Mission 2017: A View of its Life Cycle from 1800 Miles Away

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My background

- Mentor for several Mission Classes (Floods, Fish, SW Water, Air, Food, Biodiversity, Rare Earths)
- MIT SB/SM Course 2
- Engineering Consultant (Primarily in energy/power production)
- Mission Cheerleader
- Why do I do this?

Mission Problem vs. Classical Problems

- Classical: Often well defined, deterministic or close. Needed input is clear. Final solution is quantifiable and usually verifiable.

- Mission: Often open ended, underdefined, nondeterministic, not quantifiably verifiable. Often long time scale.

Mentors

- The alumni mentor group is like a consulting company for Mission teams
- A lot of experience, not necessarily in topic
- Eager to help, but don't know "the answer"
- Hoping to be asked to play

How mentors can help

- Critique logic of teams
- Suggestions in the context of experience
- Listen to ideas
- Sanity checks

- But: we are not usually subject matter experts
- We shouldn't be proof readers
- We can't do the project. You will (already!) know a lot more than we do.

Getting pointers

Mission "Life Cycle" (my perception)

- September 1-15: Class and topic introduction, team formation
  - (They haven't told me how to do this, but I'm sure they will soon.)
  - Remote view: Lectures, resources posted. Not much communication with class.
- September 16-30: Team meetings, Mini-project assignment, Library and other resources
  - (So, team, what are we supposed to do? Let's make some assignments.)
  - Remote view: Some teams post and talk a lot.

Look familiar?

Life Cycle

- October 1-31: Complete mini-project, web design
  - (Post more stuff on wiki. 8.01 problem sets are killing me. Better focus on that. I don't actually have to do the Mission stuff today.)
 - Remote view: Things get really quiet on e-mail.

Life Cycle

- November 1-8: Your final presentation is in a month. Your website is due before Thanksgiving.
  - (Class and team leaders: Please get your input in, we're trying to pull things together.)
  - Remote view : Some drafts are sent for review. Increasing e-mail traffic, sense of looming panic.

Life Cycle

- November 9-18: "It's 2 am, we're working in the Terrascope room, and we have FOOD. Please join us!"
- "We need your input NOW"
  - (What? In TWO WEEKS? AAARGH)
  - Remote View: Increasing panic. Team leaders and UTFs try to encourage and gently motivate (or butt kick). Intense e-mail traffic

Mission 2016 Activity
(e-mails per week)
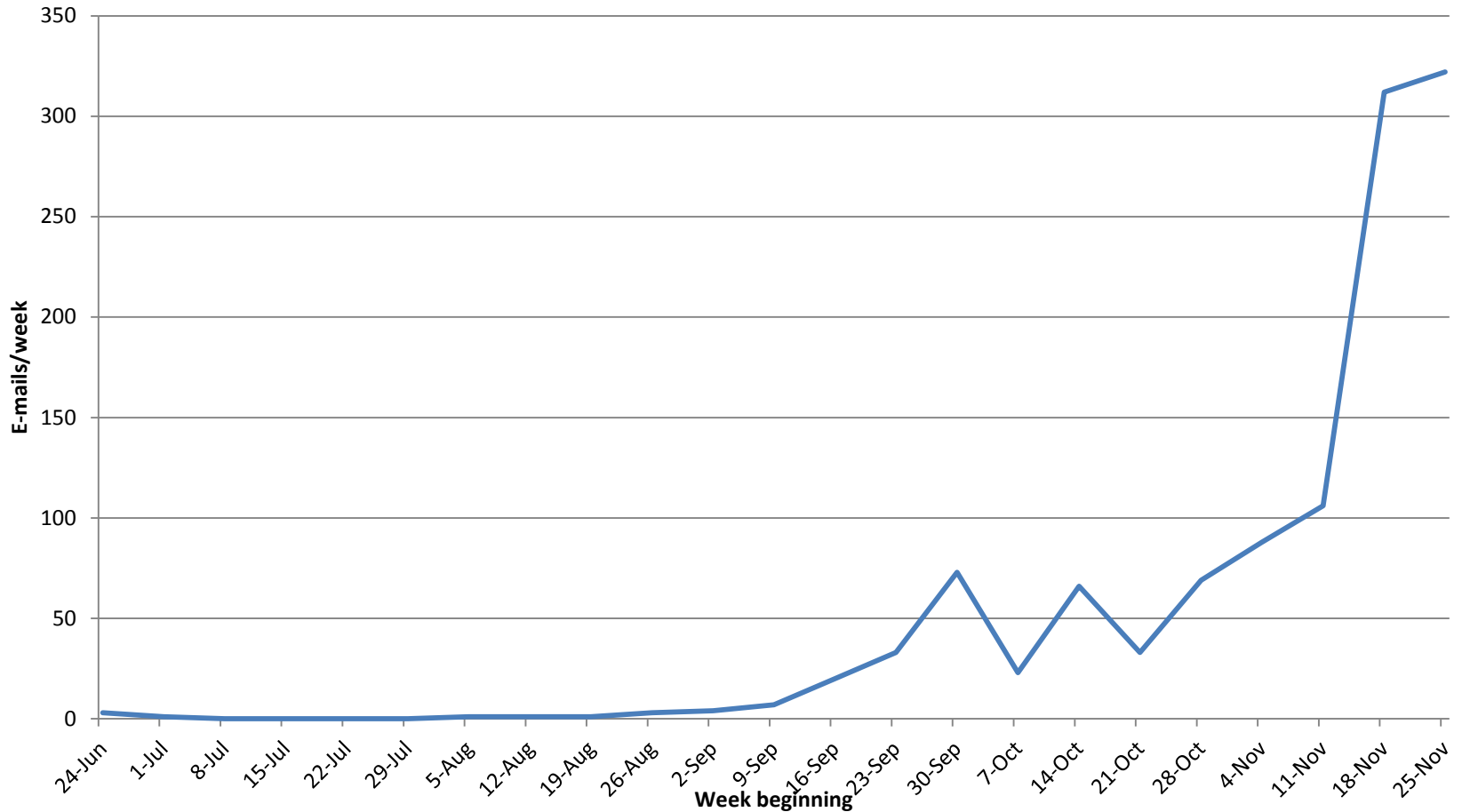
Life Cycle

