Background Information for speakers of Subaru International Partnership Science & Instrumentation Workshop

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Basic framework of partnership

- Subaru/NAOJ would like to pursue ‘partnership’ rather than providing telescope time on nightly basis
  - To create broader ‘Subaru community’ to enable:
    - Future collaborative science programs
    - Coherent future strategy
    - To promote strong science cases
    - Joint technical development programs
- In the current scope, Subaru Telescope will continue to be a part of NAOJ, with contributions from partners.
  - Assuming more than half of operation budget will come from NAOJ.

Information provided in this document

1. Telescope time access framework
2. Contributions
3. Governance / Organization
4. Timeline

- Note: all the ideas on the Subaru Telescope partnership in this document is still under discussion and may change.

1. Telescope time access framework

- Telescope time categories
  1. Regular open-use time
     - Includes Time Exchange Programs and Guaranteed Time for instrument developers
  2. Subaru Strategic Programs (SSPs)
  3. University of Hawaii (UH) time
  4. Director's Discretionary Time (DDT)
     - 25% of nights for SSPs
     - Engineering time
     - Staff time

Sub-categories in Regular open-use

- Normal Program: single semester, up to 5 nights
- Intensive Program: up to 40 nights in total, up to 6 consecutive semesters. Up to 20 nights in a semester.
- Service Program: up to 4 hours with limited number of instruments
- Time Exchange: currently Subaru is exchanging ~5 nights/semester with Gemini and Keck, respectively.
- Queue-mode: HSC is offered in queue mode, with no lower limit of requested hours.

Subaru Strategic Programs

- Basically, the existing SSPs have their own collaboration framework, and Subaru partners will not 'automatically' join these collaborations.
- HSC SSP (2014-2019?)
  - Collaboration of Japan, Taiwan, Princeton.
  - Having new institutional partners have not been considered.
  - The first public data release was just made.
- PFS SSP (2020?-2025?)
  - Large international PFS collaboration
  - PFS collaboration is still looking for new institutional members
  - Access to PFS SSP will only be made with agreement with PFS collaboration
- IRD SSP (2018?-)
  - No detail of membership has been discussed yet.
- In Subaru partnership perspective, we exclude these SSP nights from nights accessible by partners.
- However, we should think about future framework of large-scale programs with Subaru partners, to maximize the science outputs from the enlarged 'Subaru community'.

1. Telescope time access framework: Current rules

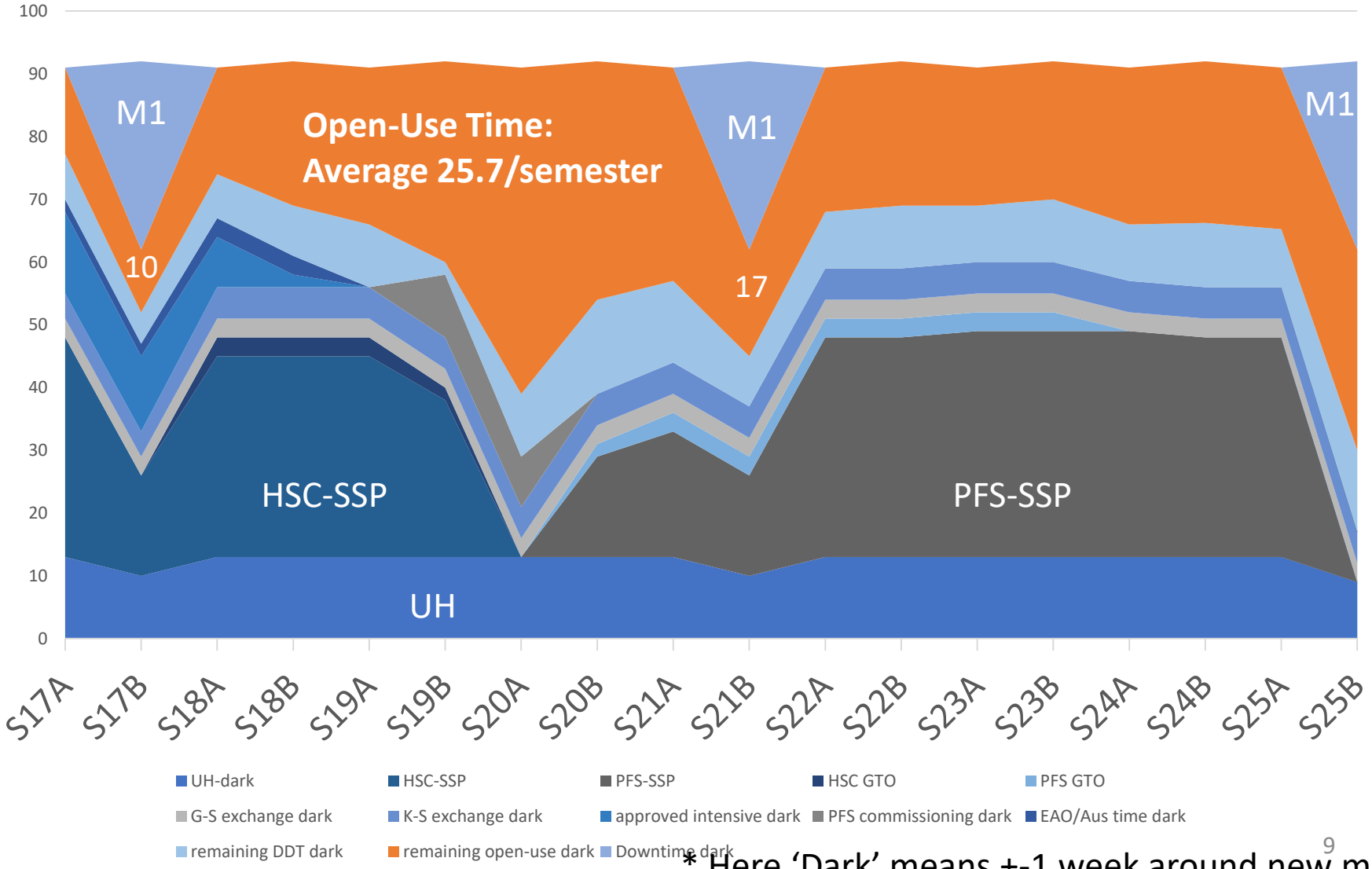
- 65% of available nights will be open-use (including SSPs, time exchange programs, etc.)
- 52 nights / year goes to UH time
  - If there's significant downtime UH has cooperated to reduce number of nights
- 20% of available nights to DDT (including 25% of SSPs)

