

SIG 1 Virtual Meeting #3, Aug. 18th, 2015
Amy Lo's Notes

Caveat: I summarized comments rather than type verbatim, hopefully got the gist right. My apologies for any inaccuracies. The chat transcripts are shown in italics and should be verbatim.

Dashed lines separates discussion topics; italics indicate comments from on-line chat. I've tried to place them in context of the voice discussions, at least chronologically.

Attendees:

1. Presentation by Scott: notes only contain info not in explicitly Scott's charts

Meeting structure

- 1:00-1:30 Introduction and Summary of Current Status
- 1:30-3:30 Discussion of Draft Report
- 1:30-4:00 Path Forward, Additional Writing Assignments?

Initial list of 4 missions actually says UV/Optical/IR surveyor, does not include the word "large", should we change our references? To discuss later.

Upcoming:

Aug. 20, COPAG Virtual Townhall

Oct. 7th, deliver report to APS (Paul's deadline)

Oct. 22 and 23, APS meeting in DC

Plan for a final report around mid September, current draft is in good shape.

ExoPAG/COPAG concerns that each PAG's science is a descope option for the other.
Working out with COPAG on a joint statement, to be discussed

Shawn Domagal-Goldman: Nice summary, Scott.

Discussion

Authorship.... No comments, if folks would like to be added, send email to Scott with (short) affiliation.

Aki Roberge: Yes

Mark Swain: yes

Aki Roberge: Concur on authorship

Aki Roberge: Are all the co-authors getting the drafts by email? Some might not be on the exopagannounce mailing list.

Specify COr (Cosmic Origins) science with HabEx?

Scott: likely don't want to advocate CO_r science, the STDE should explore the range of architectures possible, and don't want to get into the specifics. This is where Ken and I arrived at.

Mark Swain: agree

Shawn Domagal-Goldman: Scott, in my opinion that's a great way to summarize the exopag side of this.

Aki: are we short circuiting Paul's intention by calling out HabEX with CO_r science, isn't HabEX specifically named as a chance to descope the CO_r science?

Scott: talked to Paul, and he called out 2 missions for a reason. There is a subset of folks that want to merge the two missions. I think he's looking for 2 price points (Paul has not denied this) and there's a natural break at 8m. CO_r will already have JWST. So I think these should be separate. By saying CO_r should be part of HabEX, we're saying this is an Exoplanet driven mission, but CO_r is baselined. It isn't in conflict with what Aki said.

Scott: ultimately, STDT will be charged by Paul, not by what our report says. We may bring more trouble if we say we can descope the CO_r science and alienate COPAG.

Shawn Domagal-Goldman: "Primary science goals: • Direct imaging of Earthlike planets. • Cosmic origins science enabled by UV capabilities; considered baseline science."

Shawn Domagal-Goldman: ^ That was from the table's column for HabEX

Aki: saying that Exoplanet and CO_r are "equal" really makes HabEX a descope of CO_r

Scott: I don't think we're saying that, we're just saying we're not going to e.g. throw overboard UV capability just because it makes coronagraphs more challenging.

Aki: that's fine, we just need to realize it's punting the question down the line

Scott: yes, that's what Ken and I discussed and agreed that we don't know enough to make a decision and let the STDT figure it out

Aki: that sounds fine

Wes: focusing on the diameter of the telescope is too narrow, I'd rather we focused on the instrument capability. Re: WFIRST, the community is happy because it has a huge # of pixels and large FOV. I think wavelength coverage and FOV is at least equal with diameter of the telescope.

Scott: I agree. I've wanted to put a diameter to distinguish between HabEX and LUVOIR to distinguish them, and there is a technology difference.

Wes: but we're focused on science, not technology

Scott: yes, I think we're threading a needle, we have to be specific enough to say yes, this mission ought to be studied. If we just used a general name, say, 2030 Space Telescope, do you want that to be studied? No one knows what it is because it's not descriptive. You have to give it some definition, aperture, sensitivity, wavelength, etc.

Wes: I agree, but you just mentioned wavelength, so we can specify we want it to do X instead of specifying the transmission or wavelength coverage.

Eric: text in the table seem to imply there are some things that are "necessary" when we call it "baseline" or "significant", and while we don't want to exclude anything, we may [be so inclusive] that we get to a place where the mission seems too expensive.

Scott: yes, we certainly don't want that, but we have the caveats in place. I don't think the STDT will get handed this table as a starting point.

Shawn Domagal-Goldman: (I had my hand raised, but Scott just made the point I was going to make.)

