ABSTRACT
As a first step in understanding whether computing faculty are receiving the support necessary for them to achieve promotion and tenure at U.S. and Canadian institutions, we address the question of what requirements exist at such institutions. Via a survey created and sent to approximately 7500 computing faculty at the 256 institutions that participate in the annual Taulbee Survey, we examined characteristics of and differences in promotion and tenure requirements at U.S. and Canadian institutions. Our results identify several hidden tenure and promotion requirements that can be important for computing faculty to know. Our results also show significant differences in requirements for the number of publications, venue ranking and scope, refereed conferences and non-refereed journals, and collaborative publications and grants across various types of institutions. This work provides a basis for further study of whether faculty receive support congruent with their promotion and tenure requirements and allows computing administrators and faculty to compare institutional requirements to requirements in the broader community.

Categories and Subject Descriptors
K.3.2 [Computer and Information Science Education]: Computer Science Education

General Terms
Management

Keywords
Tenure, promotion, institutions, Taulbee, requirements, collaboration, publications, presentations

1. INTRODUCTION
Research requirements for promotion and tenure are both an important and controversial topic for academics. As a relative young field, promotion and tenure requirements in computing are more in flux than for older, more established areas of study. In the United States and Canada, the Computing Research Association (CRA) conducts the annual Taulbee Survey, a report of the profiles of computing faculty. The Taulbee Survey includes information about salaries and basic information about resources and support necessary for faculty to be successful and meet their tenure and promotion requirements. However, there are no studies or published research for computing faculty that includes a wide spectrum of factors that can impact research productivity as it relates to promotion and tenure for computing faculty. These factors typically fall into three areas: time to pursue scholarship, funding to pursue scholarship, and technical expertise, assistance, and training [9, 11].

One of the first questions that any researcher looking at this issue must consider is what promotion and tenure requirements exist in the computing discipline. In this paper we examine that issue for U.S. and Canadian institutions, taking as our focus the institutions that can be found on the Forsythe List that forms the basis of the Taulbee Survey. In particular, the research questions we pose are as follows:

- What publication tenure and promotion requirements exist for institutions on the Forsythe List?
- Is there a difference in tenure and promotion requirements between ranked and unranked U.S. computer science departments?
- Is there a difference in tenure and promotion requirements between U.S. and Canadian institutions?

In answering these questions we form the basis for a broader study examining whether computing faculty receive institutional resources and support congruent with their needs for meeting tenure and promotion requirements. This research is also immediately useful for computing faculty and administrators for computing programs, providing a point of reference for comparing some of their institutional requirements with promotion and tenure requirements in the broader community.

2. BACKGROUND
Within U.S. institutions, research productivity is an important element in the attainment of tenure and promotion [4]. Though archival journals are often the place where faculty are required to publish in higher education, this is not the case for computing faculty. CRA submits that conference publication is preferred in the field, and computing artifacts can also serve as valid evidence of research productivity [4]. Presentation is one of the primary reasons for this, since it provides a valuable forum for dissemination of current research. Within the field, “conference publication is both rigorous and prestigious” and “[a]ssessing artifacts requires evaluation from knowledgeable peers” [4]. The former requires conference attendance for authors, while the latter requires networking among peers within one’s specific research area. The recognition of the importance of conference
Research productivity is recognized as an important area of faculty development, and others also support networking as a critical component for it. In her summary of experiences at Griffith University in Australia, Conrad notes that the context-sensitive activities and networking opportunities are important [3]. Shaw emphasizes the need for network building for securing both internal and external funding, acknowledging that the latter can only be accomplished through intentional networking [10]. He also recognizes the importance of establishing peer recognition and support for research agendas. The importance of access and opportunity is also emphasized, as networking can be crucial in finding the right venue for publishing books and journal articles.

