University of Colorado **Boulder**

2018 Program Review

ATLAS Institute

Academic Review and Planning Advisory Committee Report

Approved

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Provost and Executive Vice Chancellor for Academic Affairs. | Date

Contents

Process Overview

The Academic Review and Planning Advisory Committee (ARPAC) conducts and writes the final reviews of all Boulder campus academic units. The ATLAS Institute (or "ATLAS") completed a self-study in December 2017. An internal review committee composed of two CU Boulder faculty members from outside the unit assessed the study and produced a list of questions asking ATLAS to provide additional analyses or clarifications. The internal review committee, working with ARPAC staff, addressed surveys to ATLAS graduate and undergraduate students in January 2018, covering curricular and climate matters. The internal reviewers' surveys followed climate assessments conducted by ARPAC staff in September 2017, addressed to ATLAS faculty and staff members and graduate students with funded appointments. The results of the surveys indicated a generally positive climate within ATLAS; flagging issues are discussed in relevant sections below. In March 2017 the internal review committee determined the self-study to be accurate and complete. An external review committee, consisting of two experts from outside of the University of Colorado, visited the unit over March 12-13, 2018, reviewed relevant documents, and met with faculty and staff members, students, and university administrators. Internal and external reviewer comments and recommendations are cited at points throughout the report. This public document reflects the assessment of and recommendations for ATLAS as approved by ARPAC.

Academic Review and Planning Advisory Committee (ARPAC)

Academic Year 2018-19
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Staff

Andre Grothe, Office of Faculty Affairs

Emmanuel Melgoza Alfaro, Office of Faculty Affairs

Unit Overview

The campus's standardized description of the unit is available on the website of the Office of Data Analytics (ODA) at https://www.colorado.edu/oda/institutional-research/institutional-level-data/information-department/academic-review-and-planning. ODA updates the profile annually in the fall semester. This report cites data posted in October 2017, reflecting the state of ATLAS as of the academic year (AY) 2016-2017.

ATLAS was created in the late 1990s and in 2006 moved into the newly constructed Roser ATLAS Center. As of 2013, ATLAS has been administratively located within the College of Engineering and Applied Science (CEAS) with eight other academic units. ATLAS is also one of eleven CU Boulder campus institutes. The unit is unique in that it is the only CU Boulder institute that offers academic degrees at all levels: BS, MS, and PhD. It therefore has a dual reporting structure. As an academic unit, it reports to the CEAS dean; as an institute, it reports to the vice chancellor for research. At its founding, the ATLAS charter, according to the unit's self-study, was to provide "multidisciplinary curricular, research and outreach programs that integrate information technology with a wide variety of disciplines and people, both inside and outside the university."

Personnel

According to the Office of Data Analytics (ODA), ATLAS personnel as of November 1, 2017 comprised six tenured and tenure-track (TTT) faculty members, seven instructors and senior instructors, seven lecturers (and other instructional personnel), 11 non-tenure track researchers, and five classified staff members (see: https://public.tableau.com/profile/university.of.colorado.boulder.ir#!/vizhome/EmployeeCounts/byCategoryChart). The ATLAS self-study indicates that, as of spring 2018, a newly hired

assistant professor brought to eight the total count of institute-affiliated tenure-track faculty members. The distribution includes two full professors (among these the ATLAS director) and five assistant professors. The tenure-track faculty are rostered in ATLAS but have tenure homes in other academic units, primarily in the College of Engineering and Applied Science but also in the College of Media, Communication and Information (CMCI). These units currently include Computer Science in CEAS (five ATLAS TTT faculty members, including both full professors), the Herbst Program of the Humanities in CEAS (one TTT faculty member), Mechanical Engineering in CEAS (one TTT faculty member), and Information Science in CMCI (one TTT faculty member). Instructors and lecturers, according to the self-study, bring a wealth of experience from current and/or past employment into the classes they offer.

In addition to its own teaching faculty, ATLAS invites faculty affiliates to serve on PhD committees and to serve the unit in other capacities. The self-study lists faculty affiliates from Music, Information Science, Law, Mechanical Engineering, Environmental Engineering, Computer Science, and Integrative Physiology. Additionally, non-faculty affiliates, who offer workshops and mentor students, are drawn from a gamut of firms in the greater Boulder area, including, but not limited to, Cycling ’74, Toys2Life, Lunchbox Electronics, Plus Productions, Ello, Creative Coder, Noun (CP+B Brand Invention), Elevated Third, and Denver BioLabs.

The ATLAS self-study describes the staff as including two business managers, an undergraduate advisor, a 0.40 FTE class scheduler, a human-resources generalist, a building proctor/administrative assistant, an industry liaison, a 0.50 FTE communications assistant, a broadcast engineer, and an audio

technician. CEAS advancement personnel conduct fundraising activities on behalf of ATLAS.

