

*An Evidence-based Framework for
Professional Learning*



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Lifelong Learning Group

Informal STEM DACUM Competency Profiles

Verification Report

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Executive Summary

This project asks the question: are there duties and tasks consistent across job descriptions of those who work in informal science learning institutions, and do those duties and tasks change over the course of a career? This is being done to critically look at professional development for science and technology centers and think critically about the career path needs of people, rather than focusing on job specific skills. Using literature and experience, the project team had in the proposal identified the stages as early career (0-3 years as a science-related museum professional), mid-career (4-10 years), and mature (11+ years). Three cities were identified for hosting one of the three career-stage panels: New York City with host American Museum of Natural History for early career-stage; Berkeley with host Lawrence Hall of Science; and Columbus with host COSI. For each site, six institutions were initially approached to ask for one or two staff members who were “expert at being in a science museum” at the specific stage of career. Once nominated, individuals were then approached with explicit information about what the process would entail and informing them that the choice to participate was freely their own. If an institution could not send participants, other institutions were approached until the panel had reached 12 committed individuals.

The panels were each held in closed rooms in the host museums. The panel workshops strictly followed the DACUM process. Following the panels, draft Competency Profiles were generated. A survey instrument based on the DACUM results was then developed to distribute to the field. The questionnaire was an online survey using the Qualtrics platform. The first question distributed respondents into one of three career stages based on self-reported years of being a science-museum professional. This screen fed individuals into one of three different questionnaires which listed every task identified in the panel process by duty. The respondent was asked to first identify how important the task was for being successful in their work. This was followed by asking the respondent to rate how difficult the task was to learn. There was a combined total of 20 duties and 106 tasks that were to be verified.

Also, for each career stage, the respondents were provided with a rank-scale matrix for 1) skills; 2) knowledge, and 3) characteristics to gauge agreement of importance. These were each followed by open-ended response opportunities for additions or challenges. Following project IRB protocols, ASTC began to distribute the questionnaire to science centers in autumn, 2016. The first wave was specifically targeted toward the 19 institutions participating. Following this first distribution, ASTC gradually expanded the request with an intention to achieve distribution across the U.S.

There was a total of 1061 respondents. Of these, 289 (27.2%) are museum or science center professionals for up to three years. For those who have been in the museum profession four and ten years, there were 363 respondents (34.2%), and for 11 years or more, there were 409 (38.6%).

Across the three stages, there was very strong agreement regarding duties and tasks, thereby verifying the DACUM and the competency profile for each stage. The skills, knowledge, and characteristics were also strongly supported as being correct. The data show interesting variability in the difficulty of learning the tasks, however. Although most hovered around the neutral zone—suggesting it was difficult for some and easy for others, there were some tasks and duties that, though important, were seen as easy to learn while others were more difficult. This does suggest the framework is appropriate for individuals to enter at any level of existing competency to determine if they wish to go deeper into developing competencies around a task and/or duty, or if they choose to move to a different level of performance.

There were four broad conclusions from this study:

1. The Competency Profiles for all three stage levels appear to be valid.

All 20 duties and 106 tasks for the three Competency Profiles are verified. There was strong agreement by the 1006 respondents both in means and in combined scores for wide-spread acceptance of the Duties and the subsequent Tasks for all three career stage profiles. There were no duties or tasks suggested by the verification panel that the original DACUM panel had not considered, though some word changes and concerns have led to reconsidering how to frame those duties and tasks in the Professional Learning Framework.

2. The skills, knowledge, and characteristics appear to appropriately represent the career stage

All 31 skills, 22 knowledge sets, and 48 individual characteristics are verified. There was very strong agreement by the 1006 respondents both in means and in combined scores for wide-spread acceptance of the individual needs to be considered expert at being a science-museum professional at varied career stages. There were several additional individual skills, knowledge, and traits identified and have been incorporated into the considerations for inclusion into the Professional Learning Framework.

3. The Career-stage approach appears to be a useful construct for looking across the profession for learning pathways

There were multiple pathways seen where for a similar construct such as a duty related to mission, in the 0-3 year professional the duty was implementation, the 4-10 year professional the duty tended toward managerial, and in the 11+ the duty tended toward leadership. Even within the DACUM panels, the responsibility was not as clear cut, but the overall tasks associated with a duty had differing levels of maturity within the institution associated with it. The approach of separating career stage reveals that there are clear stage differences in the professionals and the many connections across the duties and the progressions of the tasks support the need for a Professional Learning Framework.

4. The difficulty of learning the unifying duties and tasks of science-museum professionals across job-specific duties and tasks appear to increase in difficulty to learn as the individuals mature in the field.

The increase in perception of difficulty of learning tasks in each of the three career stages is interesting and striking. It is very likely that as individuals progress through their careers, the distance from job-specific entry skills appears to lead to job elements being further from training and career preparation. This was reflected in the increase in perception of difficulty of learning tasks and the increasing movement from the “doing” of the work to the managing and then leading of the work across the career pathways.

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Introduction

DACUM (Developing A CURriculum) was developed in Canada in the 1980s as a tool for industry to improve training. It has been championed in the USA by the Center for Education for Employment at The Ohio State University where they have conducted thousands of DACUMs and trained scores of people to conduct them. As used today, DACUM is a unique, innovative, and very effective method of job, and/or occupational analysis. It is also very effective for conducting process and functional analyses.

The DACUM analysis workshop itself involves a trained DACUM facilitator and a committee of 5-12 expert workers from the position, occupation, or other area of analysis. The profile chart that results from the usual two-day workshop is a detailed and graphic portrayal of the duties and tasks performed by the workers involved. In addition to the development of precise duty and task statements, lists of the general knowledge and skills, worker behaviors, and optional lists including tools/equipment used, materials/supplies necessary to conduct the job, and future job trends/concerns are also identified.

DACUM is based on three logical premises:

1. Expert workers can describe and define their job/occupation more accurately than anyone else. Persons who are working full-time in their positions are the real experts on that job. Even though supervisors and managers usually know a lot about their subordinates' work, they usually lack the expertise needed for a high-quality analysis.
2. An effective way to define a job/occupation is to precisely describe the tasks that expert workers perform. A successful worker performs a variety of tasks that either the customer or employer wants performed. Possessing positive attitudes and knowledge alone are not enough. Hence, finding out what the expert workers (top performers) do will give us the opportunity to prepare other experts.
3. All tasks, in order to be performed correctly demand the use of certain knowledge, skills, tools, and positive worker behaviors. While the knowledge, skills, tools, and worker behaviors are not tasks, they are enablers which make it possible for the worker to be successful. Because these four enablers are so important, considerable attention is given during the DACUM workshop to identifying lists of each. Because these attributes are different and distinct from the tasks, it is very important to keep them separate if a high-quality analysis of job performance requirements is to be obtained.

DACUM has been used effectively to analyze occupations at the professional, managerial, technical, skilled, and semiskilled levels. It has also been used effectively to conceptualize future jobs, and to analyze portions (selected duties) of one's occupation and as a basis or foundation for analyzing various industrial systems and processes.

This project is asking the question: are there duties and tasks that are consistent across job descriptions of those who work with the publics in informal science learning institutions, and do those duties and tasks change over the course of a person's career? This is being done as a means to critically look at professional development for science and technology centers and think critically about the career path needs of people, rather than focusing on job specific skills.

Methods

Using literature and experience, the project team had in the proposal identified the stages as early career (0-3 years as a science-related museum professional), mid-career (4-10 years), and mature (11+ years). To maximize the number of institutions participating in the DACUM process and so looked at cities where there were reasonable numbers of ASTC member institutions. Three cities were identified for hosting one of the three career-stage panels: New York City with host American Museum of Natural History for early career-stage; Berkeley with host Lawrence Hall of Science; and Columbus with host COSI.

ASTC led the recruitment effort by sending letters to contact individuals in institutions in each region based on size and type of museum/institution. For each site, six institutions were initially approached to ask for one or two staff members who were “expert at being in a science museum” at the specific stage of career. Care was given to strongly encourage non-education related staff members to be nominated. Once nominated, individuals were then approached with explicit information about what the process would entail and informing them that the choice to participate was freely their own. If an institution could not send participants, other institutions were approached until the panel had reached 12 committed individuals.

The panels were each held in closed rooms in the host museums on March 3-4, 2016 at AMNH, March 22-23, 2016 at Lawrence Hall of Science, and April 6-7, 2016 at COSI. The requirements for set-up had been sent to each museum (see Appendix XX). Participant costs were covered by the project including travel, hotel, and meals, and snacks and beverages were available all day both days of the workshop.

The panel workshops strictly followed the DACUM process of a one-hour overview, followed by prescribed steps of generating duty lists, clustering duties, building duty statements. This was followed by generating task lists, building task statements, and revising duty and task statements. On the afternoon of the second day, the panels organized the duties and then the tasks. Finally, lists of knowledge, skills, and characteristics necessary for experts at being a professional in a science-related museum at each stage were generated, discussed, and narrowed down.

Following the panels, draft Competency Profiles were generated. A survey instrument based on the DACUM results was then developed to distribute to the field. The questionnaire was an online survey using the Qualtrics platform. The first question distributed respondents into one of three career stages based on self-reported years of being a science-museum professional.

