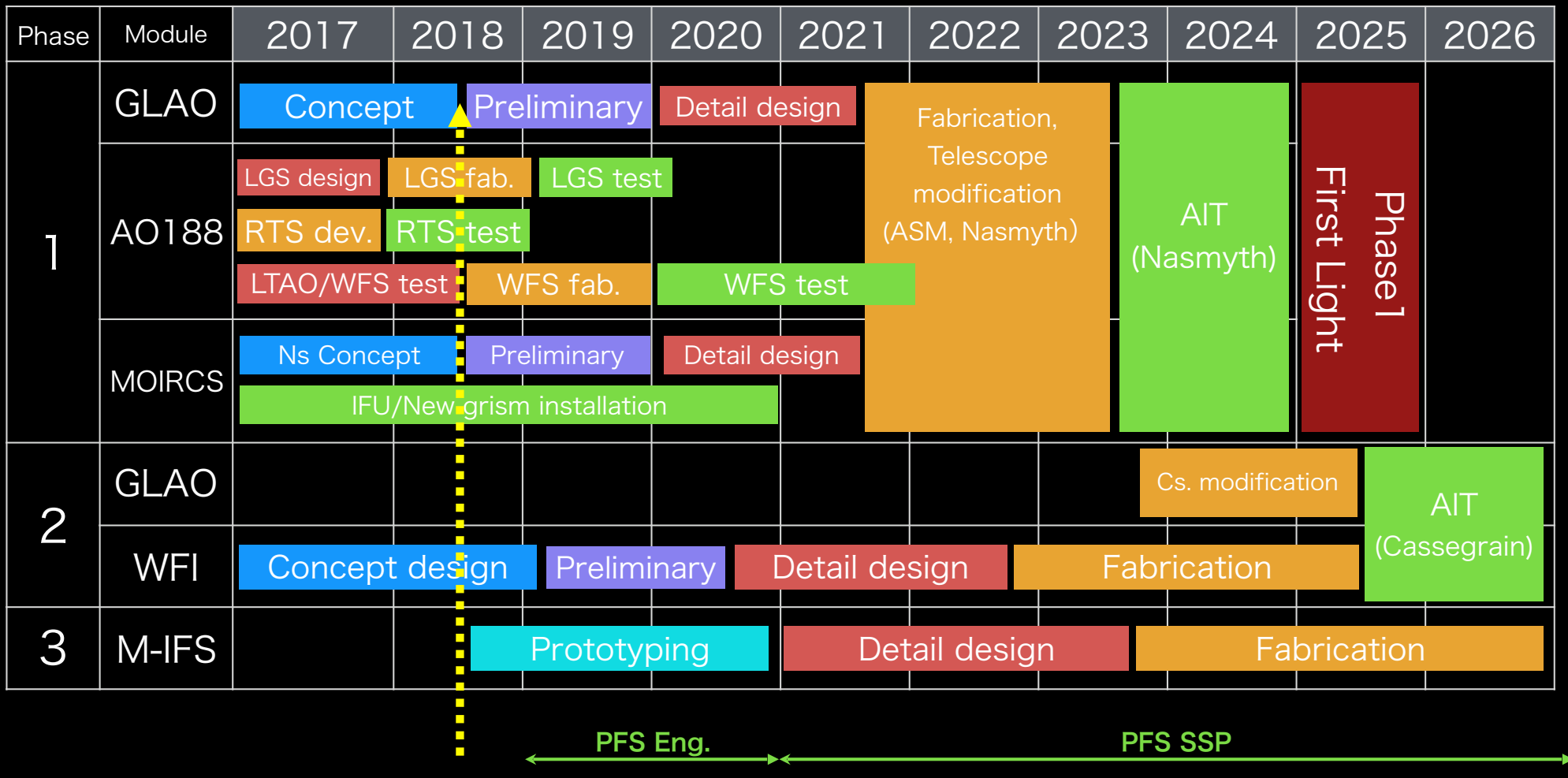
Discussion (I)
Project management

ULTIMATE-Subaru: Schedule



GLAO CoDR planned in early July, 2018

ULTIMATE: Schedule & Mile stone

Conceptual design of GLAO

- Scope of the CoDR 2018
  - GLAO performance model
  - Conceptual design of the GLAO WFS at Cs and Ns and LGSF.
  - Feasibility study of the ASM
  - Science case (assuming MOIRCS, WFI, and M-IFS as wide-field instruments for ULTIMATE) and requirements for the GLAO and instruments
  - Project management: More accurate cost and human resource estimation, framework of the international collaboration.