Governance

A director, an associate director, an assistant director, a co-director of graduate programs, and a director of communications comprise the institute's leadership. A faculty advisory board was created in 2017 with the purpose, according to the self-study, of connecting ATLAS with all parts of academic life across the campus. Faculty affiliates of the advisory board were drawn from CMCI (two faculty members), the College of Arts and Sciences (A&S) (two), CEAS (two), the College of Music (one), the School of Education (one), and the School of Law (one). In 2017 a working group replaced the advisory board. The new working group is composed of a mix of CU Boulder faculty, graduate students, and alumni, one non-CU Boulder academician, and several industry representatives (some of whom are CU Boulder alumni). Members of the disbanded advisory board have formed an entity called the Council of Founders and Friends. The self-study describes the council as including "individuals who are active members of the university community, [who] remain closely engaged with ATLAS and continue to support ATLAS in various ways."

Documents included with the self-study indicate that ATLAS has developed bylaws that conform to campus norms; it also has formal mentoring processes and a code of conduct for its BTU (Blow Things Up) Lab, a hackerspace for the entire community. The bylaws specify the director's role, eligibility to vote on unit governance issues, voting procedures, the annual merit review process, and grievance procedures. Neither the bylaws nor other documents provided to ARPAC specify the criteria used in the annual merit review process. According to the self-study, the Office of Faculty Affairs developed and reviewed the ATLAS bylaws in 2016. ATLAS faculty members

adopted the bylaws on June 1, 2016, but the College of Engineering and Applied Science dean asked to delay formal adoption due to the pending shift of institute reporting from the Graduate School dean to the vice chancellor for research. ATLAS faculty members plan to revisit bylaw review and adoption during AY 2018-19.

Research and Scholarship

Prior to 2015, ATLAS did not roster research faculty other than the director. According to the ATLAS self-study, research activity in this earlier stage was conducted by the National Center for Women and Information Technology (NCWIT), discussed below in the section on inclusive excellence, and by ATLAS PhD students under the tutelage of faculty from other units. Beginning in 2015, the institute began to roster tenured and tenure-track (TTT) faculty members who had tenure homes in other units. In conjunction with this decision, the institute established several labs. These include the Interactive Robotics and Novel Technologies (IRON) Lab; the Emergent Nanomaterials Lab; the Laboratory for Playful Computation; the Unstable Design Lab; TYPOLAB; and the ACME Lab. Additionally, ATLAS indicates in its self-study that it intends for the Black Box Experimental Studio "to become an important space for enabling work across a broader spectrum of technically-enabled projects and cross-departmental collaborations, including interdisciplinary research activities". The 2017 ODA profile, describing Office of Contracts and Grants information, counts ATLAS research faculty members as securing $13.6 million in direct research funding over the previous five years, $8.3 million after allocation (seventh of nine CEAS units). In the prior year, sponsored research totaled $3.2 million, $3.1 million after allocation (seventh of seven CEAS units). As explained in the ATLAS self-study, "'direct' shows expenditures recorded in the unit itself; 'after allocation' shows expenditures after allocation from non-tenure-granting units

(including institutes) to tenure-granting departments based on the tenure locus of the principal investigator."

Undergraduate Education

The ATLAS undergraduate program has grown rapidly. In addition to a newly approved Bachelor of Science degree in technology, arts, and media (BS TAM), the institute offers a minor and a certificate in technology, arts, and media (TAM). The TAM minor was initiated in AY 2009-2010. TAM certificates were awarded to undergraduates beginning in AY 2011-2012. According to the ATLAS self-study, the number of students in the TAM minor grew from 80 in 2009 to 389 in 2017. The TAM certificate grew from 419 students in 2011 to a high of 982 students in 2016. As of AY 2017-2018, the certificate had 680 students. The University of Colorado Board of Regents approved the BS TAM In April 2015. The most recent ODA data, based on the fall 2016 census, indicated that ATLAS had 100 BS TAM majors. The ATLAS self-study indicates BS TAM 200 majors in fall 2017. ATLAS also provides courses to a large number of students majoring in other units. The fall 2016 ODA census indicated that ATLAS provided total student credit hours (SCH) of 6857 hours, 74% of which were taken by non-majors. According to ODA data, most of ATLAS's undergraduate instruction falls to non-tenure track faculty: in fall 2016, ATLAS-rostered TTT faculty members taught 6% of SCH (seventh of seven CEAS units), instructors and senior instructors, 49% (second of eight CEAS units), and lecturers and adjuncts, 45% (second of eight CEAS units); GPTI/TAs generated no SCH.

Graduate Education

ATLAS offers a PhD and two Masters of Science degrees: a technology, media and society professional master's degree (TMS) and a "traditional" MS that is a stepping stone for students pursuing the interdisciplinary PhD. The TMS degree offers two tracks: information and communication technology

for development (ICTD) and creative technologies + design (CTD). The PhD is a technology, media, and society degree. ODA data for FY 2016-2017 shows that ATLAS awarded three PhD and 15 MS degrees. ODA reports that as of the fall 2016 census, the PhD program enrolled 16 students and the master's degree programs 32 students. ATLAS graduate program enrollments have held relatively stable, with growth primarily in the TMS CTD track. The self-study reports that from 2011 through 2017, the count of master's students in the ICTD track ranged from a low of 18 to a high of 24; CTD students numbered seven in 2015, the first year of the track, to 13 in 2017. During the same 2011-2017 time period, the PhD program averaged 16 students, with as few as 13 students and as many as 20. ODA reports that in FY 2016-2017, 29% of graduate teaching involved individual instruction, placing ATLAS fifth of the nine CEAS units on this metric; most of the classroom instruction was provided by non-tenure track faculty, with 19% of graduate SCH taught by tenured or tenure track faculty (seventh of eight CEAS units), 41% by instructors and senior instructors first of nine CEAS units), and 40% by lecturers and adjuncts (third of nine CEAS units).

