Uplifting the Whole People: The Impact of University of Alberta Alumni through Innovation and Entrepreneurship

Dr. Anthony Briggs
Dr. Jennifer Jennings

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Executive Summary

In 1908, Henry Marshall Tory, the University of Alberta’s first president, believed that universities must uphold a promise to the people:

“The modern state university has sprung from a demand on the part of the people themselves… The people demand that knowledge shall not be the concern of scholars alone. The uplifting of the whole people shall be its final goal. This should never be forgotten.”

In 2012, Dr. Anthony Briggs and Dr. Jennifer Jennings, in the Department of Strategic Management and Organization, at the Alberta School of Business, released a report showing that the University of Alberta is pursuing this final goal as it is one of the largest drivers of the provincial economy. The report on economic impact of the University of Alberta estimated $12.3 billion of direct and induced economic activity in the region, or approximately 5.0% of Alberta’s GDP in fiscal year 2009/10.

The University of Alberta’s responsibility for the uplifting of the whole people extends beyond its economic footprint. Each day its quarter of a million University of Alberta alumni, engage in collective and creative activities that drive positive social, environmental and cultural outcomes.

This report is the second of a project that aims to better understand the University’s impact on the broader society. Its design is to examine the educational experiences of alumni and how the experiences translate to “uplift the whole people.” The study builds on methods of recent surveys, particularly those by MIT (Roberts and Eesley, 2009), Stanford (Eesley and Miller, 2012) and Tsinghua University (Eesley, Roberts and Yang, 2010), that study the impact of alumni through innovation and technological entrepreneurship. But it also adds to these approaches, bringing attention to additional impact outcomes including social, environmental and cultural entrepreneurship, as well as the role played by family enterprise.

There are three general findings from the study:

- University of Alberta alumni have founded over 70,000 organizations, one-third of which have a primary social, environmental or cultural mission;
- A University of Alberta education is a major catalyst for innovation and entrepreneurship;
- Faculty interactions, more than any other experience, have the highest impact on University of Alberta alumni after graduation.

The impact of our more than 246,000 University of Alberta alumni is significant. The estimated 70,258 alumni-founded organizations in operation in 2012, have annual revenues of $348.5B and employ 1,581,923 people.

Through this report we aim to make available the aggregate information provided by some 11,229 University of Alberta alumni in a summer 2012 survey. We also make available our estimation methods and the assumptions that underlie them. While these results warrant a special report, the authors are continuing to examine the data and look forward to providing additional results back to our alumni and the public. Our thanks go out to our many alumni who participated and who continue to uplift the whole people.
1. Introduction

Since its founding in 1908, the University of Alberta has expanded in parallel with the province’s remarkable growth. The University now offers approximately 400 undergraduate, graduate and professional programs across 18 faculties and 5 campuses. It employs over 14,500 faculty and staff, serves over 38,000 students annually and, as of this writing, boasts an alumni base of over 250,000.

In 2012, Dr. Anthony Briggs and Dr. Jennifer Jennings, of the Department of Strategic Management and Organization at the Alberta School of Business, released their first report on the impact of the University of Alberta. It followed the methods of prior economic impact studies conducted at the University of British Columbia (Sudmant, 2009), Simon Fraser University (Sun and Lee, 2011) and the University of Ottawa (Diaz, Mercier and Duarte, 2012), and compared the University of Alberta’s economic impact against those obtained for these institutions. It put forward three findings.

- The University of Alberta is one of the largest drivers of the provincial economy;
- The University of Alberta induces a much higher level of regional economic activity than other studied peer institutions, both proportionally and as a total measure;
- At the individual level, the high education premiums that accrue to alumni suggest that university education means more in Alberta than in the other major provinces.

Recently released data from National Household Survey (Curry, 2013) validates the main driver of these findings, confirming the link between university education and the education premiums that Albertans enjoy.

In this report, we aim to extend our understanding of the impact of the University of Alberta through its quarter of a million alumni. There are three general findings from this study:

- University of Alberta alumni have founded over 70,000 organizations, one-third of which have a primary social, environmental or cultural mission;
- A University of Alberta education is a major catalyst for innovation and entrepreneurship;
- Faculty interactions, more than any other experience, have the highest impact on University of Alberta alumni after graduation.