ULTIMATE: Schedule & Mile stone

Conceptual design of the instruments

- New wide-field instruments (WFI & M-IFS) is out of scope for the CoDR 2018.
- CoDR of the instruments after the GLAO CoDR, how?
- Collaboration is essential to move forward the WFI
- M-IFS concept has been provided by AAO a few years ago
  - Do we need prototyping of the Starbug to proceed to the next step?

ULTIMATE: Schedule & Mile stone

Uncertainty in the ASM development

- Big unknown in the schedule is when we can secure the budget to fabricate the ASM
- We are expecting NAOJ to allocate the budget around 2020 after PFS development is completed.
- ASM can be regarded as a part of major telescope upgrade after 20 years since first light.
- We cannot proceed to the fabrication for the other sub-systems or instruments without securing the ASM budget.
- We should consider the collaboration frameworks before and after securing the ASM budget.

ULTIMATE: Schedule & Mile stone

Step-by-step approach to implement ULTIMATE sub-systems

- Develop the sub-system for ULTIMATE through the upgrade of the existing AO188
  - ULTIMATE-START (LGS & SH-WFS)
  - RTS upgrade for AO188/SCExAO (advanced wavefront control with GPU based RTS)
- AO188 upgrade is planned in 2017-2021 before securing the ASM budget

ULTIMATE-Subaru can be benefitted from the upgrade of AO188

Three pillars of AO188 upgrade

1. Performance upgrade to keep the Subaru facility AO competitive in the world
   - Upgrade the existing capability
   - Maintain stable operation for next 5-10 years

   ULTIMATE-START (TOPTICA laser)

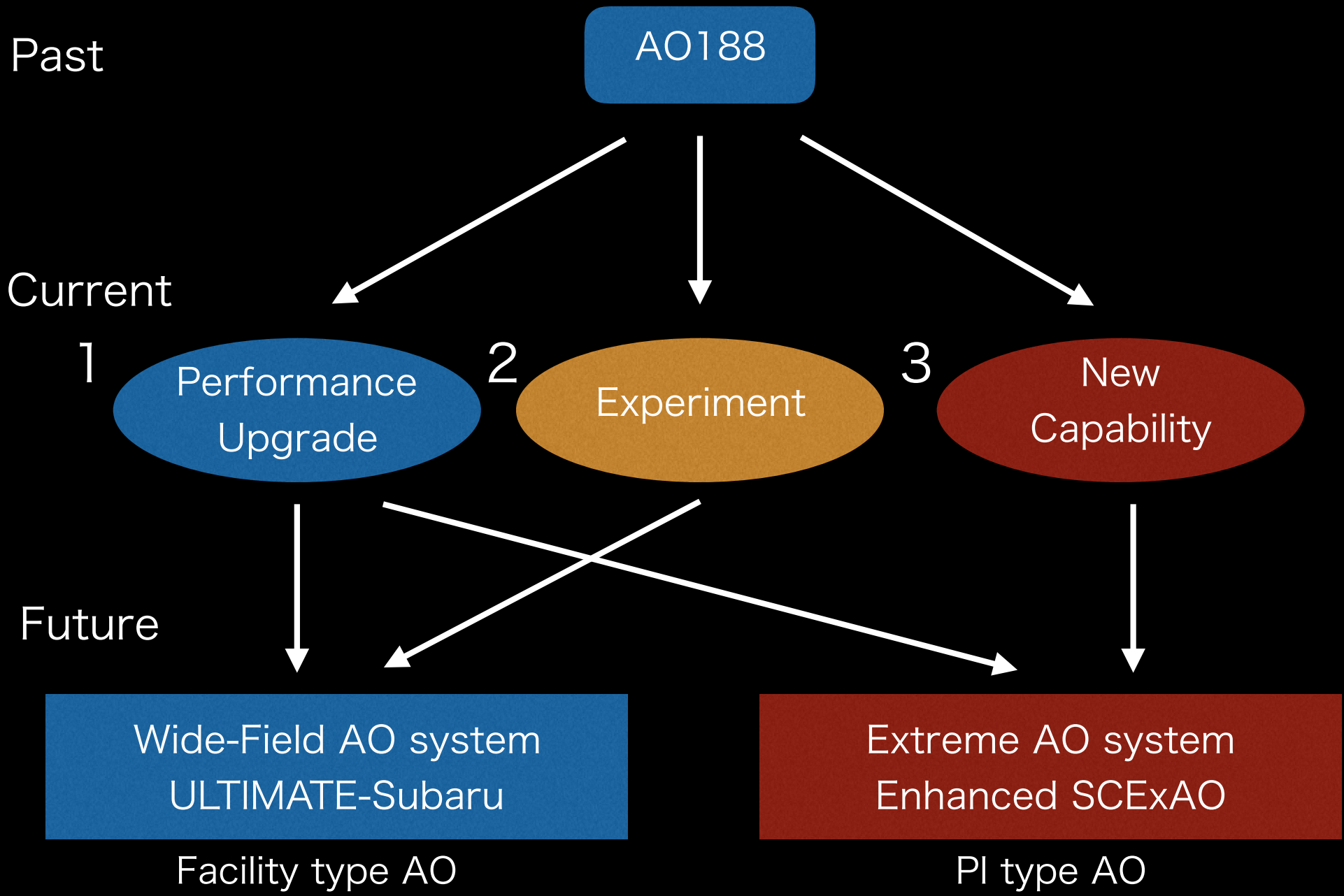
2. Develop a new technology to use for future AO system at Subaru and TMT
   - Develop technologies to be used for ULTIMATE-Subaru
   - Provide a testbed environment for a new technology

