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The NIAID Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program Needs Assessment

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Final Report
December 2014

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**The NIAID Extramural Policy and Procedure Information and Knowledge
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Executive Summary

The National Institutes of Health (NIH), National Institute of Allergy and Infectious Diseases (NIAID), Division of Extramural Activities (DEA) staff members manage and communicate to stakeholders vast amounts of information associated with NIAID extramural grant activities. The volume and demand for these grants-related information and services is growing. Increasingly, this growth challenges the NIAID staff's capacity to manage the Institute's knowledge and provide convenient and customized resources to its stakeholders.

To address this issue, NIAID set out to develop a knowledge management (KM) strategy and system to serve its internal (NIH) and external (non-NIH) stakeholders. An initial and critical step was the identification of stakeholder grants-related knowledge needs and preferences through a rigorous needs assessment (NA). Via a contract (GS10F0381L (GSA)) with Social & Scientific Systems, Inc. (SSS), Silver Spring, Maryland, NIAID launched in FY2014 the assessment of the needs of its stakeholders for extramural activities-related information and services. The aim was to inform further the NIAID Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program using results from the assessment. The assessment would engender evidence-based recommendations for the next steps in a NIAID strategy to manage grants-related knowledge and to meet stakeholders' current and future resource needs and preferences. Ultimately, NIAID hopes to design a comprehensive KM program that, like its newsletters and existing websites, could serve as a model for other Institutes and Centers (ICs) planning to develop their own KM programs.

The NA followed a mixed method approach to collect quantitative and qualitative information, and included two focused literature searches, interviews with groups of NIAID and other NIH extramural program staff, an inventory of grants-related resources, and an online customer satisfaction survey for NIAID stakeholders worldwide. This approach yielded standardized information and quantifiable data from stakeholder comments that provided a context for this information.

Highlights from the assessment revealed a perception that NIAID-level resources (staff and website) on the whole were helpful. However in current practice for internal stakeholders, there reportedly were issues with navigating the NIAID website, among others. For internal and external stakeholders alike, reviewing large volumes of grants-related information and knowing how up-to-date resources were also illustrated some of the challenges currently faced by these stakeholder groups. Future knowledge needs were distilled into two major but disparate topics—policies for the internal group, and funding opportunities for the group of external stakeholders. Addressing these future needs may warrant a two-pronged approach.

Stakeholder ratings of useful training enhancements going forward included concise, specific, and readily available ("24/7") training options. When invited to assign priorities to possible knowledge management enhancements, stakeholder groups wanted a more centralized point of access to grants-related resources. Both groups embraced technology-based enhancements with the exception of social media and SmartPhone apps. The external group underscored that these technological improvements should not be put into place at the expense of human-to-human interaction. A KM approach that combines tech components and person-based characteristics, such as the virtual information concierge

(VIC), might well serve stakeholder needs in a resource-constrained environment until a greater shift to technological solutions is desirable, feasible, and vital.

For consideration, we present several high level recommendations, some of which may already be planned or in progress, to address knowledge management:

- Engage NIAID/NIH leadership; leaders are critical assets
- Adopt or develop a theoretical KM framework for NIAID EPPIKD and follow it
- Formulate a KM strategy driven by end-user (stakeholder) needs
- Set priorities for KM based on feasibility and budget. Focus on a targeted set of topics (e.g., policies, funding opportunities)
- Educate stakeholders about KM and provide guiding principles; let them know their input is valuable as creators and consumers of knowledge
- Start small; test KM solutions and assess performance, to a reasonable extent, prior to full-scale implementation

Overview

The National Institutes of Health (NIH), National Institute of Allergy and Infectious Diseases (NIAID), Division of Extramural Activities (DEA) staff daily manage and communicate to stakeholders growing amounts of information about complex application, award, and implementation processes. This mounting task increasingly affects the NIAID staff's capacity to provide convenient and customized resources, as well as the ability of other internal (NIH) and (non-NIH) external stakeholders to access timely and reliable information about extramural grant policies, procedures, and services.

The NIAID DEA staff knew that a critical first step for its Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program was to identify current and future knowledge management processes and resources, as well as stakeholder information needs and preferences, through a rigorous needs assessment (NA). This NA would ultimately help guide the further development of the EPPIKD Program.

The NA set out to address three major research questions:

- What are current practices and experiences among stakeholders for knowledge sharing and knowledge seeking about NIAID grants?
- What do stakeholders anticipate being future knowledge needs with regard to NIAID grants?
- What would participants prioritize for knowledge management enhancements for the extramural grant program at NIAID? For training enhancements?

The NA, conducted by Social & Scientific Systems, Inc. (SSS), gathered and synthesized information from a diverse group of internal and external program stakeholders. A mixed methods data collection approach was used to address these questions. Data were collected from internal NIH and external (non-NIH) stakeholder groups, including the larger research community and the general public. Exploratory and confirmatory group interviews, an inventory of grants-related resources, focused literature reviews, and an online customer satisfaction survey provided evidence to inform the development of a KM strategy and system for the NIAID.

Approach and Scope

SSS's assessment approach included a mix of qualitative and quantitative methods. Formative research helped identify and weave together current NIAID knowledge management practices and stakeholder voices into the design of an online customer satisfaction survey for internal NIH and NIAID and external stakeholders such as grantees, applicants, the media, and the public. SSS conducted focused literature reviews of knowledge management trends, technologies, and successes. As part of the formative research, SSS developed and conducted a series of focus group and group interviews with stakeholders. Stakeholders were invited to indicate their use of NIAID grants-related resources by filling out a resource inventory form. For validation of key results, SSS conducted a confirmatory focus group with selected NIAID program staff.

Focused Literature Reviews

Using PubMed, Google Scholar, Scopus, and an NIAID-approved list of search terms, SSS performed two literature reviews. The first review (January 2014) focused on how people disseminate information to external audiences and how audiences access information. The review also included stakeholder

behaviors and engagement in knowledge management strategies in government (including e-government). The second (April 2014) focused on trends in knowledge management technologies and critical success factors for knowledge management implementation in both the public and private sectors. (Reports on the findings from the literature reviews are listed in the Appendix.)

Formative Research Group Interview Methods

SSS conducted group interviews with NIAID staff over a two week period (February 2014) about knowledge management practices at NIAID with respect to grants, grants management, and policy resources. Stakeholders from various groups across NIH/NIAID were invited to participate in the interviews. Participant groups included NIAID Program Officers, Training Officers, Scientific Review Officers, Branch and Section Chiefs, Program Evaluators, Medical Officers, Scientists and other NIAID staff. The 45-minute interviews proceeded with a semi-structured interview guide developed by SSS in collaboration with NIAID. Interview group input was audio-taped and transcribed to facilitate the summary and analysis of the interview data. After review of the transcripts, SSS identified themes from the discussion. (Findings are summarized in a report, *NIAID EPPIKD Formative Research Group Interviews. Summary of Findings*, listed in the Appendix.)

NIAID Grants Management and Policy Resources Inventory

NIAID compiled an inventory of NIAID grants management and policy resources as part of the formative research for the NIAID EPPIKD Needs Assessment. SSS emailed the *NIAID Grants Management and Policy Resources Inventory* (listed in the Appendix) to 32 NIH interview participants in advance of the four group interviews at NIAID offices in February 2014. Participants were invited to indicate whether they recognized or used each resource listed, the frequency with which they used the resource (if at all), whether they thought the resource was kept current, and whether they found the resource useful. They were also provided space at the end of the form to enter any additional comments they might have. SSS collected completed inventories before, during, and a short time after the group interview sessions.

Online Survey

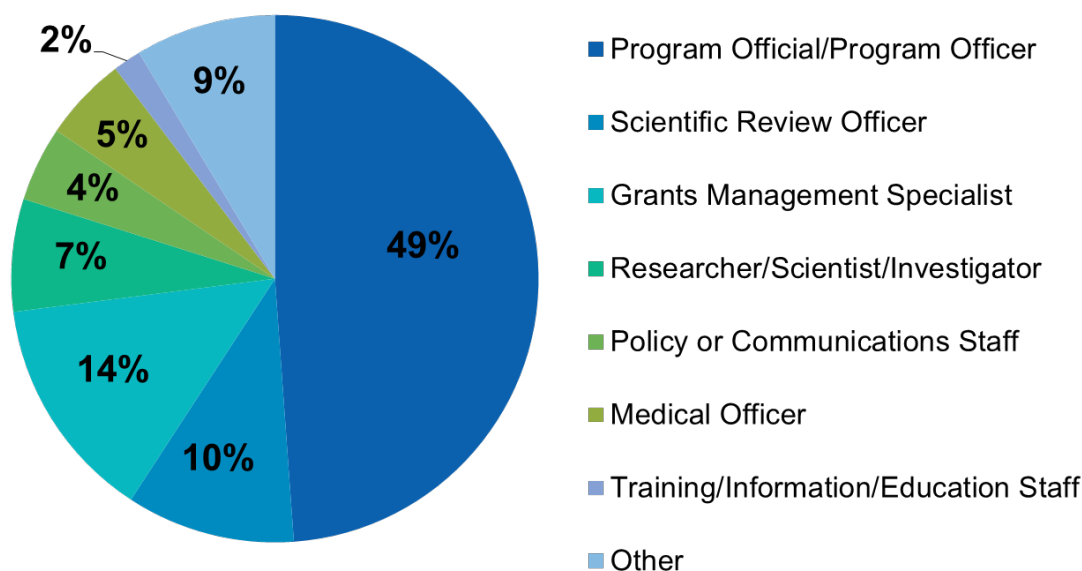
SSS in collaboration with NIAID EPPIKD staff developed the online customer satisfaction survey based on the findings from the formative research. While the majority of questions were designed to be completed by internal and external audiences, some questions were customized for an internal NIH audience only or for external participants only. The online survey was programmed by SSS staff using DatStat Illume®. SSS developed and submitted an OMB Fast Track package for the online survey, including screen shots of the questionnaire created by SSS, and received approval (OMB Control # 0925-0668). From July 17 to September 16, 2014, over 67,000 NIAID Funding News newsletter subscribers from the United States and foreign countries and 600 NIAID staff were invited via an email invitation to complete the online survey. The email invitations were sent in three batches of approximately 20,000 invitations. Reminder email invitations were sent at two- and four-week intervals after the initial email. Survey security was ensured by assigning a randomly generated unique identifier (ID) and password to each invitee. To help interpret and confirm the validity of the online survey results after the survey was completed, SSS convened a confirmatory focus group of NIAID program staff; these staff were hand-selected based on their specific knowledge and expertise.