This report builds on and extends recent studies at Massachusetts Institute of Technology (Roberts and Eesley, 2009), Stanford University (Eesley and Miller, 2012) and Tsinghua University (Eesley, Roberts and Yang, 2010). These prior studies emphasize the relationships between entrepreneurship and innovation at those universities with the technological intensity and growth of the entrepreneurial ecosystems fostered by the alumni of those universities. Like the MIT and Stanford studies, we use a scaled estimation technique from a large scale survey (see Appendix for details) involving over 10,000 alumni.

The intent of this report is to share aggregate data about the university alumni, and provide technical details surrounding the organizational estimates. Where it is valuable, descriptions of the data are provided for context. Similarly, the report includes five vignettes of organization founders that were not survey respondents, and thus not counted in the estimates, but help to illustrate the variety of organizations founded by U of A alumni in the uplifting of the whole people.
Unlike the MIT and Stanford reports, this report does not develop a history of the region, nor does it identify founders and organizations that may have participated in the survey. Also, unlike MIT and Stanford cases, many of the larger U of A alumni-founded organizations are not in highly consumer-visible industries. Instead, many are found in the growing Canadian venture sectors like construction, agriculture, fisheries, forestry and mining, and finance, insurance and real estate (BDC, 2010). The economic impact of these types of organizations is substantial, with estimated global revenues of $348.5B in 2012, and actively employing some 1,581,923 people, 390,221 of which are in Alberta.

This report is broken into several major sections. Section 2.0 provides a brief overview of the research methods, with additional details provided in the appendix. Section 3.0 focuses on demonstrating the significant impact of alumni-founded organizations. It provides several factor-scaled estimates with comparisons to Stanford and MIT and is the only scaled data provided in the report. Following this, it provides additional details regarding the distributions of organizations in sample. Section 4.0 demonstrates that the university influences innovation and entrepreneurship, but it also makes the case that the vast majority of alumni engaging in these activities do so after they leave the university. Section 5.0 looks at the mechanism of alumni impact. It finds that faculty interactions are the top driver of alumni impact, more so than other traditional outcomes like learning and certification. We discuss these findings and conclude.

As with the last report, we note that this report represents just one component of a much larger research project designed to capture the myriad ways in which the U of A has delivered on its founding promise to “uplift the whole people.” This research project is the first in Canada to build on the methods of leading global research institutions to examine University impact on innovation and entrepreneurship. It is also the first anywhere to develop new ways to consider University impact on the perpetuation of family enterprise, the founding of social, cultural and environmental organizations, and impacts on individual well-being (forthcoming). To the best of our knowledge, this “Made in Alberta” approach will be the first to measure a university’s socio-economic impact in such a holistic manner.

### 2. Research Method

This study is based on a large scale survey of U of A alumni. This survey approach follows other recent studies at MIT (Roberts and Eesley, 2009), Iowa State University (Jolly, Yu and Orazem, 2009), Tsinghua University (Eesley, Roberts and Yang, 2010) and Stanford University (Eesley and Miller, 2012).

The University of Alberta Impact Survey was emailed to 84,387 U of A alumni in the summer of 2012. The email was sent twice, first by the President of the Alumni Association, Jane Halford (email open rate of 21,244), and then by the President of the University, Dr. Indira Samarasekera (email open rate of 21,205). Additionally, hard copies of the survey were distributed in the Alumni Magazine, though this was primarily used to promote the online survey. The researchers did not have access to the alumni email distribution list and the survey was anonymous.

There were 12,801 email link follows. Responses were received from 11,229 individuals, of which 418 by hard copy, for a response rate of 13.3%, and a response rate from opened emails of 26.4%. The most conservative measure of response rate falls between the range for similar surveys, such as 19.5% for the Stanford University Innovation Survey (Eesley 2012) and 9.9% for the Tsinghua University Founders Survey (Eesley 2011). Of the 11,229 surveys that were
returned, 8,853 were completed providing a completion yield of 78.8%. This is very favorable compared to the 62.4% completion rate of the Stanford University Innovation Survey.

