The Roles of Chief Research Officers at American Research Universities: A Current Profile and Challenges for the Future

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Abstract: *The individual charged with stewarding the academic research and creative activity enterprise (i.e., Chief Research Officer or Vice President/Chancellor for Research), has tremendous responsibility and influence over the institution's ability to achieve its overall mission. Yet, the skills and knowledge required to successfully serve in this role have not been comprehensively studied. To address this deficiency, we synthesize the views of 78 sitting Chief Research Officers to document the academic and experiential pathways of respondents, their current roles and responsibilities, and future challenges. We provide recommendations for effective ways of preparing future candidates for this important role.*

Keywords: *Chief Research Officer; Vice President/Chancellor for Research; training; experience*

A Current Profile and Challenges for the Future

American research universities currently face an environment of change, marked by broad opportunities for growth in terms of research development, as well as many challenges (Brint, 2005). Opportunities arise in research from new and diversified sources of funding, via partnerships with private industry, and by focusing on innovative and interdisciplinary areas of inquiry (Brint, 2005). Challenges emerge from a variety of sources: unpredictable federal and state funding, escalating competition for resources, increasing regulatory and compliance requirements, and the erosion of public support for the importance of university research (NRC, 2014; NSB, 2012; RUFC, 2012). Thus, the ability of the individual charged with leading the research enterprise (e.g., Chief Research Officer or Vice President/Chancellor for Research, hereafter referred to as CRO) to balance a multitude of conflicting forces has a substantial influence on the institution's capacity to maintain and increase its research productivity (Kulakowski & Chronister, 2006).

However, the only study published to date examining the role of CROs revealed that little consistency exists among job descriptions of the position of CRO across institutions, suggesting that responsibilities of the position vary widely (Nash & Wright, 2013). Nash and Wright (2013) found that actual job descriptions for the CRO position focused on skills and knowledge different from those CROs view as essential. Their study indicated that incumbents typically have led a prolific research career and cited their scholarly work as vital to obtaining their position, while CRO job descriptions focus more on the leadership skills and business acumen necessary for success in the position.

Despite the insights provided by Nash and Wright (2013), questions remain about the skills, knowledge, and personal characteristics needed to succeed as a CRO. In addition, the means by which individuals acquire necessary skills and experiences to excel in the role are not clearly identified, nor is the process by which an institution might best ensure a strong and diverse pool of candidates to fill the role in the future. Given rapidly changing elements of the CRO role (Kulakowski & Chronister, 2006), it is imperative to look to future demands when developing a plan by which to fill the position in the future, ensuring that skills, knowledge, and characteristics representing the scope of the entire role are incorporated, including those that may not be easily developed in a traditional academic career path.

One particularly salient unanswered question is whether the processes (e.g., search committees, leader training and development, succession plans[1]) currently in place to identify and select CROs are adequate. Nash and Wright (2013) found that 83% of the individuals who become CROs were faculty members upon assuming the position. They also found that the CROs they surveyed cited their experience in research, and as faculty members, as the most helpful attributes in preparing them for the role of CRO. However, given the role of many CROs in compliance, intellectual property, export controls, economic development, and building relationships with the public and private sector, there is a need to clarify whether the expertise possessed by faculty

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[1] When using the term "succession plan," we refer to the process by which an institution broadly explores the interests and potential of its members to take on new roles and assists members in developing and strengthening competencies for these roles.

members meets the minimum qualifications required or highly desired for the role of CRO.

For example, most CROs are actively involved in a variety of professional organizations that are geared toward institutional leadership and development (e.g., Association of Public and Land-grant Universities, American Association of Universities, National Organization of Research Development Professionals), which may assist in building research-related skills and knowledge, as well as necessary relationships with the public and private sector (Nash & Wright, 2013). However, most faculty members are not involved with such organizations. Thus, institutions may consider whether alternative pathways to the CRO position may be possible and perhaps more likely and appropriately helpful for institutions in the future.

There is a substantial need to better document the necessary responsibilities, skills, and knowledge of the CRO position, and the variety of ways in which the role is enacted, in order to maximize the effectiveness of the position itself, assist those interested in obtaining the position in the future, and help university leaders and administrators responsible for hiring CROs choose candidates most likely to be effective in the role. Clarity about the essential characteristics of the role will assist universities not only in selecting the most promising candidate, but in providing guidance for encouraging and training future candidates.

The current study examines the above questions, providing a description of the structure and function of CRO offices, portraits of current occupants of the CRO role, expectations for change in the future of the role, and the means by which universities might best develop procedures to encourage skill development, recruit potential candidates, and evaluate current CROs. More specific knowledge in these areas is expected to contribute to enhanced means by which individuals, universities, and professional organizations can promote more effective training and mentoring for developing the necessary competencies of future CROs.

Method

The present study arose from a Spring 2013 meeting of the Council on Research Policy and Graduate Education (CRPGE, recently renamed the Council on Research, or CoR) within the Association of Public and Land-grant Universities (APLU). APLU, as North America's oldest higher education association with 195 public research and land-grant university members, serves as a microcosm of higher education at large. Across many meetings and discussions, it came to the attention of CoR—which is comprised of chief administrative officers who oversee research policy, administration and graduate education—that no comprehensive survey had been conducted of CROs. Because the chair of CoR at the time was an administrator at the University of Oklahoma (OU), APLU agreed to collaborate with OU researchers in developing and administering the survey.

The survey questions and design were finalized by a team of faculty and graduate students in Industrial/Organizational Psychology who have expertise in survey development and data analysis. The team received approval from OU's Institutional Review Board before administering

the survey. The finalized online questionnaire was sent to 155[2] members of APLU who were identified as serving in a research leadership role. Invitations were sent to email addresses provided by the individual to APLU's CoR, which directed participants to an online survey using the Qualtrics platform. The initial response period lasted approximately one month, and participants were emailed two survey reminders during this period. The original sample resulted in 57 completed responses. Preliminary data from these responses was presented at the annual meeting of the APLU in November 2013.

