
Alternative Research Delivery Formats

A TRB Resource Guide

PREPARED FOR ACRP BY

Grafton Technologies, Inc.
Newburyport, MA

Eastern Research Group, Inc.
Boston, MA

AND

Barich, Inc.
Richmond, TX

Contents

Summary	3
Introduction	6
Objective	6
Approach	6
Findings	6
Conclusion	7
Delivery Formats	8
Factors to Consider when Choosing a Format	8
Considerations when Using a Format to Convey Research Results	9
Primarily Electronic Formats	11
Websites	11
Applications	15
Database or Interactive Library	19
Primarily Graphic Formats	24
Training Material	24
Presentation Material	28
Infographic	31
Videos	33
Webinar (recorded)	36
Other Formats	40
Research Summaries	40
FAQs (Frequently Asked Questions)	43
Social Media	45
Standards and Specifications	48
Appendix: Basic Process for Website Development	52

SUMMARY

Alternative Research Delivery Formats: A TRB Resource Guide

For more than ten years, the Airport Cooperative Research Program (ACRP) has helped airport practitioners and others in the airport industry by providing quality research products that focus on important issues and problems that are not being addressed by other research programs. Recently, the ACRP Oversight Committee (AOC) adopted a strategic vision to continue and improve ACRP's contributions to the airport industry for the next ten years. A prominent element of this vision is to expand and diversify the products that ACRP provides as a way to respond to the diverse needs of its key audiences.

This report, which summarizes the results of ACRP Project 11-02, Task 24, provides guidance for expanding the types of formats in which ACRP research results are presented to the industry. In developing this report, ACRP examined new technologies and formats other agencies and institutions are using to serve their audiences' informational needs and consumption behaviors. What has been extracted from this effort may help ACRP achieve higher levels of research comprehension, dissemination, and implementation.

The following new formats for research deliverables may be used individually or in combination with more traditional formats to appropriately convey the results of ACRP projects to current and future airport practitioners:

- **Websites, blogs, and social media** that broadly disseminate engaging information via many of today's commonly used electronic devices.
- **Training curricula and modular learning programs** that separate research results into consumable portions to aid in the adoption of new practices or knowledge.
- **Research summaries** that emphasize concise text and graphical formats, such as infographics, that can convey information quickly and are easily understood.¹
- **Computer applications, models, and databases** that provide an interactive experience and enable practitioners to apply the research results to customized situations.

Traditional printed reports and guidebooks will continue to deliver ACRP research results to practitioners. Incorporating new formats, such as those identified in this report, will complement these traditional publications in the following ways:

- These concise, highly visual, and in some cases interactive formats can deliver information faster than lengthy reports and may therefore better serve the needs of busy professionals.
- Their flexibility allows research teams to select the most effective means of packaging their results.

¹ Infographics are visual representations of information that emphasize intuitive, easy-to-understand graphical formats.

- They can provide applications, templates, and data that practitioners can adapt to their specific needs.
- They may attract a broader range of practitioners, including those who are unfamiliar with traditional ACRP research products.
- They can serve as tools for dissemination, helping to convince busy practitioners that it is worth their time to read the full reports.

Non-traditional formats may pose new challenges while they create new opportunities for research teams, ACRP staff, and project panels. These challenges and opportunities include:

- **New capabilities may be required.** Presenting research in non-traditional formats may require graphic, audio/visual, and programming skills beyond those used to produce traditional formats. Depending on project scope, these skills may be required of research team members, post-project third-party contractors, and ACRP support staff. Although some may already have such capabilities, some teams may need to enhance or acquire new capabilities, such as graphics software or audio/visual production equipment. This challenge opens the door for ACRP to solicit participation from non-traditional sources and attract new participants who are comfortable with emerging technologies.
- **Research processes may need to change.** Projects may require additional review cycles not only to evaluate the content but also to assess the format in which it is conveyed. This change may add some administrative and scheduling challenges, but also will ensure that the quality and usability of ACRP research materials remains high.
- **Ongoing support may be required after a project ends.** Some electronic formats require hosting or ongoing support. Although electronic formats make it easier for ACRP to make changes or update content, their maintenance may also require server upgrades or software updates. Depending on the rate of change in the research field or topic, providing such ongoing support can significantly prolong the value and utility of the research.