The individual data that is reported in this study is derived from the 8,853 completed surveys, unless otherwise noted. The organizations data in this report is derived from the responses of 1,746 alumni that identified themselves as organization founders. Of these, 490 founders had identified themselves as founding organizations with a cultural, environmental or social mission. Additionally, 749 alumni identified themselves as having been involved with a family business, 96 of whom had identified their family business as having a cultural, environmental or social mission.

Additional information about the survey responses, sample and estimation techniques are provided in the appendix.

3. The Organizations Founded by U of A Alumni

The 246,000 U of A alumni are estimated to have founded over 70,000 active organizations as of 2012. This section presents the scaled estimates of U of A alumni-founded organizations, compares them estimates to the recent Stanford and MIT surveys. It then provides the underlying assumptions and the aggregate data which led to these conclusions. Table 3.1 presents the summary of the key estimates.

Table 3.1: U of A Alumni Organizations (2012 Estimate)

<table>
<thead>
<tr>
<th>University (Number of Alumni)</th>
<th>U of A (246,000)</th>
<th>Stanford (191,332)</th>
<th>MIT (105,928)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizations Started (All)</td>
<td>70,258</td>
<td>69,900</td>
<td>25,800</td>
</tr>
<tr>
<td>… with a Cultural, Environmental or Social Mission</td>
<td>23,332</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>… Non-Profit</td>
<td>13,013</td>
<td>30,000</td>
<td>n/a</td>
</tr>
<tr>
<td>Jobs Created</td>
<td>1,581,923</td>
<td>5,387,000</td>
<td>3,283,294</td>
</tr>
<tr>
<td>… in Alberta</td>
<td>390,221</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Revenues</td>
<td>$348.5B</td>
<td>$2,667B</td>
<td>$2,000B</td>
</tr>
<tr>
<td>Provincial/State GDP</td>
<td>$306.7B</td>
<td>$1,900B</td>
<td>$388.6B</td>
</tr>
<tr>
<td>Ratio Revenue/GDP</td>
<td>1.14</td>
<td>1.39</td>
<td>5.14</td>
</tr>
</tbody>
</table>
The results of the MIT survey are based on 105,928 alumni (Roberts and Eesley, 2009). The study estimated that alumni had founded 25,800 active organizations with combined annual revenues of two trillion ($2,000B), creating an estimated 3,283,294 jobs. The MIT study measured only for-profit organizations. It also used a simple scaling measure for its estimates, and was not factor-scaled to account for responses by different alumni characteristics like graduation year and gender. While the MIT study has a high response rate, it provides limited detail on revenue estimates.

There are two aspects of the MIT survey that are interesting to note. The estimated revenue of MIT-founded companies far exceeds, by five times, the total GDP of the state of Massachusetts. The reason this is possible is that the vast majority of MIT students are attracted from outside the state, and while many leave after graduation, many stay to pursue entrepreneurial opportunities. The second aspect to note is that the average revenue per employee for these organizations is approximately $609,000. This suggests a very high level of economic activity per employee.

The Stanford study is based on 191,332 alumni (Eesley and Miller, 2012). It estimates that Stanford alumni had founded 69,900 active organizations with combined annual revenues of 2.667 trillion ($2,667B), creating an estimated 5,387,000 jobs. The Stanford study also considered non-profit organizations, as compared to the MIT study.

The Stanford study significantly improved on the methods of the MIT study by using 84 scaling factors for the graduation year, school and gender of the respondent. Both studies used Dun and Bradstreet databases to verify organization revenues and employees, where such comparisons were available. The average revenue per employee in the Stanford study is approximately $495,000, which according to the report was similar to a NASDAQ 100 firm in the same year, and approximately half that of some alumni-founded organizations like Google ($1.15M/employee, Stanford alum) and Koch Industries ($1.25M/employee, MIT alum).

The U of A study is based on a 246,000 alumni as of 2012 and estimates that U of A alumni have founded 70,258 active organizations. Of these organizations, it is estimated that one third, or 23,332, are CES organizations that have primarily a cultural, environmental or social mission. CES organizations can be either for-profit or non-profit. The number of non-profit organizations is estimated separately as 13,013, or slightly more than half of the total CES organizations. The U of A organizations are estimated to have a combined annual revenue of $348.5B, creating an estimated 1,581,923 jobs globally, and 390,221 in Alberta. The average scaled revenue per employee for these organizations is approximately $220,000.

