Project Description

The overall goal of RAMP-UP, Rensselaer's proposal for Institutional Transformation, is to reform university advancement processes using a model of professional self-regulation that will increase the participation of women in the senior ranks, particularly in science and engineering.

I. The Situation for Women's Advancement at Rensselaer

Rensselaer is uniquely situated to address the tough issues associated with women's advancement to the senior ranks. To begin with, the appropriate leadership is in place. In a recent article on "Steering Girls into Science," *Time Magazine* called Rensselaer's President, Shirley Ann Jackson, "perhaps the ultimate role model for women in science" (Rawe, 2005). In addition, Dr. Jackson speaks out nationally concerning the coming shortages in the talent pool in engineering and science (Jackson, 2004), and has taken a special interest in the women's pipeline (Jackson, 2005).

Under Dr. Jackson's tenure, the growth in the women faculty has been impressive. As shown in the table to the left below, the number of women faculty at Rensselaer has increased 39% since 2001, with growth at the senior level up 75%. Women now constitute 18.5% of a faculty of 267. There are 10 women of color, an increase of 43% since 2001.

	Assistant	Associate	Full	Total		Science	Engineering	Other	Total
# in 2001	17	20	12	49	# in 2001	16	9	24	49
# in 2005	27	20	21	68	# in 2005	21	15	32	68
increase	59%	0%	75%	39%	**increase**	31%	67%	33%	39%

The table to the right above shows how this growth has been distributed across schools. Particularly noteworthy is the growth in engineering, where numbers have been historically low. Here the numbers have risen 67%, bringing the percentage of women up to the level of the rest of the university. Four hires have been made in engineering in the last year.

Women who come to Rensselaer enjoy a slate of women-friendly benefits unusual for a technological university. The Samaritan-Rensselaer Children's Center has served our children with day care for more than a decade. A generous parental leave policy granting teaching relief for up to two semesters has been in place nearly as long. In a recent survey (see section C, below), 50% of the women reported utilizing this policy. A part-time tenure policy has not yet been codified, but our first part-time tenure track appointee was granted tenure last year. Many of these policies have come about through the auspices of an active group of senior women faculty, a group out of which this proposal comes.

Nevertheless, despite these accomplishments, Rensselaer still has nagging problems with the advancement of women. In particular, the three studies described below document both a differential rate of promotion for women and differential access to the knowledge and advice necessary to advance in the academic ranks.

A. The 2001 Study

Our first study began in December of 2001 in the wake of the MIT report (Hopkins, 1999) and the imminent arrival of President Jackson. Informal discussions among tenured women faculty suggested something was amiss in the advancement of women, and we were looking for a way to move forward. Our solution was to focus on what we came to call the 13+ Club (Geisler, Kaminski, and Berkley, 2005). Faculty in the 13+ Club are those with thirteen or more years from highest degree. They are assumed to be eligible for promotion to full, considering six years as the time period to associate and roughly another six to full. Of course, some faculty members are promoted to full before their 13th year from degree; others achieve promotion some time after the 13th year. By choosing the 13th year as the threshold for being included in the 13+ Club, however, we sought to look at the members of the faculty that were usually seen as eligible for promotion to full.

The graph on the next page shows the patterns for the 13+ Club for Rensselaer as a whole and for individual schools in 2001.   Overall, 48% of the women in the 13+ Club at Rensselaer had not yet been promoted; the comparable percentage for men was 21%.   In other words, women in the 13+ Club were 2.3 times less likely to have been promoted than men. This is consistent with recently published national data on promotion rates for women faculty (Curtis, 2005).

Interesting, our 2001 data also showed significant variation by school. National figures show that in Humanities and Social Sciences 10% of women are full professors compared with about 21% men (Valian 1998:

% of men not promoted □ % of women not promoted
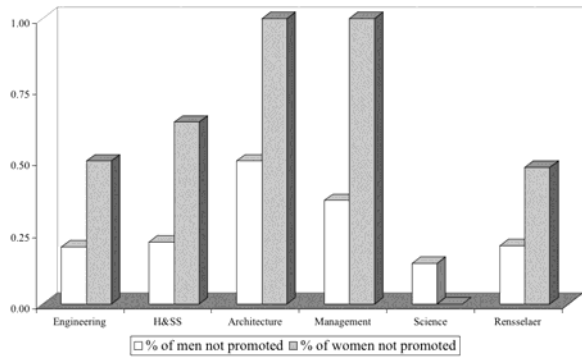
232). Rensselaer's record for promoting women in the School of Humanities and Social Sciences was significantly worse than these national figures: 64% (7 of 11) of the women who were 13 or more years past degree had not been promoted in 2001 versus 22% (5 of 23) of the men.

Women in science, by contrast, fared much better at Rensselaer than nationally. A study done in 1993 showed only 31% of the women in science who earned their degrees before 1985 were full professors compared with 59% of the men (Valian 1998: 223). The recent study by Nelson and Rogers (2004) found the representation of women full professors in science and engineering appears to be only a quarter of what the figures show for academia generally— 3 to 15 percent (Nelson and Rogers 2004). At Rensselaer, by contrast, 100% of the women in science with thirteen or more years since highest degree had been promoted to full professor in 2001.

B. The 2004 Study

Our second study repeated the 13+ Club analysis two and one-half years later to examine the impact of the changes in faculty composition. The figure to the left below shows the results. Overall, the 13+ Club metric

The 13+ Club Metric 2001 & 2004

declined from the 2.3 found in the 2001 study to 2.2 in 2004. Patterns for individual schools show this overall decline came from changes outside of science and engineering. We came to see the overall change as a result of four interacting forces:
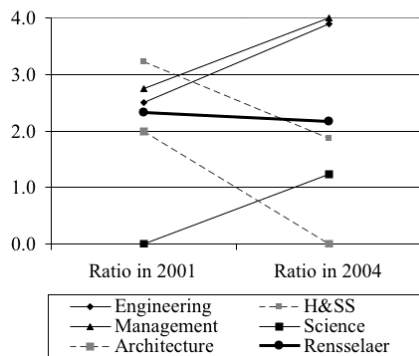
- First, many of the women in the 13+ Club in 2001 had sought and received promotion by 2004, leading to an overall decline in the rate of non-promotion from 48 to 36 percent. This factor was the major positive force in bringing the 13+ Club metric down over 2 1/2 years.

- Second, the rate of non-promotion for men also declined during this period, going from 21 to 16 percent. This factor actually lessened the impact of the overall decline in non-promotion for women on the 13+ Club metric.