- We assume regular open-use time will be shared with partners.
  - excluding time exchange with Gemini and Keck – unless partners want to have access to these telescopes through Subaru time exchange programs.

1. Telescope time access framework: Perspective of available open-use time

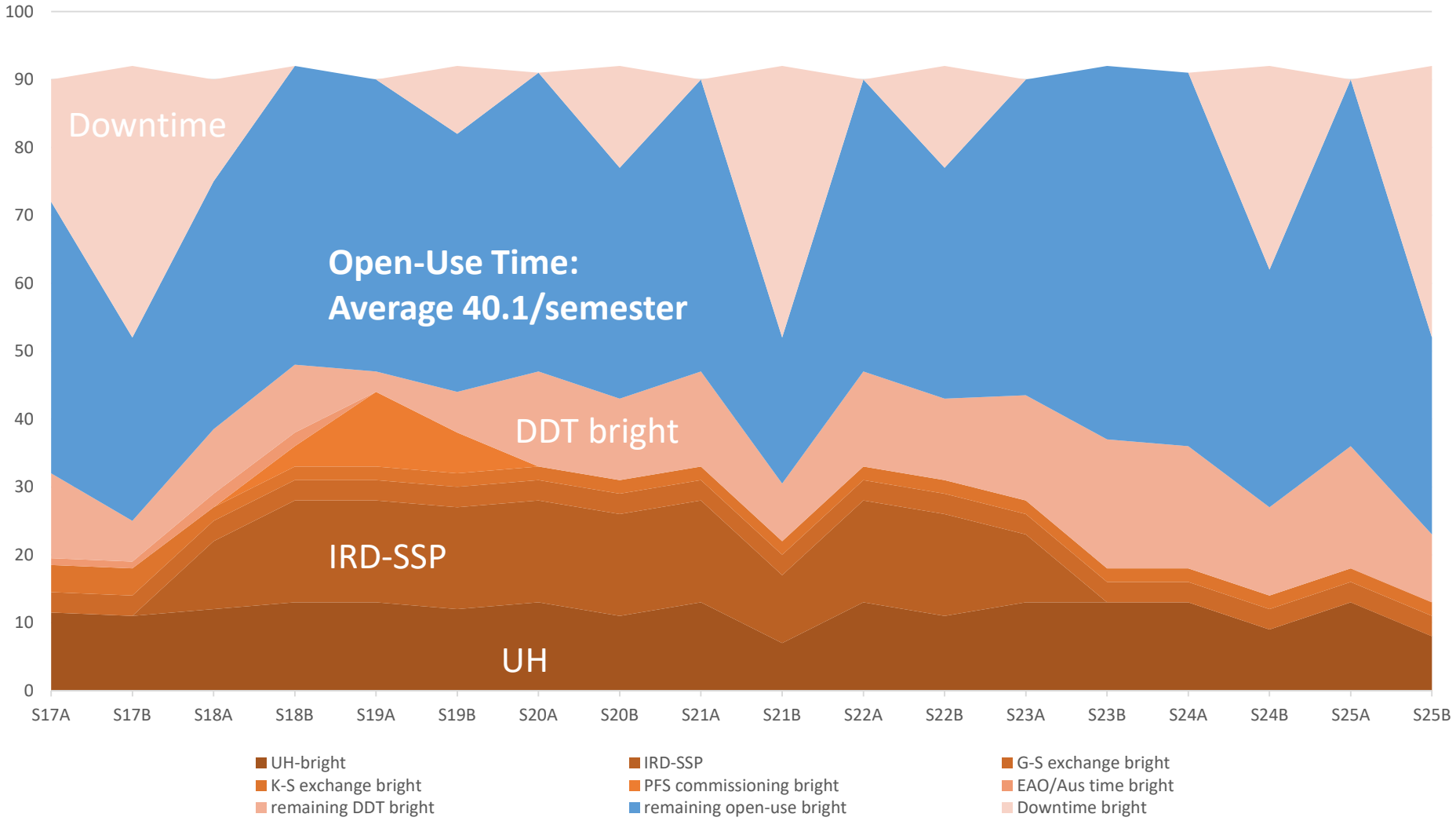
- We estimate the size of available regular open-use time in coming years, based on the latest information on PFS schedule, telescope maintenance plans
  - There are some on-going discussions about possible medium or large-sized programs such as Subaru-Keck collaboration, Euclid-support HSC intensive, WFIRST joint programs etc. These are not taken into account in the following graphs.
  - We assume that major downtime for maintenance will be made in bright nights except M1 recoating.