Space and Physical Infrastructure

ATLAS is housed in the Roser ATLAS Center, a 66,000 square foot building completed in 2006. The external reviewers note that the design of the facility permits strong collaboration opportunities and natural mentoring. The building contains a mix of lab spaces, classrooms of varying size (some centrally scheduled and used for non-ATLAS classes), "makerspaces," offices, and a coffee shop managed by an outside vendor. The Black Box Experimental Center hosts large multimedia installations and performances and includes a television studio. Makerspaces include facilities for standard 3D printing and more extensive machining capabilities. Roser ATLAS also

houses the Department of Cinema Studies and Moving Image Arts (formerly the Film Studies Program).

Inclusive Excellence

ATLAS is in the vanguard of inclusivity in CEAS. As of the fall 2016 census, as reported by ODA, 47% of ATLAS undergraduate majors identified as women and 18% were from underrepresented minority groups. Among graduate students, women accounted for 60% of those enrolled and members of underrepresented minority groups for 17%. The ATLAS self-study reports that five of 17 full time faculty members are women (one-third of the instructional faculty and one-fourth of the tenure-stream faculty). ATLAS was formerly home to the National Center for Women and Information Technology (NCWIT), an independently governed 501(c)(3) corporation separate from CU Boulder. According to the self-study, the presence of NCWIT resulted in numerous collaborations on gender and cultural diversity and helped with recruitment and retention of women faculty members and graduate students. In its earlier days, ATLAS also had a formal partnership with historically black colleges and universities, including Dillard University and Tuskegee University. Such partnerships, while no longer operating, appear to have contributed to the ATLAS culture of inclusivity.

Climate

As mentioned above in the process overview, in January 2018 the internal review committee, assisted by ARPAC staff, administered surveys addressed to ATLAS undergraduate and graduate students largely regarding curricular matters that included the option for open-ended comments. A few months prior, in September 2017, ARPAC staff had conducted a climate survey addressed to ATLAS faculty and staff members, and graduate students with paid appointments. The results of these various assessments indicated a generally positive ATLAS environment. Sixteen of 17 faculty members completed all or

part of the climate survey. The staff, like the faculty, report a generally positive climate. Of the 15 people identified as ATLAS staff, 12 completed all or part of the survey. Among 15 graduate students on appointments (GSAs), 13 completed the climate survey. Undergraduates and graduate students not on appointments fell outside the September 2017 climate survey scope.

One battery of climate survey questions pertained to respect, humiliation, intimidation, and incivility. Among faculty members, 14 of 16 “agreed” or “strongly agreed” that they were treated with respect by the director; 15 of 16 “agreed” or “strongly agreed” that they were treated with respect by staff; 15 of 16 “agreed” or “strongly agreed” that they were treated with respect by students. None of the responding faculty members agreed with statements that the faculty behave in ways that humiliate or intimidate other faculty members, staff, or ATLAS graduate students. Likewise, none of the faculty members agreed in any degree with the statement that incivility has a disruptive effect on the institute. Among staff, all 12 “agreed” or “strongly agreed” that they were treated with respect by faculty members, other staff, and ATLAS students. All of the GSAs “strongly agreed” that they were treated with respect by their faculty advisors, with one non-response; all “agreed” or “strongly agreed” that they were treated with respect by ATLAS faculty. Only one “disagreed” with the statement that they were treated with respect by ATLAS staff or by other graduate students.

Another question set pertained to the friendliness and supportiveness of the ATLAS climate. Among faculty members, all “agreed” or “strongly agreed” that the faculty are friendly and supportive of one another. In addition to the generally positive responses in the climate survey, there were two issues

of concern in the faculty surveys relating to the internal culture. Five of 16 faculty members “agreed” or “strongly agreed” with the statement that they felt excluded from ATLAS informal networks. Three of 13 disagreed that the climate is generally positive for faculty members regardless of political ideology. Among staff, all 12 “agreed” or “strongly agreed” that the climate was supportive of women staff members; eight “agreed” or “strongly agreed” that the climate was supportive of staff members of color, and four did not respond; ten “agreed” or “strongly agreed” that the climate was supportive of staff members of different sexual orientations, and two did not respond; eight “agreed” or “strongly agreed” that the climate was supportive of staff members of different religious views, and four did not respond. Six staff members “agreed” or “strongly agreed” that the climate was supportive of staff members regardless of political ideology, with one disagreement, and five who chose not to respond. All of the GSAs that responded “agreed” or “strongly agreed” that the social and professional climate is generally positive for students of different sexual orientations; likewise all who responded “agreed” or “strongly agreed” that the climate was positive for people of different religious traditions. By contrast, three of eight responding GSAs disagreed with the statement that the climate was generally positive for graduate students from other countries. One of 12 responding GSAs disagreed with the statement that the climate is generally positive for women graduate students. One of seven responding GSAs disagreed with the statement that the climate is generally positive for graduate students of color. Two of five responding GSAs disagreed or strongly disagreed with the statement that the climate was generally positive for graduate students regardless of political affiliation.