Multiple requests were made by attendees to reopen the survey to allow additional responses from those who had not previously completed the survey. The survey was thus re-opened at the end of 2013 for an additional four-week period, during which 22 additional responses were received. The majority of the items in the survey consisted of Likert-type items in which individuals indicated the degree to which they agreed with various statements, such as, "I have control over the allotment of space at my institution." Participants also were asked to respond to open-ended items to gain a fuller picture of the position (see Appendix 1 for a list of all questions in the survey).

In order to analyze these responses, one member of the research team read through each response, determined themes that represented the responses, and then rated the themes of each response. A second researcher compared the themes with the responses and examined the ratings. Any disagreement among the two was resolved through a consensus discussion. Any given response could reasonably express multiple themes and was coded accordingly.

Results

Efforts were made in conducting the survey to include only those individuals who, at that time, served as the highest ranking administrator of the research enterprise. However, it is possible that some others individuals were contacted. Thus, the response rate of 51% (79/155) is likely an underestimate of the proportion of members of APLU actually holding the CRO position.

Of responses received, the vast majority (92%) came from research universities: 51% from Carnegie Very High Research Institutions (now called Carnegie R1 or Highest Research Activity), 33% from Carnegie High Research Institutions, and 8% from doctoral research institutions (Carnegie Classification of Institutions of Higher Education, n.d.). Responses overwhelmingly (97%) were from public universities, including 41% from land-grant institutions (institutions historically designated by state legislature or Congress with the mission of teaching agriculture, military tactics, mechanic arts, and classical studies as set forth in the Morrill Acts). On average, the universities represented included 1354 FTE faculty (Standard Deviation (SD) = 918) and had $201 million (SD = $228 million) in yearly research expenditures.

In the following sections, we present survey results thematically, examining the structure and function of CRO offices, the role of CROs in university planning and resource allocation,

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[2] The discrepancy between the number of APLU institutions and the number of CROs on the APLU email list is due to institutions located outside of the U.S. and members without CROs.

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demographic composition of CROs as a group, professional and background experiences of CROs, future challenges to institutions, potential changes in the CRO role in the next five years, and suggestions for preparing future CROs. All analyses discussed in the results section are statistically significant at p < .05.

What characterizes the structure and function of CRO offices?

One aim of the study was to document the current structure of CRO offices. Our findings indicated that the average number of employees that directly report to CROs is 10.1 FTE, and ranged from 2 to 50 FTE. The average yearly operating budget of a CRO organization[3] was $17 million, which represented 12% of the total research expenditures for the institutions. In 63% of institutions, the budget of the CRO organization was equivalent to the amount of indirect costs recovered by an institution on research expenditures. On average, research expenditures amounted to $132,106 per FTE faculty member, with those in Very High Research Institutions expending more money per faculty member (M (mean) = $170,063 per FTE) than those in High Research Institutions (M = $109,987 per FTE ; t(62) = 3.00, p < .05). Expenditures per FTE were also higher at land-grant (M = $171,185 per FTE, SD = $80,662) than non-land-grant institutions (M = $104,318, SD = $74,296; t(43)=2.29, p < .05).

Regarding the structure of the CRO office, 70% of CROs reported directly to the President, 27% of CROs reported to the Vice President for Academic Affairs or the Provost, whereas 3% reported to other offices. As shown in Table 1 on page 31, which provides current responsibilities of CROs, CROs almost universally reported responsibility for the university Institutional Review Board (IRB), sponsored programs/pre-award services, research development, Institutional Animal Care and Use Committee (IACUC), and external funding. In addition, more than 75% of CROs were responsible for oversight of a research center/campus, patenting/licensing, export controls, research communications, and economic/technology development. Some of the least frequently reported responsibilities included supervising the graduate school/college, environmental health and safety, philanthropy, university press, and other responsibilities.

What role do CROs play in university planning and resource allocation?

Overall, 78% of CROs either agreed or strongly agreed that they were very involved in strategic planning at the university level. In contrast, 55% of CROs either agreed or strongly agreed that they were very involved in budget planning at the university level. In terms of university plans that guide the goals of research within an institution, 72% of CROs indicate that their university had or was currently developing an institution-wide strategic plan for research and/or graduate education. Of institutions having a plan in place, 68% of CROs reported that they, or one of their predecessors, led its creation. However, the proportion of universities that had an institution-wide strategic plan for undergraduate research was much lower, with only 23% of universities indicating such a plan existed. The CRO led the creation of that plan in only 18% of the schools that had a plan for undergraduate research.

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[3] See Appendix 1 for relevant response options

Table 1. Primary Responsibilities of Current CROs

Responsibilities	%
IRB	96%
Sponsored programs, pre-award services	95%
Research development	94%
IACUC	90%
External funding	89%
Research center/campus	86%
Patenting/licensing	84%
Export controls	84%
Research communications	80%
Economic/technology development	78%
Sponsored programs, post-award services	65%
Private industry relations	59%
Federal relations	58%
Budget/strategic planning	44%
Radiation and laboratory safety	33%
Undergraduate research	32%
Graduate school/college	20%
Environmental health and safety	20%
Other	18%
Philanthropy	13%
University press	5%

CRO responsibilities related to cost sharing on grant proposals, and on resource allocation, also were examined. In our sample, 99% of CROs reported having some role in deciding whether cost sharing should be provided to a given external grant proposal, with 52% being solely responsible for these decisions. Overall, CROs had less control over allotment of space and facilities for research; 22% agreed or strongly agreed that they have control over the allotment of space and facilities. In addition, 56% of CROs reported having a role in providing funding to retain faculty who are considering leaving their institutions, and 73% having a role in funding start-up packages for new faculty hires.

Responsibilities of the CRO frequently extend beyond the main university campus. In our sample, 35% had purview over a health campus/organization, 22% had purview over a veterinary campus/organization, and 57% had responsibility for a 501(c)3 non-profit research organization. CROs surveyed also indicated having external professional commitments, in that 99% of CROs served on professional boards, committees, commissions and councils external to their institution.

What is the composition of CROs as a group?

Analyses revealed that the majority of CROs are male (80%) and white (91%). These trends were generally consistent across Carnegie classification and land-grant status of the institution. Our sample was highly consistent with Nash and Wright (2013), in terms of the proportion of males (80% vs. 76%) and diversity (in both studies 91% of respondents were white).