Telescope time – Dark*



* Here ‘Dark’ means +-1 week around new moon

Telescope time – Bright*



* Here ‘Bright’ means +-1 week around full moon

1. Telescope time access framework: Perspective of available open-use time

- Until 2025 there will be limited amount of ‘dark’ nights available for open-use, due to PFS SSP
  - 25-30 nights / semester
- Less pressure is seen for ‘bright’ nights
  - 40 nights / semester
  - Note: large program associated with ULTIMATE-Subaru is not considered.
- We will share these 65-70 nights/semester with Japan and partners.

1. Telescope time access framework: Telescope time allocation (draft)

- Single TAC
  - Programs are selected based on scores by external reviewers.
- Partner shares will be determined by their contributions. (see ‘2. Contributions’)
  - Some fluctuations per semester need to be allowed, due to scheduling constraints and scientific evaluation.
  - International programs (i.e., proposals from non-partner countries) will be allowed with some upper limit.

2. Contributions

- Cash contributions
- In-kind contributions
  - Upgrades of telescope, facilities, instruments
  - Contributions to the operations
    - Human resources
    - Contributions to improvements / cost reduction
- New instrument development as contribution?
  - In the past, development of a new facility instrument was not regarded as ‘contribution’ to the Subaru Telescope operations. Instead, the development team have obtained a privilege to propose SSP with the new instrument (for the cases of FMOS, HSC, and PFS). That does not mean that running SSP with the instrument is guaranteed; the SSP proposal need to be reviewed by SAC, TAC and experts.
  - To keep the fairness to the past developers, applying the same policy to the future instrumentation is one simple possibility. However, we should have some ways to promote collaborative instrumentation to strengthen the collaboration and competitiveness of Subaru Telescope. This could be one discussion topic in the workshop.

2. Contributions:
How telescope time is related (draft)

- Fraction of Japanese contribution among the total operation budget will determine the fraction of Japanese PI time:

Japanese contribution:

$$\frac{\sum (\text{Cash} \quad \text{Tech})}{\sum (\text{Cash} \quad \text{Tech} \quad \text{Cash} \quad \text{Tech} \quad \text{Cash} \quad \text{Tech})}$$

JP Partner A Partner B

- In the above equation, capital investment made by Japan is not included. Currently it is suggested that partners will be asked to pay 'membership fee' to be a Subaru Partner, which will be based on acknowledgement of current Subaru Telescope's value made possible by the Japanese investment.
- Time for SSPs will be included in 'Japanese PI time'. This means that partners are not asked to share operation cost required to run SSPs.