- Third, nearly all of the women coming up through Rensselaer's pipeline to join the 13+ Club after 2001 were not promoted. Specifically, of the six women who crossed the threshold between 2001 and 2004, only one was promoted to full. Thus the five women who had promoted by 2004 were replaced by five new women from the pipeline. The overall effect, then, was to keep the number of unpromoted women at steady state.

- Finally, hires into the full professor ranks, aggressively pursued by Rensselaer in this period, were all men. While 35% of the male hires were at the rank of full professor between 2001 and 2004, none of the women hires were at this advanced rank — though one new senior woman has been hired since this study.

As this analysis suggests many forces combine in ways that challenge institutions to examine the full scope of improving women's advancement. Focusing on one to the exclusion of the others can lessen the impact of an institution's efforts. In the case of Rensselaer, our efforts had been on improving the promotion rate for women already in the 13+ Club in 2001; in this we succeeded. But other factors came into play in the same time period to make the change in the 13+ Club metric less than we had anticipated.

Understanding these factors has been an important part of the development of this proposal. To begin with, pipeline issues are notoriously difficult to ameliorate. While it may be possible to reduce the rate of non-promotion of women already in the 13+ Club relatively quickly, reducing the flow of the pipeline into the ranks of the non-promoted may be a longer-term project (Williams 2004). In addition, achieving equity in senior hires is particularly

difficult. While processes can be put into place to insure a diverse pool of applicants, the pool of available women applicants at the senior rank is still limited. For this reason, we seek to develop novel solutions by recruiting from industry where the track record in women's advancement has been more successful (Federal Glass Ceiling Commission, 2004).

C. The Faculty Survey

For our third study of advancement at Rensselaer, we undertook a faculty survey in follow-up to the 2001 analysis of promotion patterns. Using a comprehensive survey of 130 questions, we looked at factors affecting promotion such as advising and mentoring, clarity of criteria, school service, and the effects of life experiences. Because of the small number of women, we used a stratified random sample of associate and full professors matched by school and gender. Overall we surveyed 28 faculty members, 16 at the associate professor level and 12 at the full professor level with even numbers of men and women.

Of the 28 participants in our study, 12 men and 12 women were 13+ years post attainment of their highest degree. Of those 24, half were promoted and half were not promoted yet, again, equally split between men and women. Based on their data we developed six distinct profiles to represent the major advancement patterns at Rensselaer (Berkley, Kaminski, Geisler, and Layne, 2005):

  I. Promoted to Full on First Try with service, advice, and encouragement

 II. Promoted to Full on First Try with no advice or encouragement, but major service

III. Promoted to Full after Denial with no advice and no high-level encouragement

IV. Not Promoted after Denial

 V. Not Seeking Promotion despite encouragement/advice

VI. Not Seeking Promotion and not encouraged/advised.

The first three profiles represent successful advancement; the last three failures to advance. The chart below shows the distribution of men and women over these six profiles. Two points can be made relevant to women's advancement.
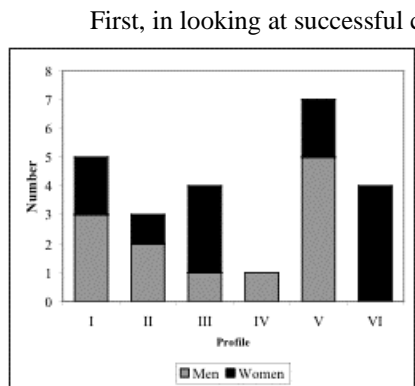
First, in looking at successful cases of advancement, we note that women are disproportionately

represented in Profile III. Specifically, three women and only one man were promoted to full after denial and with no advice or encouragement. We can compare this to Profiles I and II where men were slightly more likely than women (5 men versus 3 women) to be promoted on the first try. Of the three women who were denied on their first try but were later promoted, only one actively appealed the decision. The other two women reapplied at a later date and were subsequently promoted to full professor. The single man in that category did not appeal and later reapplied and was promoted to full professor.

Next, in looking at cases of failures to advance, we noted that women are disproportionately represented in Profile VI, men in Profile V. In Profile V, five men 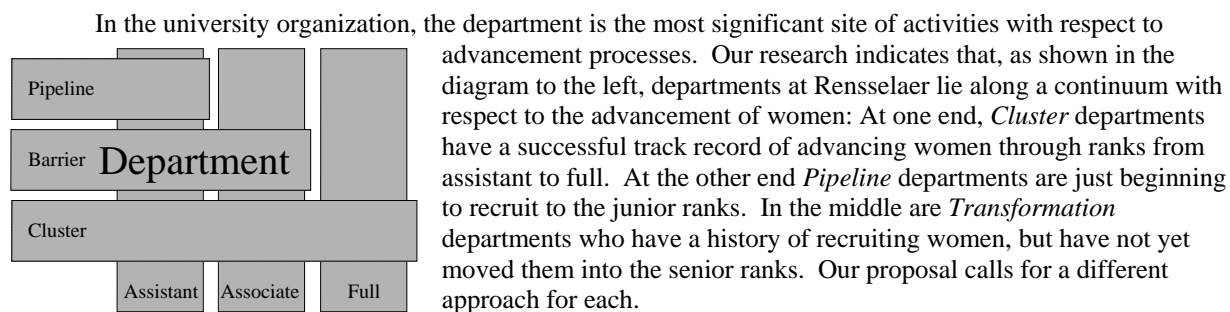and two women were not seeking a promotion to full despite advice and encouragement, whereas in Profile VI, four women and no men were not seeking promotion nor were they advised or encouraged. While it is unclear from our data why the participants in Profile V have not gone up for promotion, the stark comparison with Profile VI suggests men are more likely to be encouraged and advised than are women. Further investigating this result, we broke down the entire sample in the 13+ group based on advice and encouragement and found eight of eleven males were advised and/or encouraged to go up for promotion; however, only four of twelve women were so advised.

Since our study was based on a randomly selected group of men and women, we can say with some confidence that asymmetries in the availability of advice and encouragement play a big role in creating differential advancement paths for men and women at Rensselaer. This result is reinforced by the results of a recent climate study at Rensselaer (Hubbard & Hubbard, 2004) that showed faculty believing there to be a glass ceiling for women and minorities with perceived barriers to inclusion including "favoritism and the buddy system," with a resulting lack of a clear path for advancement

II. Reforming Advancement Processes at Rensselaer

The groundwork just outlined has provided us with a deep understanding of the systemic issues involved in reforming advancement processes at Rensselaer. In this section, we detail a comprehensive model for addressing reform by harnessing the power of the academic professions as self-regulating organizations with both the need and the responsibility to address the diversity challenges of the 21st century. Our approach begins at the level of the department.