Online Survey Findings

Of the 3,132 online survey participants, 175 self-identified as NIAID or other NIH staff members (“internal” participants), and 2,957 as non-NIH employees (“external” participants). Approximately one half (49%, n=85) of the internal participants were Program Officials/Program Officers, while the large majority of external participants classified themselves as researchers, scientists, or investigators (75%, n=2,214).

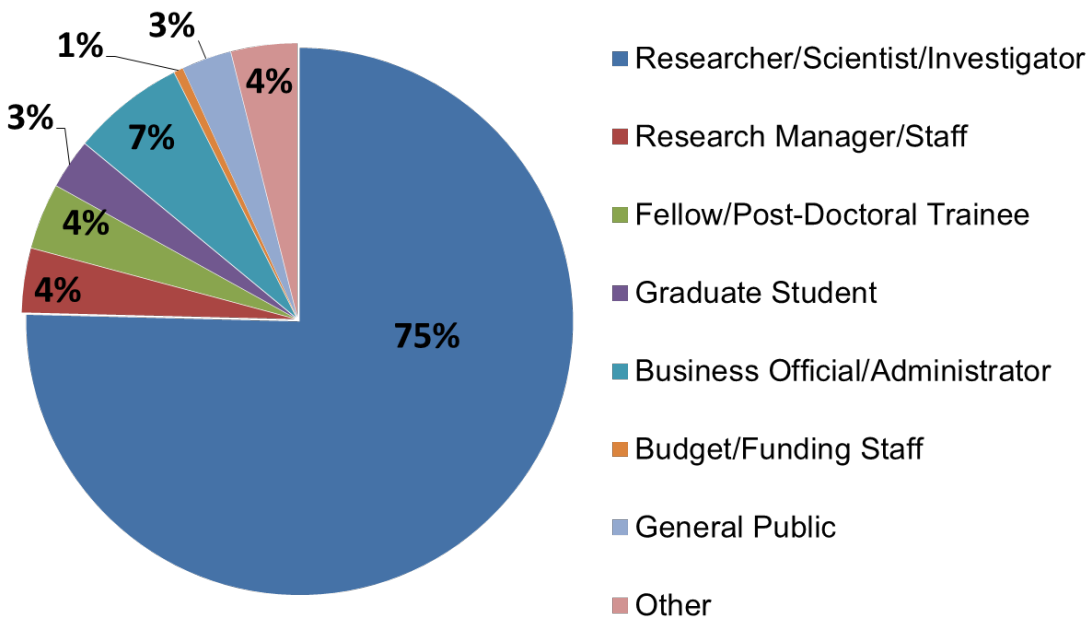
Figure 1. Proportion of Online Survey Participants, by Primary Position or Role at NIH:

Internal (NIAID, NIH) Participants (n=175)



Among the internal participants, about 9% (n=16) were NIH or NIAID staff whose primary role was unspecified, or did not match any of the pre-coded survey responses, and had insufficient numbers to warrant creation of a new category.

Figure 2. Proportion of Online Survey Participants, by Primary Position or Role at their Home Institution: External (Non-NIH) Participants (n=2,957)



Regarding external participants, 4% (n=118) were members of the research community or the general public whose primary role at their home institution was not specified or did not have sufficient numbers to justify a new category (e.g., retirees, social workers, undergraduate students). Most (73%, n=2,135) external participants' type of home institution affiliation was a university or college with the next most frequent affiliation a non-profit organization (12%, n=351). Few external participants indicated they were affiliated with institutions based outside of the United States (9%, n=275).

About half of the external participants were relatively new to the NIH extramural research grant program with about one third (33%, n=948) identifying themselves as a New Investigator and 17% (n=493) as an Early Stage Investigator.

Of the external participants, almost three quarters (74%, n=2,147) indicated their intention to apply for an NIH grant within the next 12 months. Sixty-five percent (n=1,871) reported they currently had research funding. Of these, about 60% (n=931) were funded via a Research Project Grant (RPG), R01 or equivalent and another 57% (n=881) had another type of NIH grant.

Current Practices and Experiences

Where people seek resources

When seeking NIAID grants-related resources, the majority of the internal and external participants first sought out a NIAID-level person or other NIAID resource (Internal: 84%, n=169; External: 64%, n=2,863). Among those internal staff going first to a NIAID resource, most first searched on the NIAID website (60%, n=84). External participants who first went to a NIAID resource also generally started off with a NIAID website search (74%, n=1,338).

Types of resources sought out in the past 12 months

“Funding opportunities” was reported by both internal and external participants as the topmost resource type sought in the 12 months prior to the survey (Figures 3a & 3b); however, other sought after resource types between the two groups did not overlap.

Figures 3a & 3b. NIAID Grants-Related Resources Sought in Past 12 Months

Figure 3a. External

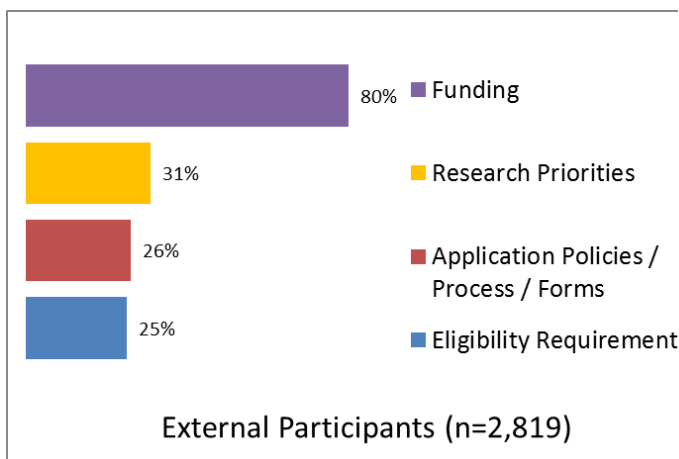
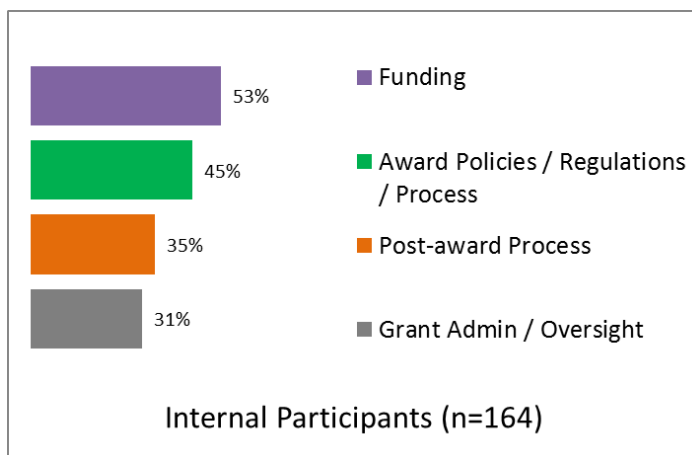


Figure 3b. Internal



Most Helpful Resources

The external (Figure 4a) and internal participants (Figure 4b) commonly identified searching the NIAID website and the NIAID staff as the top two most helpful resources, albeit in reverse order. Thirty-five percent (n=996) of the external participants indicated that *someone within their own organization* was most helpful. This suggests a possible opportunity for NIAID to identify and then interface with key organizational informants regarding grants-related information.

Internal participants also identified a *global web search* as most helpful, consistent with what was heard from some NIAID stakeholders during the group interviews. It should be noted that only small percentages (fewer than 5%) of participants identified *NIH/NIAID hardcopy or print documents/publications*, *NIH/NIAID conference, seminar or webinar*, or *social media* as most helpful.