3. METHODOLOGY
To answer the research questions, a cross-sectional survey was created to collect data about tenure and promotion requirements for computing faculty [5]. The survey was developed to address standard types of tenure and promotion requirements as defined by previous researchers. The demographic information that was collected included position, type of institution, gender, race, and faculty rank. It also included questions about the department's publication and collaboration requirements needed to receive tenure and/or promotion.

The population for this survey was identical to the population for the Taulbee Survey, which consists of 256 institutions on the Forsythe list. Though computing department chairs complete the Taulbee survey, the population for this survey included the faculty in the computing departments. To request participation, we obtained email addresses of computing faculty at each of these institutions by accessing publicly available information.

The data collection followed techniques that were previously approved by the researcher’s committees on research of human subjects. The survey was disseminated electronically using surveymonkey.com using SSL for an added measure of security. Only participants who agreed to the letter of consent that appears on the first page of the survey were able to complete the survey.

The survey was launched February 28, 2011 and closed on March 16, 2011. Two emails were sent to 7,787 computing faculty in the United States and Canada, the first announcing the survey and inviting participation. The second email was sent one week after the first to remind computing faculty of the survey and the closing date.

To ensure reliability and validity, data was collected electronically and confidentially. The data was downloaded and then analyzed using the SPSS software system. Descriptive and inferential statistics were used to analyze the data.

4. RESULTS
To complement the Taulbee survey, institutions were grouped in the same seven categories. For U.S. institutions, respondents could choose Computer Science (CS), Computer Engineering (CE), or U.S. Information (including Information Systems and Technology) departments. Those in the CS department could then qualify their institution ranking as 1-12, 13-24, 25-36 or other based on the name of their school and how it corresponded to the Taulbee survey. Canadian institutions were all placed in one category.

The request for participation was sent to 7,787 computing faculty at the 256 Forsythe institutions. Some of the email addresses culled from each institutions website belonged to part-time faculty, researchers, deans, emeriti faculty, and others that fall out of the scope of faculty for this study. Therefore, we estimate the actual population was 7,500. 447 surveys were completed by faculty, giving a response rate of 6%.

Respondent demographic data is provided in the first section. The results are stated in context of the research questions, with the second section defining the tenure and promotion requirements for institutions. The third section looks at the differences between tenure and promotion requirements at the institutions.

4.1 Respondents
Of the 447 responses, there were 343 participants from CS departments in the U.S., 15 participants from CE departments in the U.S., 37 from Information departments in the U.S., and 52 participants from Canada computing departments. Table 1 provides more detail.

<table>
<thead>
<tr>
<th>Table 1. Number of respondents per institution type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution/Department Type</td>
</tr>
<tr>
<td>U.S. CS 1-12</td>
</tr>
<tr>
<td>U.S. CS 13-24</td>
</tr>
<tr>
<td>U.S. CS 25-36</td>
</tr>
<tr>
<td>U.S. CS Other</td>
</tr>
<tr>
<td>U.S. CS Subtotal</td>
</tr>
<tr>
<td>U.S. CE</td>
</tr>
<tr>
<td>U.S. Information</td>
</tr>
<tr>
<td>Canadian</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Faculty rank was also gathered using the Taulbee survey categories. 383 respondents specified their faculty rank, as shown in Table 2. Similarly, 356 respondents specified their tenure status, with 70 responding that they did not have tenure and 286 responding that they did. For the remainder of the data analysis, data is only reported for those holding one of the professorial ranks.

356 of the professorial rank respondents gave their race, with 264 (78%) identifying themselves as white and 76 (22%) as non-white. 350 respondents provided their gender, with 286 (82%) identifying themselves as male and the remaining 64 (18%) as female.