The Stanford and MIT scaling methods differ so both have been used to estimate the U of A figures. While the application of the more sophisticated Stanford method is reported in Table 3.1 (and described in the appendix) the simple scaling process used in the MIT results in fairly similar estimates. The estimated number of organizations started is slightly higher, at 70,542, but results in lower CES and non-profit estimates of 23,134 and 12,531, respectively. This suggests that non-profit founders were slightly less likely to report organizational foundings relative to what the population would predict. Jobs created were estimated at 1,499,207 and annual organization revenues were estimated at $331.8B.
The U of A estimates are also more conservative than the MIT and Stanford approaches, in part due to survey design and estimation choices. Similar to the Stanford study, the U of A estimates employ 87 scaling factors based on the alumni population post-1945, and accounting for faculty area of study. Using these scaling factors provides an estimate for the sample, which is then scaled to the population. Like the Stanford study, we use the largest estimate of the sample size, so 11,229 responses, as this will result in the lowest scaling factor. We conservatively assume that every response that is not included in the 8,853 completed surveys is counted as a non-founder. Also, like the Stanford study, we reduce the scaling factor by 0.992 to account for duplicate founders.

However, it is also the case that many self-identified founders do not report revenues or other organizational details. In the Stanford survey non-reports are considered average entrepreneurs with average revenues. In the U of A sample, if an alumni does not report revenues it is estimated that they have $0 in revenues. This estimation choice difference likely increases the Stanford estimates by 61% (100%/62% reporting revenue). Using similar methods our revenue estimates would be 171% (100%/37% reporting revenue) higher due to a higher revenue non-report rate in our survey.

Additional details about assumptions and scaling factors can be found in the Appendix.

3.1 Alumni Founders and Alumni Organizations

One of the key reasons that alumni organizations are so important to study is that they can have a lasting social and economic impact long after the original founders have moved on. They are also important because the relationship between and founder and the organization is not one-to-one, and a single founder can create multiple organizations in the pursuit of various economic, cultural, environmental and social goals. An example of the evolving impact of founders is in the vignette of BioWare and Threshold Impact, an organization that was not in the survey sample.

**BioWare and Threshold Impact**

After practicing rural ER/family medicine for two years full time, Ray Muzyka (’90 BMedSc, ’92 MD) switched gears in 1995 to co-found the video game company BioWare with Greg Zeschuk (’90 BMedSc, ’92 MD) and Augustine Yip (’90 BMedSc, ’92 MD). BioWare was acquired by Electronic Arts in 2007, after which Muzyka stayed on in a senior leadership role for five years until his retirement from videogames in 2012. At the time of his retirement, BioWare had grown to eight locations with over 1,400 full time staff world-wide, and had become a ‘label’ within Electronic Arts. Last year, Muzyka founded Threshold Impact, mentoring and investing in information technology, new media, medical innovations, and social entrepreneurs, seeking sustainable, profitable impact investments. “Medicine at the U of A taught me the importance of communication, lifelong learning, teamwork, and humility. These concepts translated extremely well to a new high tech business in BioWare, and are equally relevant to my mentorship and angel impact investment work at Threshold Impact.”
The relationship between founders and founder-organizations is complex. In the U of A sample we find that of the 8,853 completed surveys, 19.7% identify themselves as organization founders. Of these, 5.5% have founded a for-profit, or non-profit organization, with a primary “CES,” or cultural, environmental or social, mission. For comparison purposes, we also include respondents who have joined a family business, including those with CES mission.

Table 3.2: Founder and Family Business Organizations (2012 Estimate)

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded an Organization</td>
<td>1746</td>
<td>19.7%</td>
</tr>
<tr>
<td>…that has a CES* mission</td>
<td>490</td>
<td>5.5%</td>
</tr>
<tr>
<td>Joined Family Business</td>
<td>749</td>
<td>8.5%</td>
</tr>
<tr>
<td>…that has a CES* mission</td>
<td>96</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

The 1,746 founders reported that they were responsible for founding 2,794 organizations (or 1.60/founder, Stanford’s for-profit rate or organization formation). In 426 cases, the respondents included company information but did not provide a count for the total companies founded. When we account for these incomplete responses, it is estimated that 3,220 organizations were founded (3,206 scaled), or 1.84 organizations per founder.