Figures 4a & 4b. Most Helpful Resources

Figure 4a. External

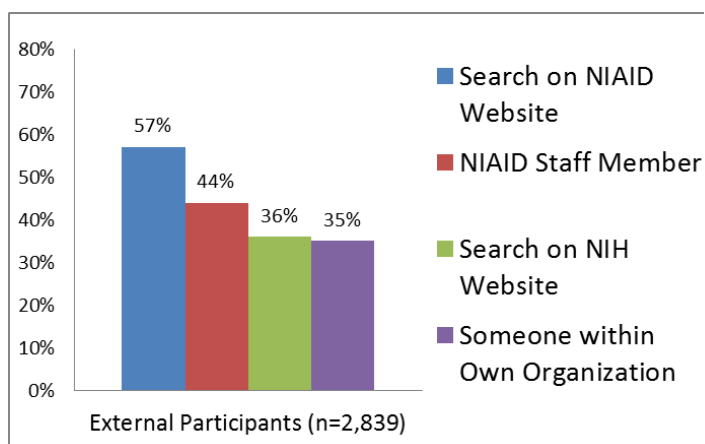
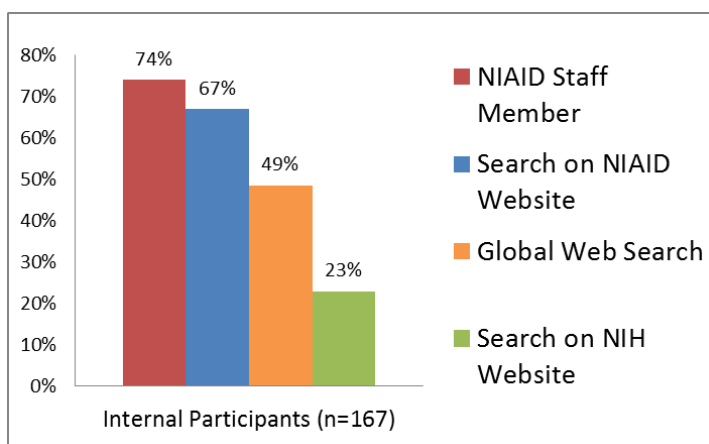


Figure 4b. Internal



Most Difficult to Find Resources

Survey participants were invited to select up to three types from a list of NIAID grants-related resources they felt were “most difficult” to find in the prior 12 months (Figures 5a & 5b). Among the external participants, no single resource stood out as the most difficult to find; a similar percentage (14% to 18%) of participants selected *funding opportunities*, *research priorities/mission*, *scientific review process*, *award policies/regulations/process*, and/or the *post-award process*. Among internal participants, *award policies/regulations/process* was reported most often (32%, n=52).

Interestingly, while most (80%, n=2,265) external participants and about half (52%, n=86) of internal participants reported seeking information on *funding opportunities* over the past 12 months, only 17% (n=485) and 11 (n=18) respectively, considered it a “most difficult” to find resource.

Figures 5a & 5b. Top Most Difficult to Find Resources

Figure 5a. External

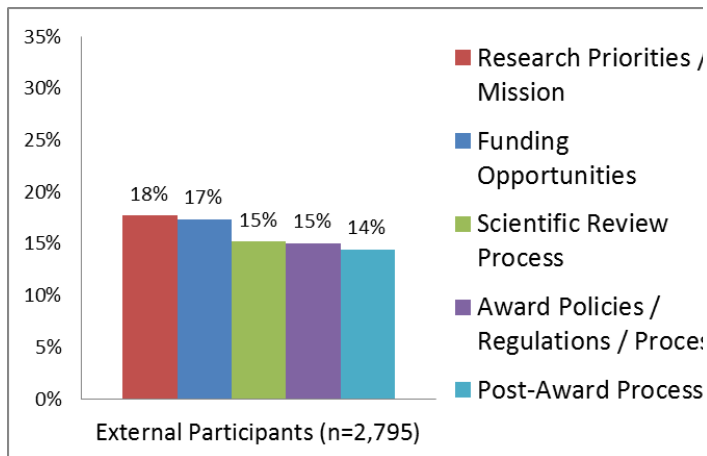
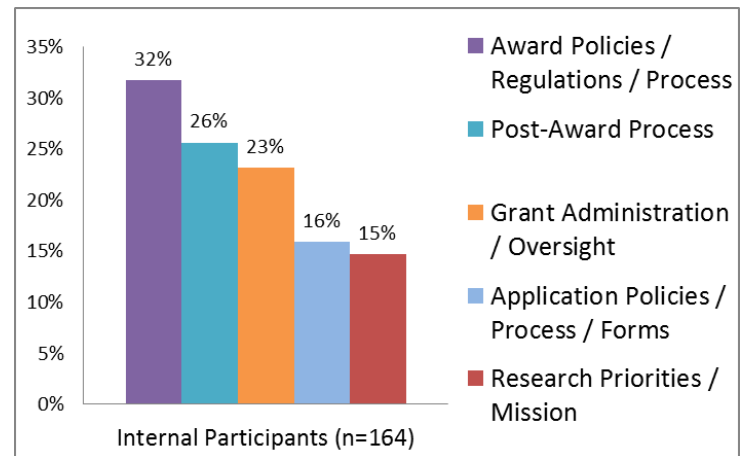


Figure 5b. Internal



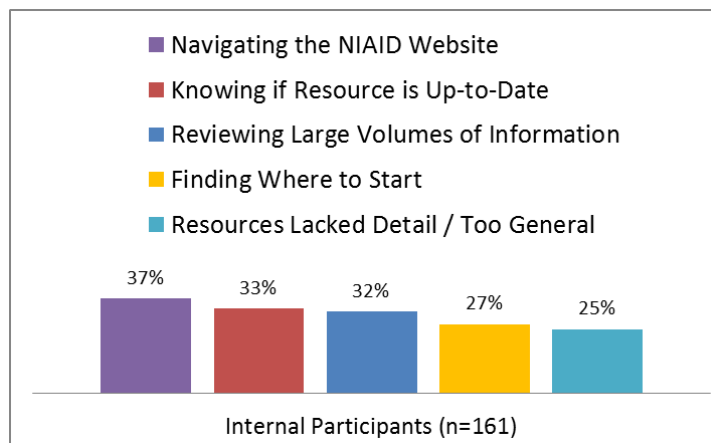
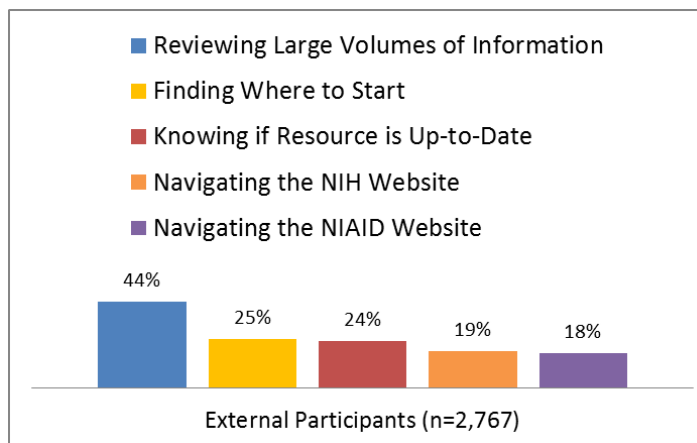
Top Challenges to Finding Resources

Reviewing large volumes of information and *navigating the NIAID website* were top challenges commonly identified by internal and external participants (Figures 6a & 6b). External (25%, n=694) and internal participants (27%, n=43) reported challenges with *finding where to start* when looking for grants-related resources. Both sets of participants also indicated one of their biggest challenges was navigating the NIAID (External: 18%, n=487; Internal: 37%, n=59) website, but at different magnitudes of proportions. It is possible that even though the response categories explicitly distinguished the two websites, some participants might have considered the NIAID and NIH websites as the same entity, and may have referred to the two interchangeably. In the formative research group interviews and the closing comments of the online survey, the NIAID website typically was praised for being one of the better resources of its kind.

Figures 6a & 6b. Top Challenges in Finding Resources

Figure 6a. External

Figure 6b. Internal



Future Knowledge Needs

Needs within the Next 1 & 5 Years

The stark contrast between the external and internal participants with regard to their future knowledge needs presents challenges for meeting those needs (Figures 7a & 7b). External participants overwhelmingly identified *funding opportunities* as their primary need, while internal participants named *policies*. Both sets of internal and external groups expressed an increase in these needs over the next five years. Among internal participants, the knowledge needs reported by POs were similar to those of the other NIH and NIAID staff surveyed.