A. At the Level of the Department

In the university organization, the department is the most significant site of activities with respect to advancement processes. Our research indicates that, as shown in the diagram to the left, departments at Rensselaer lie along a continuum with respect to the advancement of women: At one end, *Cluster* departments have a successful track record of advancing women through ranks from assistant to full. At the other end *Pipeline* departments are just beginning to recruit to the junior ranks. In the middle are *Transformation* departments who have a history of recruiting women, but have not yet moved them into the senior ranks. Our proposal calls for a different approach for each.

1. Pipeline

Our first department-level approach is aimed at those departments at Rensselaer who lack a history of advancing women through the pipeline. Under the current administration, several departments have now succeeded in bringing in women into the junior ranks, but still lack a senior presence, putting the junior women potentially at risk —for inadequate opportunities for joining research groups, for receiving mentoring, and for developing appropriate career models. We propose to capitalize on the fact that all of our Pipeline departments come from fields in which the diversity track record in industry is much stronger than that in academia. Our Pipeline plan calls for recruiting three senior women from industry.

The first phase of the *Pipeline Effort* focuses on the search, first orienting the search committee to their pipeline challenge and then identifying viable candidates from industry. In the second phase, the focus shifts to recruitment: Following a department orientation, one-week visiting fellowships will be arranged for up to two interested candidates. In the final phase, we move to hiring: an offer will be extended to one of these candidates and a start-up package provided to make the offer competitive. This three-phase process will be repeated three times, allowing for learning across the searches.

2. Cluster

At the other end of the spectrum, some departments at Rensselaer have already developed significant clusters of women ranging from junior through senior ranks. Our next department-level approach solicits the participation of these cluster departments — who have both a history of success as well as the motivation to systematize — to enable them to consolidate their success. Our proposal is to support three departments, one in each of three areas (engineering, science, and other schools) to become cases studies in the reform of departmental advancement processes.

Advancement Process Reform will be conducted in two phases. In the first phase, the department will receive an orientation from an external facilitator on advancement issues and then conduct a review of the current state of their advancement processes. In the second phase, the department will undertake projects to address areas that need reform. In the final phase, they will produce a department Guide to Advancement for use in their own self-regulation and as a model for the rest of the university.

Concurrent with this work on advancement processes, cluster departments will also work on *Community Building*. Community Building grants will be provided to address infrastructure needs departments have identified as a result of their review to be critical to advancement processes. These projects represent something in the line of rewards for participating in advancement reform, will be developed over a year's time, and will be launched toward the end of the ADVANCE grant period.

3. Transformation

As already mentioned, our research documents a significant number of women in the 13+ Club — with thirteen or more years since highest degree yet still not in the full professor ranks. Subsequent analysis of our data has shown that these problems are neither restricted to women nor common to all departments. Instead, it appears that certain departments have developed barriers to advancement that mitigate against the advancement of both men and women.

Our proposal is to target three departments for transformation, two in science and engineering and one in the other schools. Transformation departments will undertake the three-phase *Advancement Process Reform* described above, as well as *Community Building*. In addition and in recognition of their advancement needs, transformation departments will participate in mentoring projects for post-tenure women.

In ***Mentoring Projects***, senior faculty willing to serve as mentors will be matched with post-tenure faculty. In the Career Strategy phase, the mentor-mentee pair will conduct a cumulative review of the mentee's work, develop a strategy for advancement, and develop a proposal for a career campaign. Proposals for Career Campaigns will then be reviewed by the department's senior faculty who will be empowered to provide funds through ADVANCE. Three year Career Campaigns will culminate in a Gala celebrating the achievements of the mentees. From this effort, we expect that one third of our mentees will achieve advancement by the end of the Advance grant and at least one-third will be well on their way.

B. At the Level of the Individual

The next component of our plan reaches out to the individual faculty member, both those who are candidates for advancement and those who are decision-makers in the advancement process. In many ways, the

individual is the heart of the advancement process. Sitting at the intersection of the hierarchical organization of the university and the collegial organization of the profession, the individual faculty member makes innumerable daily decisions that add up to a career path. As we have found at Rensselaer, no reform of advancement processes can neglect to reach out to these individuals to provide them with a better understanding of the interaction between ideal norms of academic careers and the actual patterns of success and failure. The discrepancy between the ideal and the actual inevitably affects those outside the traditional networks and only education can serve as a corrective.
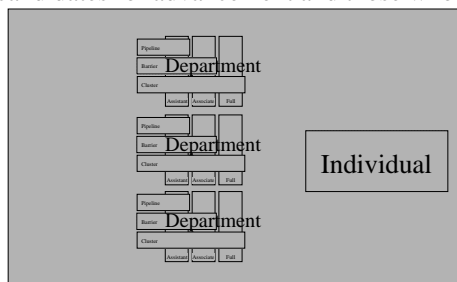
We propose a series of ***Faculty Workshops*** addressing major issues in women's advancement, at the rate of roughly one per semester for the life of the grant. Each workshop will provide attendees with brief summary and bibliography of relevant research, a time for discussion of issues, and a breakout time so that women may pursue networking opportunities. Tentative topics for workshops include:

1. Overview of Advance Activities
2. Advancement Issues
3. Mentoring
4. Career Strategy
5. Negotiation
6. Work-Life Balance
7. National Visibility
8. University Service
9. Teaching Issues, and
10. Case Preparation

C. At the Level of the School

The results of our faculty survey suggest that many difficulties in the advancement process occur one level up from the department, at the level of the school. School-level processes are responsible both for the annual evaluations that constitute the major feedback mechanism on faculty performance as well as the promotion reviews that constitute the major reward. At Rensselaer, a school-level administrative leadership team serves as the intermediary between departments and university-level processes, bringing together the department chairs with the dean. To deal with advancement issues at the school level, we propose to change the cast of players in the school level as well as alter the terms of deliberation.

First, we propose to balance the attention of the school-level administrative leadership team through the addition of a school-level ***Faculty Advocate*** who will serve as an advocate and advisor for individual faculty.
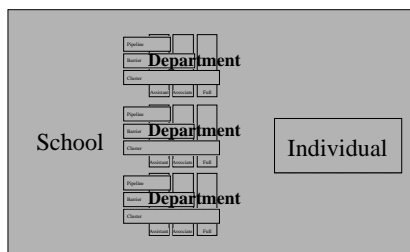
Unlike department chairs, whose role it is to attend to the overall welfare of the department, or Deans, whose role it is to attend to fairness across departments, the role of the Faculty Advocate will be to attend to the career development of individual members of the faculty. The Faculty Advocate will also serve as a primary source of information in the school for individuals on issues of advancement and be the point person for revising the annual review process (see below). Faculty Advocates will be placed in three schools, engineering, science, and one other, at a staggered pace over the first year-and-a-half of the project.