This screen fed individuals into one of three different questionnaires which listed every task identified in the panel process by duty. The respondent was asked to first identify how important the task was for being successful in their work. This was followed by asking the respondent to rate how difficult the task was to learn. For each duty, respondents were provided the opportunity to offer suggestions for additional tasks, rewording of tasks, or comments on tasks within the duty statement. There were six duties identified by the early career respondents with 31 tasks, six duties and 33 tasks identified by the mid-stage career respondents, and eight duties with 42 associated tasks by the later career respondents. This led the questionnaire to a combined total of 20 duties and 106 tasks that were to be verified.

Then, for each career stage, the respondents were provided with a rank-scale matrix for 1) skills; 2) knowledge, and 3) characteristics to gauge agreement of importance. These were each followed by open-ended response opportunities for additions or challenges.

Finally, all respondents were then brought to the same questions related to demographics including willingness to have name/institution listed as participants in the process, and interest in participating in the random drawing for a thank-you gift—a subscription to a professional journal.

Following project IRB protocols, ASTC began to distribute the questionnaire to science centers in autumn, 2016. The first wave was specifically targeted toward the 19 institutions participating. Following this first distribution, ASTC gradually expanded the request with an intention to achieve distribution across the U.S.

Results

Who responded?

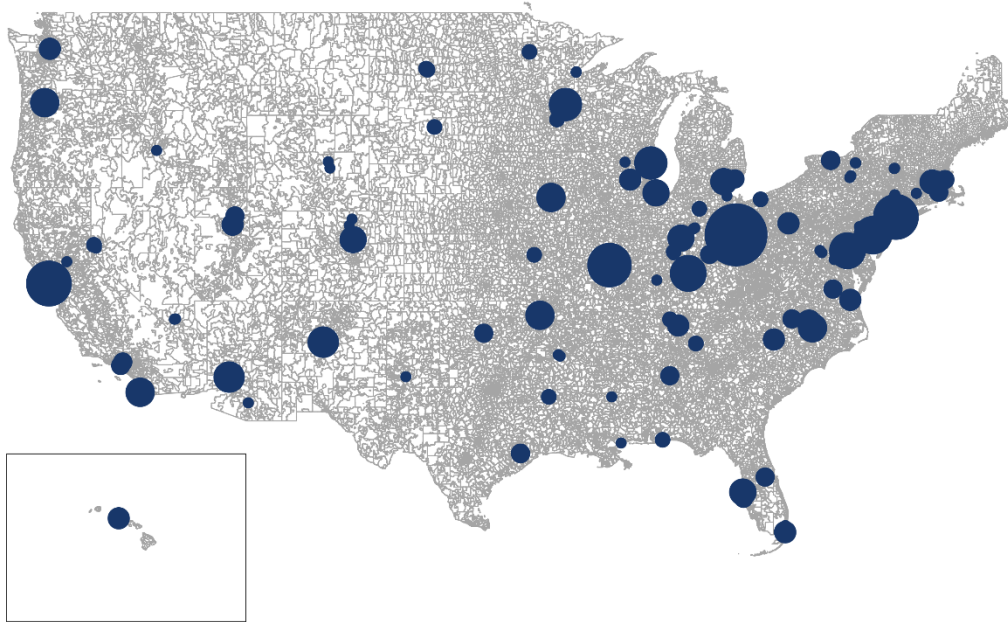
There was a total of 1061 respondents. Of these, 289 (27.2%) are museum or science center professionals for up to three years. For those who have been in the museum profession four and ten years, there were 363 respondents (34.2%), and for 11 years or more, there were 409 (38.6%). Of respondents providing demographic details, 69.1% (430) were female, 29.9% (186) were male, and 6 (1.0%) identified as non-binary. Sixty-eight (11.2%) of the respondents identify as LGBTQ+.

It should be noted that there were two points at which drop-out from completion occurred. The first was after the final Duty verification. The second was when a respondent reached the end of the skills, knowledge, and characteristics. In the end, slightly more than a third provided all demographic information, so the data may not be fully representative of the entire panel, but is as representative as we can expect from the conditions of the study.

Eighty-four (13.7%) of respondents to the question on ethnicity identified as an ethnic or racial minority. There were 10 respondents who identified as Asian/Asian American (including one who identified as Chinese and one as Japanese American). Three respondents named their ethnicity as Asian/Pacific Islander. There were 5 biracial/missed or multiracial respondents, 7 black, 4 Native American, 2 Jewish, and then a variety of others including Arab, Half Chamorro half white, Hapa (Asian, white), Japanese-Cape Verdean-Portuguese-Polish, and Mediterranean.

The respondents did represent a broad distribution across the United States. On the following heat map, the three locations of the three DACUM panels are clearly visible: New York, Oakland, and Columbus. This is in part because the initial roll-out of the verification was to the museums participating in one of the three DACUM panels. These institutions also had greater buy-in to the process. Overall, the mid-west and then the Northeast down to the mid-Atlantic are more heavily represented, but the distribution of those who responded to the item about zip code reveal a cross-country spread.

Figure 1. Map of respondent distribution



Circles represent density of respondents in a geographical area.

Respondents also represent a broad range of job responsibilities. Of the 584 individuals who provided them, there were 437 discreet job titles ranging from educator (33 with educator in the title) to Executive Directors (13) and CEO (14 with several as President and CEO). Fourteen individuals identified themselves as Vice Presidents with 9 discreet specific titles. One-hundred forty-four respondents had the word “manager” in their title while 163 had the word “director.” The divisions of these were wide-ranging with variations of education, development, marketing, PR, advancement, operations, visitor services/experiences/guest relations, strategic initiatives/ planning/ partnerships, camp, programs, communications, volunteer, finance, box office, exhibits, fabrication, membership, admissions, traveling exhibitions, research, school, teacher programs, MAKESHOP, collections, registrations, and others. There were six titles with Designer in them, and four with Finance. In addition to the 33 educators in titles, there were an additional 7 with the word “teacher” and 12 with “school” in the title. Additionally, there were 11 individuals with “outreach” as part of their title. There were only four individuals with “floor” in the title.

There were a lot of positions identified, and support the entry hypothesis that in the informal science learning profession, titles are not consistent and positions are uniquely constructed within each institution, thus increasing the need for a professional learning framework.

Museum professional with 0-3 years of experience

There were five job duties identified in the DACUM panel by the up to three-years employed in museums panel.

Duty 1: Produce visitor experience

For the first duty, Produce Visitor Experience, all tasks within the duty had a strong majority of respondents identifying them as being of great importance. Table 1 shows the means (on a 7 point scale) and percent of respondents who were in agreement (combined 5, 6, and 7 point rankings on the 7-point agreement scale).

Table 1. Duty A: Produce Visitor Experience

Task	Mean	% Agreement
Identify audience and institution needs	6.53	97.0%
Determine feasibility of projects	5.91	90.5%
Acquire approval to proceed with projects	5.60	80.4%
Develop experience content	6.08	90.4%
Refine experience content	5.87	86.7%
Implement visitor experiences	6.33	92.2%
Evaluate experience effectiveness	6.13	92.1%
Maintain experience integrity	6.23	94.6%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Respondents were asked if any task statements were missing or needed to be altered. Many responses were too vague or off topic to qualify in the context of this analysis. Two responses referred to other duties/categories within the DACUM that overlap with producing visitor experiences. More specific advice for Duty A included ensuring the feasibility of a visitor experience according to “price, location, and [institutional] hours,” maintaining the “aesthetics of content,” and “adjusting [experience] content to audience’s [learning] level.” Notable new insights into Duty A included more job specific activities: designing visitor experiences that align with a state’s given learning standards for children, engaging younger audiences to help design the experiences, and understanding how to scale experiences given resource constraints. Two responses noted confusion with what “refine experience” and “implement visitor experience” mean in the text of the DACUM.

Duty B: Manage staff and volunteers.

For Duty B, there was a very clear majority who felt this task is important. The lowest ranking was for evaluating subordinate’s performance, which is clearly a task for which some early-career professionals are not responsible. This item’s mean was still in overall agreement at $\bar{x}=5.41$. The agreement ranking (percent of respondents at agree, moderately agree, and strongly agree levels) was 80.4% (See Table 2).

Table 2. Duty B: Manage staff and volunteers

Task	Mean	% 5, 6 and 7
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		rankings
Contribute to a positive work environment	6.60	98.7%
Foster productive work relationships	6.53	98.1%
Coordinate schedules among relevant individuals	6.03	86.8%
Balance staff workload	5.89	87.4%
Facilitate training for job function	5.92	84.9%
Evaluate subordinates' job performance	5.41	80.4%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Responses to potential changes to items in Duty B included a few that reiterated the need to interact with staff and volunteers alike. (One of these responses came from another section of the interview). One response highlighted the fact that “managing youth is different from adults.” Another respondent pushed back against the duty itself, saying that “entry-level workers are not usually responsible for managing staff.” Several responses offered new insights into the Duty B standards—information which will be useful for descriptions in the framework. One respondent added the task of helping to train new employees (“provide consistent on-boarding”). Two respondents provided sufficiently new tasks to Duty B that went further than ‘contribute to a positive work environment’ and ‘foster productive work relationships’ (as stated in the DACUM). These respondents suggested initial stage employees actually be able to “manage staff discord” and “respond to volunteer concerns.”

Duty C: Cultivate visitor relationships

For Duty C, Cultivate visitor relationships, there is again clearly strong agreement with over 85% in agreement on the importance of each task. The means are generally lower than for the first two duties, but remain positive on the 7-point scale (See Table 3) with strong overall agreement on the tasks. This suggests that some respondents may not see this as important, and it may be in relationship to their particular roles—clearly not all museum roles involve engagement with the subsets of groups identified in each item.