Table 2. Faculty rank of respondents

<table>
<thead>
<tr>
<th>Faculty Rank</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>Non-tenure track teaching</td>
<td>22</td>
<td>6%</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>70</td>
<td>19%</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>130</td>
<td>36%</td>
</tr>
<tr>
<td>Full Professor</td>
<td>136</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>383</strong></td>
<td></td>
</tr>
</tbody>
</table>

4.2 Tenure and Promotion Requirements

As shown in Table 3, the number of publications required per academic year for those seeking tenure or promotion is on average 3.16 (N=241, SD=1.60). During the entire probationary period for tenure, the average number of publications required is 12.90 (N=180, SD=7.44), while the average number of publications required during the promotion review period was 17.09 (N=167, SD=9.98).

Table 3. Number of Publications Required

<table>
<thead>
<tr>
<th>Number of Publications Required</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Academic Year</td>
<td>241</td>
<td>3.16</td>
<td>1.60</td>
</tr>
<tr>
<td>During Probationary Period</td>
<td>180</td>
<td>12.90</td>
<td>7.44</td>
</tr>
<tr>
<td>During Promotion Review Period</td>
<td>167</td>
<td>17.09</td>
<td>9.98</td>
</tr>
</tbody>
</table>

The respondents rated the characteristics of the publications on a 5-point Likert scale with the scaling options of Unimportant, Of Little Importance, Moderately Important, Important, and Very Important, with 1 being Unimportant and 5 being Very Important (Table 4). The most important publication characteristics were refereed journals (M=4.5, SD=0.80) and refereed conferences (M=4.17, SD=0.92). Venue ranking, number of publications, venue acceptance rate, and venue scope were also deemed important. Of little or no importance was non-referred conferences or journals.

Table 4. Importance of publication characteristics

<table>
<thead>
<tr>
<th>Publication Characteristics</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refereed Journals</td>
<td>349</td>
<td>4.50</td>
<td>0.80</td>
</tr>
<tr>
<td>Refereed Conferences</td>
<td>350</td>
<td>4.17</td>
<td>0.92</td>
</tr>
<tr>
<td>Venue Ranking</td>
<td>348</td>
<td>3.93</td>
<td>0.98</td>
</tr>
<tr>
<td>Quantity of Publications</td>
<td>350</td>
<td>3.85</td>
<td>0.94</td>
</tr>
<tr>
<td>Acceptance Rate</td>
<td>350</td>
<td>3.70</td>
<td>0.98</td>
</tr>
<tr>
<td>Venue Scope</td>
<td>347</td>
<td>3.49</td>
<td>1.06</td>
</tr>
<tr>
<td>Non-refereed Conferences</td>
<td>346</td>
<td>1.90</td>
<td>0.71</td>
</tr>
<tr>
<td>Non-refereed Journals</td>
<td>333</td>
<td>1.87</td>
<td>0.71</td>
</tr>
</tbody>
</table>

Over 70% of institutions require external collaboration activities and 65% require internal collaboration activities for tenure and promotion. Another 25.6% and 30.9% of institutions expect collaboration externally and internally, respectively, though it is part of the department culture rather than written policy.

The type of collaborative activity required is not fully specified by the respondents. Publications and grants garnered the highest responses, but mostly at the informally required level. Presentations and projects are also ranked very high at the informally required level. Table 5 summarizes the results.

Table 5. Collaborative Activities

<table>
<thead>
<tr>
<th>Collaborative Activities</th>
<th>Formally Required (Written Policy)</th>
<th>Informally Required (Culture/Environment)</th>
<th>Not Required Informally or Formally</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>External</td>
<td>243</td>
<td>70.6</td>
<td>88</td>
</tr>
<tr>
<td>Internal</td>
<td>225</td>
<td>65.0</td>
<td>107</td>
</tr>
<tr>
<td>Publications</td>
<td>103</td>
<td>29.8</td>
<td>119</td>
</tr>
<tr>
<td>Grants</td>
<td>48</td>
<td>13.8</td>
<td>133</td>
</tr>
<tr>
<td>Presentations</td>
<td>28</td>
<td>7.9</td>
<td>198</td>
</tr>
<tr>
<td>Projects</td>
<td>14</td>
<td>4.1</td>
<td>209</td>
</tr>
</tbody>
</table>

Removing the outliers under the assumption that the response of 36 papers and 36 presentations in one year is highly unlikely, the mean for presentations drops to 3.2, SD=3.36 and for publications is 5.44, SD=3.90.