Aki: I share the nervousness of sticking in the specificity of UV. COr considered baseline or something, the current text seems overly prescriptive. It seems to say if HavEx doesn't have UV, we shouldn't do it.
Scott: yeah, I can see how it says that. [it will be changed]

Shawn Domagal-Goldman: How about:

Shawn Domagal-Goldman: "Cosmic origins science, for example enabled by UV observations, considered baselinescience.

Aki Roberge: Shawn: nah, just take out UV. "Cosmic origins science capabilities considered baseline"

Shawn Domagal-Goldman: I'm fine with that, too.

Scott: so are people happy with this paragraph?

"The COPAG and ExoPAG concur that, in order to ensure broad support for the HabEx and LUVOIR missions within both the exoplanet and cosmic origins communities, significant science capabilities in both topical areas must be baselined for these missions."

Our goals is not to fracture the community at this point in the game. If we can get a bigger mission to do better, great. Don't think anyone disagrees?

(no hands raised)

Shawn Domagal-Goldman: IMO, yay!

[general agreement with paragraph]

Prioritization? Folks suggested we put HabEx first.

Scott: I think this promotes infighting. Suggest we just list the missions in the order they were presented in the white paper.

Aki Roberge: Putting HabEx first will piss off COPAG for no good reason

Aki Roberge: Mission ordering is fin

Aki Roberge: fine

Mark Swain: yes i'm fine

Shawn: I wrote it with LUVOIR first, so we may just want to wordsmith the transition.

Scott: yes, I did edit some, but make sure I didn't lose the meaning.

[general agreement with no prioritization]

Do we leave the "large" in for LUVOIR?

Shawn: it's one of the things we've been using to differentiate LUVOIR from HabEx.

Scott: there's been pushback on differentiate using aperture

Scott: I think we should leave it in. There was a reason why the roadmap called it Large.

[general agreement to leave in “large”]

Do we include biosignatures?

Shawn: I don't want the STDT to think we require biosignature or need to detect it [to be successful]. I want it to be on the table and have capability. Both Exo-S and Exo-C have capabilities, so the next flagship should have significant capabilities, but we don't want to [over]promise.

Mark Swain: Shawn - we need care to make sure biosig is not a requirement for HabEx

Mark Swain: at least that is my view

Mark Swain: that sounds like a requirement

Scott: “search for” doesn't guarantee you find it. Mark you want to make a comment?

Mark: I want to make sure it doesn't become a requirement [which can really strain the capabilities of the system]

Scott: maybe we can say for “favorable targets”?

Shawn: but I don't want to design any direct imaging without the capability to detect biosignatures

Scott: Shawn can you write a few words that biosignatures are needed for favorable targets?

Shawn: we should also say something like the standards for detection of bio sigs are not clear.

Scott: I thought we had something

Shawn: maybe I did put it in.

Wes: not sure why we're going down the biosignatures route. A few things, 1) why is biosig line in LUVOR and not HabEx? 2) if we've defined our wavelength properly, we should have capability for O₂ and others. The question is whether you want to extend into the Near-IR to get CO₂ or methane. I'd advocate to take out biosignatures from LUVOR, and put search for Signs of Life in HabEx, because it's the Hab part of HabEx.

Shawn: the word we use for sign of life is challenging, we'll expand the section below on biosignature standards

Scott: how about we do search for biosignatures in favorable cases

Mark Swain: Scott - I can't figure out how to raise my hand. I have a time constraint so if we are going to discuss the table with my input, can we do it soon?

Mark Swain: A point of HabEx can be to search for habitable worlds, which is different than searching for signs of life

Aki Roberge: Leave the table the way it is

Aki: habitable is not the same as inhabited... we can't only look at 1 molecule.

(discussion on habitability, detection, etc)

Scott: how about “Search for potential habitability” in HabEx, and “search for biosignatures” in LUVOR.

Aki/Wes: agree

Scott: Shawn has an action item to provide words on biosignatures.

Mark Swain: Agree with Aki

Eric Ford: Would it be heresy to suggest we replace the term "Earthlike planets" with something more realizable? (see next discussion)

Scott: THEIA vs. Theia

Clarify it's an ESA mission vs. the Kasdin et al mission.

[general agreement to clarify]

Shawn: there's a discussion in chat that we should pay attention to

Eric Ford: Would it be heresy to suggest we replace the term "Earthlike planets" with something more realizable?

Aki Roberge: What do you suggest, Eric?

Mark Swain: temperate terrestrial planets?

Eric Ford: Maybe "rocky planets in the habitable zone"?

Eric Ford: Or what Mark said

Ravi Kopparapu: Well, we don't know if they are temperature

Ravi Kopparapu: temperate

Ravi Kopparapu: Mark Swain's suggestion is good

Aki Roberge: Temperate terrestrial isn't bad, but this isn't a vital issue right now

Wes: what is earthlike? How earthlike? TV sets?