In the next phase of school level activity, these Faculty Advocates will chair a school-level committee on the *Annual Review*. Currently, the way annual review is done varies across Rensselaer's five schools, but the process has several characteristics that make advancement problematic. First, annual review focuses solely on a faculty member's most recent activity; neither the accomplishments of the whole career nor the prospects of advancement are considered. Second, the evaluation is dependent almost entirely upon the judgment of the department chair; while both deans and faculty members have some ability to influence their evaluations, the grounds for judgment are often hard to discern. And third, inadequate record keeping make it difficult for chairs or other members of the administrative leadership team to chart progress or make comparisons. Under the leadership of the Faculty Advocate and with the participation of selected senior faculty from departments involved in department-level *Advancement Process Reform*, we expect these committees on Annual Review to produce School Guidelines that will make annual review more transparent, fair, and consistent.

D. At the Level of the University

Beyond the schools and departments, responsibility for advancement at the university level is shared between an administrative committee under the direction of the Provost and an elected faculty committee under the

auspices of the Faculty Senate. Our intention is to work with both to make advancement processes more transparent, open, and equitable. To this end, we propose two activities.
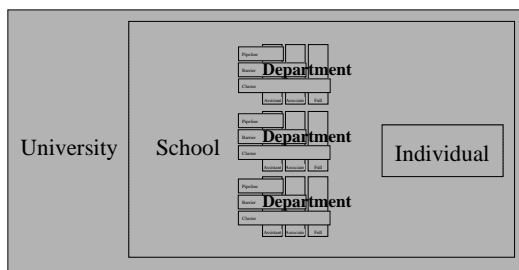
First, under the auspices of the Faculty Senate, we propose the establishment of a Faculty Senate Task Force for the *Revision of the Faculty Handbook*. As at most universities, the Faculty Handbook codifies the process and criteria for advancement in the academic ranks. Rensselaer has just completed the first major revision of the Rensselaer Handbook in over ten years. We propose to draw on the expertise of current and former members of the Faculty Committee on Promotion and Tenure as well as selected senior faculty in ADVANCE Departments to carry the revision process to the next stage by codifying processes such as those for part-time tenure and clarifying criteria such as the pace of productivity in advancement. We have staggered this university effort to take advantage of the reform efforts in departments and schools, culminating with the ratification of the Handbook revisions by the Faculty Senate and endorsement by the Board of Trustees in the final year of this grant.

In addition, under the auspices of the Provost's office, we will develop and deploy an *Open BioSketch* database to create a better feedback mechanism for faculty deliberation. The Biographical Sketch (BioSketch) is the main document for advancement at Rensselaer: it contains a detailed record of academic activity and accomplishments as well as a succinct statement of research. Currently, no record of the BioSketch of successful candidates is routinely available either to the members of faculty who deliberate on advancement or to the individual faculty members preparing for promotion. Our research suggests that many faculty, both men and women, have inadequate understandings of what it "takes" to be promoted; that many chairs hold candidates back from promotion believing that their accomplishments are not adequate. An Open BioSketch database would give these parties — who now operate with little more than institutional memory to direct their thinking — concrete information about successful cases, thus inserting a missing feedback loop into the self-regulating processes of the academic professions. Specification of the Open BioSketch will be done by a university-level committee designed to take advantage of ADVANCE faculty leadership, followed by a year-long implementation, with pilot testing and launch

by the conclusion of the ADVANCE grant. Following the grant period, the Open BioSketch will be maintained by the Provost's office.

Finally we propose the creation of a new position of *Institute Advocate*, a three-year faculty position within the Office of Institute Diversity. The Institute Advocate will serve as a liaison between individual faculty and the university hierarchy at all levels. This position will bring a much-valued faculty perspective to Rensselaer's Diversity initiatives and be a locus of responsibility for developing and implementing a program of education and interaction on advancement issues. After an initial term of serving on the Faculty Committee on Promotion and Tenure as an invited non-voting member, we would move that this position be made a permanent and elected voting member of this committee as part of Handbook Reform, with the first elected Institute Advocate assuming office in the Fall of 2009.

E. At the Level of the Profession

Our next initiatives reach beyond Rensselaer to address the issue of professional self- regulation at the national level. Unlike their industrial colleagues, faculty work in what is, in effect, a matrix organization. Along one dimension exists a classic hierarchical institution we have thus far been describing where individual faculty members report to departments chairs who in turn report to deans who in turn report to the Provost or other chief academic officer. This administrative hierarchy is responsible for much of the day-to-day, year-to-year processes of academic advancement.
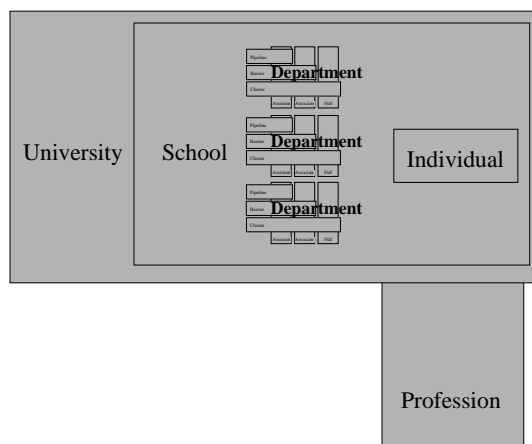
Along a second dimension, however, lies the collegially-organized academic professions whose role in academic advancement is no less important. Through the mechanism of peer review, professions establish criteria for publication, recognition for professional service, and venues in which to pursue the national agenda of a profession's knowledge development. In fact, the self-regulating force of faculty committees throughout a university's advancement process derives directly from the strength and credibility of these national professions. No effort at the reform of academic advancement can fail to address them.

We propose to work with a Senior Network made up of interested senior ADVANCE faculty on projects targeted to their professional associations. Our first project will be to draft *Publications Guidelines for Bias-Free Review* in the academic publications particularly with respect to double blind peer review. Building on a thorough literature review, we will prepare a case for a double-blind review process. Then, with the aid of Senior Network members, we propose to lead a campaign to change the peer-review policy of leading science and engineering journals. The case will be presented to boards of editors when they meet at disciplinary conferences. In each discipline, we will recruit an advocate who is interested in altering the policy and provide funds so that the advocate can attend appropriate conferences and generate interest among peers at other institutions. The effort will be coordinated and assessed through the ADVANCE grant.