Table 6. 2009-10 Scholarship Activity

<table>
<thead>
<tr>
<th>2009-10 Scholarship</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentations</td>
<td>345</td>
<td>0</td>
<td>36</td>
<td>3.30</td>
<td>3.78</td>
</tr>
<tr>
<td>Publications</td>
<td>344</td>
<td>0</td>
<td>36</td>
<td>5.53</td>
<td>4.22</td>
</tr>
</tbody>
</table>

4.3 Similarities and Differences Across Institutions

An analysis of two-way contingency tables was conducted to evaluate whether the demographic and tenure and promotion requirements differed across the seven categories of institutions defined in the Taulbee report.

4.3.1 Faculty Demographic Data

Across institutions, there were no significant differences (p<.05) found between the type of institutions and the following variables: gender (Pearson χ² (6, N=350) = 8.61, p = .20), tenure status (Pearson χ² (6, N=350) = 2.86, p = .83), rank (Pearson χ² (12, N=356) = 11.03, p = .53), or race of professors (Pearson χ² (6, N=340) = 7.66, p = .26).

4.3.2 Tenure and Promotion Data

For the remaining 18 tenure and promotion variables, we started analyzing the data using Pearson's chi-square, which generated 7xn contingency tables, where n is the number of responses for each survey item.

Using Pearson's two-way chi-square tests, all of the generated tables had five or more cells with no data; therefore, the tests for significance were unreliable. A test of analyzing the data with the Fisher-Freeman-Halton exact test did not produce results within 30-minutes. We then chose to use the Monte Carlo method for...
each tenure and promotion variable, using a 99% confidence interval based on 10,000 samples and a starting seed of 2,000,000.

There were no significant differences (p<.05) found between the institution type and each of the following:

- The importance given to non-refereed conferences (Pearson $\chi^2$ (24, N=346) = 27.20, p = .33),
- The importance given to refereed journals (Pearson $\chi^2$ (24, N=349) = 33.82, p = .11),
- The importance given to the acceptance rate of venue ((Pearson $\chi^2$ (24, N=350) = 33.42, p = .10),
- Internal collaborations (Pearson $\chi^2$ (12, N=346) = 17.09, p = .15),
- External collaborations (Pearson $\chi^2$ (12, N=344) = 12.59, p = .39),
- Collaborative projects (Pearson $\chi^2$ (12, N=341) = 9.57, p = .65), and
- Collaborative presentations (Pearson $\chi^2$ (12, N=345) = 12.36, p = .42).

Using one-way analysis of variance for interval data, the number of publications required per academic year (F(6, 234)=1.30, p = .26) and the academic review period (F(6, 173)=1.49, p = .18) also were not statistically different across institutions. Finally, the number of presentations given in the 2009-10 academic year did not indicate any significant difference across institutions (F(6,338)=1.88, p=.082).

There were, however, significant differences found in the remaining categories. To test the hypothesis that higher ranked institutions have different requirements than other institutions and to test whether U.S. and Canadian requirements differ, pairwise comparisons were performed using a 2x2 table extracted from the original table. Institutions were combined across categories as follows:

- CS 1-12 and all other institutions
- CS 1-24 and all other institutions
- CS 1-36 and all other institutions
- All U.S. and all Canadian institutions

The importance ratings were compressed as Unimportant, Of Little Importance, and Moderately Important in one group, and Important and Very Important in another.

4.3.2.1 Quantity Of Publications
Participant's institution type was compared against the 5-point Likert rating of the importance of the quantity of publications required for tenure/promotion, resulting in $\chi^2$ (24, N=350) = 55.76, p = .002, 99% CI[.001,.003], Cramer's V=.20. Therefore, there is a significant difference among institutions in the importance placed on the quantity of publications.