Of those CROs who reported their terminal degree, 97.4% held a Ph.D. with only one CRO indicating an M.D. degree and one indicating an M.B.A. degree. On average, CROs received their terminal degree in 1984, with a wide range of other degree dates between 1966 and 2008. On average, respondents served as CRO for 4.6 years (SD = 3.89). The discipline of the highest degree held was predominantly science, with 27% receiving their degree in engineering, 25% in biomedical sciences, 23% in physical sciences, 13% in psychology and social sciences, 8% in health-related programs, and 5% in agriculture and related sciences (see Figure 1).
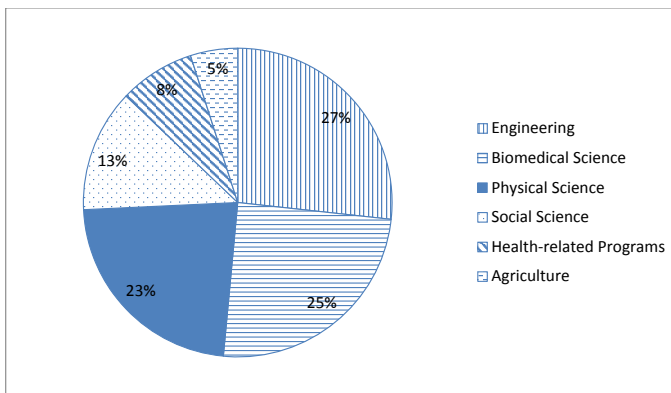

Figure 1. Distribution of CRO terminal degrees by discipline

What professional background and experiences do CROs possess?

CROs were asked to indicate the most important knowledge and skills they deemed necessary or useful for fulfilling their current roles (see Table 2). Knowledge of university culture was most highly cited, followed by developing strategic research areas and/or teams, knowledge of national research priorities, personnel management, and knowledge of developing and/or sustaining programs. In terms of essential skills, current CROs most frequently cited leadership skills, ability to influence stakeholders, ability to gain credibility in the eyes of faculty, strategic planning, and critical thinking (see Table 2).

Table 2. Essential Knowledge and Skills for CRO Role

Knowledge	%
University Culture	67%
Developing Strategic Research Areas and/or teams	65%
National Research Priorities	34%
Personnel Management	33%
How to develop and/or sustain programs	32%
Skills	**%**
Leadership	79%
Ability to influence stakeholders	53%
Ability to gain credibility in eyes of faculty	49%
Strategic Planning	45%
Critical Thinking	42%

The majority of CROs (87%) reported holding one or more administrative roles prior to serving as CRO. Most commonly, CROs had served as Vice, Associate, or Assistant CRO (49%) or Graduate Dean/Graduate Program Director (20%), although a variety of other positions were also reported. Approximately 7% of CROs indicated they had never held an academic position as a professor at any level. When asked what experiences were instrumental to obtaining their current position as CRO, the top answers included personal research experience, being a Department Chair, serving as Dean or Associate Dean, and acting as Center/Institute Director (see Table 3).

Overall, the majority of current CROs received little direct training for their position. In our sample, 44% of CROs indicated that they either agreed or strongly agreed that they received formal or informal training that allowed them to be a competitive candidate for their current position, and 49% of CROs agreed or strongly agreed that they had received mentoring that contributed to achieving the role of CRO. Regarding training once CROs are in the position, only 33% attended the formal APLU orientation and training for new research officers and graduate deans. The most helpful aspect of the APLU orientation was reported to be networking opportunities with other CROs. Additionally, merely 28% agreed or strongly agreed that the

Table 3. Instrumental Events, Activities, and Experiences Contributing to Becoming CRO

Contributing Experiences	%
Personal Experience as Researcher	27%
Department Chair/Head	24%
Dean/Associate Dean	20%
Center/Institute Director/Assistant Director	18%
Previous role in office of CRO	15%
Program officer or other role at national agency	13%
Leadership in national level organizations	12%
Work in industry/private sector/corporate	9%
Experience with national laboratories	8%
Mentoring	5%
Experience with strategy	3%
Experience with external relations	*3%*

opportunities for professional development they currently received at their institution were helping them to excel as CRO.

What challenges do institutions face in the next 3-5 years?

Although the CROs surveyed appeared to be satisfied with their jobs (80% indicated they would accept the position again), our results suggest the potential for a high degree of turnover in the CRO role in the near future. A majority (74%) of CROs indicated that they plan to remain in their position for fewer than 6 years (see Figure 2).
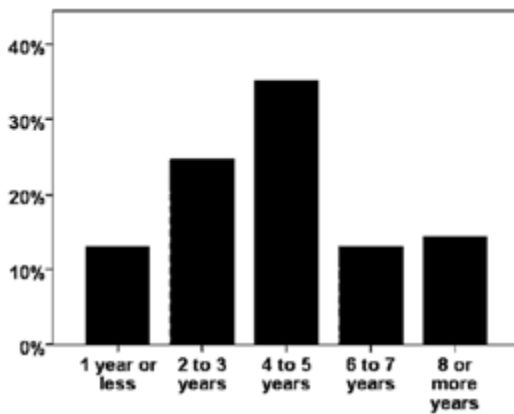

Figure 2. Length of time CRO intends to stay in position

Interestingly, 31% of CROs reported they intend to pursue a position as university President following their tenure as a CRO. This intention is in sharp contrast with responses to a question that inquired about the frequency of promotion from CRO to President at the university; 62% of CROs indicated that a CRO had never become President at their university. Thus, the challenges of universities to train and hire future CROs are paralleled by a lack of clarity about realistic career paths following the position of CRO.