Next, building on our work on the 13+ Club, we propose to work through the Senior Network to encourage professions to enhance their self-regulating capacity by collecting and publicizing a *13+ Club List*, reporting data comparable to that we described earlier for Rensselaer. Our initial focus will be on two to three professional associations suggested by the Senior Network. We will work to solicit their associations' support for the project, conduct analyses of their 13+ data, and launch a web site publicizing the results. This 13+ List will enhance the self-regulating capacity of these professional organizations and provide incentives to universities to attend to advancement issues.

Finally, at the level of the profession, we also propose to extend the *Research Foundations* on the advancement process by conducting ethnographic interviews to get a more in-depth understanding of advancement. Thus far, most studies of academic advancement have been quantitative (National Center for Education Statistics 2000, Academe 2005, Valian 1998). While there has been substantial qualitative work on the education of women

and girls in science and engineering (e.g. Margolis and Fisher 2002, Seymour and Hewitt 1997, McLoughlin 2003), there has been relatively little done on female academics. Qualitative work, like the valuable collection *Journeys of Women in Science and Engineering* (Ambrose, Dunkle, Lazarues, Nair, Harkus 1997), can have a significant impact in helping to understand the issues of advancement. The proposed study follows upon and extends the survey described earlier (Berkley, Kaminski, Geisler, Layne, 2005), by providing the qualitative data needed to understand the experience of women in each of the six profiles. First person narrative accounts of the women on each of these career paths will provide information for those working toward institutional transformation. In order to assure confidentiality, the work will be done at three technological institutions, and portraits will represent an amalgam of individual stories. This work will be completed early in the grant period in order to provide input to the advancement reforms being undertaken by departments and schools. Results will be shared with the project teams on campus during their deliberations and with the professions via presentation and publication.

III. Conceptual Framework: Advancement Reform through Professional Self-Regulation

A. The Problem of the Academic Glass Ceiling

Promotion to full professor is an important milestone in the career of an academic; unfortunately, women and men have markedly different success rates in reaching this milestone. Women are underrepresented in the ranks of full professor in virtually all disciplines, with the situation most severe in male-gender typed areas such as science, mathematics and engineering. This problem exists at universities nationwide, as documented by many studies (Valian, 1998; AAUW, 2005; Nelson & Rogers, 2004). The situation at Rensselaer thus reflects the national pattern.

Data for select institutions have shown a range of women full professors from 10.3 to 17.2 percent in 2000 and from 12.5 to 19.7 percent in 2002 (Hornig, 2003). Individual schools show similar patterns: For example, only 11% of the full professors at the University of Illinois at Champaign-Urbana were women in 1999 (Greendorfer, et. al. 1999). At Johns Hopkins, the women made up 12% of the faculty in the same year (Weiss, et. al., 1999). Nationally, although the percentage is slowly improving, women are still less than half as likely as men to be promoted to full professor at doctoral granting institutions (Curtis, 2005).

Under-representation of women in senior faculty positions occurs in all types of institution being, if anything, more severe in the most elite universities. For example, women make up only 4.4% of full professors at the top five Electrical Engineering departments nationwide and only 6.4% of full professors at the top five Mathematics departments (Nelson & Rogers, 2004). At Rensselaer, there are no women full professors in Electrical Engineering and, in Mathematics, women make up 15% of full professors.

Those women who are promoted often are delayed compared to their male counterparts. Princeton, for example, found that the time to promotion to full for women in the natural sciences was 1.4 years more than for men (Zakian, et. al., 2003). Our own survey (Berkley, Kaminski, Geisler, and Layne) found that women in general were delayed an average of 5.2 years compared to men. Analysis of NSF data on doctoral recipients indicates that even when background variables are accounted for, women are still less likely than men to occupy the senior ranks in departments in science and engineering (Long, 2003).

The disadvantaged position that women occupy in academia is part of a larger picture of advancement problems in industry spotlighted by the Federal Glass Ceiling Commission (1995). The commission report revealed that women are underrepresented in managerial positions, with considerable variation by industry. Academia was not among the industries examined; however, it appears that the problem is more severe in academia than in industry in general. Data from the 2002 EEO Survey of Private Firms in Private Industry reports, for instance, that the percentage of women serving as officials or managers had reached 36.4% by 2002 (Federal Glass Ceiling Commission, 2004). By contrast, the percentage of women at the full professor rank in academia had only reached 20.9% by 1999-2000 (AAUW, 2005).

B. Changing Organizations

National data like that reviewed in the last section suggests that Rensselaer is not alone in the advancement problems documented by our research. Rensselaer does, however, have the basic elements required for change: In general, organizations change in response to grass-roots efforts, dynamic leadership, and/or external factors. The best chance of success occurs when all three align.

Our proposal harnesses the grass-roots effort of the faculty to improve the status of women. Academia varies sharply from industry in that advancement decisions are in the hands of peers rather than administration. As a result, the growing cadre of active senior women on campus can work as peers to represent the interests of women. In the deliberations about advancement processes at department, school, and university levels that this proposal calls for, senior women can call into question the attitudes and practices on promotion and tenure committees and, with the resources and leadership made available through the ADVANCE program, convince colleagues of needed changes. The visible presence of these senior women is likely to lead to less gender stereotyping on campus (Ely, 1995).

In those cases where the representation of senior women is too weak to engage the mechanisms of self-regulation, this proposal calls for repairing the leaky pipeline with recruitment from industry. In general, as we noted earlier, women have advanced more rapidly in the private sector than in academe. The pool of available candidates is therefore larger. Senior women from industry will bring a new perspective on gender-fair advancement practices from the workplace and will thus be able to take a leading role. In addition, these senior women provide an invaluable source of mentoring and may also be able to channel opportunities to their junior colleagues.

Strong leadership at the highest levels of the university is the second powerful mechanism for organizational change harnessed by this proposal. Rensselaer is led by President Shirley Ann Jackson, the first woman and the first African American to head a major technological university. As we noted earlier, her term of office has been characterized by a dramatic increase in the size of the faculty and aggressive hiring of women faculty, including a department chair. In addition, she has elevated three minority candidates to vice-presidential positions. President Jackson is known on campus for her courage in tackling difficult issues and effecting major changes in policy. She is a role model with national visibility, and a champion for the advancement of women and minorities.