Figures 7a & 7b. Knowledge Needs within the next 1 and 5 Years

Figure 7a. External Participants (Applicants: 1 yr., n=2073; 5 yr., n=2065/All other: 1 yr., n=645; 5 yr., n=643)

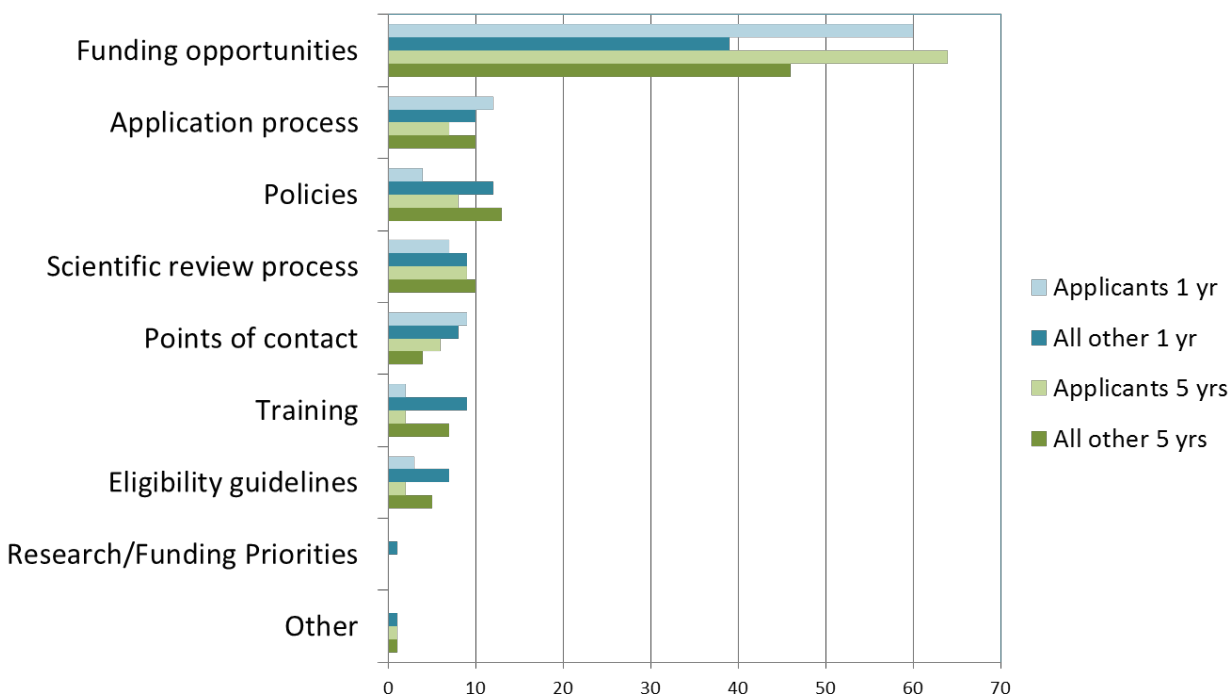
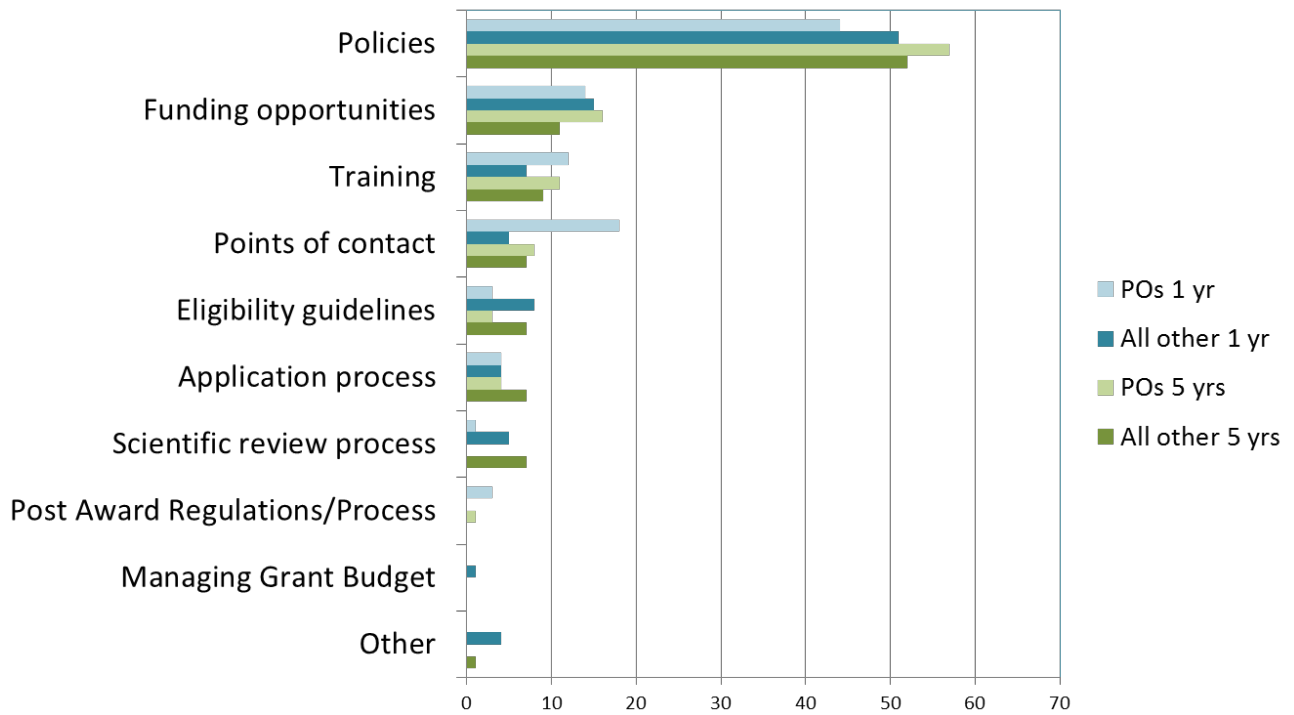


Figure 7b. Internal Participants (POs: 1 yr., n=77; 5 yr., n=76/All other: 1 yr., n=75; 5 yr., n=75)

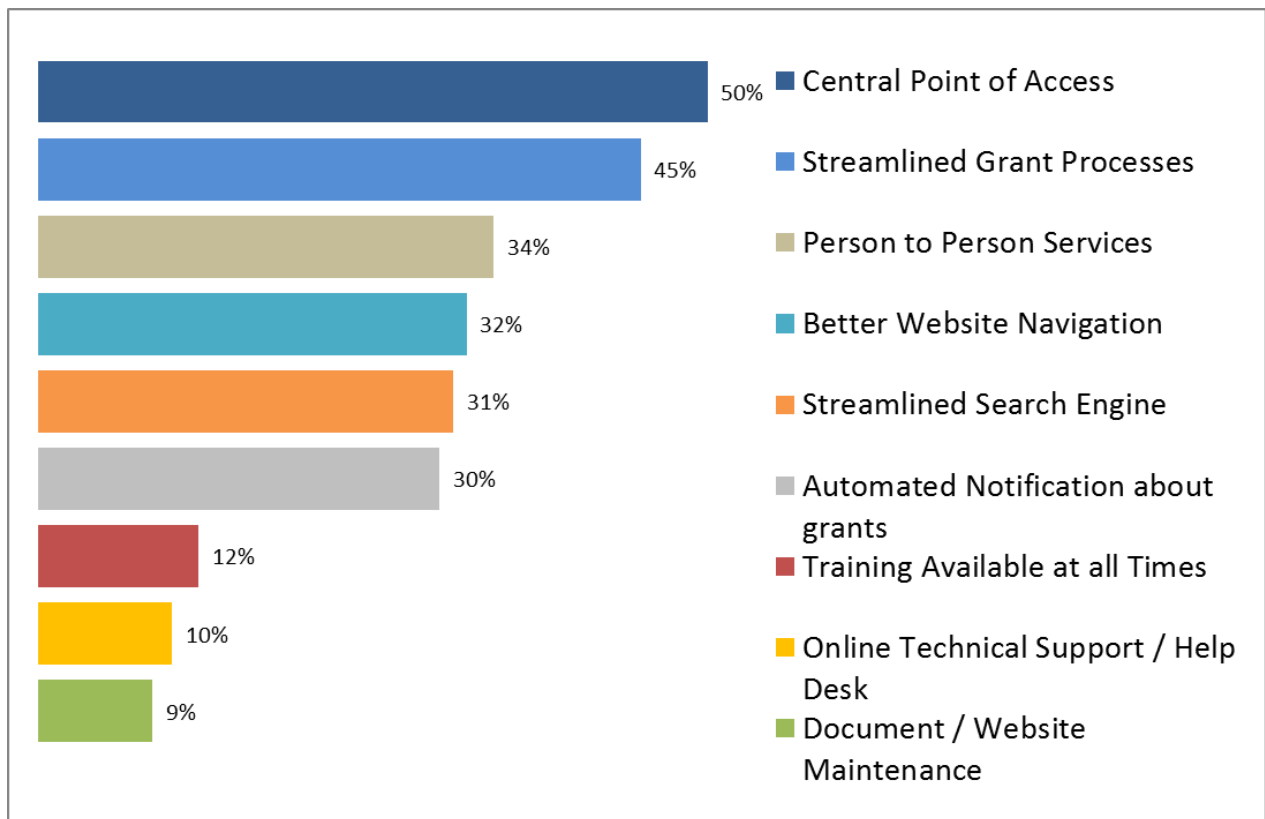


Priorities for Knowledge Management

External and internal participants were given a core list of possible enhancements that were generated through the formative research (Figures 8a & 8b). Internal participants were presented with additional options. Technological and person-based types of priorities for KM enhancements were named as top priorities. *Having a central portal or point of access* was identified as a high priority by the largest percentage within each group of external (50%, n= 1,371) and internal participants (42%, n=64). Both groups also expressed a clear interest in having a *streamlined search engine* along with *better website navigation*. Close to half of the external participants (45%, n=1,212) prioritized having *streamlined grant application and award processes*.