A final set of questions pertained to the sense of an ATLAS community. This battery of questions highlighted a potential issue of staff-to-staff relations. Three of 11, with one non-response, “agreed” or “strongly agreed” that one or more staff members say things or behave in ways that humiliate or intimidate other staff members. Two of 12 disagreed with the statement that there is a positive sense of community in ATLAS. Graduate students, too, flagged some potential problems within ATLAS. When asked if “one or more ATLAS faculty members say things or behave in ways that humiliate or intimidate graduate students,” seven GSAs “agreed” or “strongly agreed” with this statement, and six “disagreed” or “strongly disagreed” with it. Two of 11 responding GSAs “agreed” or “strongly agreed” with the statement that “faculty incivility is having a destructive effect on Institute functioning;” nine “disagreed” or “strongly disagreed” with it. Ten GSAs “agreed” or “strongly agreed” with the statement “I feel like a valued member of ATLAS;” three disagreed with the statement. Similarly, three GSAs “agreed” or “strongly agreed” with the statement “I feel excluded from informal networks in the institute”; ten “disagreed” or “strongly disagreed” with the statement (with one non-response).

In its response to the internal review committee report, ATLAS leadership reports that it has already begun responding to concerns that emerged in the climate survey.

Budget

CEAS supplies the lion’s share of the ATLAS budget. The Research and Innovation Office (RIO) covers some administration costs and the director’s course releases. ATLAS also receives $200k from the campus for building and equipment renovation and repair. The ATLAS professional master’s degree program also generates revenue from tuition. Eighty-five per cent of indirect cost return totaling $105k in FY

2016-2017 was directed at administrative support and faculty member development costs (85%), with the balance returned to principal investigators. The coffee shop vendor pays rent. ATLAS also receives revenues from the Division of Continuing Education per summer class enrollments. Until recently, ATLAS also received revenues from program fees.

In FY 2016-17, ATLAS costs included $1,280,730 for faculty and adjunct lecturer salaries, $726,674 for staff salaries, $90,302 for graduate student support, $86,000 for annual building defeasance, $30,000 for Center for Media, Arts and Performance operating costs, and $23,808 for Office of Information Technology (OIT) technology support.

Past Reviews

This is the first time that ATLAS has been included in a review cycle.

Campus Context

ATLAS faculty members conduct innovative interdisciplinary research addressed at emerging societal needs. ATLAS's instructional offerings reach students across the campus. The undergraduate technology, arts and media (TAM) program, according to the ATLAS self-study, serves more than 55 majors and more than 1000 students through the TAM certificate and minor. Based on fall 2017 data, the distribution of TAM students by college/school included 41% from A&S, 26% from the Leeds School of Business, 22% from CMCI, 7% from Environmental Design, 5% from CEAS, and less than 1% from the School of Music. With respect to graduate education, students work with faculty members from unique combinations of departments and schools, including Music, Theatre and Dance, Humanities, Computer Science, and others.

Disciplinary Context

As a unit, ATLAS is self-consciously designed to be multidisciplinary and unique both on campus and in the larger academic universe, with connections across engineering departments and colleagues in music, arts, and the humanities. ATLAS's TTT faculty members have tenure homes in traditional discipline-based departments, including Computer Science, Mechanical Engineering, and Information Science. Creative work and research conducted by these faculty members might be evaluated with comparisons to that of their peers within their disciplines. It is more difficult to ascertain the extent to which these faculty members and their students produce creative work and publications at the interstices of multiple disciplines. At the next review, ARPAC may want to request a list of parallel programs at aspirational peer institutions.

Analysis

Mission and Identity

The ATLAS website homepage describes the unit as follows: "ATLAS Institute is a place where artists write code and robots read body language; where the norm is the unexpected and creativity is currency. We wear many hats—artist, engineer, technologist, humanitarian, designer—and together we form a lively interdisciplinary research and learning community driven by insatiable curiosity and a little mischief." The foci of the research labs, as described in the self-study, attest to this eclecticism. One investigates "human-centered principles for developing novel sensing, interactive and robotic technologies"; another "manipulates matter on the smallest of scales to create materials with emergent properties, characterized by novel and sometimes surprising features arising from the interactions of multiple bodies"; a third "designs new playful and programmable technologies for learning"; a fourth "interweaves anthropology, art, design, and engineering to imagine the future of human-technology relationships"; a fifth "is an experimental studio for creative work and research related to the technologies of language"; and a sixth "will research computational tools for design, creativity, cognition, tangible and embedded interaction and computing for health and wellness."

