The Importance of Solar Car Project Management

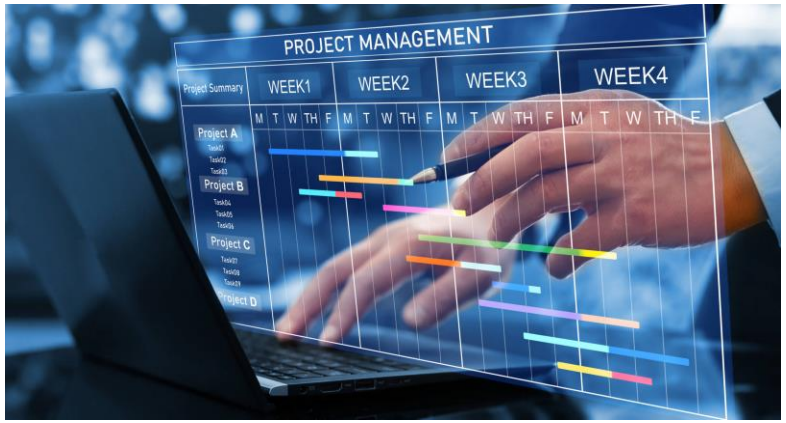
William Shih, Deputy Race Director

Solar Car Projects are complex...

- Involves multidisciplinary teams (mechanical, electrical, power, business)
  - How do these teams work together?
- Takes a long time
  - How do you ensure that the project is done on time?
- Requires development of new skills
  - How do you know whether teaching resources are appropriately allocated?

Project Management helps…

- Break up the complicated into simpler pieces
- Develop the roadmap for how to get there from here
- Flesh out dependencies between teams
  - “Just-in-time” manufacturing
- Set trip-points for evaluation
  - Am I getting done what I need to get done in time?
- Prioritize work on a week-by-week basis
  - Do work on the critical path



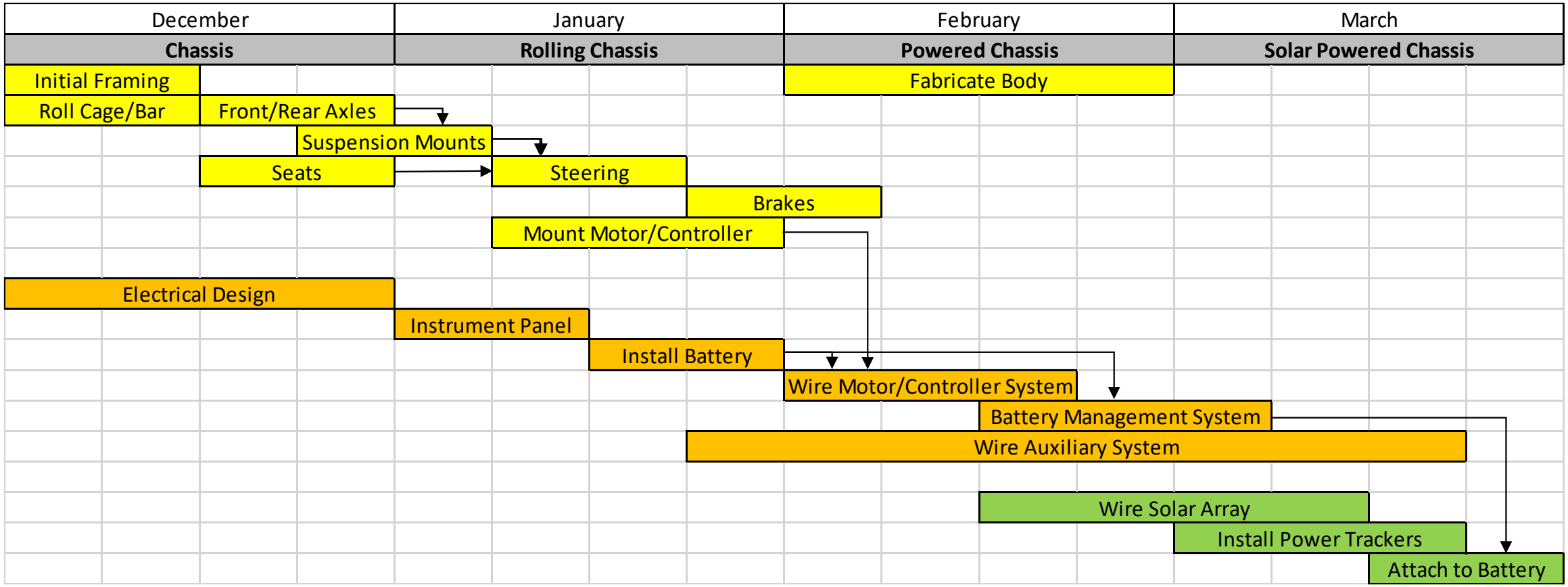
How do I manage a project I've never done before?