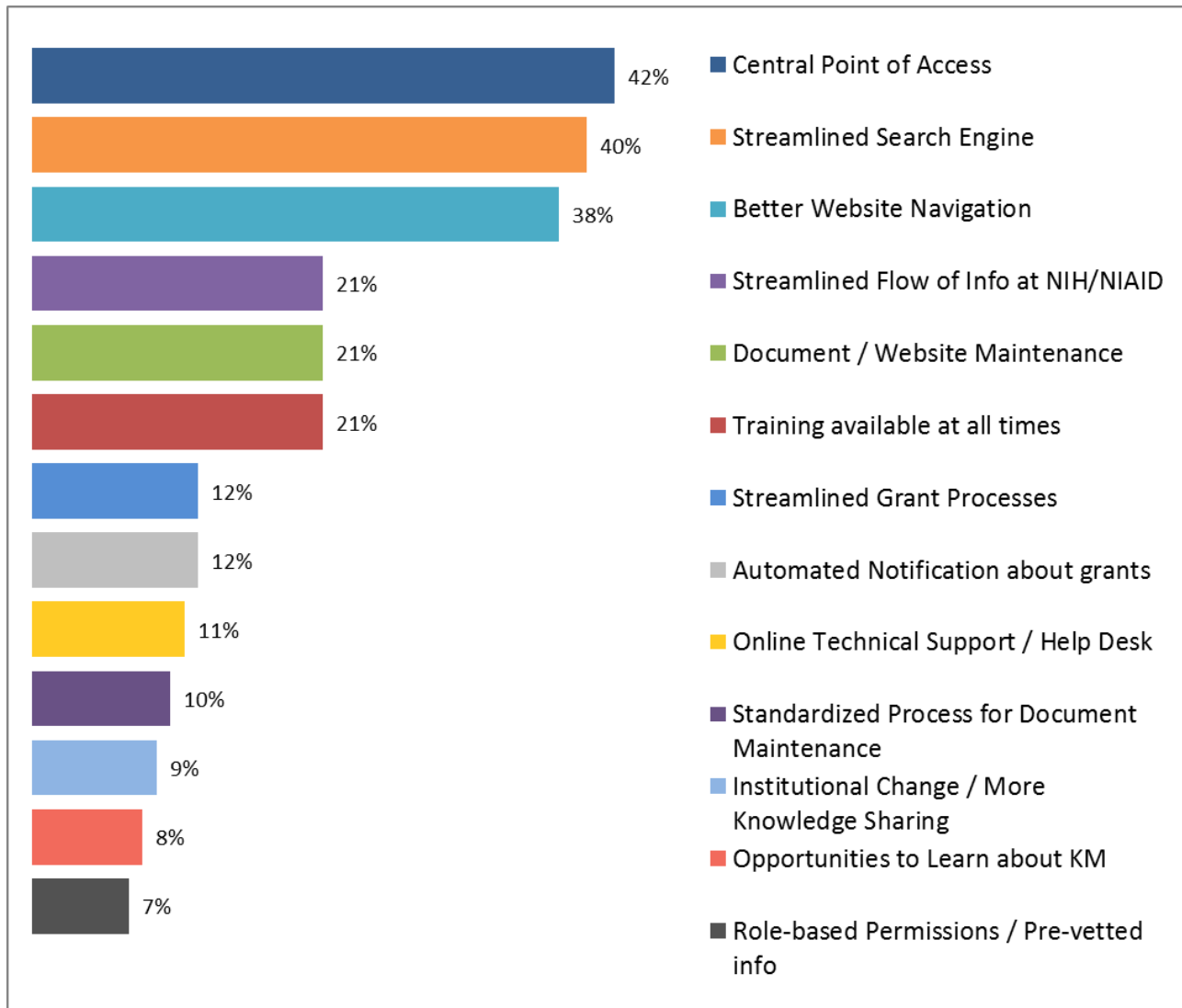
Figures 8a & 8b. Priorities for KM

Figure 8a. External Participants (n=2,726)



On the lower end of the priority spectrum, *learning about KM*, *institutional change/knowledge sharing practices*, and *document maintenance* were a priority for a small proportion of the internal participants.

Figure 8b. Internal Participants (n=154)



Usefulness of KM enhancements

Participants ranked the usefulness of possible KM enhancements from 1 to 5, where “1=very useful,” “3= neutral,” and “5=not at all useful.” The highest usefulness rankings for the two groups were attributed to technology-related enhancements—*Improved NIH search engine* and *better website navigation* were the two top-ranked enhancements (Figures 9a & 9b). Also highly ranked for their usefulness by both groups were *Email alerts for updates*, *Grant FAQs*, a *Central starting point* for getting information, and *Helpdesk/online technical support*. Several of the enhancements deemed helpful represent potentially low cost options that might be easier to improve (if already in place) or implement than some of the other more technology-driven enhancements. Other technology-based enhancements, such as *SmartPhone App* and *social media*, received lower rankings on the usefulness scale. It may be that these types of enhancements are not yet part of many participants’ daily habits or ways of operating or perhaps these technologies are not currently well-integrated into the NIH or academic work environments.

Figures 9a & 9b. Usefulness Rating of Possible Enhancements

Figure 9a. External Participants (items range from n=2,572 to 2,598)

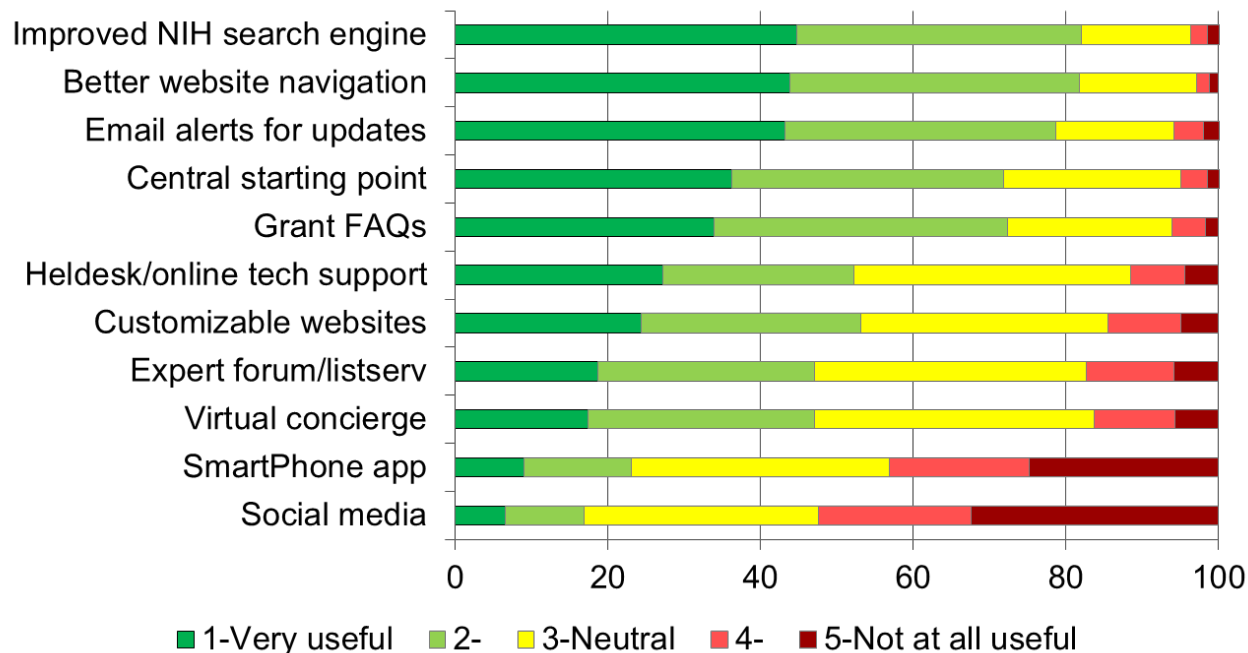
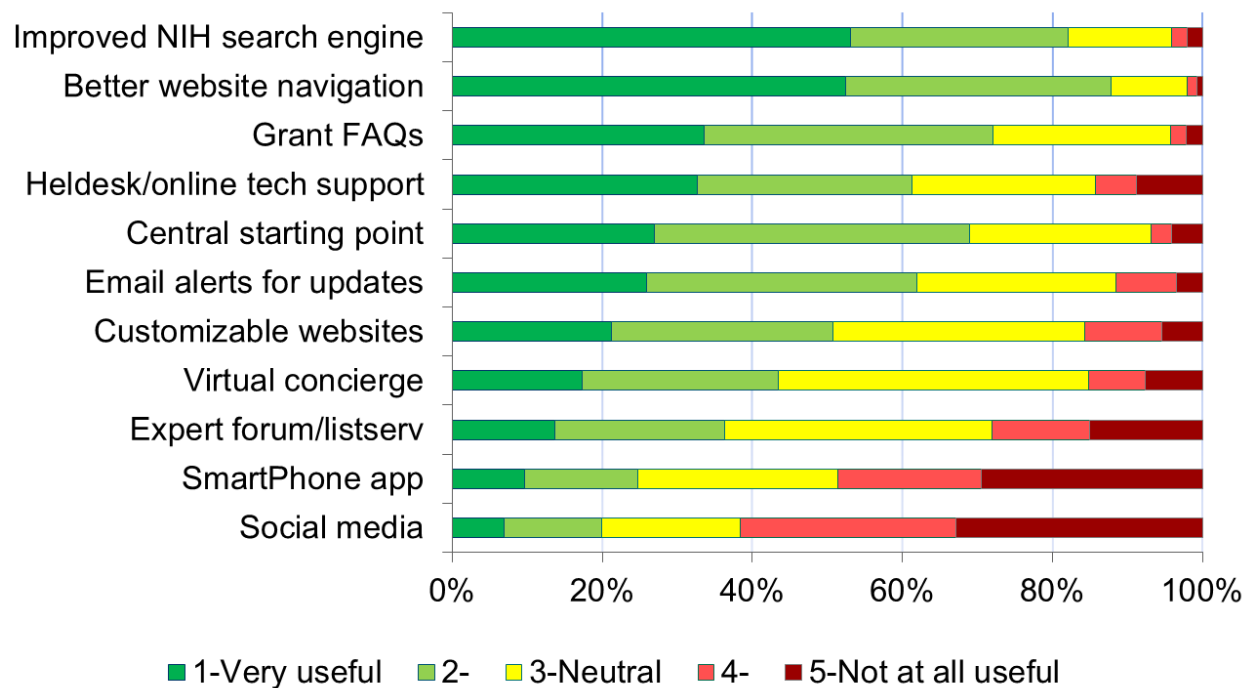


Figure 9b. Internal Participants (items range from n=143 to 147)



Usefulness of Training Enhancements

Participants were asked to rank training enhancements on a usefulness scale, with 1 labeled “Very useful,” 3 as “Neutral,” and 5 as “Not at all useful.” The majority of external (Table 1) and of internal participants (Table 2) rated *short mini-trainings* and *training available at all times* as useful or very useful. Internal participants were asked to rate additional enhancements. *Adding policy interpretations to trainings* also was rated highly by 75% of internal participants, followed by *interactive/practical trainings* (69%).