Correlational analyses were conducted to examine whether various factors were associated with the length of time an individual intended to remain in the CRO position. Variables that correlate significantly vary in tandem, such that an increase in one is associated with an increase in the other, in the case of a positive correlation, and a decrease in one variable is associated with an increase in the other variable, in the case of a negative correlation. Control over the allotment of research space on their campuses, and role in determining cost sharing on grant proposals, were moderately positively related to intended length of time in the CRO role ($r = .33$, $p < .05$; $r = .27$, $p < .05$, respectively). Opportunities for professional development were also positively related to intention to remain in the CRO role ($r = .31$, $p < .05$), as was the degree to which a succession plan was in place at the institution ($r = .24$, $p < .05$). Carnegie classification was moderately negatively associated with length of intention to act as CRO ($r = -.30$, $p < .05$), with CROs in higher Carnegie-ranked institutions more likely to report the intention to leave sooner. Thus, these analyses reveal two things: (1) CROs who had greater input into decision making about resources and greater opportunities for professional development, and whose institutions have succession plans, indicated they intend to remain in the role for a longer period of time; and (2) CROs at more research-intensive (i.e., Carnegie Research Very High and Research High) institutions intend to remain in their positions for shorter periods of time.[4]

Although current CROs reported intending to remain in their position a fairly short period of time, only 16% of CROs agreed or strongly agreed that their institution has established a clear path to developing the background needed for someone to attain the position of CRO. Additionally, CROs from institutions without plans for CRO successors indicated that they intend to leave sooner than those individuals at universities with a succession plan.

Findings from the current study indicated an approximately equal focus on internal and external candidates for the CRO role among the institutions responding. In particular, 26% of respondents indicated that previous searches were mainly internal, with some search for external candidates, 23% reported that searches were mainly external, with some search for internal candidates, and 31% indicated an equal focus on internal and external candidates. Regarding development of future CROs, only 41% of current CROs reported that potential future CROs were provided with a moderate or great deal of mentoring in the last three years by the current CRO and/or the institution. The amount of training and mentoring of future CROs was fairly consistent across Carnegie High and Very High institutions, and land grant and non-land grant institutions.

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[4] There is no significant difference across Carnegie ranks in the current length of time CROs have served. Thus, this finding indicates a shorter overall intended time in position for CROs in higher Carnegie ranked institutions.

What changes are likely in the CRO role in the next 3-5 years?

The high potential for future change in responsibilities and demands for the CRO position is exemplified by change within the careers of current CROs. Notably, a majority of CROs (68%) reported that their responsibilities had changed over the course of their time in the position. The ability to accommodate these changes also may serve as a marker of CRO candidates with high potential for success.

When asked about emerging challenges for CROs (see Table 4), the most highly cited concern was funding issues, reflecting the trend toward unpredictable state and federal funding for research (RUFC, 2012). Economic development was the second most frequently cited challenge, followed by developing relationships with industry, fulfilling the burden of regulatory compliance, and promoting research collaboration and faculty development.

Table 4. Most Commonly Reported Emerging Challenges

Emerging Challenges	%
Funding issues	76%
Economic Development	31%
Relationships with Industry	26%
Compliance Burden	24%
Research Collaboration	15%
Faculty Development	11%

These emerging challenges may require some additional knowledge and skills, or increased focus on certain knowledge and skills, beyond what is currently required or expected in the CRO role. The ability to communicate and relate to external stakeholders was most frequently cited (by 38% of respondents) as an emerging need, likely due to the fact that such relationships are required for seeking funding and support from state and federal entities as well as for economic development. Leadership and management skills again were cited as essential by 36% of respondents, similar to findings for the current CRO role. CROs also reported a greater need to successfully foster teamwork and collaboration among institutional partners as well as faculty researchers (36%), and a greater requirement to gain support and collaboration from industry and the private sector (30%). The importance of strategic planning, including creating and executing a plan for university research development, was also emphasized by 26% of CROs. Finally, 25% of CROs acknowledged the significance of developing partnerships and promoting strong communication with internal stakeholders, such as the President, Provost, Deans, and faculty.

How should the next generation of CROs be prepared?

Nash and Wright (2013) proposed four pathways to the CRO role, which we used to examine the experiences of the CROs in our sample. These pathways were 1) through faculty/academic positions, 2) through administrative positions in the research office, 3) through positions in private

industry, and 4) through a combination of administrative/private industry positions followed by academic positions prior to the CRO role. In our sample, 83% of CROs followed a traditional faculty/academic pathway to the CRO role, in which an individual begins as assistant professor, and moves on to full professorship and then to university leadership, before being appointed CRO (Nash & Wright, 2013). Approximately 7% reported following a combination pathway, consisting of an administrative position in private industry or government, followed by a position as a faculty member or higher education administrator, moving higher in the ranks of academic administration. No CRO took a purely administrative or private industry path. Approximately 10% of respondents could not be categorized based on the information provided.

Experience in research administration and other administrative capacities, as well as training in leadership, management, and/or communication, were suggested by respondents as primary ways to develop needed skills in the faculty rank. CROs also identified management of large organizations, general research experience, and training specific to the CRO role as productive activities to develop future CROs. A complete list of the actions most highly endorsed to prepare future CROs is provided in Table 5.

Table 5. Recommended Actions and Resources to Prepare CROs

Knowledge and skills	%
Research Administration	20%
Administration experience (not including research administration)	18%
Leadership, Management or Communication Training	16%
Experience in the office of the CRO	16%
Management of large organizations	14%
General research experience	12%
CRO-specific training resources	10%
Training from APLU/CoR	10%

Discussion

The present study explored the structure and function of CRO offices, the role of CROs in university planning and resource allocation, the demographic composition of CROs as a group, the professional and background experiences of CROs, the challenges expected by CROs in the next five years, and suggestions for preparing future CROs. Several findings that reveal potential steps to increase effectiveness of the future of the CRO role emerged.

The majority of CROs responding report directly to the university President. The position of CRO encompasses a variety of roles, often including the IRB, sponsored programs/pre-award services, research development, IACUC, and external funding. CROs were likely to be highly involved in research strategic planning, somewhat less likely to be involved in institutional strategic planning, and reported playing a role in grant cost sharing, retention packages and start-up packages. However, they reported less control over research facilities and space. The majority

of institutions had a strategic research plan in place that guided the actions of the CRO.

In many university administration roles, diversity among leaders is lacking (Cook & Kim, 2012). Unsurprisingly, this was found to be true among leaders of the research enterprise as well. CROs were likely to be male and white and to hold Ph.D.s, particularly in engineering, biomedical science, or physical science.