The pairwise comparison using Pearson's chi-square test for the a priori analysis formed from the research questions found significant differences for institutions types. Respondents at the top 12 institutions place less importance on the number of publications than other institutions (Pearson $\chi^2$ (1, N=350) = 14.45, p = .00, Cramer's V=.20). The top 24 institutions place less importance on publications (Pearson $\chi^2$ (1, N=350) = 12.72, p = .00, Cramer's V=.19) and the top 36 institutions place less importance on publications (Pearson $\chi^2$ (1, N=350) = 9.61, p = .00, Cramer's V=.17). The strength of the relationship (Cramer's V) is medium.

There was no significant difference in the importance placed on the number of publications at U.S. institutions versus Canadian institutions (Pearson $\chi^2$ (4, N=350) = 3.73, p = .44).

4.3.2.2 Venue Ranking
Institution type was compared against the importance of the ranking of the publication venue and the relationship was found to be significant (Pearson $\chi^2$ (24, N=348) = 46.44, p = .00, 99% CI[.006,.010], Cramer's V=.18).

The pairwise comparison for top ranked institutions did not find significant difference for CS1-12 and other institutions (Pearson $\chi^2$ (1, N=348) = .17, p = .68) or for CS1-24 and other institutions (Pearson $\chi^2$ (1, N=348) = .86, p = .34). However, there was a difference found between the top 36 institutions and the rest of the institutions, though the relationship is weak (Pearson $\chi^2$ (1, N=348) = 8.56, p = .01, Cramer's V=.14).

There was no significant difference between U.S. and Canadian institutions (Pearson $\chi^2$ (1, N=348) = 1.40, p = .24).

4.3.2.3 Venue Scope
The importance of the scope of the venue (international, national, local) was significantly different across institutions (Pearson $\chi^2$ (24, N=347) = 75.20, p=0.00, 99% CI[.000,.000], Cramer's V=.23). Upon further analysis using pairwise comparisons, there was no significant difference between CS1-12 and other institutions (Pearson $\chi^2$ (1, N=347) = 1.91, p=.17). Significant differences were found between CS1-24 and other institutions (Pearson $\chi^2$ (1, N=347)=12.16, p=.00, Cramer's V=.19) and CS1-36 and other institutions (Pearson $\chi^2$ (1, N=347)=4.09, p=.04, Cramer's V=.11). The strongest relationship was between CS1-24 and other institutions.

Significant difference was found between U.S. and Canadian institutions, though with a somewhat weak relationship (Pearson $\chi^2$ (1, N=347) = 5.85, p=.02, Cramer's V=.13).

4.3.2.4 Refereed Conferences
The importance placed on refereed conferences was significantly different across institutions (Pearson $\chi^2$ (24, N=350) = 41.58, p=.02, 99% CI[.071,.024], Cramer's V=.17).

Upon further analysis, no significant differences could be found between CS 1-12 and other institutions (Pearson $\chi^2$ (1, N=350) = .23, p=.63), between CS 1-24 and other institutions (Pearson $\chi^2$ (1, N=350) = .36, p=.56), and between CS1-36 and other institutions (Pearson $\chi^2$ (1, N=350) = 2.45, p = .12). Additionally, no difference could be found between U.S. and Canadian institutions (Pearson $\chi^2$ (1, N=350) = .36, p=.55).

4.3.2.5 Non-Refereed Journals
The importance placed on non-refereed journals was significantly different across institutions (Pearson $\chi^2$ (18, N=333) = 27.20, p = .01, 99% CI[.009,.014], Cramer's V=.19).

No significant differences could be found between CS 1-12 and other institutions (Pearson $\chi^2$ (1, N=333) = .61, p = .44), CS1-24 and other institutions (Pearson $\chi^2$ (1, N=333) = 1.52, p = .22), and CS 1-36 and other institutions (Pearson $\chi^2$ (1, N=333) = 2.60, p = .11). No significant differences between US and Canadian institutions (Pearson $\chi^2$ (1, N=333) = 1.60, p = .20) were found.
The aggregation assumes a more general distribution of answers. However, the results of the chi-square test show that no respondents selected non-refereed journals as Very Important. The data aggregation, therefore, is skewed towards being less important across all institutions.