Figure 3.1: Number of Organizations Founded by Founder
Like the Stanford and MIT studies, there are a very large number of small organizations, but very few large organizations. Our sample is no different. The sample accounts for some 68,023 employees (72,209 scaled), suggesting an average of 21 employees per founded organization.

**Figure 3.2: Number of Employees of Founded Organizations**

However, while less than 10% of alumni-founded organizations in the sample have over 50 employees, they are significant drivers of employment. One alumni-founded organization that is not counted in our survey is Acrodex, a significant employer that gives back to its community.

Acrodex

Yasmin Jivraj ('80 BSc) is the president and founder of one of Canada's largest information technology firms, Acrodex, which supplies IBM products and services. In 2010, the company boasted revenues of more than $175 million. Acrodex employs 600 people in seven cities across Canada, as well as in Bangalore, India. Jivraj is involved with a variety of community initiatives focused primarily on post-secondary education, youth support and information technology leadership.

Like the employee distribution, a few companies in the survey are driving a large percentage of the revenue estimates. For the largest companies in the sample, steps were taken to examine if they were likely to be founded by a U of A alumni. Unlike the MIT and Stanford surveys, where a large number of the alumni-organizations are public, have celebrated founder stories and can be researched against commercial databases, this is only the case for a few of the large Canadian organizations in the sample. Instead, many of these companies are private, have complex founding conditions (particularly given the complexity of organizations in Canada's resource sector), and do not have celebrated or public founding stories. Overall, once several responses were removed, the sample accounts for $15.147B in annual revenues of ongoing firms. This averages to $222,684 in annual revenue per employee ($220,301 scaled).
3.2 Alumni Founders and CES Organizations

Figure 3.4: CES Organizations Founded by Founder

Last, approximately a third of the organizations in our sample, or 1,056 organizations, were founded were reported to have a cultural, environmental or social mission. We find that over 40% of founders report founding at least one CES organization.
Of the CES organizations in our sample slightly more than half, or 572, were reported to be non-profits like Foundation for the Children of the California, an important alumni-founded non-profit that was not included in our sample.

**Foundation for the Children of the Californias**

Betty (Millard) Jones ('55 BSc) founded the Foundation for the Children of the Californias, which constructed and developed the Hospital Infantil de Las Californias in Tijuana, Mexico, the region’s first pediatric medical specialty centre that offers health care to children regardless of their ability to pay. With associates and business leaders, Jones brought together resources from Canada, the United States and Mexico to meet the need for a facility like the Hospital Infantil. Since opening its doors in 1994 the facility has offered more than 350,000 medical consultations, 9,000-plus surgeries and 250,000 hours of education. “I have always felt that I’ve had probably more than my share. It just seemed more rewarding for me to be doing something for other people, especially children.”

4. The U of A is a Catalyst for Innovation and Entrepreneurship

The University of Alberta is a major catalyst for innovation and entrepreneurship. The word catalyst is chosen carefully and specifically. In chemistry, a catalyst is typically considered an agent whereby a small proportion of which provokes a significant change, or action, without itself being substantially changed or consumed.

The data that follow about the activities of alumni innovation and entrepreneurship suggests strongly that the University is a catalyst, rather than vessel or incubator of innovation and entrepreneurship. The distinction is subtle but important. The survey data reveals that alumni are generally far more likely to engage in innovation and entrepreneurship once they have finished their degree programs rather than engaging in them during their programs. This data sheds light on the question of whether the university should be thought of as an incubator that creates innovators and entrepreneurs on campus, or should instead continue to develop as a catalyst that prepares, or instills, in alumni the capacity and capabilities to engage in innovation and entrepreneurship after graduation.

4.1 The U of A is a Catalyst for Innovation

There are a number of definitions of innovation, but a simple one would define innovation as the act of introducing something new and valuable. The survey asked questions about whether alumni had engaged in four different innovation activities: publication of a peer reviewed publication; creation of any literary, educational, design and/or artistic work for sale; creation of a new product, process, service or business model; and last patented a new product or method.