Overall, the majority of current CROs received little direct training for their position. Less than half of respondents indicated receiving formal or informal training, or mentoring relevant to the CRO role.

The intended remaining time in the position of CROs was fairly short; a large portion of CROs indicated plans to serve for fewer than 6 more years. What is particularly concerning about the situation of high future turnover is the small proportion of institutions with a succession plan in place for the CRO role. Given the expected high turnover in CRO ranks during the next several years, along with the importance this position holds in the university, institutions would be wise to develop plans to establish a pool of qualified future candidates and, as noted below, to think more expansively about how qualifications can be met by candidates from non-traditional pathways.

CROs provided helpful insight on future challenges of the role and effective ways of preparing future CROs. Emerging concerns about funding issues, economic development, relationships with industry, and the compliance burden imply that a background in administration, research experience, leadership, and management of large organizations are essential skills for upcoming CROs.

Recommendations

Based on the current study, we suggest that institutions could take several steps to promote avenues by which effective CRO candidates can be both developed and identified. The first step is to specify the most essential competencies for the position within the institutional context. In order for universities to develop adequate candidate pools for the CRO position and select the most effective individual for the role, deep understanding of the nature of the position is essential. Detailed information about the skills and knowledge needed now, and in the future, should inform leadership transition plans, including the training and mentoring needed to develop the next generation of CROs. These can be derived from analysis of the current position, as well as consideration of future challenges. The current study provides a guide to knowledge and skills that may be considered.

In addition, it should be noted that a strategic plan for research and/or graduate education is a critical foundation on which the pathway to the CRO role can be based. In our study, the presence of such a plan was associated with several important variables. Institutions with a strategic plan for research had higher research expenditures, the CRO had been in the position longer, the CRO had both received and provided greater mentoring, and the CRO was more likely to report that the current developmental opportunities at the university were helping him/her to excel in the position.

Institutions also should establish a means by which faculty or professional research staff members who possess the necessary characteristics for a CRO role or the potential to develop them can be identified (Clunies, 2004). An effective practice can be developed by institutions to identify individuals who have high potential for taking on leadership roles and provide the necessary preparation for those individuals to assume CRO roles in the future (Klein & Salk, 2013). Mechanisms such as yearly faculty evaluations may be one way in which individuals who are successful and willing to take on leadership roles are identified. Succession plans articulating transparent pathways by which faculty members who are interested in developing leadership skills may nominate themselves provide a mechanism for increasing the diversity of faculty members with relevant skills.

This process of identification should not begin when individuals attain administrative positions, but as early in the career as possible (McCall, 2004) and should be on-going, followed by regular opportunities for training, mentoring and development. Each faculty member identified should be provided a plan that outlines steps by which to develop needed skills and be given the opportunity to participate in work experiences and assignments, mentoring, and workshops that will assist in developing these skills (Clunies, 2004). Given the high rate of future turnover of CROs and the small proportion of universities with established plans for identifying future candidates for the CRO position, institutions should place emphasis on developing plans to ensure that a pool of high caliber applicants is available for future CRO searches.

Consideration should be given to preparing individuals internal to the university for the position, as well as to recruiting external candidates who have had the required preparatory experiences. Throughout these processes, it is important to broaden the search beyond faculty members and administrators at other universities in identifying individuals capable of assuming the CRO role.

The CROs in our study suggested a set of recommended experiences and training that would contribute to developing future candidates for the position. The first suggestion is to provide experience in research administration, such as temporary appointments in the CRO office. Ideally, this opportunity would be offered in a transparent manner, such as a faculty fellow process by which interested parties can apply to take on responsibilities in research administration. Opening the process to all qualified and interested faculty is likely to allow diverse individuals (in terms of gender, ethnicity, and discipline) to express interest. Our findings indicate that experience in administration other than research is also suggested as a pathway to prepare the next generation of CROs. This could include full-time administrative positions as well as temporary opportunities in the Provost's office, Dean's office, or as an Assistant Chair or Director.

General research experience was also noted as an important development opportunity. Experiences can be enriched to the extent that the university offers workshops and support for applications for funding, particularly for notable awards such as the NSF CAREER program and large center awards. In addition, given our findings emphasizing the promotion of research collaboration and teamwork as a future skill for CROs, encouragement and recognition of, and reward for, collaborative and interdisciplinary funding efforts would be helpful.

Training in leadership, management, and/or communication were also suggested as ways to develop needed skills in the faculty rank (see http://www.ou.edu/fla.html for one such program targeted toward developing fungible leadership skills for faculty.) Specific training in these skills will enable many otherwise successful faculty members to achieve the additional skills needed for administrative effectiveness.

Internal and external candidates may bring different strengths to the CRO role and thus recruitment should strive to broadly attract candidates. In particular, external candidates should also be sought, as they may be better able to facilitate change and likely do not suffer from biases due to precedent or personal obligations as internal candidates may (Barden, 2009). Due to the discrepancy between the reported equal emphasis on internal and external search strategies and the very small proportion of CROs who reported never holding an academic position, it can be surmised that university efforts, to date, to search externally are primarily focused on recruiting from other academic institutions. Because of the unpredictability of state and federal funding and other changes in higher education, it is important that universities modify their recruitment and selection methods, including looking to non-academic advertising and recruitment outlets, when searching for future CROs. In addition, professional organizations (e.g., Association of Public and Land-grant Universities, American Association of Universities, National Organization of Research Development Professionals) could provide opportunities for training and development of essential skills to assist individuals in more effectively navigating a pathway to the CRO position.

Although perhaps more challenging, structural changes to the CRO role also have the potential to draw a wider pool of competitive candidates and promote retention of effective CROs. In our survey, the most frequent suggestion for changes to the position to improve effectiveness was increasing authority, autonomy, and voice. Other data in our survey support this suggestion, revealing that greater input into budget planning and strategic planning at the university level, greater control over allotment of space and facilities for research, and greater flexibility with regard to the CRO budget were associated with CRO satisfaction with the position and intention to remain in the job. Other suggestions by CROs to change the position included more funding, more staff, and a direct reporting relationship to the President.