4.3.2.6 Collaborative Publications
Significant differences were found among institutions and whether or not collaborative publications were formally required, informally required, or not required at all (Pearson $\chi^2 (12, N=347) = 24.81, p = .014$, 99% CI[.011, .016], Cramer's $V=.19$).

Significant differences were found between CS1-12 institutions that required collaborative publications either formally or informally and other institutions (Pearson $\chi^2 (1, N=346) = 7.62, p = .01$, Cramer's $V=.15$), between CS1-24 and other institutions (Pearson $\chi^2 (1, N=346) = 11.89, p = .00$, Cramer's $V=.19$), and between CS1-36 and other institutions (Pearson $\chi^2 (1, N=346) = 10.86, p = .00$, Cramer's $V=.18$). No significant differences between U.S. and Canadian institutions (Pearson $\chi^2 (1, N=346) = .59, p = .44$) were found.

4.3.2.7 Collaborative Grants
Significant differences were found among institutions and whether or not collaborative grants were formally required, informally required, or not required at all (Pearson $\chi^2 (12, N=347) = 23.57, p = .025$, 99% CI[.021, .029], Cramer's $V=.18$).

Significant differences were not found between CS1-12 institutions that required collaborative grants either formally or informally and other institutions (Pearson $\chi^2 (1, N=347) = 1.86, p = .17$). They were found, however, between CS1-24 and other institutions (Pearson $\chi^2 (1, N=347) = 7.28, p = .00$, Cramer's $V=.15$), and between CS1-36 and other institutions (Pearson $\chi^2 (1, N=347) = 11.45, p = .00$, Cramer's $V=.18$). No significant differences between U.S. and Canadian institutions (Pearson $\chi^2 (1, N=347) = 2.85, p = .09$) were found.

4.3.2.8 Number of Publications Required During Promotion Period
A one-way ANOVA was used to find significant differences among the number of publications required by institutions during the promotion period ($F(6,337)=2.84, p=.01$). The strength of the relationship was very weak at .05. Due to the weakness in the difference, no additional tests were performed.

5. DISCUSSION
For this survey, random sampling was not used; rather, the entire population received an invitation to participate in the survey, eliminating the possibility of sampling errors. One of the concerns of this study is that with a 6% response rate, 94% of the population did not respond. This may have introduced nonresponse bias, and those who were motivated to respond to the survey may have different responses than those who did not. Care should be taken when reviewing these results. However, the demographic data illustrates that the survey was completed by a wide variety of faculty in terms of gender, tenure, race, institution rank, and faculty rank.

The results indicate that the distribution of male and females, white and non-white, tenured and non-tenured, and professorial rank does not differ significantly across the various institutions. Tenure and promotion requirements across institutions include on average 3 publications per year, 13 publications during the probationary period (non-tenured faculty), and 17 publications during the promotion review period for Full Professor. The higher standard deviations, particularly in the latter two categories, indicate that there is some variability across respondents. There is much more emphasis placed on refereed journals (M=4.5, SD=.80) and conferences (M=4.17, SD=.92) than non-refereed journals (M=1.90, SD=.71) and conferences (M=1.87, SD=.71).

Other characteristics considered for promotion and tenure include, in order of importance, the ranking of the venue, quantity of publications, acceptance rate, and venue scope. These characteristics are consistent with other studies that have emphasized peer-reviewed articles, conference presentations, and book contributions when considering faculty scholarship [9], and with studies that have focused heavily on the ranking of publication venues as correlated with the quantity of publications that appear in those venues [1]. As is noted by Athey and Piotnicki, the scope of a publication venue and acceptance rate for the venue are strongly associated with the venue’s ranking [1].