Table 3. Duty C: Cultivate visitor relationships

Task	Mean	% Agreement
Connect with non-members	4.72	86.5%
Personalize existing member experiences	4.61	86.9%
Supplement STEM learning for schools and community organizations	4.85	88.7%
Foster ongoing youth involvement with the Institution	4.97	92.4%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Responses to Duty C were limited. One response related more to Duty A, and another reiterated the importance that institution employees “have daily interaction[s] to make a positive impression with

[sic] everyone they come in contact with [sic].” Another response specified the need to “connect to older demographics of children (8-12 years old).” One response offered a new potential addition to the DACUM: “cultivate digital interactions,” which is likely a job-specific task.

Duty D: Participate in professional learning

Duty D, Participate in professional learning, also has overall strong agreement, but has one item with under 80% strong agreement: “promote professional development opportunities for others.” The agreement is likely somewhat lower because of specific individual job responsibilities. Even so, mean scores were consistently above 5.6 indicating clear agreement (See Table 4).

Table 4. Duty D: Participate in professional learning

Task	Mean	% Agreement
Evaluate professional development needs	6.00	86.0%
Engage with the professional field	5.97	92.0%
Invest in personal growth	6.15	92.0%
Contribute in mentor relationships	5.61	82.0%
Promote professional learning opportunities for others	5.62	77.9%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Responses to task changes or additions on Duty D were limited. Two responses seemed to critique the wording/semantics of the interview questions. Another response was confused about “which perspective these questions are wanting.” One respondent, while explaining a previous response in the interview, argued that “promoting professional learning for others... depends critically on the interest and appetite for learning of the other(s).”

Duty E: Facilitate institution operations

For Duty E, there is less overall support as reported by task mean scores. Although still positive, one item mean score was at the slightly agree level (just above mid-point). This item had to do with hiring and personnel decision-making, which again could be heavily dependent on the specific situation of the individual responding. All other items had mean scores above 5 (agree) although the item “contribute to financial operations” was minimally within the cluster with a 5.01 mean score. (See Table 5). However, there is still majority saying these tasks are important. In the framework, there may need to be some acknowledgement of these particular tasks being important, but not necessarily part of uniform training, or that they are job specific types of tasks that move into managerial responsibilities.

Table 5. Duty E: Facilitate institution operations

Task	Mean	% Agreement
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Abide by established policies	5.83	86.4%
Contribute to financial operations	5.01	65.3%
Contribute to departmental personnel and hiring discussions	4.88	61.0%
Enforce codes of conduct	5.49	72.8%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

The only response to additions or clarifications for tasks for Duty E questioned what ‘contribute to financial operations’ means. This suggests that the task needs to be explicated in the framework for early-career science museum employees.

Duty F: Represent the institution.

Task 6, Represent the institution, had extremely high agreement with each item having a mean score of above 6.60/7.0 and over 97% ranking each item in the top 3 rankings. (See Table 6)

Table 6. Task F: Represent the institution

Task	Mean	% Agreement
Uphold institution’s mission	6.73	98.64%
Act as a steward on behalf of the institution	6.62	97.28%
Promote the value of the institution	6.69	97.96%
Advocate positive institutional image	6.65	97.96%

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

One respondent noted that these were “Easy for me, not so easy for others.” This might suggest that framing of these tasks in the professional learning framework be approached with caution to allow these tasks to be seen as the more difficult work they refer to, rather than onboarding activities or simplistic meaning of the tasks. There were no additional task changes offered.

Difficulty to learn

For the tasks, respondents noted the difficulty of learning each. For most items, there was a very good distribution, suggesting each task has degrees of challenge for different individuals. Most of the tasks hovered around the middle with means between 3.1 and 4.9 with only three tasks having means below 3.0, suggesting a dominant perspective of easy to learn; these items also had a clear majority identifying the task as easy to learn (around 75% for each). Five items had a majority of respondents ranking the task as difficult to learn with Duty C having a very strong perception of difficulty by most of the respondents, even though the means were low reflecting the bimodality of responses. (See Table 7).

Table 7. Challenge in learning tasks

Duty	Item	Mean	% Easy to learn	% Difficult to learn
A: Produce visitor experience	Identify audience and institution needs	4.01	34.9	9.8
	Determine feasibility of project	4.26	33.0	44.3
	Acquire approval to proceed with projects	3.78	50.9	32.9
	Develop experience content	4.55	19.0	55.8
	Refine experience content	4.21	28.2	43.5
	Implement visitor experiences	3.93	42.9	39.9
	Evaluate experience effectiveness	4.82	23.0	61.2
	Maintain experience integrity	4.16	28.8	41.7
B: Manage staff and volunteers	Contribute to a positive work environment	2.62	73.7	14.7
	Foster productive work relationships	3.28	54.8	19.1
	Coordinate schedules among relevant individuals	4.12	36.3	44.0
	Balance staff workload	4.59	23.6	51.0
	Facilitate training for job function	4.23	28.4	43.9
	Evaluate subordinates' job performance	4.07	35.7	44.2
C: Cultivate visitor relationships	Connect with non-members	4.00	3.5	86.5
	Personalize existing member experiences	4.04	5.4	86.9
	Supplement STEM learning for schools and community organizations	4.20	2.4	88.8
	Foster ongoing youth involvement with the Institution	4.59	2.4	92.4
D: Participate in professional learning	Evaluate professional development needs	4.46	23.0	50.7
	Engage with the professional field	4.17	31.5	40.3
	Invest in personal growth	4.40	27.5	46.3
	Contribute in mentor relationships	4.33	23.7	45.3
	Promote professional learning opportunities for other	4.06	31.3	39.5
E: Facilitate institution operations	Abide by established policies	2.19	75.3	8.2
	Contribute to financial operations	4.30	24.1	39.7
	Contribute to departmental personnel and hiring discussions	3.86	40.0	29.0
	Enforce codes of conduct	3.32	54.1	26.7
F:	Uphold institution's mission	2.49	75.3	8.2

Represent the institution	Act as a steward on behalf of the institution	4.30	24.1	70.0
	Promote the value of the institution	3.86	40.0	29.0
	Advocate positive institutional image	3.32	54.1	26.8

In general, the distribution of responses suggests that these tasks range in difficulty, probably based on individual and position. The tasks appear to be appropriately challenging across distribution to be included in a learning framework.

Skills, knowledge, and characteristics

For this study, a skill was defined as “the ability to perform occupational tasks with a high degree of proficiency.” For knowledge, the definition given was “an understanding and familiarity with facts and information.” And for characteristics, the working definition was “a quality that allows an individual to complete a job.”

Table 8 below shows the importance for skills, knowledge, and characteristics again showing mean and the percent who ranked this in agreement (important, moderately important, or very important with a 5, 6, or 7 on the 7-point scale). There were no standard deviations over expected deviation to raise concern. There were several items with very low distributions, indicating much stronger alignment across respondents. (See Table 8)

Table 8. Skills, knowledge and characteristics

	Item	Mean	% Agreement
Skills	Basic communication skills	6.80	100.0
	Public speaking and presentation	5.76	85.3
	Time management	6.23	95.8
	Collaboration	6.42	97.9
	Project management skills	5.89	90.1
	Job specific skills (e.g. artistic, scientific, data analysis, safety, CPR/first aid, education, etc.)	5.73	83.2
Knowledge	Basic understanding of the institution (mission, vision, facility, programs, etc.)	6.45	98.6
	Basic technical competency	5.72	90.2
	Understanding of institution	5.99	93.0
	Institution’s role in the community	5.81	88.8
	Cultural competency with demographics served	6.09	93.7
	Knowledge of interpersonal relations	6.03	93.0

Characteristics	Speaks eloquently	5.33	80.4
	Embodies vision of the institution	5.73	88.8
	Maintains composure	6.17	96.5
	Is determined	5.95	92.3
	Treats others with respect	6.70	100.0
	Works independently	5.68	83.9
	Adapts to circumstance	6.47	97.9
	Is accountable for job performance	6.38	99.3
	Thinks creatively	6.02	95.8
	Is welcoming	6.44	96.5
	Reflects on practice	6.04	93.7

There was very strong agreement on skills with strong agreement on knowledge and characteristics. Respondents were asked to comment on each section as it was completed.

Skills

While many responses to Skills related more to Characteristics, more than half of responses offered either more specific or new insight into the DACUM. Respondents cited “creativity, innovation, and cross-disciplinary engagement” as specific skills required of the DACUM and it could be considered that ‘creativity’ and ‘innovation’ are skills rather than characteristics of the initial stage employee, because these can arguably be enhanced through training. Other respondents highlighted writing, management, and entrepreneurial skills. Some respondents suggested skills not seemingly covered by the DACUM, and in particular, those that prioritized the ability to work independently in a broad range of tasks. For example, respondents cited “speaking up for [oneself] and [one’s] ideas” and “navigate interdepartmental politics” as important skills. Together with the stated importance of entrepreneurship by another respondent, these responses seem to value an initial stage employee’s independent working ability, or being able to establish their own priorities, argue for those priorities, and achieve those priorities within the institution. Further, respondents added that “improvisation” and being able to “handle tasks that may seem to be outside of the normal job scope” as important skills for the job, highlighting the need for initial stage volunteers to do go above and beyond stated tasks.