Conclusion

Research universities are remarkably complex institutions that are both extraordinarily innovative as well as notably cautious in their willingness and ability to change. A core component of the mission of research universities is scholarship and creative activity across a wide array of disciplines—a component that exists within an environment challenged by increasing competition and compliance, flat or diminishing research funds and problematic state support. The role of the CRO in this complex ecosystem is central for ensuring the existence of a transformational climate of research advancement and its associated impacts on the educational experience (Dingerson, 2006).

The growth and expansion of research universities is tightly connected to the presence of CROs with the ability not only to lead administrative functions, but also to serve as agents of

transformation to encourage institutions to maintain the adaptability necessary to flourish in an ever-changing and unpredictable environment.

Due to the expected turnover among current CROs during the next several years, research universities should focus attention on generating a stream of emerging leaders through institution-wide strategic plans and strategic plans for research, as well as providing opportunities for promising faculty members to develop the skills known to predict success among current CROs and expected to be necessary to address future challenges faced by those in the role. In addition, universities and professional organizations should acknowledge that individuals emerging from pathways other than academia, such as research administration, government, and the private sector, offer skills and abilities that may match the essential skills needed for effective future CROs. Both directing resources toward mentoring and training to develop needed competencies in promising faculty members and making connections with well-positioned individuals outside of academia may provide the most effective means of ensuring a diverse and accomplished pool of candidates for the CRO positions of the future.

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SOCIETY OF RESEARCH ADMINISTRATORS INTERNATIONAL

Appendix 1. Survey Questions and Response Options

Questions About Your Institution

1. *What is the Carnegie Basic Classification of your institution?*

Select one.

RU/VH: Research Universities (very high research activity)

RU/H: Research Universities (high research activity)

DRU: Doctoral/Research Universities

Master's L: Master's Colleges and Universities (larger programs)

Master's M: Master's Colleges and Universities (medium programs)

Master's S: Master's Colleges and Universities (smaller programs)

Bac/A&S: Baccalaureate Colleges--Arts & Sciences

Bac/Diverse: Baccalaureate Colleges--Diverse Fields

Bac/Assoc: Baccalaureate/Associate's Colleges

Tribal: Tribal Colleges

2. *Are you at a public or private institution?*

Select one.

Public

Private

3. *Are you at a land grant institution?*

Select one.

Yes

No

4. *Approximately how many full-time faculty (tenured, tenure track, and research only) are at your institution?*

5. *What were the approximate research expenditures for your institution, or the campus for which you have responsibility, for the latest year data are available?*

6. *In which region is your institution located?*

Select one.

New England (CT, ME, MA, NH, RI, VT)

Mideast (DE, DC, MD, NJ, NY, PA)

Great Lakes (IL, IN, MI, OH, WI)

Plains (IA, KS, MN, MO, NE, ND, SD)

Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)

Southwest (AZ, NM, OK, TX)

Rocky Mountain (CO, ID, MT, UT, WY)

Far West (AK, CA, HI, NV, OR, WA)

Questions About You

7. *What is your gender?*

Select one.

Female

Male

Prefer not to disclose

8. *Are you Hispanic or Latino?*

Select one.

Yes

No

Prefer not to disclose

9. *Please specify your race (select all that apply).*

Select all that apply.

American Indian or Alaska Native- (A person having origins in any of the original peoples of North and South America (including Central America), and who maintains a tribal affiliation or community attachment.)

Asian- (A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.)

Black or African American- (A person having origins in any of the Black racial groups of Africa – includes Caribbean Islanders and other of African origin.)

Native Hawaiian or Other Pacific Islander- (A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.)

White- (A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.)

Prefer not to disclose

10. *Please list your highest degree attained (e.g., M.S., Ph.D.) and the year in which you received it.*

Terminal Degree:

Year:

11. *In what discipline is this degree? (Select all that apply)*

Select all that apply.

Agriculture, Agriculture Operations, and Related Sciences

Architecture and Related Services

Area, Ethnic, Cultural, Gender, And Group Studies Basic Skills and Developmental/Remedial Education

Biological and Biomedical Sciences

Business, Management, Marketing, and Related Support Services

Citizenship Activities

Communication, Journalism, and Related Programs

Communications Technologies/Technicians and Support Services

Computer and Information Sciences And Support Services

Construction Trades Education

Engineering

Engineering Technologies and Engineering-Related Fields

English Language and Literature/Letters

Family and Consumer Sciences/Human Sciences

Foreign Languages, Literatures, and Linguistics

Health Professions and Related Programs

Health-Related Knowledge and Skills

High School/Secondary Diplomas and Certificates

History

Homeland Security, Law Enforcement, Firefighting and Related Protective Services

Interpersonal and Social Skills

Legal Professions and Studies

Leisure and Recreational Activities

Liberal Arts and Sciences, General Studies and Humanities

Library Science

Mathematics and Statistics

Mechanic and Repair Technologies/Technicians

Military Science, Leadership and Operational Art

Military Technologies and Applied Sciences

Multi/Interdisciplinary Studies

Natural Resources and Conservation

Parks, Recreation, Leisure, and Fitness Studies

Personal and Culinary Services

Personal Awareness and Self-Improvement

Philosophy and Religious Studies

Physical Sciences

Precision Production

Psychology

Public Administration and Social Service Professions

Residency Programs

Science Technologies/Technicians

Social Sciences

Theology and Religious Vocations

Transportation and Materials Moving

Visual and Performing Arts

Questions About Your Professional Experience

12. *What non-academic administrative positions did you hold prior to your current position? (Select all that apply.) Select all that apply.*

Vice President/Vice Chancellor for Research

Associate or Assistant Vice President/Vice Chancellor for Research

Graduate Dean/Graduate Program Director

Associate or Assistant Graduate Dean/Associate Graduate Program Director

Chief Technology Transfer/Economic Development Officer

Associate or Assistant Technology Transfer/Economic Development Officer

No Administrative title

Other (*please specify*):

13. *How long (in years) did you hold your most senior administrative position?*

Select one.

