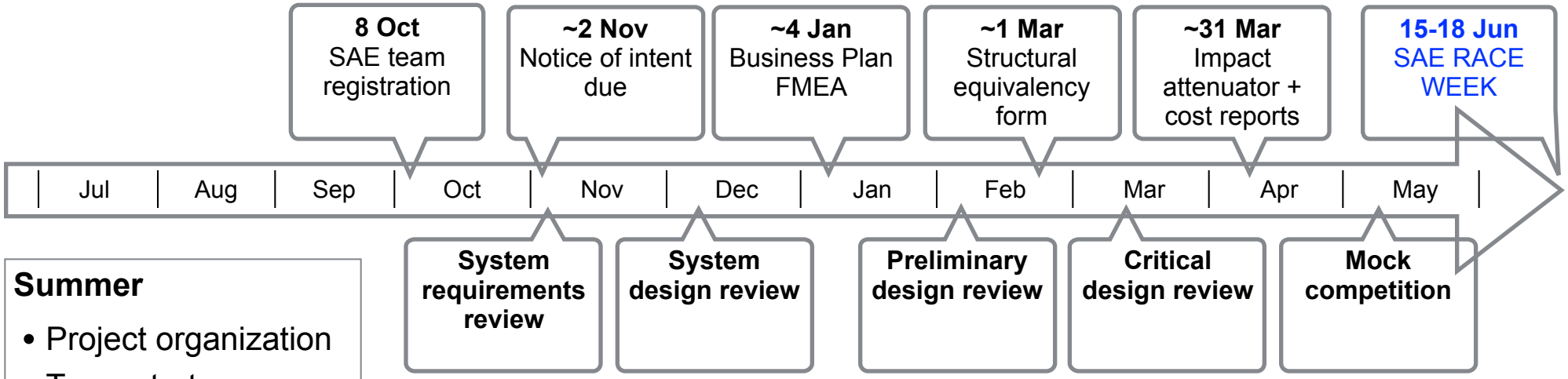
Team Architecture Tree



System Architecture



Project/Course Timeline



Summer

- Project organization
- Team strategy
- System architecture
  - Subsystem def'ns
  - Preliminary req'ts
- Funding plan
- Facilities plan

Fall

- Design studies
- Subsys selection
- System model/FMEA
- HIL lab setup

- MT: review system → subsystem req's
- FN: review system → subsystem designs

Winter

- Frame construction
- Subsystem proto-typing (HIL)
- Subsystem integration
- First drive

- MT: preliminary design review (with data)
- FN: critical design review (against specs)

Spring

- Optimization
- Testing
- Competition practice

- MT: mock competition (at Caltech)
- FN: public demonstration

CS/EE/ME 75 Organization

Integrated Product Team (IPT)
Project lead engineer: Rob Anderson Technical lead engineer: Jake Harmon

Mechanical	**Energetics**	**Operations**	**Support**
Instr: G. Blanquart	Instr: A. Emami	Instr: R. Murray	Instr: Fromer
TA: Joseph Bowkett	TA: Cibele Halasz	TA: Noah Olsman	TA: Shenghan Yao
UG lead: Evan Sloan	UG lead: Santiago N	UG lead: Anup Kishore	UG lead: Mark Lorden
• 15-25 Caltech ug • 2-4 Art Center ug/gr • 2-4 advisors	• 10-15 Caltech ug • 0-2 Art Center ug/gr • 2-4 advisors	• 10-15 Caltech ug • 2-4 Art Center ug/gr • 2-4 advisors	• 25-35 Caltech ug • 5-8 Art Center ug/gr • 2-4 advisors
• Structural frame • Body shell • Drivetrain • Driver interface	• Power • Hardware • Firmware • Software	• Systems modeling • Safety procedures • Test procedures • Computing systems	• Fund raising • Communications • Facilities/equipment • Outreach/events

Team assignment guidelines

- All CS/EE/ME 75 students on 1 subsystem team (blue)
- Students w/ 6-9 hrs/week on additional supporting team (non-technical activities)
- IPT role requires 9 hrs/week; rotate assignments each term

CS/EE/ME 75 Goals, Objectives and Schedule

Fall 2015 Goals

- Build a highly effective team with the skills and insights required to build an electric vehicle from scratch
- Complete a design that is compliant with the rules and will win the Formula SAE Electric competition

Objectives

- Train all CS/EE/ME 75 students in safety procedures and create protocols required for safe testing, operations
- Create compliant designs for all components and review design choices by the end of the term
  - Midterms: clearly defined requirements for each component (performance, cost, weight)
  - Finals: compliant design, with evidence of viability (prototype, vendor quote, etc)
- Monitor system-level requirements and budget allocations for weight and cost of components as design is evolving
- Make enough progress in first term to build complete vehicle by end of second term

Schedule

- Weeks 1-4: team formation, planning, requirements
- Midterm: requirement review
- Week 6-10: baseline design, validation, documentation
- Final: design review

Milestones

- 5 Oct: teams formed; collaboration tools working
- 12 Oct: subsystem teams know SD rules + baseline status
- 27 Oct - 3 Nov: subsystem requirements review
- 3-8 Dec: subsystem design review
- 11 Dec: final documentation due
- 4 Jan: Business plan and FMEA due to SAE

CS/EE/ME 75 Course Administration

Class homepage: http://www.cds.caltech.edu/~murray/wiki/CS-EE-ME_75

Course meetings (first term)

- Team meetings: time and location TBD (1 hr, weekly)
- Division meetings: time and location TBD (0.5-1.5 hr, weekly)

Units (default = 3; file signed add card by end of week 3 to change)

- 3 units: participate in one design team; meetings + help with design, presentations
- 6 units: additional design work and/or participation in second (non-design) team
- 9 units: even more design work; required for all team rep roles

Grading

- 20% Homework (weeks 1-4 only)
- 20% Subsystem presentations (team effort)
- 40% Documentation of work for the term (individual writeup)
- 20% Participation (attendance, discussion, contributions)

Collaboration policy: full collaboration *required*. (Write up your own final report)

Signup sheets due Wed (30 Sep) at 11 am in box outside 237 Gates-Thomas