Table 1. Usefulness Rating of Training Enhancements by External Participants*

EXTERNAL PARTICIPANTS	1-Very useful	2-	3-Neutral	4-	5-Not at all useful
Short mini-trainings (n=2,617)	33%	33%	24%	6%	4%
Training Available at all Times (n=2,458)	32%	30%	28%	6%	4%

*Row percents may not add to 100 due to rounding.

Table 2. Usefulness Rating of Training Enhancements by Internal Participants*

INTERNAL PARTICIPANTS	1-Very useful	2-	3-Neutral	4-	5-Not at all useful
Training Available at all Times (n=148)	41%	34%	17%	7%	2%
Policy Interpretation included (n=147)	40%	35%	21%	1%	3%
Short mini-trainings (n=147)	31%	46%	16%	5%	3%
Interactive training (n=148)	30%	39%	21%	6%	5%
Mixed Group Trainings (n=149)	20%	34%	32%	9%	5%
Group Listserv (NIH-based) (n=145)	7%	27%	39%	14%	13%

*Row percents may not add to 100 due to rounding.

Themes in Closing Comments

The closing comments (n=801) from the survey fell into thematic areas:

- Technology as a facilitating and limiting factor
- Need for better communication and information resources
- Obtaining guidance and training

Technology

Websites and Search Engines

The greatest number of comments concerned technology, though it was sometimes difficult to discern whether the comment was NIAID- or NIH-specific. The majority of comments referenced issues with website content and navigation. Participants mentioned confusion regarding “where they are on the website,” how to find what they need on the website, and outdated website content.

Some illustrative examples:

“Even after using the NIH and NIAID websites for the last 2 years, they are still difficult to navigate internally.” —Internal participant

“The main difficulty I have is when browsing the website, it can be hard to find the right answer or know what the correct, most up-to-date answer is.” —External Participant

“Clean out old information and be up to date” —External participant

Others mentioned issues with search engine functionality, and that the NIH search engine was problematic in many ways.

“Web site is not very user friendly and often it takes me a long time to find things that I know I've seen. The search engines (especially when searching for funding opportunities) are particularly bad...” —External Participant

Social Media vs. Human-to-Human Contact

Contrary to what was found in the literature review—that Web 2.0 tools will facilitate knowledge sharing and “put the knowledge sharing power in the hands of the users themselves” and “enable individuals to dynamically interact with information in disparate formats”—several participants commented that they did not want to abandon the human-to-human interaction for a focus on social media or technology-driven solutions.

“Based on the prior questions, there appears to be a push to over-use technology to communicate. It's a little too much emphasis on technology. It would be nice to not be inundated or require so much technology just to find the information. The use of Facebook or Twitter is not ideal.” —External participant

“As someone who is less computer savvy, I tend to not use social media and smart phone for work-related information.” —External participant

“Website and email work well. Social media is not necessary and is over-stimulating without really clear benefit.” —External participant

Resource Management / Keeping Materials Up to Date

Another prominent theme found in the technology-related comments was about *resource management/keeping materials up to date*, which was also found in the responses to the *NIAID Grants Management and Policy Resources Inventory* that many of the group interview participants completed as part of the formative research. Participants to that inventory expressed some uncertainty regarding whether resources were up to date. A few examples from the online survey are below.

“It would be very helpful to find a way to remove old notices/guidance or at least to mark them as outdated and link to more recent guidance.” — External Participant

“It would be helpful if old and redundant information could be removed from the website. Conducting a search of the NIH website requires a lot of time to sift through the many hits that are obtained, many of which, are not helpful. Thank you.” —External Participant

“Clean out old information and be up to date.” — External Participant

“Can't emphasize enough [that] NIAID SOPs...need to be updated. Those SOPs are a significant resource for grantees and all of NIH.” —Internal participant

Need for Better Communication and/or Information Resources

Comments about the *need for better communication and/or information resources* with some specific reference to NIH/NIAID staff (e.g., access to, knowledge or skills, responsiveness), processes, policy, and research priorities was also a main theme. Participants indicated that they felt burdened when trying to reach people and locate information, and oftentimes, information provided was not clarifying.

“You need more staff managing your online resources. They are way too overworked and slow in processing requests and questions. It is having a very large negative impact on us as researchers.” —External participant

“Knowledgeable program officers are crucial the success of NIAID mission.” —External participant

“...the inconsistency in guidelines (sometimes within the same document) can be frustrating.” —External participant

“A clear document explaining the difference between the grants administration process and the scientific review process. An organizational tree, with contacts or how to find contacts would be helpful too... Lots of words are too many words. Figures with links to explanations would be better.” —External participant

“Improving how information is accessed is really helpful. Currently it is confusing with the Forms constantly changing. For many years they did not change and now it seems every year they are changing.” —External participant

Training

Another common trend in the comments was about getting further guidance or training on a specific topic, most often about simplifying the training, and making it more concise and specific.

“Often there is plenty of easy-to-find information available online, but information appears to be conflicting, or at least only makes sense with an expert understanding of the policies. It would be most helpful to have a resource (chat help, help desk) available to answer questions on how general policies apply in the applicant's specific case. (Preferably 24/7...)” —External participant

“Simple is good. On line tutorials must be simple and concise...” —External participant

“The opportunity to speak with someone on a specific topic would be most helpful. I imagine this could be implemented via an expert forum or a published list of experts by topic/category whom you can call, email, or chat online, depending on how involved the discussion may be. Mini trainings and FAQs would be helpful, but I often wish I could speak to an NIH staff after reading something online for clarification or questions not addressed.” —External participant

“There is no clear “training” requirement for new program officers. There is also a lot of nuanced or “in the know” information that only experienced program staff are aware of. If you’re lucky enough to have a mentor then you’re in much better shape than if you don’t.” —Internal participant

Some of the training related comments requested that there be specific trainings for ESI or NI.

“I have found NIAID to be easier to navigate than other NIH divisions [division name] but have still had to spend a large amount of time to find funding priorities, study sections, and details on new investigator and early career information.” —External Participant

“It would be very helpful for first timers, in particular, to have an overview of the process including all of the acronyms, what to do when, and the most updated notices all on one page...” —External Participant

Other Comments

The largest number of comments regarded issues tangentially related to knowledge management for the NIAID grants-related resources. These concerns involved funding practices, paylines, the ability to get NIH funding, biases or flaws in the application review process, and so on.

“The knowledge management resources for extramural grants are fine. The PAYLINES are the problem. Single digit paylines for any NIH-funded grants lead to a massive waste of resources (time, effort, and expertise constantly grubbing for funding), and no increase in knowledge management resources will change that...” —External Participant

“Main problem is the limited resources (money) for a large pool of investigators. Everything else is just putting a wrapping paper around. Without solving a major problem of funding for current and new investigators, technical improvements to the web-site, search engine etc. would not make an impact.” —External Participant

Word Cloud

SSS created a “word cloud” or visual representation of the 65 most common words (excluding articles and prepositions) found in the open-ended comments field to explore further the salient themes in the closing comments. The frequency of each word’s usage is represented by the relative size of the word.

From the illustration (Figure 10), *funding* stood out as the most common word mentioned, which is consistent with an area of interest for NIAID Funding News newsletter subscribers. Those who commented expressed concerns regarding NIH funding for grants in general. The next most commonly used words were *application* and *helpful*. The words reflect a focus on the application process and materials sought by external stakeholder survey participants and provide context clues about the reported helpfulness of the NIAID staff.

The largest number of open-ended comments regarded issues not directly related to the NIAID grants-related resources and were about funding practices, paylines, the ability to get NIH funding, biases or flaws in the application review process, and so on, and reveal perhaps a more deep-seated concern.

Study Limitations

Due to time and resource constraints, the needs assessment relied primarily on the input of NIAID and NIH internal staff for the formative research. For the online survey, participants were invited to participate, on an opt-in basis, from a current list of email addresses from the *NIAID Funding News* newsletter subscriber list. The time period and project resources did not allow for construction of a sample frame based on NIH grantee and applicant databases. Use of the subscriber list, while convenient, resulted in a substantial number of undeliverable and spam-blocked emails, changed addresses, and out-of-office notices at any one mailing. Consequently, the results are not statistically representative of the stakeholder population, but do reflect the views and practices of thousands of stakeholder participants. A significant number of invitees (3,132) responded, voluntarily shared information, and voiced their opinions on their knowledge management needs.