The results are proportions of the 8,853 completed surveys that affirmatively responded to accomplishing certain innovation activities. The large number in the upper right of the next four graphs is the number of respondents that agreed, or strongly agreed, that the U of A had influenced their innovative activity.
An immediate reaction to these graphs might be that it is an aging effect, but the results are more interesting (note that many respondents’ most recent U of A degree is their second or third degree). Certainly, a high percentage of alumni engaged in peer review publication during their most recent of U of A degree. Also not surprising, over 75% of respondents reported that the U of A influenced their publishing of peer reviewed publications. However, what is more interesting is that while innovative activities increased when respondents were at the U of A, the vast majority of alumni innovated for the first time after the completed their degree programs. Then, the high rates of U of A influence on these innovators, 57%, 63% and 51% respectively, suggest that that the U of A is acting as catalyst for alumni-driven innovation.
4.2 The U of A is a Catalyst for Entrepreneurship

Like innovation, entrepreneurship has many definitions, but a simple one is the act of creating new organizations. The results presented are proportions of the 8,853 completed surveys.

Figure 4.5: Founded a For-Profit Organization

While the founding results are similar to those of innovation rates, the results are more stark. For example, the founding rates before and during the most recent university degree are very similar, jumping eight fold for for-profit organizations. In comparison, the proportion of alumni working for their family business remains relative stable, not showing the same pattern and only dropping a bit while the respondent is attending university. Shifting back to alumni working for start-ups, there is a similar effect. The survey does not measure the degree of influence for each of these activities, but for foundings it is lower than for innovation. 35% agree, or strongly agree, that the U of A influenced the founding of their organizations, a number that increases to 42% for CES founders. This section closes with a vignette of Innovative Trauma care that exemplifies the idea of the catalyst role of the U of A.
5.0 Faculty and the Mechanisms of U of A Impact

If the U of A is a catalyst for innovation and entrepreneurship, the next question is what are the mechanisms that instill in alumni the desire and capability to innovate and found new organizations. Is it exposure to social groups, new knowledge, developing leadership skills or access to new experiences? Below are ranked the top student activities by alumni participation out of 8,853 survey respondents.

Table 5.1: Top Non-Curricular Student Activities While at the U of A

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student social groups</td>
<td>5,419</td>
<td>61.2%</td>
</tr>
<tr>
<td>Research with faculty</td>
<td>4,581</td>
<td>51.7%</td>
</tr>
<tr>
<td>Student athletics</td>
<td>3,909</td>
<td>44.2%</td>
</tr>
<tr>
<td>Lived on campus</td>
<td>3,606</td>
<td>40.7%</td>
</tr>
<tr>
<td>Student politics</td>
<td>3,337</td>
<td>37.7%</td>
</tr>
<tr>
<td>Career services</td>
<td>3,014</td>
<td>34.0%</td>
</tr>
<tr>
<td>Student work programs</td>
<td>2,999</td>
<td>33.9%</td>
</tr>
<tr>
<td>Academic competitions</td>
<td>2,778</td>
<td>31.4%</td>
</tr>
<tr>
<td>Study abroad/exchange</td>
<td>2,308</td>
<td>26.1%</td>
</tr>
<tr>
<td>Entrepreneurship classes</td>
<td>2,058</td>
<td>23.2%</td>
</tr>
<tr>
<td>U of A alumni association</td>
<td>1,992</td>
<td>22.5%</td>
</tr>
<tr>
<td>Start-up exploration/planning</td>
<td>1,896</td>
<td>21.4%</td>
</tr>
<tr>
<td>Faculty alumni association</td>
<td>1,826</td>
<td>20.6%</td>
</tr>
<tr>
<td>Technology licensing</td>
<td>1,825</td>
<td>20.6%</td>
</tr>
</tbody>
</table>
Participation in some of these activities has changed dramatically over time, while for others it hasn’t. The research reveals the ascendency of a research intensive university over the decades, as well as one that is increasingly entrepreneurial, social engaged and international, though these differences do not directly address the potential mechanism of U of A impact.

**Figure 5.2: Change in Non-Curricular Student Activities by Cohort**

An open-ended question asked alumni “what was your most impactful experience at the U of A?” This wordle graph summarizes the raw data.

**Figure 5.3: Most Impactful Experience Wordle**
Some 5,883 open ended responses were coded into 29 emergent categories of responses. Some responses invoked multiple categories resulting in 7,428 instances of U of A impact broken into the categories below.