The external reviewers were impressed by the energy emanating from the faculty and students, writing "that the students and faculty [are] quite simply excited about the work they are doing and are having fun. While this may sound like a strange finding to list first, it reflects an energy in the ATLAS program that will enable it to push through most administrative and logistical challenges." At the same time, the external reviewers voiced concerns about the lack of a core ATLAS identity. The seriousness of this issue is evident in the external reviewers' comment:

> [I]nterviews with undergraduate students—and these were students who were highly engaged in the program—there was a repeated expression of frustration at the challenge of communicating the nature of their studies to potential employers. The name of Technology, Arts and Media did not reflect much of their training which was really in Technology, Computing and Design. They chose to describe themselves as either designers or computer scientists, rather than the interdisciplinary mix that they were. They mentioned that existing career fairs were either oriented towards engineering or arts, and in both venues were told that the companies attending were not looking for students like them, as their training and experience did not fall within the usual scope. This is a critical problem of identity, where students have trouble describing who they are to employers, parents and other stakeholders, making it much more challenging than necessary to find companies that will engage them and hire them.

At the undergraduate level one of the identity issues is a confusing naming congruity, "TAM," between the BS, the minor, and the certificate in technology, arts, and media, as well as the overlap of names with the College of Media, Communication, and Information (CMCI). The external reviewers recommend that ATLAS consider dropping the name "technology, arts, and media" in favor of "technology, computing, and design." However, this issue of identity is deeper than merely a nomenclature problem. The external reviewers point to numerous overlaps between ATLAS and other campus units, especially the Department of Information Science in CMCI and legacy arts units in A&S. The external reviewers argue that "Going forward it will be critical to define the focus of ATLAS' educational and research offerings and

how they relate to the other units on campus." The lack of identity and mission clarity also impacts ATLAS's requests for faculty lines. As spelled out in its self-study, ATLAS requests five new faculty lines, including three rostered outside CEAS. There is little, if any, discussion of how the proposed lines might add to ATLAS's existing or emergent research mission or how they might expand the curriculum to address crucially missing gaps. Instead, ATLAS writes that new faculty members "will be polymaths inventing the future through creative, interdisciplinary approaches to research" and says "we can imagine effective hires in areas like electronic music or technology for social good." How such positions as those might contribute to its core scholarly and instructional mission is not explained.

Budget

The ATLAS self-study and the external review committee report note that the institute's ability to respond to student needs is crippled by a lack of a CEAS revenue-sharing model that would provide ATLAS with an appropriate share of tuition from non-CEAS ATLAS student enrollments. ODA data indicate that 74% of the SCH provided by ATLAS in FY 2016-2017 were for non-majors. Most of these non-majors come from outside CEAS. This is an issue that CEAS should examine, particularly given ATLAS requests for funds to augment its undergraduate educational experiences and to address other needs.

In its self-study, ATLAS requests a number of additional undergraduate program budget lines ($25,000 for undergraduate scholarships and travel; $5,000 for additional annual funding for CMAP; $10,000 for CMAP marketing; $5000 for undergraduate events; and an unspecified amount for an Honors program), support for affiliate faculty ($10,000), TA position funding, and new tenure-track hire startup package funding. ARPAC, however, is not in a position to judge whether

$5000, $10,000, or $25,000 is the appropriate line-item amount for a particular activity or event. In general, ARPAC prefers that units have an adequate resource pool, which, subject to explicit unit governance policies, the unit can allocate across various current and emerging needs. Finding a more equitable revenue-sharing model within CEAS that rewards ATLAS for the non-CEAS SCH it produces should go a long way toward creating an operating budget adequate for addressing the unit's needs. ARPAC notes, as well, that some of the needs might be addressed by appealing to the external donor community. As part of a strategic visioning process, ATLAS might consider how it could solicit donor dollars directed at its instructional and research missions.

Governance and Structure

ATLAS has the benefit of a strong and dynamic leadership team. A review of the governance documents, including bylaws, code of conduct, and grievance procedures, indicates a house in good order. With the shift of institute reporting from the Graduate School dean to the vice chancellor for research now accomplished, ARPAC encourages ATLAS to move ahead with a formal adoption of its bylaws. ARPAC notes that while the bylaws detail the procedures for annual merit evaluations, the documents submitted during this review process do not include explicit evaluation criteria. By regent policy, each unit is required to have an explicit description of annual merit evaluation criteria.

ATLAS has a unique Boulder campus role as an institute with an instructional profile. In practice, ATLAS appears less an institute than a department or program, which are the typical structures for instructional units. General revenues, which derive from tuition, fund departments and programs. Proceeds of sponsored research, often described prosaically as soft money, fund institutes. As is clear in the self-study's discussion

of its budget, ATLAS is dependent primarily on general revenues for its activities and is requesting additional funds for activities that typically come from general revenues. Grants play a more limited role in its fiscal profile. ATLAS might solve some of its budget needs internally through soft money allocations if grants played a bigger role. Moving forward, the question is whether a different budgeting arrangement might make more sense. ARPAC is agnostic as to what that structure should look like. ARPAC wonders, however, if granting ATLAS departmental or program status, with the institute as a separate, though allied, entity that would house sponsored research activities and host researchers with limited teaching expectations, might better answer the structural question. Answering this question should be a high priority in the strategic visioning process that ARPAC is asking ATLAS to undertake.