Summary and Discussion

The needs assessment identified several needs/issues voiced by stakeholders:

- Need to locate NIAID resources in a timely and efficient manner
- Need for improvements in existing information technology
 - Better and more streamlined website navigation
 - Search engine that delivers more targeted and up-to-date information
- Information resources lack clarity and are often out-dated
 - Needs better oversight/management
- Need more concise and readily available training
- Need more person-to-person communication

Based on the survey results and the closing comments, participants sought clarity in grant application instructions, policy, and procedures. They wanted assurances that they were accessing up to date information, and the ability to do so in an easy and streamlined fashion. Results also indicated they sought reductions in the volume of information available, not wanting to spend valuable time searching for information.

Participants, particularly the external group, preferred to retain access to human beings. When people mentioned social media and similar technological tools, it was mostly in the context of not wanting the NIAID to supplant access to individuals with IT solutions. Several participants commented that they did not want to abandon the human-to-human interaction for a focus on social media or technology-driven solutions. However, it remained clear that technology was perceived as an important piece of knowledge management.

Opportunities for learning about KM were low priority among internal participants. One reason for this might be that some participants might not understand the connection between learning KM techniques and successfully implementing the KM enhancements they prioritized. On the other hand, it may reflect more pressing priorities or a lack of recognition of the importance of KM in general and suggests a need for further education regarding KM overall.

High-Level Recommendations

Prior to adoption of any one KM solution, we recommend that, if not already under consideration, the following next steps be considered:

- Engage leadership in KM
- Adopt a KM framework for NIAID EPPIKD
- Conduct an inventory of existing processes, technologies, and behaviors
- Formulate a KM strategy driven by end-users' needs and business practices
- Set priorities for KM based on budget limits and feasibility
- Educate stakeholders about KM and provide guiding principles and processes
- Start small to test operations and assess performance

Engage Leadership

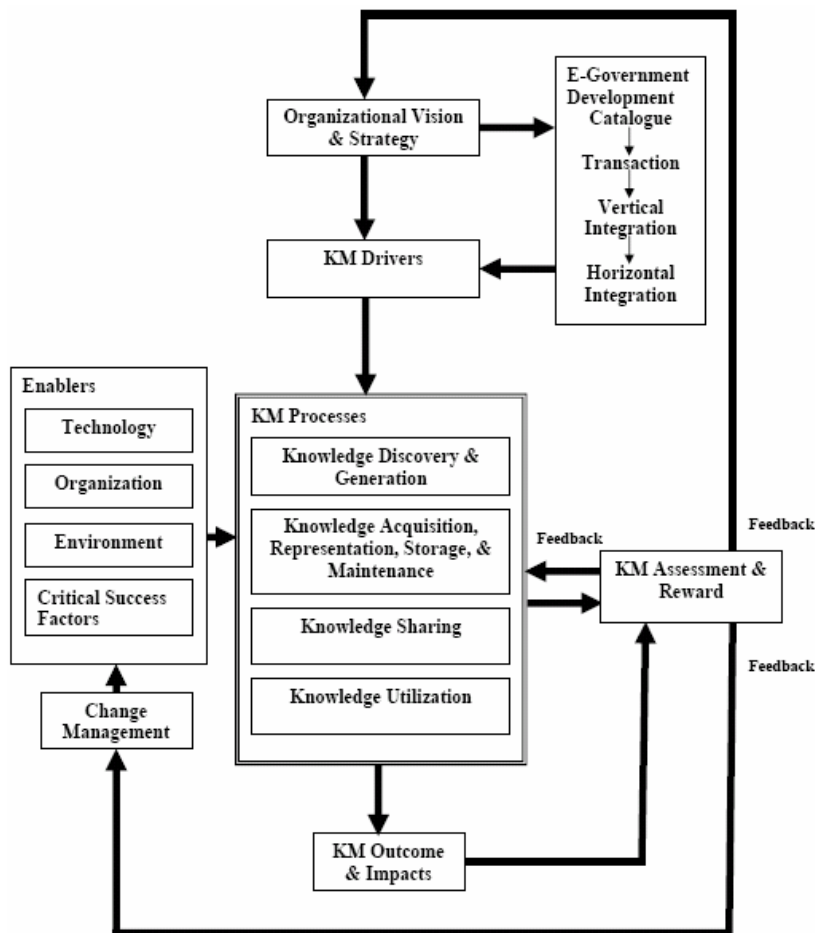
The literature mentions engaging leadership in KM as being critical to the successful implementation of an organization's KM project or system. SSS recommends that efforts be made to engage leadership to the extent possible in discussions regarding the KM strategy and its implementation. As described by Horak (2001), the most important leadership elements are:

- Creating a vision and infrastructure of KM in the organization
- Developing a collaborative culture to promote sharing of information
- Modeling enterprise-wide thinking
- Providing sufficient time for KM implementation
- Establishing new processes to make KM part of daily work

Adopt a KM framework for NIAID EPPIKD

Another step described in the literature as critical to the success of KM programs is the adoption of a conceptual or theoretical framework for KM. There are a variety of frameworks in the KM literature; however, the one that seems most relevant for the NIAID EPPIKD Program is by Ha and Zanebe (2008) because of the need to have IT solutions integrated with KM (Figure 11). This framework provides a foundation from which to proceed, as well as provides KM managers and stakeholders with a common understanding of how KM functions within an organization.

Figure 11. Conceptual Framework for KM in Government



Conduct an Inventory of existing processes, technologies, tools and behaviors

In order to determine the KM strategy, it is necessary to gain a thorough understanding of the existing KM processes, tools and behaviors used by the people creating, managing, and sharing/disseminating the content of the NIAID extramural grant resources. Using the conceptual framework above, questions can be addressed such as: What are the KM Processes for Knowledge Sharing? What are the enabling factors? More specifically, what is the current content management system at NIAID? Is there an appropriate document management system in place?

To conduct a thorough inventory as well as identify what gaps need to be filled in the KM framework, it is important for KM leaders to become familiar with the KM techniques, tools, and technologies that are available. In *Knowledge Management in Theory and Practice*, Dalkir (2011) provides a concise overview of major KM techniques (Table 3).

Table 3. Major KM techniques, Tools and Technologies

Knowledge creation and codification phase	Knowledge sharing and dissemination phase	Knowledge acquisition and application phase
Content Creation <ul style="list-style-type: none"> • Authoring tools • Templates • Annotations • Data mining • Expertise profiling • Blogs • Mashups 	Communication and collaboration techniques <ul style="list-style-type: none"> • Telephone/Internet, telephone/fax • Videoconferencing • Chat rooms/instant messaging/Twitter • Email/discussion forums/wikis • Groupware • Workflow management • Folksonomies • Social networking • Web 2.0/K.M. 2.0 	E-learning technologies <ul style="list-style-type: none"> • CBT • WBT • EPSS
Content management <ul style="list-style-type: none"> • Taxonomies • Folksonomies • Metadata tagging • Classification • Archiving • Personal KM 	Networking technologies <ul style="list-style-type: none"> • Intranets • Extranets • Web servers, browsers • Knowledge repository Portal 	Artificial intelligence technologies <ul style="list-style-type: none"> • Expert systems • DSS • Customization/personalization • Push/pull technologies • Recommender systems • Visualization • Knowledge maps • Intelligent agents • Automated taxonomy systems • Text analysis—summarization

Source: Dalkir (2011).

Formulate a KM strategy driven by end-users' needs and business practices

Throughout both literature reviews that were conducted, the often repeated message was to focus the KM strategy on end-users' and stakeholders' needs. This was accomplished by including stakeholders and end-users in the design and development of the KM program and linking the KM program back to routine business practices. Also, the literature showed it was critical to incentivize and integrate KM technology into existing institutional and organizational workflows to facilitate the adoption of KM practices by making them easier to use.

Set priorities for KM based on budget limits and feasibility

In a resource-constrained environment it would be prudent to set priorities for KM, and target what is most feasible within the current fiscal and cultural milieu. For instance, what KM tools, techniques, or technologies are "low hanging fruit?" Which will require a cultural or behavioral change? Which need a large investment of resources? Which KM tool will yield the biggest benefit? These are all questions to be grappled with in the construction of a KM strategy and program for the NIAID.

Educate stakeholders about KM and provide guiding principles and processes

To facilitate successful integration and adoption of KM practices, a key factor is educating stakeholders and end-users about KM and its principles and processes. The literature recommends linking the adoption of KM practices to performance incentives and objectives; this helps increase motivation for making needed adjustments to business practices leading to successful knowledge management projects.

Start small to test operations and assess performance

Finally, the literature recommends “starting small” with one component of a KM program, such as a focus on activities surrounding grant funding opportunities. A pilot program could be rolled out for a group of motivated users/stakeholders. The users could provide feedback so that adjustments could be made prior to launching the component to a larger group. The literature points out that an initial KM application will “typically be a content management system on an internally managed intranet site. This is a good building block for subsequent applications...and tools to enable newly connected knowledge workers to continue to work together.”

References

Dalkir, K. 2011. *Knowledge management in theory and practice* (2nd Ed.). Burlington, MA: MIT Press.