Knowledge

Responses for Knowledge, like Skills, seemed to prioritize independence in initial stage employees. Responses that specified knowledge already reflected in the DACUM mentioned that initial stage employees should know where to go for help if they cannot solve a problem on their own. This response likely relates to ‘Understanding of [the] institution’ and ‘Knowledge of interpersonal relations’ that the DACUM already lists. The response also highlights the need for initial stage

employees to function without oversight in their jobs; no one is likely going to identify problems for them or show them where to go for help. A respondent also specified a need for “knowledge of age appropriate activities and early childhood development,” which likely relates to more specific details of the DACUM’s requirement of ‘basic technical competency.’ One other response relating to more specific details of ‘basic technical competency’ suggested that initial stage employees have an understanding of “how exhibits function and how [they] are produced.” New knowledge mentioned by respondents included an “awareness of museum field direction(s) and pressing issue(s).” While the DACUM already includes an ‘understanding of [the] institution’ and knowledge of the ‘Museum’s role in the community,’ this response widens the scope of the employee’s knowledge to include more meta-level understanding arguably more akin to more experienced-level knowledge. However, only one respondent suggested this.

Characteristics

Generally, the responses for Characteristics continued a trend of valuing independence and broad ability in initial stage employees. Most of the responses relating to initial stage employee Characteristics came from other sections of the interview. Many of these responses reiterated Characteristics already present in the DACUM, including “Identifying what skills would be useful to cultivate” (reiterates ‘reflects on practice’); “flexible and adaptable” (very similar to ‘adapts to circumstances’); and persistent (similar to ‘is determined’). Overall, responses reiterated the need for initial stage employees to be ‘adaptable to circumstances’ several times and continues the themes of independent and broad ability. However, two responses that seem to add a new dimension to the stated Characteristics in the DACUM stated that initial stage employees should be “curio[us]” and willing to “question the status quo.” These responses further prioritize not only independent ability already present in responses for Skills and Knowledge, but also independent thought.

Museum professionals with 4- 11 years experience

Those who responded as professionals with 4-11 years of experience in museums addressed six Duty categories identified in the second DACUM panel. In terms of the comments offered by the respondents, generally, there were more responses and details in this section than in the early-stage professional section. Two main themes emerged from the responses. The first major theme, responses across the duties and skills/knowledge/characteristics suggested that mid-career professionals need to have more consideration of institutional finances, as well as need to better reconcile institutional resource constraints and the institution’s mission, beyond what is already stated in the DACUM. This theme was particularly prominent in Duty A and the Skills section, and was mentioned in Duties B, C, F. The second major theme was a tension between task specialization and broad skills. For example, responses implied that Duties B, C, E and F were not applicable to all mid-career professionals. Further, several responses suggested that these tasks and skills had less to do with experience within an organization, and had more to do with a mid-career professional’s specific department or institutional role. However, other responses argued that mid-career professionals need to be “adaptable” and “flexible,” according to the needs of the institution. These responses seem to imply, in contrast, that professionals be prepared to take on new duties, if needed. In contrast to the broad, do-it-all skill-sets of early-stage professionals, there is more expectation that mid-career professionals specialize in their skills according to which department

or role they serve in their institution. Further, mid-career professionals are expected to grapple with budgetary constraints more-so than early-stage professionals.

Duty A: Advance institutional mission

The first duty, Advance institutional mission, had very strong agreement that this is very important with extremely high mean scores with all tasks having over 90% of respondents in agreement these are important tasks (See Table 9).

Table 9. Duty A: Advance institutional mission

Task	Mean	% Agreement
Embody Institutional Mission	6.42	94.1
Align department/program/project goals with the mission	6.48	95.5
Uphold institutional standards	6.45	96.5
Represent the institution	6.49	97.9
Advocate for the museum	6.25	92.7

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

A few responses in this section dealt with survey/interview questionnaire criticisms, and were ignored by the analyst. Others referred to other sections of the DACUM, specifically Duty E ('Develop Institution Personnel') and knowledge. Some responses referred to more specific elements of tasks, including the importance of "track[ing] program impact... [to] tell the story about how you are constantly meeting the goals of your institutional mission" (this fits into the 'Align department/program/project goals with the mission' task). Another respondent included "creating a sense of community or family...[and] mutual investment in work" as more specific elements to the task of embodying the institutional mission and aligning department goals with the mission. Another response suggested the need to "collaborat[e] with other museum departments" as part of 'aligning department goals with the mission.' Several responses added new insight along the themes of reconciling financial constraints with mission objectives, as well as the theme of not only reflecting the institution's mission, but shaping it. Three respondents mentioned a need to consider financial constraints as part of 'advancing the institutional mission.' One pointed out that it is (understandably) more difficult to align with institutional mission "when money is tight." They called this tension "Mission vs. Margin." Another respondent's comment echoed this insight, saying: "it's easy to accomplish goals and support the museum when the money flow is favorable." Another respondent critiqued a perceived lack of business acumen of mid-career professionals by saying that "too many non profit museum professionals are so driven by passion that it is challenging for them to think of the larger mission and make the necessary business decisions for a museum to stay relevant to their audience." Other responses stated that mid-career professionals should not only align themselves with the institutional mission, but take a more active role in "change and adapt institutional culture." Respondents suggest that mid-career professionals "create and set values that align with [the] mission," as well as "develop a culture of philanthropy aligned with mission." Rather than passively working with existing values and behaviors, these responses suggest that midcareer professionals help develop the mission by establishing values and behaviors that flow

from the mission. Lastly, some respondents commented on more philosophical issues relating to Advancing the Institutional Mission. One respondent argued that the tasks of ‘representing the institution’ and ‘advocating for the museum’ are one in the same. Another respondent noted that ‘learning’ how to advance the institutional mission is a constant process that is “never perfected.” Another respondent noted that “if the museum and individual are a good match, it should be easy to embody the institutional mission.” One response suggested that there might be personal disagreement with an institutional mission, saying that success in advancing the mission “rests on what your mission is and how much you personally support it.” Duty

Duty B: Nurture mutually-beneficial relationships

Duty B, nurture mutually-beneficial relationships, had strong agreement around importance, and overall had a very clear majority viewing each task as important for the work (See Table 10). The lowest mean score and agreement was for “Steward relationship life cycle” which, as will be discussed below, had some respondents who were not clear of the meaning, suggesting a need for explication in the framework.

Table 10. Duty B: Nurture mutually-beneficial relationships

Task	Mean	% Agreement
Assess internal and external stakeholder needs and expectations	6.19	94.3
Negotiate shared objectives	6.01	91.0
Steward relationship life cycle	5.81	83.5
Invest resources in key relationships	5.98	89.4
Create meaningful experiences	6.69	97.1

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM. Many responses to ‘Nurture Mutually-Beneficial Relationships’ implied that this duty and its tasks do not apply to all mid-career professionals, likely because they did not interpret the duty and associated tasks as the panel had discussed them. For example, several respondents did not understand what is meant by “steward relationship life cycle.” More than one respondent commented that it “sounds like development language,” suggesting that this individual thought the task applies specifically to the development department in their home institution. Another respondent further supported this implication, saying that “these [tasks] are more important to an employee based on their job description. For example, ‘Negotiate shared objectives’ may be more important to a museum professional working in development than it would be for a person working in education for the museum.” Among those respondents who had more experience with this duty, one suggested that one of the resources to invest (task ‘Invest resources’) is scheduled time to build relationships that longer to mature. Others added that professionals engaged in these tasked should “include stewardship activities in [the] institutional budget” and “prioritize partners and end unnecessary relationships.” These comments reiterate a prominent theme among the responses that highlights the need for mid-career professionals to think about using the institution’s financial and human resources efficiently (though already reflected in Duty F, task 5). Further, these issues highlight the need for the framework to consider how to explicate the intentions within these duties.

Duty C: Fulfill administrative requirements

Duty C had clear agreement on the importance, but had more in the strong, rather than the very strong level. There are a couple of items that had extremely strong percent of agreement, there were a few that hovered around the 75% level of agreement (See Table 11).

Table 11. Duty C: Fulfill administrative requirements

Task	Mean	% Agreement
Develop department/project/program plan	6.39	95.8
Contribute to institutional policy	5.45	74.2
Support institutional compliance	5.62	76.8
Schedule institutional resources	5.54	76.5
Distribute pertinent information	6.29	92.8

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Three respondents did not understand what “schedule institutional resources” means. A respondent suggested that this duty and its tasks might not apply to all mid-career professionals, saying “many people don’t have these as part of their regular functions (such as me). Instead, I am often trying to support these efforts as appropriate.” Another respondent argued that these tasks might vary dependent on an employee’s place in the institution’s pecking order. They comment that “a guest service team member will not contribute to institutional policy as a VP would.” For those respondents who seemed to have personal experience with this duty and its tasks, comments highlighted the need for communication and “coordination between departments” to achieve these tasks. Also, one respondent specified that examples of how to successfully comply with institutional policies would help employees in these tasks. Others echoed the importance of balancing financial, human, and time resources.

Duty D: Solve emergent problems

As with earlier duties, the fourth, solve emergent problems, had consistently high means with an very large proportion of respondents in agreement that each task was important (See Table 12).