The third factor we harness for organizational change is external forces. We expect the ADVANCE program to act as an external catalyst for change, providing a platform for coordinating efforts across departments and schools. The resources provided by the grant will enhance the visibility of advancement issues and, together with the efforts of faculty and administrative leaders, will result in a more collegial and rewarding environment for all.

C. Drawing on the Legacy of ADVANCE

With the support of the National Science Foundation, ADVANCE Institutions have put in place a wide variety of interventions to improve the environment for women faculty. These include workshops, seminars, mentoring programs, services for dual-career couples, on-campus child care, seed money awards and start-up packages, and awards to support departmental transformation.

Prior efforts have been largely focused on recruiting, retaining, and tenuring women, with the unspoken assumption that post-tenure women would be positioned to succeed. This round of ADVANCE presumes otherwise, but even in earlier rounds, there have been efforts to address the issues post-tenure women face. Utah State, for example, has discovered the unfavorable climate that senior women face in academic departments (Utah State, 2005). Tenured women report the lowest levels of access to both information and resources, while tenured men are the best connected. Untenured women generally have good access to resources, but not to information. Relationships with department colleagues deteriorate for women over time, with tenured women reporting the lowest levels of connectedness. The opposite is true for men, who report increasingly rewarding relationships as they progress in their careers. These results are consistent with the findings of MIT's pioneering study of the status of women in the faculty of science (Hopkins, et. al., 1999). Although not a part of their original ADVANCE proposal, the University of Wisconsin-Madison has added a leadership development component for senior women in recognition of the challenges that women face at later stages of their careers (University of Wisconsin-Madison, 2005).

Initiatives to improve the success rate for the promotion of women generally fall into two categories: cultural changes and policy changes. Among the many possible approaches to changing campus culture, some of the more successful are offering education to both men and women in the form of seminars and workshops. Topics can include leadership development (University of Washington, 2005), departmental climate (University of Rhode Island, 2005), proposal writing skills (University of Puerto Rico at Humacao, 2005), negotiating skills (University of Maryland, Baltimore County, 2005), and many others. In many current ADVANCE programs, workshops are geared toward assistant professors and new hires. Continued support of women as they progress in their career as we propose here is less common.

Cultural change is also supported by mentoring programs, in which women become more aware of opportunities and obstacles and techniques to address each. Social events that encourage networking and information sharing provide needed supplements to women who are sometimes excluded from the informal channels available to men. Issues of work-life balance can be alleviated through increased child care and support for dual-career couples. Initiatives to provide seed grants for women can be used to jump start a research agenda.

Cultural change must also involve altering the attitudes of male colleagues, so that they are willing to welcome women fully into the academic community at all levels. In addition to headline stories such as the recent statement by Harvard president Summers that women may be biologically unsuited for science and engineering (Rimer, 2005), there exist a host of lesser ways in which men and women, usually subconsciously, discriminate against women in the professoriate and erect barriers to their career success (Valian, 1998). Bringing discussion of these issues into the open through departmental retreats, survey results, and committee meetings can be a force for change.

In our proposal, policy reform builds on and goes hand in hand with cultural change – each supports the other. Beginning at the level of the department, individual, and school, we focus on cultural change using a combination of techniques pioneered at other ADVANCE institutions: faculty workshops, departmental grants, senior advocacy, and mentoring. Once this cultural change process reaches some maturity, we then introduce a level of deliberation about policy at the school and institute levels. In doing so, we consciously draw on a model of self-regulation through the academic professions as described in the next section.

D. Changing Academic Culture Through Professional Self-Regulation

One of the main thrusts of professionalization is to ensure the conditions for professional autonomy in exchange for a commitment to serve society (Larson, 1977). This social contract was built in the late nineteenth century on intellectual foundations that still support the professions today (Haskell, 1984). Intellectuals of that day wanted to create special shelters for collections of individuals who would carry out their work in accordance with internally set standards for serving the common good. What men like Tawney in England, Durkheim in France, and Peirce in the United States saw as the guarantor of professionals' service for social good, according to Haskell (1984), was their intense collegiality. These thinkers were in agreement that only a "community of the competent," could regulate itself (Haskell, 1977, 1984; see also Larson, 1977).

The very intellectual foundation for the professions thus provides the rationale for the self-regulating mechanisms we have been pointing to in this proposal. Drawing on knowledge unavailable to outsiders, professions claim the exclusive privilege to evaluate the work of its members. Collegial governance remains something of an unrealized ideal in most professions however. On the academic professions, in particular, the modern university imposed the structure of the classic bureaucracy, producing the matrix organization alluded to earlier. As a result, the advancement processes that this proposal seeks to reform are enmeshed in the confluence of two systems:

1. A bureaucratic evaluation system that regulates the day-to-day and year-to-year activities of the professoriate through a chain of command that begins with a department chair or head and extends to the chief academic officer; and

2. A collegial review system that bears the main responsibility for tenure and promotion decisions that regulate advancement at individual universities and for the peer review decisions that regulate advancement at the national level.

Using this conceptual framework, policy reforms such as those pioneered by earlier ADVANCE efforts can be understood to address the first of these systems, the academic bureaucracy, which, through its chain of command

and culture of policy regulation appears to be more amenable to advancement reforms. But, as ADVANCE Institutions have begun to realize, such policy reforms only scratch the surface of what is required to bring equity in advancement in the academy; real change requires addressing directly the second of these systems, the system of professional self-regulation.

This conceptual framework suggests, in other words, that it is the professions themselves, through the self-regulating mechanisms of collegial review, who must step up to the challenge of ADVANCE. For this reason, this proposal put the work squarely in the hands of the self-regulating mechanisms found at all levels of the university — at the department, the school, and the university as a whole. We believe that these mechanisms can and need to be repaired to function effectively. The components of this "repair" are the following:

1. Vigilant Criteria

As the history of the professions suggests, the credibility of the modern professions rests in their claim to special knowledge and understanding, special expertise (Geisler, 1994). For this reason, criteria for advancement must properly be restricted to questions of the quality of work.   Yet we now understand that threats to these criteria can arise in a system of collegial review through the imposition of unacknowledged career norms and the restriction of knowledge to already-networked individuals. At the school and university level, this proposal calls for educating participants concerning these threats and putting in place advocates with specific responsibilities for vigilance. At the level of the department, we call for the use of mentors and the development of guides to break down the restriction of knowledge to already-networked individuals.