Faculty

As previously described, ATLAS-rostered TTT faculty members have appointments in regular departments for purposes of promotion and tenure (specific terms of the appointments vary). These split allegiances raised a number of concerns for ATLAS in its self-study and for the external review committee. The most prominent of these is that ATLAS faculty members feel compelled to teach large sections in their tenure-track homes, which limits their availability for ATLAS students to only small-section courses. ATLAS leadership would like to revisit this expectation in order to make these faculty members available to teach larger ATLAS sections at least some of the time. This seems like a reasonable request. There should be ways to better equalize SCH taught by these faculty members between ATLAS and the regular departments over periods of, say, two-year intervals. A second concern describes the relative value of two research types. ATLAS values multidisciplinary research that brings together researchers from different disciplines. Traditional departments may value such research less than

discipline-specific work. Understandably, junior faculty members express anxiety about meeting expectations for tenure and promotion. ATLAS leadership and tenuring departments should communicate regularly with each other and with the involved faculty members about how to correctly value research types.

Undergraduate Education

ATLAS can point to rapid rise in undergraduate enrollments as a sign of success. It is evident from the self-study that ATLAS has already taken steps to moderate TAM certificate growth in order to accommodate increasing demands for the TAM BS. ATLAS also proposes to add a TAM BA to its stable of undergraduate offerings, modeled on the recently approved and wildly successful Computer Science BA. Such an addition seems premature at this stage. ATLAS has not articulated how a TAM BA might contribute to its core mission. Moreover, ATLAS already faces significant challenges offering sufficient sections of its courses on a timely basis for students seeking the TAM certificate and minor. The open-ended comments from undergraduates collected by the internal reviewers are overwhelming on this point. The modal category of student comment focused on frustrations with the ability to get into sections that the TAM certificate and minor require. Many students felt misled in pursuing the certificate or minor; finding themselves repeatedly waitlisted has created doubts that they can complete the required courses before their expected graduation. Others felt that the courses, when they did finally enroll, did not teach the technical skills that they anticipated learning. Comments such as these were too numerous and voiced in too many ways to be dismissed as the histrionics of a few unhappy campers.

The external reviewers point to a structural factor contributing to the mismatch between available courses and student demands. They write:

> The TAM BS in Engineering is a clear and compelling offering: an Engineering major taken by computationally sophisticated students who are not put off by technical courses. Such students can handle rigorous computing and engineering exercises in the context of the technology and design courses that make up much of the curriculum. The minor and certificate students, however, often come from other units than Engineering and have much more varied backgrounds. This places constraints on the design of the courses in terms of presumed prior knowledge and skills, along with perspective. The result of this can be seen in the program having defined courses specifically for the minor and especially the certificate students who may have limited background knowledge.

Developing courses designed specifically for non-CEAS students is one step in the direction of addressing this mismatch. But as the external reviewers note, “These new courses create an additional burden on the already over-stretched faculty.” There is already a serious imbalance between TTT and non-tenure track faculty in undergraduate teaching, where ATLAS TTT faculty teach a significantly lower percentage of undergraduate SCH (6%) than in any other CEAS unit.

It is clear that ATLAS needs to find better ways to balance the number and mix of class sections with the knowledge and skills of the students enrolled. In its self-study, ATLAS applauds the lack of prerequisites for its courses on the grounds that this

"enable[s] students to create highly individualized learning paths, according to their specific area of focus or specialization." The unit may want to rethink the lack of such requirements, however due to frequent complaints by students, some of whom report being seriously underprepared for courses while others report being over-prepared. The institute might wish to incorporate knowledge testing into its acceptance process so that the gateway courses that the students must take prove neither redundant of their prior knowledge nor so far above their heads as to be unnecessarily frustrating. ATLAS could also consider limiting TAM minor and certificate enrollments.

It is also possible that the campus should reconsider how TAM is delivered to students that have heterogeneous preparation and different curricular goals. The TAM BS appears to have an engineering mission; its students take significantly more classes in science and math than the TAM minor and certificate students, and their coursework focuses more heavily on technological product design. The TAM minor and certificate programs, in contrast, are qualitatively different, serving students whose interests seem to be focused in the related-but-distinct goals of creating and designing artistic and media products. Given fundamental disparities in student backgrounds and interests between the BS on the one hand, and the minor and certificate on the other, as well as differentials in the pre-existing capacities between ATLAS and CMCI, it might be appropriate to consider whether CEAS should focus on the TAM BS (perhaps renamed to enhance "brand" clarity), while CMCI should serve as the administrative home for delivering the TAM minor and the certificate. Such a change might require adjusting instructor lines and SCH revenue models. A realignment might involve CMCI serving as a steward of the TAM minor and certificate and presiding over a

governance structure representative of ATLAS, CMCI, and other campus stakeholders concerned with digital media, art and design. CEAS, CMCI, and other affected units would need to work out the rostering and revenue details.

