The view from the ground: Student perspectives and the future of the OFES workforce

Presentation to FESAC MFE Priorities Sub-panel
Bob Mumgaard, MIT Grad student

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MIT, Wisc, UCSD, Princeton, Texas, Washington..
for input for this talk.

Outline:
• Student perspectives and concerns
• The health of the university fusion programs
• Workforce development deficiencies
Students are concerned about program stability and future domestic capabilities.

- FY2013 proposed budget looks like decisions without a plan.
  - Students recognize budgetary constraints, eager for a peer reviewed, consensus, realist plan.
  - Students understand the fusion energy vision, want to know the who, what and when.

- Workforce instability is a deterrent to attracting and retaining talent.
  - Recognize fluctuations in funding is part of science.
  - Even in a restoration the damage is done.
  - Wary of competing against advisors for shrinking positions.

- Desire accessible experimental facilities.
  - Access to facilities a key driver for recruitment and learning.
  - Students worry about training as experiments at universities are dropped, faculty are not replaced and major machine runtime is reduced.
  - Excitement about new directions and priorities in program (i.e. PMI) tempered by seeing little shift in facilities or training.

- International collaboration in lieu of domestic facilities narrows potential applicants
  - Hesitant to join if it meant relocation overseas

Students worry about programmatic decline, want to stay in field but feel it is risky. Excitement for next steps overshadowed.
The health of the university fusion programs needs to be examined.

AT MIT:
- Magnet lab, LDX, C-Mod, VTF. ... soon nothing left.
- PSFC team still intact. But for how long?
  - Where does the accumulated knowledge go after facilities are closed?
- Despite efforts, many students are in a lurch.
  - Quit, transfer, change fields, stick it out?

Experience similar at other universities. Programs that remain wonder if they’ll be cut next.
FES program is not on a path to meet previously identified workforce needs.

- 2004 FESAC panel compiled workforce needs assuming:
  - Participation in burning plasma experiments (ITER and NIF)
  - Base program at 2004 levels (320M$ 2012)
  - Similar to program plan today.
- Recommended doubling PhD production to replace aging workforce and fill new positions needed to utilize burning plasma experiments
- Plan went unimplemented, workforce not replaced, positions not created.

Ph.D Production

- FESAC (2004) recommendation
  - Actual
  - FY2013

Fiscal year

Ph.D graduates
Large gaps in the workforce are expected under the current trajectory.

- Used a demographic model, 2004 panel and budget data to estimate current and future workforce demographics
- Compare to projection if program followed 2004 recommendation
- Did not produce the young “wing” of researchers
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- Used a demographic model, 2004 panel and budget data to estimate current and future workforce demographics
- Compare to projection if program followed 2004 recommendation
- Did not produce the young “wing” of researchers
  - Who become the mid career scientists in the late 2020’s
  - Fully utilize ITER, become group leaders
  - Bring knowledge home and prepare for next step device

![Fusion demographics](attachment:image.png)

- Current trajectory
- FESAC (2004) plan
- 2012
- 2028

Model assumes: 50% Ph.D retention rate, 1.5% diffusion into program, retirement by 70.
Priorities should reflect the importance of the universities and workforce.

- **Decisions now will greatly affect the students**
  - Program needs to attract and retain qualified students in a competitive atmosphere
  - Students desire a realistic, clear plan, prospects for advancement and impact, stability and access to domestic facilities

- **Examine the health of the university fusion programs**
  - Departments are “Canary in the coal mine” for program health
  - Academic departments are important when judged as a science program
  - Universities are the primary driver of the early workforce pipeline, if we loose them it will take decades to get them back
  - If facilities shift to national labs or international collaboration, ensure universities have a viable model for participation
  - Look to other science programs but be mindful of the differences

- **Ensure workforce is accounted for in prioritization**
  - Workforce is different from facilities or scientific milestones
  - The pipeline takes years to develop
  - If a facility is a priority, ensure the program will have the appropriate workforce to utilize it
  - If a facility is a lower priority, account for the impact on the workforce and ensure knowledge transfer

Thank you for the opportunity to contribute.