At the level of the profession, we call for a reform of the peer review system. Several studies have shown that the peer review process is susceptible to gender bias (Steinpreis, et al.,1999; Wennerås and Wold, 1997; Swim et al., 1989; Wallston and OLeary, 1982). In addition to gender, authors may face discrimination due to country of origin, ethnicity, or institutional affiliation (Bakewell, 1992).   To counteract bias, many disciplines in the Humanities and Social Sciences require articles to be reviewed by a double-blind process in which reviewers are unaware of the identity of authors. In science and engineering, however, the names of authors and their institutional affiliation are generally freely available to reviewers, creating a serious threat to collegial review. It is a deeply held principle of self-regulation that research should be evaluated on its merits without reference to the authority or status of the author. Our campaign for double-blind review calls on the academic professions in science and engineering to acknowledge and adhere to this principle.

2. Transparent Feedback

Any system of self-regulation requires adequate feedback to remain functional. In the advancement processes of the university, however, the feedback mechanisms are nearly non-existent. As we described earlier, information about what it takes for successful advancement is unavailable to the participants in promotion and tenure processes; information about annual review is largely inadequately codified and stored. This proposal calls for repairs to these feedback mechanisms by 1) creating a biosketch database that will provide both candidates and reviewers with information about past successful cases of promotion, and 2) formalizing school-specific guidelines for the annual review.

3. Reflection-in Action

Finally, a functional system of professional self-regulation requires adequate time and space for what Donald Schön (1987) has called "reflection-in-action." In Schön's view, professions have a responsibility not only to act on the basis of their expertise, but also to reflect as they act in order to improve their performance over time. Without reflection-in-action, professions can deteriorate in their performance. In this proposal, reflection-in-action is provided by ADVANCE, providing the time and space for departments, schools, and the Faculty Senate to review and reform their advancement processes. Without the support of ADVANCE, such space and time would not likely be available.

IV. Performance Plan

Both the overall program and each individual project will be evaluated under a comprehensive performance plan. Overall assessment is the responsibility of the Advisory Council, which will meet at least twice a year, receiving plans and reports of individual projects. In addition, an External Review Board will make annual visits to campus, evaluating pertinent aspects of the projects as they are planned and developed.

The metrics and goals for each project are summarized in the table on the next page, which also includes the formative evaluation to be discussed in the next section. In brief, for each project:

- Pipeline Departments – In the pipeline departments, the ultimate metric is the number of women hired from industry. Our goal is to find enough outstanding candidates that three will be hired with Institute funds.

- Cluster Departments – Improvements in department climate will be measured as a reduction in dissatisfaction, or "deficit," with a goal to reduce the deficit by 50%. We also set the goal of promoting and tenuring eligible women at the same rate as eligible men. A further measure of promotion success will be gender differences in membership in the 13+ club. Lastly, the gender balance of new hires should match the gender balance of PhDs graduated in that discipline.

- Transformation Departments – These have the same goals and metrics as the cluster departments, while some formative evaluations differ.

- Individual Outreach – Workshops will be evaluated by participants, with a goal of an average rating of 75% of maximum satisfaction. We aim to attract 40% of the target audience to each workshop.

- School Reform – The goal of this activity is to produce new guidelines for promotion that have been accepted by all constituents. Also, faculty should be given information on department averages for various annual evaluation metrics, such as papers published, research expenditures, teaching ratings, PhD students graduated, etc.

- University Reform – At the university level, our goal is to generate a database of biosketches of promoted (or denied) candidates for promotion, with at least 80% of potential faculty included. In addition, a revised section of the Faculty Handbook on the P&T process will be ratified by the Faculty Senate and the administration.

Professional Reform – We aim to change the peer-review policies of at least 6 science and engineering journals over the course of the grant, focusing on high impact factor publications. We will build a national database based on the 13+ metric, with a goal to include at least 20 universities. The research component of the grant will be disseminated through publications and presentations, with a book resulting.

V. Formative Evaluation

For each project, intermediate assessments will be used to guide and measure progress toward the final goal. The planned formative evaluations are briefly described in the table on the preceding page.

- Pipeline Departments – To assess progress toward hiring woman full professor from industry, we will create a database of potential candidates. Appropriate metrics include the number of entries in the database, the number of candidates contacted, the number interviewed, and the number offered a position.

- Cluster Departments – An initial climate survey will be used to set a baseline against which improvements can be gauged. The survey will also solicit comments on the nature of any problems and possible solutions. Data on recent hiring and promotion actions by the department will be generated and analyzed.

- Transformation Departments – As in the cluster departments, initial climate surveys and recent hiring and promotion patterns will be assessed. In addition, the percentage of eligible women faculty who are matched with mentors will be reported.

- Individual Outreach – Our formative evaluation for workshops will include a survey to determine topics of interest. Both topics suggested by the Advisory Board and those submitted by the respondents will be considered.

- School Reform – At the school level, a database of past annual evaluations will be produced. Average performance of faculty in each department will be reported.

Pipeline Effort	Formative Evaluation	Performance Metrics	Goals
	Size of candidate database	Number of women hired	Hire three senior women
	Number of candidates contacted		
	Number of candidates interviewed		
	Number of offers		

Cluster Departments	Formative Evaluation	Performance Metrics	Goals
	Initial climate survey	Final climate survey	Decrease deficit 50%
	Department advancement baseline data	Percent eligible women promoted	Men/Women same percent
	Department retention baseline data	Percent women hired	Same percent as PhD pool
		Percent faculty in 13+ club	Men/Women same percent

Transformation Departments	Formative Evaluation	Performance Metrics	Goals
	Initial climate survey	Final climate survey	Decrease deficit 50%
	Department advancement baseline data	Percent eligible women promoted	Men/Women same percent
	Department retention baseline data	Percent women hired	Same percent as PhD pool
	Percent women matched with mentors	Percent faculty in 13+ club	Men/Women same percent

Individual Outreach	Formative Evaluation	Performance Metrics	Goals
	Workshop topic interest survey	Workshop attendance	40% of target audience
		Workshop evaluation	At least 75% of max rating

School Reform	Formative Evaluation	Performance Metrics	Goals
	Create database of past evaluations	Publication of new guidelines	Accepted document
		Publication of evaluation averages	Accepted document

University Reform	Formative Evaluation	Performance Metrics	Goals
	Review biosketches of recent promotions	Percent biosketches in database	At least 80% of all possible
		New P&T section in handbook	Accepted document

Professional Reform	Formative Evaluation	Performance Metrics	Goals
	Review of publication policies	Number of journals changing policy	10 journals
		Number of universities with 13+ data	20 universities
		Publication of research results	book

- University Reform – The biosketches of recently promoted faculty will be analyzed and added to a database.
- Professional Reform – We will review the peer-review policies of leading science and engineering journals and decide which to target for change.