Table 12. Duty D: Solve emergent problems

Task	Mean	% Agreement
Assess threat level	6.00	88.0
Weigh potential outcomes	6.20	92.0
Initiate a course of action	6.31	91.6
Evaluate course of action	6.27	92.4

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Only a few responded to this duty and its tasks. There were no common themes among the subset of responses.

One respondent suggested to change the wording of the duty from 'Solve emergent problems' to 'Solve emergent challenges.'

Another suggested that board members be involved in these tasks.

Another respondent specified a need to "communicate" threats and potential courses of action to relevant actors.

Lastly, a respondent mentioned that applicability of this duty and its tasks may relate more to different roles within the institution than "years of experience."

Duty E: Develop institutional personnel

Duty E also had consistently high agreement across tasks on importance. Two items had agreement in the high 80% range (conduct formal job performance review *and* facilitate professional transitions) which both relate to supervisory positions, which not all respondents held. Table 13 shows the mean scores and percent agreement for the tasks under Duty E.

Table 13. Duty E: Develop institutional personnel

<i>Task</i>	Mean	% Agreement
Hire qualified personnel	6.65	98.6
Facilitate orientation of new hires	6.36	95.4
Ensure a safe, professional environment	6.56	96.3
Provide job-specific training	6.43	96.3
Align individual and institutional expectations	6.21	93.0
Conduct formal job performance review	5.83	85.3
Advocate on behalf of staff and department	6.48	94.9
Support career development	6.31	93.1
Facilitate professional transitions	5.89	87.0

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Many responses relating to this duty came from other sections of the interview. All of them reiterated the tasks stated in the DACUM, and the majority involved communicating the institutional mission to staff and helping them fulfill it. One respondent specified the need to account for staff turnover (likely part of 'Facilitate Professional Transitions').

Of those responses offering new insight into this Duty, two points emerged. The first, respondents argued that the hiring process should consider diversity and potential, and not just already “qualified personnel” in order to “add new perspectives to the museum staff.” These comments also speak to furthering social justice/equity of opportunity goals prevalent in many institutions by considering that not all potentially successful employees will have had the same opportunities to gain the same qualifications. Second, several respondents mentioned that they do not contribute to the hiring of personnel. One respondent suggested that changing the wording of ‘facilitate orientation of new hires’ to ‘support orientation of new hires’ would “open [the task] up to a wider variety of professional roles.” These comments further the theme of responses that many duties within the DACUM may not apply equally to all mid-career professionals.

Duty F: Ensure financial stability

The tasks in Duty F, as above, were strongly supported as important across respondents. Means were in the high 5s and into the mid 6s, with clear agreement above 86% on all tasks. (See Table 14)

Table 14. Duty F: Ensure financial stability

Task	Mean	% Agreement
Participate in institutional planning	5.88	86.0
Build a departmental/program/project budget	6.46	94.9
Monitor income and expense relative to budget	6.44	93.9
Mitigate financial risk	5.92	86.9
Optimize institutional resources	6.32	93.0

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Some responses in this section dealt with survey/interview questionnaire criticisms, and were ignored by the analyst. Another response came from another section, and reiterated the need for mid-career professionals to “maximize the efficiency of institutional resources.” One response specified a need for mid-career professionals to reflect on funding sources and their volatility, arguably an insight that refers to all the tasks within Duty F. One new insight recommended that mid-career professionals “make the connection between partnership relationships and donor relationships.” Other new insights suggested that this Duty might not apply to all mid-career professionals.

Difficulty to learn

Distribution of scores was good and the range for difficulty for almost all items was 1-7 in response. In general, there was a centrality of mean scores right around the center point of 4.00. A couple items were magnitudinally different and were either lower or higher, but none were overwhelmingly positive or negative. As can be seen in Table 15, there were 3 tasks that more than 50% of respondents thought were easier to learn, and 13 that 50% plus thought were difficult to learn.

Table 15. Difficulty to learn means and percent agreement

Duty	Item	Mean	% Easy to learn	% Difficult to learn
A: Embody Institutional Mission	Embody Institutional Mission	3.24	56.7	21.8
	Align department/program/project goals with the mission	4.00	35.7	38.1
	Uphold institutional standards	3.30	54.8	21.6
	Represent the institution	2.75	71.6	13.4
	Advocate for the museum	3.33	54.5	28.1
B: Nurture Mutually-beneficial Relationships	Assess internal and external stakeholder needs and expectations	5.04	11.2	67.5
	Negotiate shared objectives	5.05	10.5	67.3
	Steward relationship life cycle	4.76	16.0	55.3
	Invest resources in key relationships	4.57	20.9	50.2
	Create meaningful experiences	4.06	38.1	39.8
C: Fulfill Administrative Requirements	Develop department/project/program plan	4.46	26.7	53.3
	Contribute to institutional policy	4.44	23.3	47.1
	Support institutional compliance	3.84	34.5	27.3
	Schedule institutional resources	3.96	38.2	34.0
	Distribute pertinent information	3.66	46.2	29.4
D: Solve Emergent Problems	Assess threat level	4.34	27.8	48.5
	Weigh potential outcomes	4.40	26.3	49.6
	Initiate a course of action	4.44	28.1	50.0
	Evaluate course of action	4.69	22.4	58.8
E: Develop Institutional Personnel	Hire qualified personnel	4.78	19.3	61.5
	Facilitate orientation of new hires	3.70	48.0	30.6
	Ensure a safe, professional environment	3.12	62.8	17.0
	Provide job-specific training	3.61	49.1	27.5
	Align individual and institutional expectations	4.25	26.7	42.9
	Conduct formal job performance review	3.73	44.9	33.3
	Advocate on behalf of staff and department	4.21	31.2	45.0
	Support career development	4.48	25.6	51.1
	Facilitate professional transitions	4.58	18.9	53.9

F: Ensure Financial Stability	Participate in institutional planning	4.74	18.4	60.8
	Build a departmental/program/project budget	4.54	22.2	53.2
	Monitor income and expense relative to budget	3.86	37.8	35.0
	Mitigate financial risk	4.92	12.2	60.8
	Optimize institutional resources	4.53	22.1	53.9

Skills, knowledge, and characteristics

There was strong agreement across all skills, knowledge, and characteristics that the panel had identified important attributes of a museum professional with 4-11 years of experience. Agreement was also very strong with only one item (Networking) having less than 80% in agreement about the importance (See Table 16).

Table 16. Skills, knowledge, and characteristics

Duty	Item	Mean	% Agreement
Skills	Professional writing	5.84	85.6
	Project management	6.23	95.6
	Public speaking	5.49	78.8
	Facilitation	5.70	84.8
	Leadership	6.11	92.9
	Active listening	6.53	99.1
	Critical thinking	6.63	97.6
	Negotiation	5.51	81.5
	Time management	6.48	97.6
	Resource management	6.12	93.9
	Interpersonal	6.39	97.2
	Networking	5.33	75.5
	Decision making	6.23	94.3
Knowledge	Cultural competence	6.09	95.3
	Institutional history, policies, procedures, and finances	5.58	87.6
	Leadership (power dynamics; models of communication)	6.00	93.3

	Teambuilding	6.03	90.1
	Job-specific	6.48	95.6
	Industry trends and practices (technology, audience)	5.60	84.8
Characteristics	Responsible	6.62	99.5
	Creative	6.07	95.2
	Resourceful	6.36	96.6
	Insightful	5.97	94.2
	Dedicated	6.31	95.2
	Proactive	6.30	95.7
	Collaborative	6.59	97.6
	Inclusive	6.38	94.2
	Persuasive	5.31	76.8
	Confident	5.80	87.9
	Respectful	6.47	96.6
	Caring	5.88	89.9
	Flexible	6.45	94.2
	Decisive	5.78	88.8
	Thoughtful	6.10	94.7
	Driven	5.62	82.1
Self-sufficient	6.11	93.7	
Growth-oriented	5.81	85.1	

In developing the framework, the variation in the perceived difficulty of tasks should be addressed. Some of the variance is likely related to position focus, while other variance may be prior training and experience driven. Noting such variance in the framework might help individuals better identify needs and opportunities for growth.

Individuals were offered an opportunity to reflect on the skills, knowledge, and characteristics.

Skills

Respondents mentioned specific skills that fit into existing DACUM competency skill descriptions. These primarily focused on budgetary/financial skills (which fit into 'Project management' and 'resource management'); conflict resolution (which fit into 'Interpersonal', 'Leadership', 'Active listening', and 'Negotiation'); and coaching/team building/cooperation (which fit into 'Interpersonal', 'Leadership', and 'Project management'). A response from the knowledge section also mentioned "strategic planning" as important for mid-career professionals (which tends to be

classified more as a skill than knowledge), fitting into 'Project management' and 'resource management.'

There were many new points of insight that respondents contributed. Several respondents mentioned that skills stated in the DACUM for mid-stage professionals really vary by position within the institution. For example, one respondent wrote that they "answered in terms of importance [sic] skills for someone starting off in this position but would answer differently if it is supposed to be for someone with experience." Another said that these skills "depend on the position." One respondent mentioned specifically that "public speaking and facilitation are highly position-dependent... they could be of great importance in some departments (education) and very low importance in others (finance)." These responses suggest that mid-stage professionals tend to specialize in the skills necessary for their roles, rather than need as broad a skill set as the DACUM profile states. Other respondents seemed to contradict this by mentioning "the ability to pivot with institutional changes in direction, "adaptability" and "flexibility" as important skills needed in a mid-stage professional.