**Figure 5.4: Key Categories of Most Impactful Alumni Experiences**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Category (29)</th>
<th>Count (7428)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Faculty</td>
<td>1017</td>
</tr>
<tr>
<td>2</td>
<td>Learning</td>
<td>714</td>
</tr>
<tr>
<td>3</td>
<td>Degree</td>
<td>701</td>
</tr>
<tr>
<td>4</td>
<td>Social</td>
<td>632</td>
</tr>
<tr>
<td>5</td>
<td>Friends</td>
<td>521</td>
</tr>
<tr>
<td>6</td>
<td>Research</td>
<td>413</td>
</tr>
<tr>
<td>7</td>
<td>Classes</td>
<td>393</td>
</tr>
<tr>
<td>8</td>
<td>Residence</td>
<td>250</td>
</tr>
<tr>
<td>9</td>
<td>Students</td>
<td>239</td>
</tr>
<tr>
<td>10</td>
<td>Foreign</td>
<td>181</td>
</tr>
</tbody>
</table>

The largest category of impact was key relationships. Over half of this category referred to a specific mention of faculty, followed in order by friends, students, spouse and staff. The second largest category was academic experiences which included, in order, learning, research, classes, teaching, library and student aid. Next was extracurricular experiences which included references to social experiences, residence, foreign experiences, sports, leadership, work programs and art. Instrumental outcomes largely mentioned degree, followed by minor mentions of knowledge, job or no impact. Approximately 1.7% of responses were negative.

Overall, the highest ranked mechanism of university impact, as reported by alumni, was faculty interactions, followed by other key relationships. This concludes that while learning, research and the credentialing of degrees can lead to important outcomes, the most critical level for catalyzing organization impact through innovation and entrepreneurship is the role of faculty. This section of the report closes with a vignette of Cheung Kong Graduate School, a U of A alumni-founded faculty run CES organization that is changing the face of organizations in China.
6. Conclusions

The major finding of this report is the importance of U of A alumni in fostering economic and social change through new organizations. The report unpacks the mechanisms of the U of A’s role in this change, and in doing so recognizes the need for a new conversation about how universities can better employ faculty to catalyze alumni innovation and entrepreneurship.

This report, the second component of a larger study of the U of A’s impact, demonstrates that:

- University of Alberta alumni have founded over 70,000 organizations, one-third of which have a primary social, environmental or cultural mission;
- A University of Alberta education is a major catalyst for innovation and entrepreneurship;
- Faculty interactions, more than any other experience, have the highest impact on University of Alberta alumni after graduation.

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References


Appendix: Estimation Methods

This section provides additional details on the summer 2012 University of Alberta Impact Survey. The survey was designed while the Stanford 2011 Innovation Survey was underway, and Charles Eesley, Assistant Professor of Management Science and Engineering in Stanford’s School of Engineering, share in-process materials which supported the U of A efforts.

However, our survey design differed in three critical ways. First, unlike Stanford, little was known about the entrepreneurial environment at the U of A. It was not clear the degree to which U of A alumni would respond to a survey where organizational information might be shared with third parties. As a result, unlike the Stanford study which is designed as an opt-out for organizational information, the U of A study was highly conservative in how it approached the organizations information of alumni, choosing an opt-in approach. Despite a very high yield rate in the U of A surveys, only a very small percentage of respondents opted to release organizational information.

Second, the U of A survey’s completed yield is likely higher in part because the survey itself had a less onerous design. Notably, unlike the MIT and Stanford surveys which allowed for six and above organizations to be reported, the U of A founders study limited founding descriptions to a maximum of three organizations. The assumption was that founders would report their most important organizations, which are the primary drivers of the estimated results. This approach may have resulted in minor under-reporting of organizational impacts as fewer organizations are reported, but it may also result in more information if the other survey design was causing incomplete responses.

Last, the Stanford survey was sent out with two reminders to alumni and there was a greater control over the email lists. The U of A survey was anonymously sent en masse to the U of A alumni on file, and only one email reminder was sent. The response rates are below.