2. Contributions: a simple example

- Total budget: $25M
  - Japan: $15M (60%)
  - Partner A: $5M (20%)
  - Partner B: $2.5M (10%)
  - Partner C: $2.5M (10%)
- Telescope time in a year (365 nights)
  - Downtime: 10
  - Open-use: 141 (39.7%)
  - Time exchange: 24 (6.8%)
  - SSP: 90 (25.4%)
  - UH: 52 (14.6%)
  - DDT: 48 (13.5%)
- Available nights: 255 (355 – UH 52 – DDT 48)
  - Japan PI: 39 (+TE 24+SSP 90) = 153 = 255 * 0.6
  - Partner A PI: 51 = 255 * 0.2
  - Partner B PI: 25.5 = 255 * 0.1
  - Partner C PI: 25.5 = 255 * 0.1

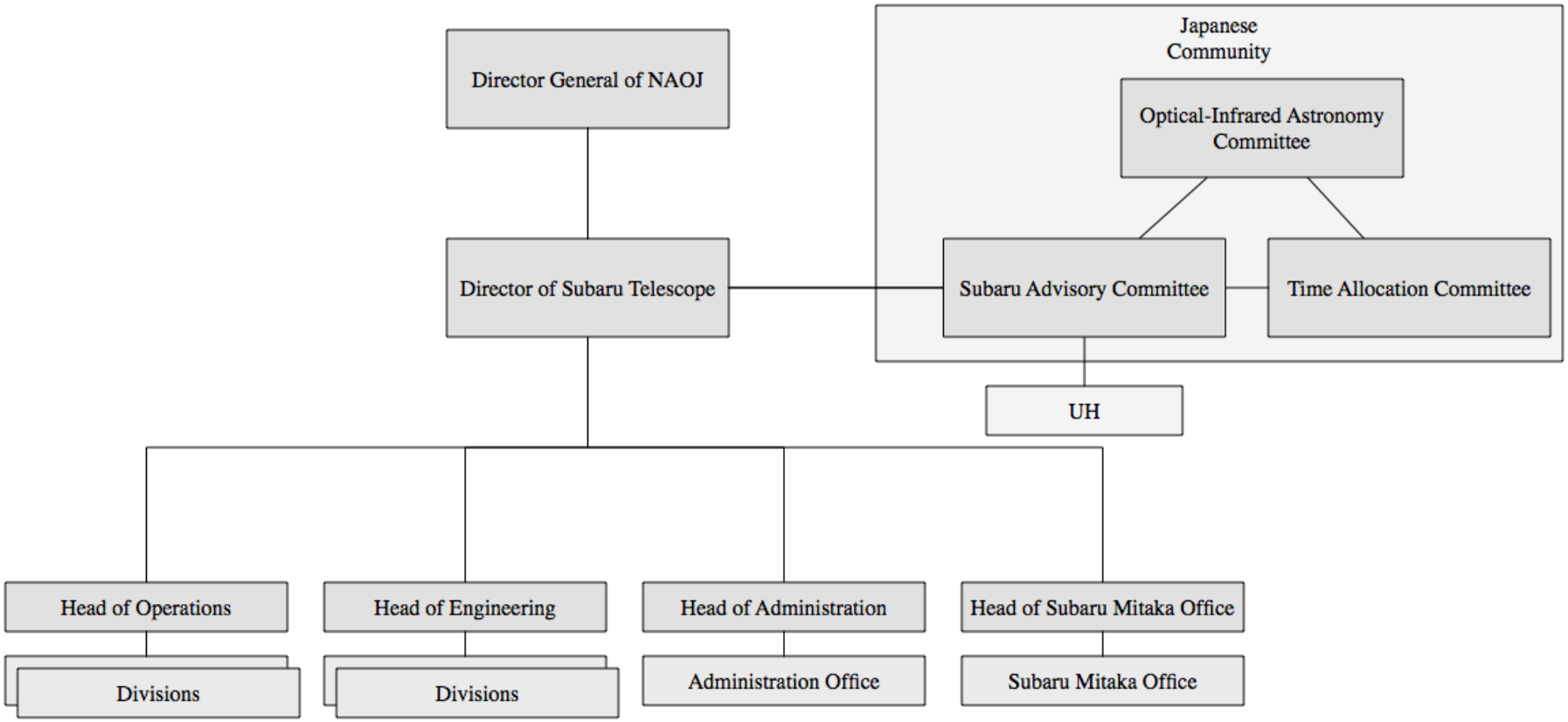
3. Governance / Organization

- The board
  - NAOJ director general and Japanese representatives
  - Partner representatives
  - Make high-level decisions on budget, strategic plan, and organization
- NAOJ director general
  - Has superior power over the board in some areas, such as appointment of Subaru Telescope director (who is NAOJ professor) and the existence of the project
- Roles of the board and NAOJ DG should be clearly defined.