- Solar Car Challenge provides Project Planning Calendar
  - September: Organize team, develop calendar, prepare presentations
  - Early October: Preliminary design, budget, construction timeline
  - Late October: Fundraising, purchasing plan
  - November: Purchase parts
  - December – March: Prototype & build
  - April: Re-engineer car, as needed
  - May – June: Test, test, test!
  - July: Arrive at the race prepared!

OK, how do I develop a construction timeline?

- Break up project into major systems: mechanical, electrical, power, business
- Then break each system into subsystems:
  - Mechanical > Frame, Suspension, Steering, Brakes, Drivetrain
  - Electrical > Propulsion (motor/controller), Auxiliary (instrumentation)
  - Power > Batteries, Array
  - Business > Fundraising, Community Events, etc.
- Note dependencies between subsystems:
  - Suspension must be completed before steering
  - Batteries must be in place to power motor/controller
- Break down into tasks based on solar car design and allocate time
  - Attempt to finish by March to leave leeway for late tasks (critical chain)
  - Be aggressive and finish early
  - Don’t eat into your re-engineering/test time!

Notional Schedule

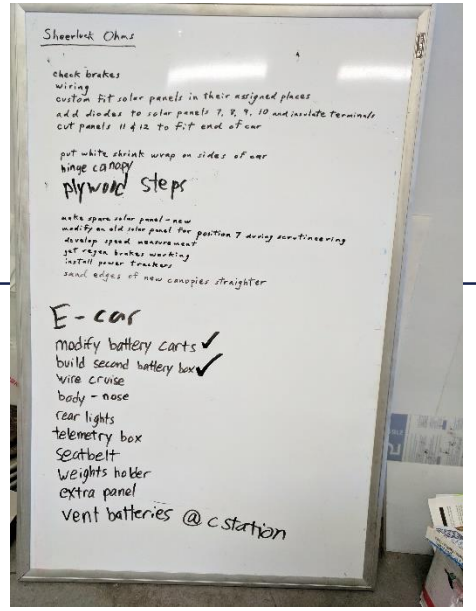


Break down tasks into individual “to-dos”, assign to team member

- Example: Steering
  - Determine location of steering wheel/column, rack-and-pinion
  - Install front wheels
  - Install rack-and-pinion
  - Fabricate steering rods
  - Fabricate mounts for steering column/wheel

- Every task should be broken down into something achievable in a given workday
  - Provides a sense of accomplishment
  - Gives team members responsibility

An example workday



- **Advanced Division Car**
  - Install front frame bulkhead
  - Rivet in steering support angle
  - Install steering column and wheel
  - Make wiring schematic
  - Run electrical conduit
  - Install headrest
  - Experiment with A/C charger
  - Build access stairs

- **Electric-Solar Powered Division Car**
  - Fabricate steering tie rods
  - Fix rear suspension
  - Install throttle pedal return spring
  - Paint steering column and mount
  - Install chain
  - Mount instrument panel

In an ideal world… all tasks are accurately identified and finish on-time

- Account for unplanned tasks
  - When things get installed in the car, you might see conflicts/issues with preliminary design
  - Revise schedule weekly with updated tasks (“living schedule”)
- Account for delayed tasks
  - Some tasks are more complicated than expected
  - Plan for slippage!
- Be aggressive in planning
  - Tasks will never take less time than you planned!
  - Challenge team members to complete tasks

Summary

- Project management provides method for assigning tasks and tracking progress
  - Allow for reallocation of resources to keep project on schedule
- Proper project management planning identifies dependencies and ensures that parts are available when needed
- Be ready to modify schedule on a weekly basis to account for unexpected/unfinished tasks
- Budget schedule for contingencies

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