Aki: I suggest we don't go down this rabbit hole.

Eric: but we are reinforcing it?

Aki: from the instrument side, there's particular meaning to the baseline planet you are designing for e.g. Earth albedo is low, 20% [studies suggests this is the lower limit for habitability].

Scott: how about we say "earthlike is loosely defined"

Wes: how about we add in the albedo of 20%

Scott: but we don't know the albedo of these planets?

Aki: just put in "earth size with a habitable zone and albedo of 20%"

Scott: why are we putting in albedo?

Aki: 20% is about the lowest albedo for a habitable planet.

Scott: but we're going to look for rocks, and figure out if they are habitable

Ravi Kopparapu: Eric's suggestions also good "Rocky planets in the HZ"

Shawn Domagal-Goldman: direct imaging of planets of Earth-like size and insolation

Shawn Domagal-Goldman: (but now we're getting wordy)

(discussion on habitability... albedo, ocean reflectivity, diameter)

Scott: how about "a terrestrial planet in the habitable zone of its parent star"

Aki: you don't want to say anything about atmosphere?

Scott: no, we want to leave it open

Aki: one of the outcomes of Chris Starks' study is the importance of the atmosphere. Do we need to be capable of characterizing Mars? Whereas characterizing Venus is easy.

Eric: how about just earth analogues?

Aki: I'm ok with that

Wes: we are overspecifying things

Scott: people are overly worrying about this table, it's gonna get thrown out!

Eric: my concern is [unrealizable goals]

Scott: I appreciate the thoughts here, Paul will read the joint statement, and then he's going to throw the report in the garbage. Paul has said he is going to hand the STDTs a blank piece of paper to get started.

[some more discussions that wasn't coherent enough to write down]

Scott: let's get to some consensus... "Direct imaging of Earth Analogs, Search for potential habitability"

Aki: I'm good

Eric: but include the footnote you have

[Scott will finalize in next version]

Space based high contrast mid IR interferometry
(no significant comments)

Transit characterization

Scott: Mark I included and = edited what you wrote, can you check it to make sure it's ok? [Scott reads the text in the draft]

Mark Swain: i did read it, it was fine

Mark Swain: yes, agreed

Scott: can we remove the table? It's confusing. Do you agree Mark?

Mark: yes

Scott: Aki, your concern about transit doing habitability in this section?

Aki: see p. 12, where it says ...include the handful of temperate terrestrial planet to search for habitable condition. Even JWST will struggle, and these will be M dwarfs. So if you don't know a lot about it, this point may be confusing.

Scott: I'll clarify this section

Shawn: I'd add "potential" before habitable

Mark: I'm up against a deadline, do you need anything else from me?

Scott: No, this is what I wanted to go over.

Astrometry probe mission.

Scott: Aki are you concerned that it's too detailed

Aki: it's more detailed compared to the other two

Scott: we spend time on transits too

Aki: but it applies to HabEx and LUVOIR

Scott: ok, we can streamline

Aki: yeah, the more general astrophysics parts are not our thing

Scott: ok, we can cut that down. Is Mike Shao on? In speaking with Mike, I added that astrometry can identify targets for direct imaging and getting mass measurements.

Aki: I have a problem with using the word precursor for the astrometry mission. I have a bad feeling this is going down the SIM thing again. Unless you do a starshade.

Scott: Should I add a part to do with a starshade?

Aki: I have issues with the precursor part, not the mass measurement part

chuck Lillie: Chuck: A starshade with a modest telescope could do characterization

Scott: ok, I'll work on that, and make sure to mention the mass measurement.

Scott: Post to X-archive?

No comments from folks

[general agreement to post to X-arch]

Scott: so I'll do some clean ups, and send out a draft within a week.

Scott: anything else?

Shawn: we should mention standards on yields, coronagraph performance and starshade performance,

Scott: ok [adding section on Standards Team]

Scott: thanks to everyone for their help! We're very close!

Chat window dump

The chat history has been cleared

Shawn Domagal-Goldman: Nice summary, Scott.

Aki Roberge: Yes

Mark Swain: yes

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Mark Swain: agree

Shawn Domagal-Goldman: Scott, in my opinion that's a great way to summarize the exopag side of this.

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Wes Traub: Wes

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Mark Swain: Agree with Aki

Eric Ford: Would it be heresy to suggest we replace the term "Earthlike planets" with something more realizable?

Aki Roberge: What do you suggest, Eric?

Mark Swain: I second the habitability wording as it stands now in the table - good clarity

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Scott Gaudi: Can we make sure we capture the chat window again? Thanks!

Amy Lo: got it all