Table A1: Survey Responses vs. Stanford

<table>
<thead>
<tr>
<th></th>
<th>U of A</th>
<th>Stanford</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living Alumni</td>
<td>246,000</td>
<td>191,332</td>
</tr>
<tr>
<td>Emails Sent</td>
<td>6,878</td>
<td>143,482</td>
</tr>
<tr>
<td>Emails Opened</td>
<td>~42,449</td>
<td>n/a</td>
</tr>
<tr>
<td>Responses</td>
<td>11,229</td>
<td>27,783</td>
</tr>
<tr>
<td>Completed Surveys</td>
<td>8,853</td>
<td>17,359</td>
</tr>
<tr>
<td>Response Rate Send</td>
<td>13.3%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Response Rate Opened</td>
<td>26.4%</td>
<td></td>
</tr>
<tr>
<td>Completed Yield</td>
<td>78.8%</td>
<td>62.4%</td>
</tr>
</tbody>
</table>
Overall, 11,229 surveys were started. Because the surveys were completely anonymous, the approach required the respondent to provide basic demographic information for the results to be usable. The minimum amount of information required to adequately use a survey would be about 30 individual pieces of information. 8,853 surveys met this requirement and they were considered completed. For the estimations, it was assumed that all 11,229 surveys were the population, meaning that 2,376 respondents were considered to be non-founders.

Figure A1: 8,853 Surveys Had Sufficient Information to be Considered Completed

Since a large amount of the alumni population was either not on the U of A alumni email lists or did not respond, there is a concern both about selection bias and the representativeness of the sample. While individual respondents were anonymous, despite this the research team did have the U of A alumni population statistics by faculty and year.

Overall, the response rate was fairly close to predicted by faculty. Of the 12 largest faculties, having more than 3,000 alumni, the response rate was slightly lower than expected (where expected = 1 or 100%) for the medical related faculties particularly Nursing and Medicine. Response rates were also slightly lower than expected for the Faculty of Education. Slightly higher than expected were the faculties of Physical Education, Science, Arts, Engineering and Law. Overall, all of the 19 faculties were adequately represented in the survey.
By year, the response rate was fairly close to predicted over broad range of years. Generally, the survey has very good representation from the early 1950s to 2011. As the graph of response rate shows, there is significant under-sampling (i.e. ~25% of expected between 1945 to 1950), a slight over-sampling in the 1960s and late 2000s, with a precipitous drop in 2012. The 2012 numbers are only around 35% of expected given that many graduates had just become alumni or were graduating later in the semester.
Like the Stanford survey (see Eesley and Miller, 2012 p. 98), it was necessary to make certain assumptions to scale the results and estimate the values for the population:

1. That the respondents accurately identify as founders and provide accurate organization information. In the U of A case, the largest firms were researched and if the founding scenario did not seem realistic (i.e. through public records, corporate histories and revenue/employee ratios) the record was eliminated from the sample.
2. That the respondents in the sample adequacy represent the proportions and success of the population as a whole.
3. That the methods of collecting organization information did not cause systematic bias in the reporting of respondents.

The simple scale factor used was $246,000/11,229 = 21.9075608$. A strong result from this sample is that when comparing the simple estimation approach with the approach using the 87 different scaling factors (most of which are fairly close to expected), the overall results are very similar.

This study has been benchmarked against MIT and Stanford, but there is a substantial reporting of other benchmarks in Eesley and Miller (2012). Also, there are a few additional notes that are unique to the U of A survey.

1. Like the Stanford survey, the estimate is reduced by 0.992 to account for duplicate founder scenarios. However, this assumes a linear likelihood of double sampling as the sample proportion gets larger. This is not necessarily the case – as the population for sampling is exhausted, the likelihood of double sampling becomes a complex function of the remaining draws from the sample and the size of the organizations left in sample. Depending on the average number of double or more founders creating large outlier organizations, a reliance on this approach may overestimate the impact of alumni-founded organizations by two or more.
2. The jobs number for Alberta uses self-reported location of revenue figures. Though most organizations are in Alberta, most jobs created are not. This is because larger firms account for the bulk of jobs and revenues. While while the average firm has 60.1% of its business in Alberta, when weighed by company size (revenues), only 24.7% of the average business is in Alberta. Notably, all but one of the largest ten firms are operating primarily outside of Alberta.
3. Family employment figures account a very small proportion of total employment – it is calculated as 1.66% of the total employment estimate.