   ULTIMATE-START (LTAO)

3. Tie up with SCExAO to provide more organized wavefront control and enhance extreme AO capability
   - Control together with SCExAO
   - Develop and test advanced wavefront control algorithm

   GPU-based RTS

Future of Subaru AO



Collaboration possibilities

Before ASM

- Design and feasibility study for the GLAO sub-system and instruments
- Collaboration on the ULTIMATE-START or MOIRCS upgrade
- Science case development

After ASM

- Fabrication and test of the GLAO sub-system and instruments
- Software development (real-time control, instrument control, operation, pipeline, etc.)
- Commissioning
- Science case development and survey design for SSP

What Subaru can provide?

Before ASM

On-sky test platform for new technologies related to the ULTIMATE

- e.g., WFS prototype, Semi-conductor laser, fiber for M-IFS (OH suppression, K-band), tip/tilt control with ROI for H2/4RG, etc.

Limited access to Subaru Telescope time through institutional partnership framework

Internship at Subaru for ULTIMATE (including START) related development

After ASM

- Participate in the SSP program with ULTIMATE

Subaru full-partner can access to all of them as well as to contribute to the ULTIMATE

Immediate collaboration items

- ULTIMATE-START
  - Mechanical/optical design and fabrication of the mount for the LGS diagnostics and steering optics
  - Mechanical/optical design for the LTAO wavefront sensor unit behind AO188
- GLAO
  - Performance simulation (ongoing with ANU)
  - WFS/LGSF conceptual optical/mechanical design (ongoing with ANU)
  - Conceptual mechanical design of the Nasmyth instrument rotator (or image rotator)
  - Conceptual design of an ASM/WFS test bench
- Wide-field imager
  - Optical/Mechanical conceptual design
  - Wide-field corrector at Nasmyth and Cassegrain platform
- Multi-IFU spectrograph
  - Prototyping of Starbug positioner
  - R&D for the optical fiber (K-band, OH suppression)
- Technology development
  - Laser/LLT development (ongoing at ANU)
  - Testing the tip/tilt control with ROI readout for H4RG (or H2RG).