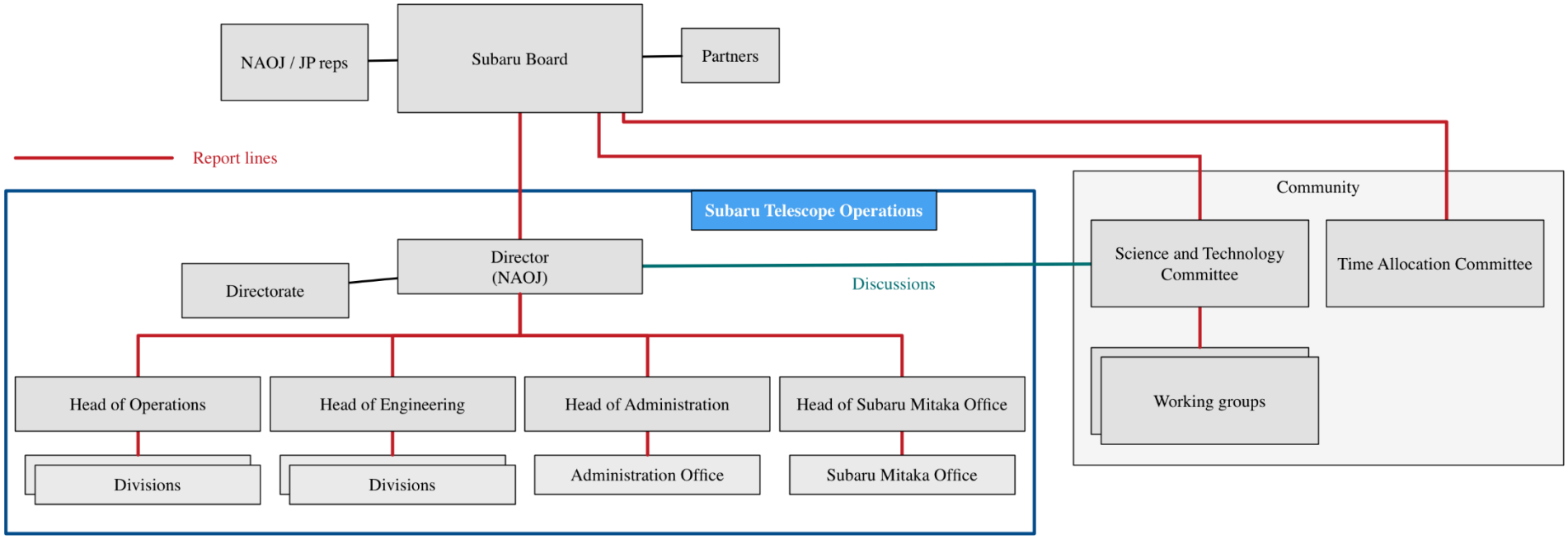
3. Governance / Organization

- Science and Technology Committee (STC)
  - Supersedes the roles of current Subaru Advisory Committee
  - Representatives of partner institutes / communities
  - The observatory consults STC on operation matters
  - Leading role to formulate future plans, instrumentation
- Finance
  - Each institute has responsibility of its contributions
  - Overall management: TBD
  - Fiscal year starts in April
- For the first 1-2 years Australia will join existing SAC until the board and other organizations are formed.

Current Subaru Organization



Organization with partners (Draft)



4. Timeline

- 2017
  - S17A and S17B: EAO time from DDT
  - Written agreement with AAL on short-term access
  - Technical collaboration with Australia
  - March 22-24: the first Partnership Science WS in Mitaka
  - Outline of long-term collaboration with Australia to be determined for funding process in Australia
- 2018
  - S18A, S18B, (S19A): Australia time from DDT
  - Agreement with Australia?
- 2019
  - S19B?: Long-term partnership starts with Australia?
  - Agreement with other partner candidates?
- Partnership agreement will be made and renewed for about 5-years, although we should consider future strategy in 10-years time scale.