Graduate Education

ATLAS has tapped into a significant latent demand in the community for training in cutting-edge technology and design as evidenced by the rapid growth of its newly developed professional master's degree. ARPAC questions whether the same is true for the master's degree in information and communication technology for development (ICTD). As the external reviewers note, current ATLAS faculty members appear less supportive of the ICTD MS. According to the external reviewers, "The program was started by a PhD graduate working within the ICTD domain who has subsequently left the University." The ATLAS self-study contains substantial discussion of the strains placed on the faculty to meet the current curricular obligations of the ICTD MS. Given these resource constraints and the fact that the ICTD MS depended heavily on a now-departed faculty member, ARPAC asks the same question as the external reviewers: is this ICTD MS worth continued resource investments, or should ATLAS phase out the program? ARPAC applauds the success of recent ICTD MS students, but the low number of program applicants raises concerns. Perhaps a well-articulated and more aggressive marketing program could boost interest among potential applicants.

Space

Space concerns echo throughout the ATLAS self-study and the external review committee report. The Roser ATLAS Center is, all agree, a magnificent building, that facilitates the sorts of collaborative interdisciplinary activities that ATLAS values. The external reviewers argue that "growth of the ATLAS program in both education and research has not been accompanied by

adequate new allocation of space within the Roser ATLAS Center." With the hire of new tenure-track faculty, the existing Roser building footprint can no longer keep up with faculty lab space demands. To help with the need for future labs, ATLAS, with the vigorous support of the external review committee, proposes that non-ATLAS related units vacate the Roser ATLAS Center. This suggestion includes space dedicated to the Department of Cinema Studies and Moving Image Arts, which has not opted to actively engage with ATLAS in research or instructional activities. ATLAS also proposes to control centrally scheduled classrooms in Roser. The institute's argument is two-fold: one, centrally scheduled class time allocations do not match the longer times required for the studio-style courses ATLAS students need; and two, ATLAS students need more space to fabricate projects and, more to the point, to alter projects over time. As the external reviewers said, "spaces where projects can be not only created, but where they can remain as they evolve, rather than being dismantled and reconstituted each class period."

Space is the holy grail of university campuses. ARPAC notes that in the absence of a clear and easily-communicated ATLAS strategic mission, it is unclear whether ATLAS's space claims are more compelling than those of other units. ARPAC agrees with the ATLAS self-study and the external reviewers' report that a one-size-fits-all scheduling system for classrooms may make little sense when the appropriate pedagogy involves non-traditional activities, such as studio-style classes. ARPAC concurs that the campus should give serious consideration to the idea of handing over scheduling control of one or more Roser building classrooms to ATLAS.

Inclusive Excellence

With respect to inclusive excellence, ATLAS clearly leads within CEAS. The campus should commend ATLAS for its record of

recruiting women and members of historically underrepresented minorities to its faculty and student cohorts. ARPAC looks forward to a continuation of this success. Campus policy requires that all units have an explicit inclusive excellence narrative. The ATLAS should complete such a narrative and incorporate such a statement into the steps it is already taking to be inclusive.

Climate

The climate surveys previously described in this report suggest that its faculty, staff, and students have generally positive feelings about ATLAS. ARPAC welcomes the steps outlined in the self-study that ATLAS is undertaking to improve the climate for all people regardless of political ideology, to improve relations involving staff, and to open up its informal networks. One item relating to climate that may be more intractable is the fact that the non-tenure track faculty feel like second-class citizens within ATLAS. With the exception of the director, all of the faculty in ATLAS prior to 2005 had been instructors and adjuncts. ATLAS was founded upon their contributions. As the self-study notes, much of the research during those early years was work that they had contributed on their own time and without compensation. It is no small wonder that, with the hiring of research faculty who are given lab spaces of their own and teaching loads involving a small number of relatively low-enrollment classes, the non-tenure track faculty feel underappreciated. The challenge for ATLAS leadership will be to forge solutions that recognize their contributions as faculty members.

Recommendations

The members of ARPAC address the following recommendations to the ATLAS Institute and to the offices of responsible administrators:

To the Unit:

1. Institute a strategic visioning process that results in the following:

    a) A well-defined ATLAS mission that can be communicated succinctly and meaningfully to colleagues on and off campus, to the donor community, to prospective graduate students, to undergraduates who are majoring or considering majoring in ATLAS, and to prospective employers of ATLAS students,
    b) A plan that can guide requests to the dean and campus for future hiring priorities,
    c) A set of principles for curricular changes that ATLAS may consider undertaking,
    d) A recommendation for a structure as a department or program, a department or program with an allied institute, or something else that best fits the scholarly, instructional, and budgetary goals of ATLAS.