Ha, L., and A. Zenebe. 2008. Knowledge management in government. 12th World Multi-Conference on Systemics, Cybernetics and Informatics, WMSCI 2008, Jointly with the 14th International Conference on Information Systems Analysis and Synthesis, ISAS 2008, at Orlando, FL.

Horak, B. J. 2001. "Dealing with human factors and managing change in knowledge management: a phased approach." *Topics in Health Information Management* 21 (3): 8-17. Retrieved from <http://www.scopus.com/inward/record.url?eid=2-s2.0-0035257229&partnerID=40&md5=7566cac0e448eeba6f3d747c35c9cc95>

Appendix

List of Project Documents

- NIAID EPPIKD Needs Assessment: Stakeholder Engagement Plan (May 23, 2014)
- NIAID EPPIKD Needs Assessment: Study Methodology Report (May 23, 2014)
- Summary of a Focused Review of the Knowledge Management Literature (~2008-2013). Knowledge Management: Dissemination of Information to External Audiences (Stakeholder Behaviors, Enablers and Barriers) (January 10, 2014)
- Summary of a Focused Review of the Knowledge Management Literature (~2008-2013). Knowledge Management: Trends and Similar Projects (April 11, 2014)
- NIAID Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program Needs Assessment Project. Formative Research Group Interviews. Summary of Findings (Prepared by Social & Scientific Systems, Inc., March 25, 2014)

List of Project Data Collection Instruments

- NIAID Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program Needs Assessment. Formative Research Group Interview Guide (2014)
- NIAID Grants Management and Policy Resources Inventory (2014)
- NIAID Extramural Policy and Procedure Information and Knowledge Dissemination (EPPIKD) Program Needs Assessment. Customer Satisfaction Assessment. Confirmatory Focus Group Guide (2014)
- NIAID EPPIKD Program. Customer Satisfaction Survey for the NIH/NIAID (Online survey, 2014)

Figure 1 Data. Proportion of Online Survey Participants, by Primary Position or Role at NIH: Internal (NIAID, NIH) Participants (n=175)

Primary Position or Role at NIH:	Percentage of total
Program Official/Program Officer	49%
Scientific Review Officer	10%
Grants Management Specialist	14%
Researcher/Scientist/Investigator	7%
Policy or Communications Staff	4%
Medical Officer	5%
Training/Information/Education Staff	2%
Other	9%

Note: Total may not add to 100% due to rounding.

Figure 2 Data. Proportion of Online Survey Participants, by Primary Position or Role at their Home Institution: External (Non-NIH) Participants (n=2,957)

Primary Position or Role at Home Institution:	Percentage of total
Researcher/Scientist/Investigator	75%
Research manager/staff	4%
Fellow/Post-doctoral trainee	4%
Graduate student	3%
Business official/Administrator	7%
Budget/Funding staff	1%
General public	3%
Other	4%

Note: Total may not add to 100% due to rounding.

Figure 3a Data. NIAID Grants-Related Resources Sought in Past 12 Months—External Participants

Resource Sought (n=2,819):	Percentage mentioned
Funding	80%
Research Priorities	31%
Application Policies / Process / Forms	26%
Eligibility Requirements	25%

Figure 3b Data. NIAID Grants-Related Resources Sought in Past 12 Months—Internal Participants

Resource Sought (n=164):	Percentage mentioned
Funding	53%
Award Policies / Regulations / Process	45%
Post-award Process	35%
Grant Administration / Oversight	31%

Figure 4a Data. Most Helpful Resources—External Participants (n = 2,839)

Most Helpful Resource:	Percentage mentioned
Search on NIAID Website	57%
NIAID Staff Member	44%
Search on NIH Website	36%
Someone within Own Organization	35%

Figure 4b Data. Most Helpful Resources—Internal Participants (n = 167)

Most Helpful Resource:	Percentage mentioned
NIAID Staff Member	74%
Search on NIAID Website	67%
Global Web Search	49%
Search on NIH Website	23%

Figure 5a Data. Top Most Difficult to Find Resources—External (n = 2,795)

Resource Most Difficult to Find:	Percentage mentioned
Research Priorities / Mission	18%
Funding Opportunities	17%
Scientific Review Process	15%
Award Policies / Regulations / Process	15%
Post-Award Process	14%

Figure 5b Data. Top Most Difficult to Find Resources—Internal (n = 164)

Resource Most Difficult to Find:	Percentage mentioned
Award Policies / Regulations / Process	32%
Post-Award Process	26%
Grant Administration / Oversight	23%
Application Policies / Process / Forms	16%
Research Priorities / Mission	15%

Figure 6a Data. Top Challenges in Finding Resources—External (n = 2,767)

Challenge:	Percentage mentioned
Reviewing Large Volumes of Information	44%
Finding Where to Start	25%
Knowing if Resource is Up-to-Date	24%
Navigating the NIH Website	19%
Navigating the NIAID Website	18%

Figure 6b Data. Top Challenges in Finding Resources—Internal (n = 161)

Challenge:	Percentage mentioned
Navigating the NIAID Website	37%
Knowing if Resource is Up-to-Date	33%

Challenge:	Percentage mentioned
Reviewing Large Volumes of Information	32%
Finding Where to Start	27%
Resources Lacked Detail / Too General	25%

Figure 7a Data. Knowledge Needs within the Next 1 and 5 Years—External

Knowledge Needs:	1 Year (n=2,718) Applicants (n=2,073)	1 Year (n=2,718) All other (n=645)	5 Years (n=2,708) Applicants (n=2,065)	5 Years (n=2,708) All other (n=643)
Funding opportunities	60%	39%	64%	46%
Application process	12%	10%	7%	10%
Policies	4%	12%	8%	13%
Scientific review process	7%	9%	9%	10%
Points of contact	9%	8%	6%	4%
Training	2%	9%	2%	7%
Eligibility guidelines	3%	7%	2%	5%
Research/Funding Priorities	0%	1%	0%	0%
Other	0%	1%	1%	1%

Note: Total may not add to 100% due to rounding.

Figure 7b Data. Knowledge Needs within the next 1 and 5 years—Internal

Knowledge Needs:	1 Year PO (n=77)	1 Year All Other (n=76)	5 Years PO (n=75)	5 Years All Other (n=75)
Policies	44%	51%	57%	52%
Funding opportunities	14%	15%	16%	11%
Training	12%	7%	11%	9%
Points of contact	18%	5%	8%	7%
Eligibility guidelines	3%	8%	3%	7%
Application process	4%	4%	4%	7%
Scientific review process	1%	5%	0%	7%
Post Award Regulations/Process	3%	0%	1%	0%
Managing Grant Budget	0%	1%	0%	0%
Other	0%	4%	0%	1%

Note: Total may not add to 100% due to rounding.

Figure 8a Data. Priorities for Knowledge Management—External (n = 2,726)

Priorities:	Percentage mentioned
Central Point of Access	50%
Streamlined Grant Processes	45%
Person to Person Services	34%
Better Website Navigation	32%
Streamlined Search Engine	31%
Automated Notification about grants	30%
Training Available at all Times	12%

Priorities:	Percentage mentioned
Online Technical Support/Help Desk	10%
Document/Website Maintenance	9%

Figure 8b Data. Priorities for Knowledge Management—Internal (n = 154)

Priorities:	Percentage mentioned
Central Point of Access	42%
Streamlined Search Engine	40%
Better Website Navigation	38%
Training available at all times	21%
Document/Website Maintenance	21%
Streamlined Flow of Info at NIH/NIAID	21%
Automated Notification about grants	12%
Streamlined Grant Processes	12%
Online Technical Support/Help Desk	11%
Standardized Process for Document Maintenance	10%
Institutional Change/More Knowledge Sharing	9%
Opportunities to Learn about KM	8%
Role-based Permissions/Pre-vetted information	7%

Figures 9a & 9b Data. Usefulness Rating of Possible Enhancements (Percentage)

Figure 9a Data. External Participants (items range from n=2,572 to 2,598)

Possible Enhancements	1-Very useful	2-	3-Neutral	4-	5-Not at all useful
Social media	7	10	31	20	32
SmartPhone app	9	14	34	18	25
Virtual concierge	17	30	37	11	6
Expert forum/listserv	19	28	36	12	6
Customizable websites	24	29	32	10	5
Help desk/online tech support	27	25	36	7	4
Grant FAQs	34	38	21	4	2
Central starting point	36	36	23	4	1
Email alerts for updates	43	35	15	4	2
Better website navigation	44	38	15	2	1
Improved NIH search engine	45	37	14	2	2

Figure 9b Data. Internal Participants (items range from n=143 to 147)

Possible Enhancements	1-Very useful	2-	3-Neutral	4-	5-Not at all useful
Social media	7	10	31	20	32
SmartPhone app	9	14	34	18	25
Virtual concierge	17	30	37	11	6
Expert forum/listserv	19	28	36	12	6
Customizable websites	24	29	32	10	5
Help desk/online tech support	27	25	36	7	4
Grant FAQs	34	38	21	4	2
Central starting point	36	36	23	4	1
Email alerts for updates	43	35	15	4	2
Better website navigation	44	38	15	2	1
Improved NIH search engine	45	37	14	2	2

Figure 10. Open-Ended Comments Word Cloud

This oval-shaped color graphic depicts the frequency of the 65 most commonly used key words in the open-ended comments. Frequency is denoted by the size of the word, where the larger the word, the more frequently it is mentioned.