As in previous studies [3, 10], the results suggest that collaboration is an important activity that is formally required in written policy or informally required via the culture of the department. This part of the study looks at hidden tenure and promotion requirements, or requirements that are not in written policy, but appear to be viewed as required by the culture of the department. External collaboration is ranked highest, with 96.2% of departments requiring external collaboration in the tenure/promotion review process. Internal collaboration is equally strong, with 96% of departments requiring it formally or informally.

64.2% of the respondents recognize that collaborative publications are required for the tenure and promotion process and 65.3% recognize that collaborative presentations are required. Collaborative presentations and collaborative projects (65.4%) are the most important hidden requirements, since these two requirements rarely appear in the written requirements. At 52.2%, collaborative grants also appear to be important for tenure and promotion. That collaboration is seen as being so important is not surprising since networking opportunities can aid in securing internal and external funding [10] and can positively impact faculty research productivity [7]. What is surprising is that collaboration is a hidden requirement.

The results suggest that the importance of the quantity of publications for computing faculty in higher ranked institutions is not as important as those at other institutions. This is particularly true for institutions ranked CS1-12 (by the Taulbee survey), which has a slightly stronger relationship (Cramer's $V=.20$) than CS1-24 and CS1-36 (Cramer's $V=.19$ and .17, respectively).

Respondents at CS1-36 institutions seem to place more importance on the venue of the publication than computing faculty at other institutions. Surprisingly, computing faculty at institutions ranked 1-24 place less importance on venue scope (international, national, or local) for publications than other institutions. Computing faculty at institutions in Canada place a much greater importance on venue scope than computing faculty at U.S. institutions.

Responses indicate that faculty overall do not place great importance on non-refereed journals. However, respondents at institutions ranked 1-36 place less emphasis on non-refereed journals than other institutions (Cramer's $V=.15$). Respondents at institutions ranked 1-24 also place less emphasis on non-refereed journals, but with a weaker correlation (Cramer's $V=.11$).
6. CONCLUSION
This research is a preliminary step in analyzing the data collected to explore tenure and promotion requirements of computing faculty at U.S. and Canadian institutions. Though the data analysis is thorough, the weaknesses of the study include the self-reported nature of the data gathered, the difficulty that faculty may encounter when quantifying unwritten requirements, the subjective nature of rankings with respect to publication venues, and differences in publication venues, collaboration expectations, and publication and grant requirements across subspecialties within each disciplinary category (e.g. CS, CE, etc.). Several respondents noted that they are expected to actively engage in grant activities to support their research. The issue of self-funding or seeking grants did not appear as a separate item on the survey, so respondents were unable to rate grant-seeking as important or not, or formally or informally required. A future version of the survey will include this item.

One of the significant findings of this study is that respondents indicated that there are several hidden requirements for tenure and promotion. Over 61% of faculty believe that collaborative projects and over 50% believe that collaborative presentations are not part of written policy for tenure and promotion, but are informally required through the culture and environment. Future research is needed to determine the impact that hidden requirements have on promotion and tenure and why these requirements are not part of written policy.

Having established a baseline for the tenure and promotion requirements at U.S. and Canadian computing institutions, including hidden requirements, our next goal is to understand the level of support that faculty are receiving in pursuing those requirements. Quantifying support, particularly when dollar amounts are involved, can be difficult for faculty, but our goal is an understanding of whether faculty believe they are receiving sufficient support. If faculty do not believe that they are receiving support congruent with the requirements placed on them, as noted in previous research [6, 7, 9], this can have a chilling effect on satisfaction and retention. For example, if the satisfaction with levels of support among underrepresented populations such as women is worse than among other faculty populations this may help to explain why the pipeline for those groups continues to shrink [2]. Understanding patterns of perceived support and satisfaction with that support is crucial for both computing faculty and for institutions wishing to recruit and retain them.

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8. REFERENCES