- November 19-30: Thanksgiving Break
  - "We are going to be working non-stop over this whole break to get website and PowerPoint drafted and revised, and we STILL don't have input from these people. We have Food and BROWNIES in Terrascope. *PLEASE COME HELP!*"
  - Remote View : E-mail at 2 am: "I'm sorry to bother you, but would you please review this? We're trying to get it done before morning"

Life Cycle

- Presentation week: "Rehearsals and Q&A sessions tonight and tomorrow, until we're done.
  - "Guys, wear shoes AND socks – not white".
  - "Girls, if you're wearing heels, practice walking in them"
  - Remote view: What's the webcast address?

Life Cycle

- The presentation was brilliant. Thunderous applause. (That never happens with an 8.01 P-set)

- Faculty and UTFs are actually smiling.

- Remote view: Like watching the Super Bowl, for mentors and other Mission groupies. Pass the wine.

- **What? Finals are in 10 days?**

Oh, Dam!

Suggestions

- Start defining your problem early. Build a time line by working backwards. Stick to it.

- What pieces are essential to a solution?

- How will you know when your solution is complete?

- Each person is part of a chain of activities. If you delay your part, you delay the people "downstream". Everyone is on critical path.

Build on individual work

Suggestions 2

- Use October well: That tends to be lower activity

- Call for help when you need it: Team, Class, UTFs, Mentors

- Help out with things other than your own assignments.

Suggestions 3

- Think about the life cycle of whatever you are studying
- Think about developing a systematic structure
- Validate your results as well as you can
- Consider opposing viewpoints.

There's more than one viewpoint

Caution 1: Data

- You'll know a lot about the topic as a group.

- Each person and group will be an expert on some piece.

- INTEGRATE and SYSTEMATIZE: The final project is not a huge data dump from everyone.

- It's more about defining a process than about the immensity of unconnected data.

Caution 2: Numbers

- Understand and validate any numbers you use, where they come from, and what they mean

- Your audience are mostly technical types. They LIKE numbers. If you state a number that doesn't make sense, they will jump all over that.

- DO a critical sanity check.

Numbers - Example

- During the typical Mission Fall Term, over 3×10^{14} Brownies are consumed (Ridiculous? Yes. Have we seen similar claims? Also yes.)

Caution 3: References

- Be very critical of what references you cite: we (your audience) will.

- Having a statement in print, or on the internet or even in Wikipedia doesn't make it true.

- A single source doesn't prove anything. Is your information broadly supported?

Talk to the experts

Primary sources

Finally

- Enjoy this process.
- This thought process, though frustrating, undefined, intense, will develop abilities that will be valuable through your academic and professional careers
- After you survive, put a bullet on your resume about the mission effort. I hire people. I look for the kinds of abilities you are developing. Others do too.

This can be fun!