Another prominent addition to the DACUM panel's skill set was an ability to advocate for oneself and underrepresented groups. Other additions offered included research skills, ability to multitask, "ability to work independently," and "innovation/ideation." Many responses in this section pointed to other parts of the DACUM, most of them referring to characteristics.

Knowledge

Much of the responses for knowledge specified knowledge that fit into existing DACUM items, and half came from other sections of the interview. These responses include introspective insights, such as "understanding your role in the organization and how you advance the mission," and "how your job fits in." These arguably fit into DACUM items such as 'Cultural competence' and 'knowledge of institution.' More extrospective insights included "understanding purpose and roles of various positions in the institution," as well as "general awareness of what other departments do, and how their functions relate to your department's." These statements, like the more introspective ones, arguably specify knowledge that fits into the existing 'cultural competence' and 'knowledge of the institution.' Other responses went even further and mentioned the need for knowledge outside of one's own institutions, including "theory and research relevant to the field" and "a general awareness of organizational structures for a broad range of institutions." These responses arguably specify knowledge pertaining to 'Industry trends and practices.' There were only two responses that the analyst deemed new insights: fundraising and technology. Characteristics Respondents conveyed a variety of opinions about the stated DACUM characteristics needed in a mid-career professional.

Characteristics

Many comments came from other sections of the interview and simply reiterated or repeated characteristics that were already stated. Many of these mentioned "flexibility" and "adaptability," which somewhat contradict the sense from other responses that mid-career professionals tend to specialize in their skills and tasks. However, other responses do support the implication that mid-career professionals tend to specialize. One respondent said that "it is hard to relate [characteristics] to a duration of experience rather than [to] a specific job type (or my own job)," suggesting that department or institutional role, and not tenure, determines how applicable these characteristics are to an employee. Another comment admitted that an institution needs people with all of these characteristics, "but that [it] can [be] accomplished by creating the correct team.

Not every individual has to display every characteristic.” Others offered additional characteristics necessary in a mid-career professional, including being “articulate, open minded, organized” and having “satisfaction [in one’s work] that transcends financial gain.” Lastly, one respondent saw the characteristics as one of two types: characteristics that primarily benefit the institution (responsible, collaborative, caring, flexible, inclusive) and characteristics that primarily benefit the employee’s career (confident, driven, growth-oriented, persuasive). This respondent argued that the former characteristics were highly sought after in their institution, but the latter may mean the employee is difficult to work with.

Eleven years or more

The participants in the DACUM panel for eleven or more years identified eight Duty areas. The agreement across all tasks within these duties was overwhelmingly strong. Only one duty had an overall mean of under 6.0 on the 7-point scale. Likewise, there were only two tasks that had less than 75% Agreement that it was an important task.

Three primary themes emerged from responses to Duties A through H and the skills/knowledge/characteristics. The responses suggest that three consistent mandates for mature stage professionals are to 1) do more to ensure better interpersonal relationships among the staff; 2) include more voices in the decision-making process; and 3) accept more risk and allow the institution to adapt to better serve and reflect its community.

Responses highlighted the need for managers to cultivate an institutional culture that promotes communication and openness, rather than just pronounce/enforce policies. Many respondents suggested mature stage professionals should focus more on communicating policies and empowering staff to follow these policies, and should focus less on enforcement. Responses to personal skills, knowledge, and characteristics reflected the need to improve interpersonal relationships among all employees. In fact, many of the mentioned skills and characteristics imply that mature stage professionals be more than respectful and fair, but be friendly and sociable peers to their staff.

Respondents also want mature stage professionals to include more stakeholders from all levels of the staff in institutional policy making. Doing so, respondents argue that institutions can better understand their audiences and lead to more creative, “informed risk-taking” ventures. Experimenting and taking “informed risks” can not only lead to programming that keep audiences engaged, but provide ways for the institution to adapt and better serve the needs and reflect the identities of their changing communities. Responses to skills and characteristics further support this observation; many mention that mature stage professionals be able to manage change, accept risk and “ambiguity.”

Lastly, many responses brought up an issue that is related, but lies somewhat outside of the scope of mature stage professional competencies: the ‘bigger-picture’ relationship between an institution and its audience/community. The consensus seemed to argue for institutions to be less reactive and more proactive in engaging its community in programming. This was articulated as the difference between doing what audiences want/expect and taking risks and trying new things that may extend the institution’s reach to new audiences. Responses also implied that institutions should go beyond forming ‘mutually beneficial’ relationships and advocate for their communities. Policy suggestions to achieve this goal included recruiting staff and board members who better reflect the institution’s community, and critically assess an institution’s social biases. What remained unresolved in these responses, however, was the difference between an institution’s audience and community.

Duty A: Determine institutional direction

All items had mean scores above six, with agreement above 90% for each item (See Table 17).

Table 17. Duty A: Determine institutional direction

Task	Mean	% Agreement
Establish a shared sense of mission	6.67	96.3
Plan institutional strategies	6.39	94.7
Champion the strategic plan	6.15	90.4
Implement institutional plans	6.46	98.1
Adjust institutional plans	6.27	94.7

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM. Specific details mentioned in the responses include linking big picture institutional mission/plan with those of individual departments. Many respondents mentioned that evaluating the effectiveness/success of the plan is an important component of the tasks in Duty A. Respondents also called for mature stage professionals in this Duty to foster an open, communicative institutional culture, as well as be open to institutional change. One respondent offered that the ability to 'adjust institutional plans' varies by institution — it can be very easy or very hard to do depending on who is in charge.

Lastly, one respondent argued that mature stage professionals should do more to "align [the] institutional mission and [institutional] resources to the needs of the community it serves."

Duty B: Ensure institutional sustainability

For this duty, 4 of the six items had very strong agreement with means above 6 and agreement above 90%. One item, maintain functional redundancies had a mean of 5.15 but there were several comments related to not understanding that task, and this lack of clarity of the task from the DACUM panel discussion, the mean was much lower. This is likely also true for the item develop risk management plans which, in the panel discussions, were very broad and covered most departments, not just safety, services, and facilities which is the more common understanding of risk management. Table 18 shows the means and agreement for tasks under Duty B.

Table 18. Duty B: Ensure institutional sustainability

Task	Mean	% Agreement
Maintain institutional relevance	6.64	98.6
Build sustainable funding model	6.71	97.9
Create a culture of fiscal responsibility	6.50	98.2
Build operational efficiencies	6.24	96.2
Maintain functional redundancies	5.15	69.2

Develop risk management plans	5.71	81.8
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All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Responses here suggest a tension between fiscal responsibilities (often perceived as favoring risk-adverse decision making) and “seizing opportunities” when they present themselves. Also, there is a specific need to forecast fiscal challenges and opportunities to better plan for change. The tasks in Duty B vary from institution to institution (the analyst assumes this to mean that some managers contribute to these tasks and others do not, or some prioritize these tasks while others do not.)

Again, respondents mention the importance of mature stage professionals in changing/fostering institutional culture.

One respondent in an academically affiliated institution did not know how to answer this Question.

Duty C: Cultivate engaged audiences

For Duty C, means were again all above 6.0 with agreement above 95% for the respondents. (See Table 19)

Table 19. Duty C: Cultivate engaged audiences

Task	Mean	% Agreement
Provide attractive, well-functioning facility	6.54	97.2
Create audience base	6.45	96.9
Fulfill audience needs and expectations	6.60	97.6
Foster long-term relationships	6.38	95.8

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM. When asked what might be missing, several respondents to this section mention a specific task they feel necessary to fulfilling audience needs and expectations: understanding an institution’s audience. Though some thought that evaluate/research audience needs and get feedback from the audience were a separate duty, in their discussions the DACUM panel had included these as steps within the task of fulfilling audiences needs and expectations. One respondent suggests that all staff members should be involved in “developing guidelines for what the audience base is,” and perhaps, what needs they may have.

Another offers a more measured approach to audience expectations: “we don’t need to be everything all audiences may wish us to be, but we can do what we do best and tell our audience what it is we do and do not do.” However, another respondent suggests that institutions “exceed audience needs” and not just “fulfill” them. Another suggests “chang[ing] up [the] audience experience,” perhaps incorporating some elements of surprise or novelty. Yet another respondent (in a different section of the interview) argues that institution “programs must reach far beyond ...

[their] resources in order to keep audiences coming back.” More than six respondents mention the need to diversify or reach “new audiences.” Another suggests “build[ing] [an] audience base representative of [the] community.” These comments make the institution responsible for not just reacting to the audiences who already visit the institution, but to actively influence who visits.

Duty D: Provide learning opportunities

Three of the four tasks in this category had very strong mean and agreement scores. One task, connect audiences to additional resources, had somewhat lower rankings (See Table 20). This may in part be due to the lack of clarity in meaning imbued to the task by the DACUM panel. The comments include several suggested tasks that did reside within the meaning of the task as intended by the panel, suggesting the framework may need to clarify this interpretation.

Table 20. Duty D: Provide learning opportunities

Task	Mean	% Agreement
Align experiences with institutional mission and resources	6.32	95.7
Present engaging, educational exhibits	6.66	99.6
Deliver engaging, educational programs	6.61	98.6
Connect audiences to additional resources	5.16	65.7

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

A few respondents thought that evaluation/assessment of learning opportunities were important additions to this duty. Another comment reflected an earlier idea of connecting the institution’s offerings (in this case educational programming) to the needs of its community, though ‘community’ may mean audience in this case. As with other comments, many of these same points had been included in the discussions by the DACUM panel, and serve as good illustrations of the complexity of steps under each of the tasks at this level of career stage.