VI. Management Plan

A. Overall Project Management

The overall management of this project will be handled by a **Leadership Team** chaired by Geisler and made up of Geisler, Kaminski, Peterson, and Durgans, meeting at least bi-monthly. This leadership team will be responsible for launching, managing, and evaluating the work of the grant.

Internal oversight for ADVANCE projects will be provided by an **Advisory Council** made up of select senior women joined by a former member of the Faculty Committee on Promotion and Tenure and the Chair of the Faculty Senate. The Advisory Council will meet at least once a semester and be responsible for reviewing the plans

and reports of the various projects making up this grant. The Advisory Council will also approve the drafts of the RFPs for internal grants, make recommendations concerning their awards, and make a recommendation concerning the appointment of the Institute Advocate.

External review of the projects on this grant will be conducted each spring by an **External Review Board** of three experts on women's advancement issues. The External Review Board will begin in spring of 2006 by reviewing the overall plans for the grant, and then go on in subsequent years to review projects as they are planned and implemented.

B. PIs and Senior Personnel

In addition to chairing the Leadership Team, **PI Geisler,** an expert on the academic professions with an established record of university leadership, will lead the Faculty Handbook Reform, accepting the appointment of the Faculty Senate Executive Committee to chair the Task Force on Handbook Revision. She will also co-chair the Senior Network and lead the effort to solicit and analyze data for the 13+ Club List.

In addition to serving on the Leadership Team, **Co-PI Kaminski,** a mechanical engineer with an established record of university leadership**,** will lead the effort to develop the Open BioSketch database, accepting the appointment of the Provost to chair the Open BioSketch Committee. She will also chair the Senior Network and lead the effort to develop and lobby for the Publications Guidelines for Bias-Free Review.

In addition to serving on the Leadership Team, **Co-PI Peterson,** Provost, will serve as an *ex officio* member of the Task Force on Handbook Revision, steering its revision through approval process. As Provost, he will also take primary responsibility for the Pipeline hires.

In addition to serving on the Leadership Team, **Durgans,** Vice Provost for Institute Diversity, will chair the Advisory Council and oversee the development and delivery of the Faculty Workshops.

Layne, a cultural anthropologist with expertise in life story and narrative analysis, will serve as the investigator for the work on Research Foundations.

C. Staff

The Leadership Team will be assisted by a full-time **Administrative Assistant** responsible for budget management, event planning, and web maintenance.Evaluation, both formative and summative, will be directed by a half-time **Evaluation Manager** under the supervision of the Leadership Team. The specification and implementation of the Open BioSketch will be assisted by a quarter-time **Technician** responsible for the detailed implementation and testing of the system.

D. Projects

As shown in the Activities Chart on the next page, projects have been staggered so that developing expertise at one level can be utilized at the upper level. Details on the management of specific projects are as follows:

The *Pipeline Efforts* will be directed by departmental search committees with advice from junior women in their respective departments.

Advancement Reform in the Cluster and Transformation departments will be overseen by Local PIs. To capitalize on their developing expertise, Cluster PIs will also serve on their school's Committee on the Annual Review; Transformation PIs will serve on the OpenBioSketch Committee.

Community Building Grants will be implemented by department chairs in the Cluster and Transformation departments.

Mentoring Projects will be the joint efforts of Senior Mentors and Post-tenure Faculty in the Transformation Departments, soliciting and implementing Career Campaign grants.

Pipeline Effort

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
		Phase 1: Committee		Phase 2: Department		Phase 3: Hire				Gala	
		Orientation	Identification	Orientation	Visiting Fellowships		Hire with Start-Up				
			Orientation	Identification	Orientation	Visiting Fellowships		Hire with Start-Up			
				Orientation	Identification	Orientation	Visiting Fellowships			Hire with Start-Up	

Cluster Departments

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
	Solicitation	Phase 1		Phase 2			Phase 3			Gala	
Advancement Processes Reform		Orientation	Review	Reform			Ratify	Publish Dept Guide to Advancement			
Community Building						Application	Development		Launch		

Transformation Departments

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
	Solicitation									Gala	
Advancement Processes Reform		Orientation	Review	Reform			Ratify	Publish Dept Guide to Advancement			
Community Building						Application	Development		Launch		
Mentoring Projects	Match	Career Strategy		Career Campaign							

Individual Outreach

	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010
Faculty Workshops	Overview of Advance Activities	Advancement Issues	Mentoring	Career Strategy	Negotiation	Work-Life Balance	National Visibility	University Service	Teaching Issues	Case Preparation

School Reform

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
										Gala	
		Recruitment	Faculty Advocate		Committee on the Annual Review draft		School Guidelines review		Publish		
			Recruitment	Faculty Advocate		Committee on the Annual Review draft		School Guidelines review		Publish	
				Recruitment	Faculty Advocate		Committee on the Annual Review draft		School Guidelines review		Publish

University Reform

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
Revision of the Faculty Handbook			Task Force Selection		Task Force Work			University-wide Discussion	Handbook Ratification		
Open BioSketch				Committee Selection		Specification		Implementation		Pilot	Launch
Institute Advocate	Recommendation	First Year		Second Year			Third Year	Election	Assumption		

Professional Reform

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6
	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	
Publications Guidelines for Bias-Free Review				Senior Network Formation		Draft Guidelines	Lobby for Guidelines			Publicize	
13+ Club List							Solicitation	Analyses		Launch	
Research Foundations	Planning	Data Collection		Analysis		Publication					

Faculty Workshops will be directed by Durgans with the assistance of the Institute Advocate.

Faculty Advocates will be responsible for providing advice and review of advancement issues to the faculty and administrative leadership teams in their respective schools. They will also chair the school-level Committees on the Annual review and serve on the Open BioSketch Committee.

Committees on the Annual Review will be chaired by the Faculty Advocates.

The Institute Advocate will co-chair the Advisory Council, provide advice and review of advancement issues for faculty across the Institute, serve as an ex-officio member of the Faculty Committee on Promotion and Tenure, and work with Durgans to plan and deliver the Faculty Workshops.

The *Task Force on the Handbook Revision* will be chaired by PI Geisler. The *Committee on the Open BioSketch* will be chaired by Co-PI Kaminski.

Professional-level Reform will be directed by Kaminski and Geisler with the advice and assistance of the Senior Network, a group of four senior Rensselaer women. *Research Foundations* work will be directed by Layne.