2. In light of the strategic visioning process, consider reforms of undergraduate course offerings so as to better meet the needs of the heterogeneous population of students seeking the BS while better addressing the backgrounds and interests of students seeking a minor or certificate through ATLAS.

    a) Consider instituting prerequisites and/or knowledge testing as part of the acceptance process, so that students are channeled into appropriate gateway courses

b) Consider limiting the numbers of students enrolling in the TAM minor and certificate programs or shifting the minor and/or certificate programs out of ATLAS by, for example, asking CMCI to be responsible for those programs.
c) Evaluate the resources that would be required to add a BA. Given the already large student demand for the existing ATLAS major, minor, and certificate and stretched resources of available faculty members, adding a BA is in ARPAC's judgment premature as a component of the reforms that should be considered at this stage.

3. Reconsider the status of the Information and Communication Technology for Development (ICTD) track that currently exists within the professional master's degree program, so as either to provide adequate faculty staffing to support it or to phase it out.

4. Market the PhD program, in light of the strategic visioning process.

5. Work with the CEAS dean to develop a revenue-sharing model that better compensates ATLAS for the provision of SCH to non-CEAS students.

6. Work with the CEAS dean to create a budget line that can be allocated, subject to ATLAS internal governance policies, to instructional purposes broadly construed, such as undergraduate scholarships, travel, honors program, support for activities of the Center for Media Arts & Performance (CMAP), research collaborations involving students, and other activities.

7. Work with the CEAS dean and the Office of the Senior Vice Provost for Academic Resource Management to consider ATLAS space needs. If additional space should be allocated to ATLAS in the Roser ATLAS Center, then space allocated for displaced units should be appropriate to their instructional and research needs.

8. Continue practices that result in a positive climate for faculty, staff, and students, while working to create a more accepting climate for those who hold different political ideologies. Also, develop mechanisms that may better integrate faculty, staff, and graduate students into informal networks that exist within ATLAS.

9. Work with the CEAS dean to better balance the teaching demands on ATLAS TTT faculty between ATLAS and their tenuring units.

10. Develop and implement measures that ensure that non-tenure track faculty will be treated as fully valued ATLAS colleagues.

11. Demonstrate, when making requests for additional faculty lines, how newly hired faculty will substantially increase undergraduate SCH by tenure-stream faculty.

12. Communicate regularly with ATLAS TTT faculty and with the leadership of their tenure-home departments about the types of research that are valued by the respective units.

13. Develop and submit an explicit inclusive excellence narrative to ODECE, building on the unit's many strengths that already contribute to its record of inclusivity.

14. In cooperation with CEAS, establish and implement explicit unit criteria (that conform to the University of Colorado Board of Regents annual merit evaluation policy.

15. Move forward with formal adoption of the bylaws and submit them to the CEAS dean for approval.

16. Work with advancement staff to prioritize how donor dollars might contribute to ATLAS's instructional and research missions.

To the CEAS Dean:

17. Support the unit in a strategic visioning process.

18. Work with the unit to make a recommendation for a structure as a department or program, a department or program with an allied institute, or something else that best fits the scholarly, instructional, and budgetary goals of ATLAS.

19. Consider new faculty lines for ATLAS, subject to how these lines will contribute to its core mission as developed via a strategic visioning process and will increase the undergraduate SCH taught by TTT faculty.

20. Work with the unit to develop a revenue-sharing model that better compensates ATLAS for the provision of class offerings to non-CEAS students.

21. Work with the unit to create a budget line that can be allocated for instructional purposes broadly construed.

22. Work with the unit and the Office of the Senior Vice Provost for Academic Resource Management to consider the unit's space needs. If additional space should be allocated to

ATLAS in the Roser ATLAS Center, then space allocated for displaced units should be appropriate to their instructional and research needs.

23. Work with ATLAS leadership and the chairs of tenuring units to better balance the research and teaching demands on ATLAS TTT faculty between ATLAS and their tenuring units.

To the Vice Chancellor for Research and Innovation:

24. Support the unit in a strategic visioning process.

25. Work with the unit to make a recommendation for a structure as a department or program, conjoined department or program and institute, or something else that best fits the scholarly, instructional, and budgetary goals of ATLAS.

To the Senior Vice Provost for Academic Resource Management:

26. Work with the unit and the CEAS dean to consider the unit's space needs. If additional space should be allocated to ATLAS in the Roser ATLAS Center, then space allocated for displaced units should be appropriate to their instructional and research needs.

To the Provost:

27. Consider shifting scheduling control of one or more classrooms in the Roser building to ATLAS.

28. Consider shifting the TAM minor and certificate programs to CMCI.

29. Consider restructuring ATLAS as a department or program, a department or program with an allied institute, or something else that best fits the scholarly, instructional, and budgetary goals of ATLAS.

Required Follow-Up

The ATLAS Institute director shall report annually on the first of April for a period of three years following the year of the receipt of this report (i.e., April 1st of 2020, 2021, and 2022) to the dean of the College of Engineering and Applied Science and to the provost on the implementation of these recommendations. Likewise, the dean shall report annually on the first of May to the provost on the implementation of recommendations addressed to the college. The provost, as part of the review reforms, has agreed to respond annually to all outstanding matters under their purview arising from this review year. All official responses will be posted online.