One respondent thought that institutions should “foster experimentation in offerings.” While most of the responses related to providing learning opportunities to visitors/audience members, one respondent argued that these should extend to employees as well. They say: I think it is very important to offer educational experiences to new, hopefully long term, employees on presenting and delivering good programming. This can be very difficult to learn for some.

This comment may refer to Duty E, Task 4 (‘Ensure Training and Professional Development’), but it provides an interesting insight to this Duty, because it could also refer to providing learning opportunities to employees that go beyond what is immediately applicable to their jobs.

Duty E: Manage human resources

For the 11+ year museum professional respondents, there was very strong agreement on the duty and tasks for managing human resources. All means were solidly above 6.0 on the 78-point scale, and the agreement was around 90.0% and above (See Table 21).

Table 21. Duty E: Manage human resources

Task	Mean	% Agreement
Ensure optional staffing	6.41	97.1
Implement staff compensation plan	6.15	90.5
Implement benefits program	6.14	89.7
Ensure training and professional development	6.25	93.4
Mentor personnel	6.11	89.7
Maximize personnel effectiveness	6.19	94.1
Facilitate communication among personnel	6.54	97.8
Advocate on behalf of personnel	6.26	93.0

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Several respondents gave feedback here that this Duty and its tasks lie outside their personal professional purview.

A comment from another section seemed to apply to task E-6 'Maximize Personnel Effectiveness.' It mentioned that mature stage professionals should "understand [the] timing of [institutional] events."

One respondent commented that it would be important to specify mature stage professionals ensure "institutional, on-going training." They argued that many institutions rely on outside conferences and professional bodies to fulfill this work.

A respondent commented that while mentoring and developing staff is extremely important, they complained that they and other mature stage professionals do not have enough time to devote to this task, given other competing priorities.

Another prominent theme among the responses is the need to recruit and develop a diverse team. As one respondent put it, institutions need to "recruit, hire, and maintain a stage reflective of [the] community. Very important and conceptually easy to do, though our field's institutional racism makes this actually more difficult than it should be." Another respondent made the observation that providing full-time positions with benefits (and not just part time positions) has a significant influence on content/service quality. They reasoned that "without full time staff, turnover could be high. When staff turnover is high, quality of programming suffers."

Lastly, a respondent suggested that mature stage professionals should also "implement personnel recognition." This echoes a theme that mature stage professionals should work to improve relationships between the institution and all levels of its employees.

Duty F: Lead institutional processes

There was continued strong support for the Duty and the subsequent tasks identified by the DACUM panel. All tasks under leading institutional processes had agreement of over 90% (See Table 22).

Table 22. Duty F: Lead institutional processes

Task	Mean	% Agreement
Create institutional policies and procedures	6.03	91.8
Enforce institutional policies and procedures	5.96	90.7
Develop the budget in alignment with institutional strategies	6.49	96.3
Manage institutional expenses and revenues	6.52	95.6

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Some respondents did not directly engage in this Duty.

One respondent took issue with the task of ‘enforc[ing] Institutional Policies and Procedures,’ saying that “In the hands of some leaders... the strict enforcement strangles initiative, creativity and informed risk taking.” Instead, another respondent suggested that managers should focus more on communicating policies with staff and “empower[ing]” them to fulfill them. Other respondents argued that more staff should be part of the policy making process, which one respondent surmised would “make enforcement much easier.” Further, another added that mature stage professionals should “value input on new ideas, procedures, or strategies,” which would arguably make the institution nimble and able to adapt to changing times.

Duty G: Build community support

Even within the longer-term professionals in the science museum sector, there are respondents uncomfortable with the concept of advocating in general, and some noting advocacy should be for their own institution, not the sector. Other comments suggest some of the concern is with the “field” rather than the specific museum, and some is simply the ongoing fear of political overstepping. On

Table 23. Duty G: Build community support

Task	Mean	% Agreement
Build community support	6.64	98.1
Promote positive brand awareness	6.37	97.0
Cultivate mutually-beneficial relationships	6.27	93.6
Match opportunities with internal needs	6.12	93.6
Administer partnership agreements	5.73	84.1
Advocate on behalf of the museum sector		

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM.

Many responses to this Duty were vague or off topic. Most responses reiterated tasks within the Duty, including several from other sections of the interview. One respondent commented that not all departments manage relationships with external groups, and thus, this Duty may not apply to them. Respondents who provided new insight into this Duty argued for not just mutually beneficial partnerships, but also partnerships that primarily serve communities. For example, one respondent said that institutions should “advocate on behalf of the communit[ies] [they] serve.” Another even argued that institutions should be ready to “change to be relevant to communities.” Many responses to this Duty were vague or off topic. Most responses reiterated tasks within the Duty, including several from other sections of the interview. One respondent commented that not all departments manage relationships with external groups, and thus, this Duty may not apply to them.

Respondents who provided new insight into this Duty argued for not just mutually beneficial partnerships, but also partnerships that primarily serve communities. For example, one respondent said that institutions should “advocate on behalf of the communit[ies] [they] serve.” Another even argued that institutions should be ready to “change to be relevant to communities.”

Duty H: Steward board relations

The DACUM panel had intense discussion around the importance of the task, Steward board relations. The executive and senior management personnel on the panel convinced the others that although this is somewhat more job specific, the importance of this task for not only senior management, but more senior members of museum staff made this duty vital and that it had to be reflected in the Competency Profile, even if it did not cover the full range of jobs specifically. The challenge of thinking that all longer-term museum professionals have a responsibility toward board relations was reflected in the scores being slightly lower, but still with very clear mean scores and strong agreement (See Table 24).

Table 24. Duty H: Steward board relations

Task	Mean	% Agreement
Facilitate effective board governance	6.08	88.2
Recruit new board members	5.76	81.0
Facilitate board development	5.69	78.9
Incorporate board expertise	5.63	78.9
Foster positive board-staff relationships	5.88	83.9

All tasks are supported by a clear majority of the respondents, thus verifying the DACUM. The majority of respondents said that stewarding board relationships lies outside of their normal scope of duties.

The few who did offer insight into this Duty highlighted a need to “recruit a board reflective of [the] community” and “foster diversity in [the] board.” These statements echo a reoccurring theme of these responses that call for mature stage professionals to ensure that institutions reflect their communities, not only through the services/programs they offer, but also their staff. One respondent thought it was important to “enforce board expectations” for the institution, while another wanted mature stage professionals to help “match board expectations with staff’s expectations.”

Difficulty to learn

Respondents were widely distributed around how difficult each task was to learn. This might reflect the diversity of position/title, length of time in the profession, route through the museum profession, and other mitigating factors. Generally, tasks have a full range of response (1-7), and all but two means were skewed toward the positive (over 4.0). The percentages of those who saw the task as difficult to learn were far more often above the 50% level suggesting there are more tasks for senior personnel that are not tasks that come naturally, likely they are different from their academic training or skills for which they were originally brought into the field. Table 25 shows the duties, tasks, means and percentages perceiving the task as easy or difficult to learn.

Table 25. Difficulty to learn means and percent agreement

Duty	Item	Mean	% Easy to learn	% Difficult to learn
A: Determine Institutional Direction	Establish a shared sense of mission	4.29	28.9	48.9
	Plan institutional strategies	4.95	13.1	65.4
	Champion the strategic plan	4.27	29.9	44.1
	Implement institutional plans	4.66	21.4	55.1
	Adjust institutional plans	4.95	14.5	62.7
B: Ensure Institutional Sustainability	Maintain institutional relevance	4.81	18.3	56.6
	Build sustainable funding model	5.61	6.9	79.3
	Create a culture of fiscal responsibility	4.36	27.6	42.1
	Build operational efficiencies	4.55	20.9	52.3
	Maintain functional redundancies	4.32	21.0	40.2
	Develop risk management plans	4.56	20.1	50.4
C: Cultivate Engaged Audiences	Provide attractive, well-functioning facility	4.11	36.8	40.3
	Create audience base	4.45	21.6	46.7
	Fulfill audience needs and expectations	4.44	26.0	49.3
	Foster long-term relationships	4.64	21.2	53.8
D: Provide Learning Opportunities	Align experiences with institutional mission and resources	4.12	36.6	39.4
	Present engaging, educational exhibits	4.41	29.5	49.8
	Deliver engaging, educational programs	4.07	35.9	44.8
	Connect audiences to additional	3.60	46.6	27.8

	resources			
E: Manage Human Resources	Ensure optional staffing	4.98	18.0	63.4
	Implement staff compensation plan	4.78	18.0	55.8
	Implement benefits program	4.38	23.6	43.8
	Ensure training and professional development	4.61	21.7	49.6
	Mentor personnel	4.36	29.1	44.7
	Maximize personnel effectiveness	4.70	20.7	53.9
	Facilitate communication among personnel	4.95	18.2	60.0
	Advocate on behalf of personnel	4.14	30.6	37.8
F: Lead Institutional Processes	Create institutional policies and procedures	4.24	26.8	41.6
	Enforce institutional policies and procedures	4.23	28.9	38.5
	Develop the budget in alignment with institutional strategies	4.60	24.4	20.7
	Manage institutional expenses and revenues	4.48	26.3	49.3
G: Manage External Resources	Build community support	4.71	20.2	59.6
	Promote positive brand awareness	4.12	30.2	38.9
	Cultivate mutually-beneficial relationships	4.49	24.2	51.1
	Match opportunities with internal needs	4.42	25.9	50.0
	Administer partnership agreements	4.08	32.3	37.6
	Advocate on behalf of the museum sector	3.94	35.9	32.5
H: Steward Board Relations	Facilitate effective board governance	5.10	10.4	61.4
	Recruit new board members	4.76	16.3	56.2
	Facilitate board development	4.87	12.4	54.8
	Incorporate board expertise	4.64	16.7	51.4
	Foster positive board-staff relationships	4.48	22.6	45.6

The more difficult duties to learn appear to include the duties to “Steward board relations,” “Manage human resources,” and “Determine institutional direction.” The only duty with no tasks with above 50% seeing them as difficult to learn was that of “Provide learning opportunities.”