Less than 1 year

1 year

2 years

3 years

4 years

5 years

6 years

7 years

8 years

9 years

10 years

11 years

12 years

13 years

14 years

15 years

16 years

17 years

18 years

19 years

20 years

More than 20 years

14. *What academic positions have you held throughout your career? For each title indicate whether you have held the position in the past or presently hold. Select all that apply.*

Associate Professor

Professor

Department Chair/Director or Associate Chair/Director

Dean

Associate Dean

Center Director or Associate Director

Assistant, Associate or Vice Provost

Endowed Professor or Chair

Program Officer

No Academic Title

Other Academic Title not listed above: (Please specify and indicate whether you currently hold or previously held the position)

15. *What administrative title(s) do you currently hold?*

Select all that apply.

Vice President/Vice Chancellor for Research

Graduate Dean/Graduate Program Director

Chief Technology Transfer/Economic Development Officer

Other (*please indicate*):

16. *How long (in years) have you held your current position(s) as VPR/VCR?*

Select one.

Less than 1 year

1 year

2 years

3 years

4 years

5 years

6 years

7 years

8 years

9 years

10 years

11 years

12 years

13 years

14 years

15 years

16 years

17 years

18 year

19 years

20 years

More than 20 years

17. *How long do you plan to remain in your current position?*

Select one.

1 year or less

2 to 3 years

4 to 5 years

6 to 7 years

8 or more years

18. *What career path do you plan to pursue after you leave your current position?*

Select all that apply

President

Provost

Teaching Faculty

Research Faculty

College Dean

Same position at a different institution

Other (please describe):

None (I plan to remain in this position for the rest of my career)

19. *On how many professional Boards, Commissions, Committees, and Councils external to your institution do you currently serve? Select one.*

0

1

2

3

4

5 or more

Questions about the Structure of your Current Position

20. *To whom (what position) do you directly report?*

Select all that apply.

President/Chancellor

Vice President for Academic Affairs/Provost

Vice Chancellor for Research

Graduate Dean

Other (*please specify*):

21. *How many people are in your research VPR/VCR organization? Enter a number.*

22. *How many people report directly to you? Enter a number.*

23. *Which of the following campus functions are included in your portfolio of responsibilities? (Check all that apply) Select all that apply.*

Human research protections - Institutional Review Board (IRB)

Environmental Health and Safety

Radiation and Laboratory Safety

Export controls

Economic/technology development

Patenting/licensing

Research communications

Institutional Animal Care and Use Committee (IACUC)

Graduate school/college

Sponsored programs, pre-award services

Sponsored programs, post-award services

Research development

Philanthropy

Undergraduate Research

Private Industry Relations

University Press

Research Center/Campus

Budget/Strategic Planning

Federal Relations

External Funding

Other (*please specify*):

24. *Do you have a 501(c)3 non-profit organization, such as a research corporation or center, in your portfolio that you are responsible for running, or that reports directly to you?*

Select one.

Yes

No

25. *Do you have purview over a health campus/organization?*

Select one.

Yes

No

Other (*please specify*):

26. *Do you have purview over a veterinary medicine campus/organization?*

Select one.

Yes

No

Other (*please specify*):

27. *How much flexibility do you have with regard to your budget, i.e., to invest in research and/or graduate education? Select one.*

1 - No Flexibility

2 - Not Much Flexibility

3 - Some Flexibility

4 - Considerable Flexibility

5 - Complete Flexibility

28. *Is the size of your budget linked to institutional indirect cost recovery?*

Select one.

Yes

No

Other (*please specify*):

29. *What percentage of indirect cost recovery contributes to your budget? (select one) Select one.*

1-20%

21-40%

41-60%

More than 60%

30. *What is the approximate dollar amount of your VPR/VCR yearly budget?*

*For computing the mean CRO yearly operating budget and proportion of total research expenditures made up of CRO yearly operating budget, the midpoint of each category was used.

Select one.

Less than $1 Million

$1 Million to $5 Million

$5 Million to $10 Million

$10 Million to $20 Million

$20 Million to $30 Million

$30 Million to $40 Million

$40 Million to $50 Million

$50 Million to $60 Million

$60 Million to $70 Million

$70 Million to $80 Million

$80 Million to $90 Million

$90 Million to $100 Million

$100 Million to $200 Million

$200 Million to $300 Million

$300 Million to $400 Million

$400 Million to $500 Million

More than $500 Million

31. *Do you have a role in funding startup packages for new faculty or professional research staff hires relative to other offices? Select one.*

Yes

No

32. *What percentage typically do you fund?*

Select one.

1-20%

21-40%

41-60%

More than 60%

33. *What is your role in deciding whether cost sharing should be provided to a given grant proposal submission? Select one.*

1 - Not Responsible

2 - Partly Responsible

3 - Solely Responsible

34. *What is your role in providing money for grant proposal cost sharing relative to other offices once the decision to provide it has been made? Select one.*

1 - Not Responsible

2 - Partly Responsible

3 - Solely Responsible

35. *Do you have a role in funding retention packages relative to other offices?*

Select one.

Yes

No

36. *What percentage typically do you fund?*

Select one.

1-20%

21-40%

41-60%

More than 60%

37. *How much do you agree with the following statements?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

I am very involved in budget planning at the university level.

I am very involved in strategic planning at the university level.

38. *Do you have an institution-wide strategic plan for research and/or graduate education? Select one.*

Yes

No

Other (*please specify*):

39. *Did the VPR/VCR (you or a predecessor) lead its creation?*

Select one.

Yes

No

40. *What are the primary goals of the strategic plan? (Choose all that apply.)*

Select all that apply.

Developing or growing research interactions with the private sector

Developing or growing undergraduate participation in research

Developing or growing diversity among research faculty and/or students (e.g., recruiting more international faculty and/or students)

Developing or growing diversity of fields of research (e.g., promoting new methodologies and fields of research represented at institution)

Developing or growing amount of multidisciplinary research

Obtaining more external funding from federal agencies

Developing or growing research interactions with non-profit foundations

Linking research with philanthropic giving to your institution

Developing or growing applied research and development

Other (*please specify*):

41. *Do you have an institution-wide strategic plan for undergraduate research?*

Select one.

Yes

No

42. *Did the VPR/VCR (you or a predecessor) lead its creation?*

Select one.