Skills, knowledge, and characteristics

There was clear agreement that the items identified for skills, knowledge, and characteristics of science-museum professionals in the field for 11+ years were those reflective of the field. Means were positive and strong (See Table 26). The standard distributions for all items were well below normal, suggesting skew and, along with the percentage in agreement being strong, reveal a positive skew.

Table 26. Skills, knowledge, and characteristics

	Item	Mean	% Agreement
Skills	Interpersonal	6.54	99.6
	Administrative/Organizational	5.78	89.1
	Teaching	5.22	69.3
	Decision-making	6.33	96.6
	Problem-solving	6.60	98.9
	Balancing multiple priorities	6.43	97.7
	Conflict resolution	5.83	88.3
	Financial	5.67	86.0
	Time management	6.11	97.0
	Leadership	6.30	94.7
	Job-specific	5.98	85.9
	Advocacy	4.89	60.8
Knowledge	Institutional procedures and policies	5.75	85.1
	Project management	5.93	91.1
	Community	5.77	87.3
	How to budget	5.90	90.7
	Customer service	6.19	92.7
	Job-specific	6.19	90.6
	Organization’s mission, vision, goals, etc.	6.23	95.0
	Institutional history	5.08	68.0
History of the field	4.43	50.4	
Characteristics	Passionate	5.95	91.1

Collaborative	6.37	97.3
Productive	6.33	98.5
Creative	6.00	92.3
Visionary	5.60	81.1
Enthusiastic	6.11	93.4
Tenacious	5.63	82.5
Flexible	6.44	97.7
Loyal	5.29	72.7
Respectful	6.17	90.7
Pragmatic	5.56	81.9
Sense of humor	5.76	83.4
Reflective	5.71	83.8
Articulate	5.90	89.2
Eloquent	4.86	60.2
Patient	5.79	84.9
Supportive	6.03	92.3
Fair	6.01	88.8
Learner	6.38	96.9

Individuals were offered an opportunity to reflect on the skills, knowledge, and characteristics.

Skills

As with the initial stage and mid stage responses, many responses here better embodied characteristics or knowledge, and are analyzed in those sections.

An often-reiterated skill from the DACUM (assumed to go along with ‘interpersonal’, ‘teaching’ and ‘leadership’ skills) was communication, particularly writing skills and public speaking. (This skill was mentioned so often that it suggested there are systemic problems with this among mature stage professionals in the field). More specific skills mentioned by respondents included “mentoring” of staff and “emotional intelligence.” Others included “consensus building [and] consensus leadership.” These skills support a reoccurring theme in the responses that push for mature stage professionals to cultivate better relationships between all levels of staff through better communication and more empathetic interactions. They also support the call for more staff participation in institutional decision making.

Many responses suggested that mature stage professionals should have skills that manage change and innovation. For instance, respondents added skills such as “flexibility,” the “ability to lead and direct change,” a “tolerance for ambiguity,” as well as “outside of the universe thinking,” which a

respondent defined as “taking a risk when others say [not to].” Another related comment added that mature stage professionals should have the “ability to learn new content knowledge.” Other insights to mature stage professional skills included “showing concern for the audience’s needs” (in line with the theme of a more community-reflective institution), and “clear and impassioned articulation of vision, goals, and outcomes” relating to the institution.

Knowledge

Responses to the ‘knowledge’ section offered many specific insights that fit into the existing DACUM. These include greater knowledge of: board relationships, “past institutional successes and failures,” the makeup of the institution’s community, community needs and opportunities. In particular, several respondents mentioned that mature stage professionals should have expert or at least “credible” knowledge of institution-specific content.

New insights offered in the responses include the importance of having “familiarity with educational theory,” having knowledge of disciplines *related* to the core content of the institution, as well as having an awareness of *current* trends in the field and a familiarity with what institutional peers are doing.

Characteristics

Many responses to this section reiterated its current content or offered very similar adjectives. There were, however, several responses that imply mature stage professionals should have personality characteristics that help foster positive interpersonal relationships. Multiple respondents each mentioned characteristics such as “friendly,” as well as “empathetic” and “honest.” The number of responses that mention these kinds of new characteristics suggest that mature stage professionals should be more than just ‘respectful’ and ‘fair,’ but should even be enjoyable to be around and consummate ‘people-persons.’

Lastly, another response mentioned the need for mature stage professionals to be “willing to fail” and “curious,” which follow the theme that these professionals should be open to risks and institutional change.

Cross-profile analysis

In looking across the three competency profiles, there were several themes that occurred in each DACUM panel. In exploring these themes, it became clear that individual professional learning could go deeper within any level (become more skilled and expert within that duty) or that could become learning progressions to differing levels of responsibility. The following table (27) shows seven cross-profile themes that suggest progressions.

Table 27. Learning progressions across the three competency profiles

Visitor experiences	Implement – directly responsible for	Develop experiences – design, create, experiment, build, find	Cultivating audiences – build the audiences internally and externally
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	visitor experiences	resources for the experiences	for whom the museum creates and implements experiences
Relationship building	Front-line/in house – responsible for relationships with all the visitors and program recipients	Build partners to do our work better both within and beyond the museum	Creating, nurturing and building partnerships for sustaining and development of the museum
Human resources	Manage staff	Develop personnel	Manage human resources
Mission	Represent	Advance	Develop
Budget	Manage	Develop	Overall institutional budget
Operations	Know and abide by operational policies	Operational problem solving/ operational issues	Sustainability for the institution
Professional learning	Individual PL	Team level PL	Institutional PL

In addition, there were some progressions that seemed to cut across the duties that seemed tied to career stage. These observations also resonate with the literature on career stage and learning pathways or progressions.

The first was about the “direction” for the work. In early career stage, the duties, tasks, and the traits of the individuals seemed to be forward-facing and related to implementation where as in the middle level, there was much more language around delegation; for longer-term individuals, the language and duties were more removed from individual action and the language used was more consistently institutionally framed. A second observation was that there was a progression in performance evaluation: from being the evaluation object to being the evaluator to setting the standards.

A third progression noted was around focus. Early in career, the language and tasks suggest the focus is on the job itself. Later, the focus expands to greater knowledge, being more proactive, and starting to shift focus externally. As one matures in the field, the focus seems to be more generative toward the whole of the individual. Another focus shift noted was from focus on the audience to focus on the museum or institution internally to finally being about ideas and how it all works together. Finally, the fourth progression was the target of reflection. For early career, reflection is individual or one-on-one. Later, reflection is on staff development or more on the group level. And finally, the progression leads to reflecting on the whole of the institution and the community(ies) served by the institution.

Conclusions

5. The Competency Profiles for all three stage levels appear to be valid.

All 20 duties and 106 tasks for the three Competency Profiles are verified. There was strong agreement by the 1006 respondents both in means and in combined scores for wide-spread acceptance of the Duties and the subsequent Tasks for all three career stage profiles. There were no duties or tasks suggested by the verification panel that the original DACUM panel had not considered, though some word changes and concerns have led to reconsidering how to frame those duties and tasks in the Professional Learning Framework.

6. The skills, knowledge, and characteristics appear to appropriately represent the career stage

All 31 skills, 22 knowledge sets, and 48 individual characteristics are verified. There was very strong agreement by the 1006 respondents both in means and in combined scores for wide-spread acceptance of the individual needs to be considered expert at being a science-museum professional at varied career stages. There were several additional individual skills, knowledge, and traits identified and have been incorporated into the considerations for inclusion into the Professional Learning Framework.

7. The Career-stage approach appears to be a useful construct for looking across the profession for learning pathways

There were multiple pathways seen where for a similar construct such as a duty related to mission, in the 0-3 year professional the duty was implementation, the 4-10 year professional the duty tended toward managerial, and in the 11+ the duty tended toward leadership. Even within the DACUM panels, the responsibility was not as clear cut, but the overall tasks associated with a duty had differing levels of maturity within the institution associated with it. The approach of separating career stage reveals that there are clear stage differences in the professionals and the many connections across the duties and the progressions of the tasks support the need for a Professional Learning Framework.

8. The difficulty of learning the unifying duties and tasks of science-museum professionals across job-specific duties and tasks appear to increase in difficulty to learn as the individuals mature in the field.

The increase in perception of difficulty of learning tasks in each of the three career stages is interesting and striking. It is very likely that as individuals progress through their careers, the distance from job-specific entry skills appears to lead to job elements being further from training and career preparation. This was reflected in the increase in perception of difficulty of learning tasks and the increasing movement from the “doing” of the work to the managing and then leading of the work across the career pathways.