Yes

No

43. *How much do you agree with the following statements?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

I have control over the allotment of space and facilities for research.

44. *During the past 10 years, how many people have held your position? Please begin with the most recent, and list the duration of each person and their disciplinary expertise, if possible, even if the office changed in structure).*

Questions about Training

45. *How much do you agree with the following statements?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

I received formal or informal TRAINING that allowed me to be a competitive candidate for my current position(s).

I received formal or informal PERSONAL MENTORING that allowed me to be a competitive candidate for my current position(s).

46. *What type(s) of training/mentoring and from what source(s)?*

47. *What other events, activities or experiences were instrumental in enabling you to attain your current position(s)?*

48. *Have you participated in the formal APLU Orientation program for new research officers and graduate deans?*

Select one.

Yes

No

49. *How helpful did you find the APLU orientation (the formal orientation program for new research officers and graduate deans)?*

Select one.

1 - Very Unhelpful

2 - Unhelpful

3 - Neither Helpful nor Unhelpful

4 - Helpful

5 - Very Helpful

50. *What was particularly helpful about the APLU orientation, and what would have made it more helpful? (If you did not attend, please leave this question blank)*

51. *How much mentoring of potential future VPRs have you or your institution been providing during the past 3 years?*

Select one.

1 - None

2 - Very Little

3 - A Moderate Amount

4 - A Great Deal

52. *How much do you agree with the following statement?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

The opportunities for professional development I receive at my institution are helping me to excel in my current position.

53. *Would you accept the position(s) you now hold if offered it (them) today? Why or why not?*

Current state of the VPR position

For the next two screens we'd like to gain information about your perception of your position. For the first we'll focus on knowledge and experience, for the second we'll focus on skills.

54. *Of the KNOWLEDGE/EXPERIENCE listed below, rank-order the top 3 most important knowledge/experience required in order to effectively carry out your current role as a research VP/VCR at your university.*

Held a previous position at a state or federal agency, or private foundation

Previously held or currently hold a position on key state or federal agency committees or boards

Participated in policy making activities at the institutional, state or national levels

Held a position within a private company

Understanding of how to develop and/or sustain collaboration between the university and other organizations/institutions

Understanding of how to develop and/or sustain collaboration between the university and companies/corporations

Understanding of how to develop and/or support strategic research areas and/or teams

Understanding of how to develop and/or sustain programs

Understanding national research priorities

Understanding personnel management

Regulatory and compliance knowledge

Legal knowledge (e.g., intellectual property, export controls)

Understanding university culture

Understanding the culture and policies of grant-issuing organizations (e.g., NSF, NIH, private foundations, etc.)

Understanding university-government relations

Basic knowledge of all fields of research at the university

Other (*please specify*)

55. *Of the SKILLS listed below, rank-order the top 3 most important skills required in order to effectively carry out your current role as a research VP/graduate dean.*

Active listening

Critical thinking

Time management

Strategic planning

Leadership

Supervision

Ability to influence stakeholders (e.g., President, fellow Deans, Trustees, etc.)

Negotiation

Ability to gain credibility in eyes of faculty

Teamwork

Conflict resolution

Communication/media/public relations

Successful grant-writing

Managing large budgets

Other (*please specify*)

56. *Please list the top 3 knowledge/skills/experiences that will be needed to be successful at this position in the NEXT 3 to 5 years. Please list them in order of importance, with the knowledge/skill/experience that will be most important listed first.*

57. *How much do you agree with the following statement?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

My responsibilities have changed during my time in the VPR/VCR position.

58. *What new challenges, responsibilities, or roles has your position taken on recently?*

Select all that apply.

Human research protections - Institutional Review Board (IRB)

Environmental Health and Safety Radiation and Laboratory Safety

Export controls

Economic development

Technology development

Patenting/licensing

Research communications

Institutional Animal Care and Use Committee (IACUC)

Graduate school/college

Sponsored programs, pre-award services

Sponsored programs, post-award services

Research development

Undergraduate Research (funded with research grants)

Undergraduate Research (unfunded by research grants)

Philanthropy

Private Industry Relations

University Press

Research Center/Campus

Foundation relations

Development

Online-Education

Globalization/Internationalism

Budget/Strategic Planning

Federal Relations

Crowdfunding

Commercialization of university research

Export control

Graduate student unions

Dotted reporting lines

Other (*please specify*):

59. P*lease list the top 3 emerging trends or challenges for VPRs. Please list them in order of importance, with the knowledge/skill/experience that will be most important listed first.*

60. *What have been the greatest challenges of your position since being appointed to it? Rank order top 3.*

Insufficient internal funding

Insufficient external funding

Insufficient importance placed on research by the university

Ineffective reporting structure

Declining federal budgets

Too many activities for one person

Burdensome federal compliance regulations

Insufficiently bold administration

Faculty who are insufficiently bold and unwilling to take risks

Lack of rewards for research

Difficult political atmosphere in the university

Limitations in my preparation for the position

Other not listed above: (*please specify*)

61. *What have been the greatest rewards of your position? Rank order the top 3.*

Helping faculty achieve their goals

Helping students achieve their goals

Seeing advances made in the scholarly enterprise

Helping create jobs

Building infrastructure for future research

Seeing society benefit through the university's research efforts

Fundraising for research projects and activities

Other not listed above: (*please specify*)

62. *What changes should be made in your position(s) to improve overall effectiveness?*

63. *At your institution, how many people who held the VPR position have later become Provost or President?*

Succession Planning

64. *In the past, how has your university typically filled the VPR position?*

Select one.

1 - Only Internally

2 - Mainly internally, with some search for external candidates

3 - Equal focus on internal and external candidates

4 - Mainly externally, with some search for internal candidates

5 - Only Externally

65. *How much do you agree with the following statement?*

Select one per row.

1 - Strongly Disagree

2 - Disagree

3 - Neither Agree nor Disagree

4 - Agree

5 - Strongly Agree

My institution has a succession plan or clear path to developing the background needed for someone to attain my current position.

66. *What actions and resources would best prepare VPRs for the expected challenges and responsibilities of the future? [open-ended]*