Overcoming these challenges will consume a modest amount of research funds each year and pose questions and considerations to be weighed by the AOC and project panels. The question of whether the benefits offered by using a non-traditional format outweigh the additional costs required to produce or maintain it will need to be answered on a project-by-project basis. For example, greater use of electronic formats may involve new commitments for hosting or maintenance, but promises to reduce other production and distribution costs, not to mention impacts on the environment. ACRP can help with these determinations by providing direction on which formats can reasonably fit into overall program requirements, guidance on factors that need to be addressed when non-traditional formats are used, and resources to support non-traditional formats that are more cost-effectively delivered at a program (as opposed to a project) level. Following are some resources ACRP might provide:

- **Establish web servers** to host electronic research products at a low initial cost that can be scaled to meet project and practitioner demand using an industry leading cloud-based service provider.
- **Provide web page and server templates** (equivalent to the existing CRP document template) to help research teams produce web pages that meet design requirements ACRP may impose and can be hosted more easily on the ACRP funded web servers. Cascading Style Sheet (CSS) files can also be provided to help research teams produce consistently formatted web pages.²

² A server template is an electronic copy (or “image”) of a virtual server. This image includes the operating system, storage drive(s), necessary software, and data. Depending on how it has been designed and configured, the

- **Specify acceptable technologies**, including programming languages, commercial-off-the-shelf software, and image/video formats that ACRP is prepared to support so that wide-ranging or unfamiliar options are not introduced unless there is a positive return and consensus in favor of doing so.
- **Offer assistance** to research teams and consultation to evaluation panels from staff or contractors with graphics skills and familiarity with ACRP branding. This assistance will help achieve consistency and a uniform level of quality across research products that include graphic content.
- **Assemble a library** of graphical, audio, and visual material that can be made available to research teams for incorporation into non-traditional formats having to pay additional licensing fees.
- **Assist research teams in identifying potential long-term agency or organizational hosts** for research products that require administration, maintenance, or governance after the project is complete. Determination of such hosts should be made as early in the project lifecycle as possible.
- **Augment Editorial Reviews** of draft written reports with graphical and technical reviews of draft digital content.

This report identifies and describes several non-traditional formats for research deliverables, the benefits of applying them to ACRP research results, and suggestions for overcoming challenges posed by implementation. A phased approach to implementing these alternatives is recommended, including checkpoints such as the following:

- **Studying the results and lessons learned** from implementing the use of non-traditional formats in a few ACRP projects.
- **Collecting feedback** on experiences with non-traditional formats from research project managers at ACRP, Transportation Research Board (TRB), Federal Aviation Administration (FAA), United States Department of Transportation (DOT), and other agencies.
- **Conducting detailed audience analyses** to better understand where, when, how, and from whom different airport professionals consume research and related information.
- **Slowly introducing** non-traditional formats to panels and research teams for incorporation into their projects as appropriate on a case-by-case basis. A phased roll-out of these new formats, perhaps using some pilot projects, will allow ACRP processes to be adapted, common resources to be provided where relevant, and subsequent project teams to learn from the early adopters. Panel members can then choose from formats that ACRP is prepared to support and that fit overall program objectives.

Incorporating feedback from these initial phases, ACRP will be better prepared to evaluate whether, how, and when to use non-traditional formats on a program-wide level.

template can be launched within virtual machine host software running on a physical machine or in the cloud. Some cloud service providers offer easy-to-use interfaces that help users find and launch a desired template. If the template is launched in the cloud, the user is typically charged a fee for the time the server is running, although the user can pause or stop interactions with the template at any time and is not charged for time when the server is not in use. While running, the server template acts as a normal computer that can host websites or applications.

Introduction

Objectives

The goal of ACRP Project 11-02, Task 24, was to investigate new and potentially beneficial formats for ACRP deliverables that differ from traditional research deliverables, namely printed and online Portable Document Format (PDF) reports. Alternative formats include websites, applications, databases, summaries, infographics, and audio recordings. Each format should be carefully considered on a project-by-project basis. The objectives of this investigation were to identify the alternatives, describe criteria that can be used to determine whether an alternative format makes sense for a given project, and provide guidance to support the successful implementation of that format.

Approach

The research team took the following steps to fulfill the objectives of this task:

1. Developed a comprehensive list of possible formats. This list was based on research in transportation and non-transportation industries, as well as the experience of research team members and input from the project panel. Descriptions were added to define each format and distinguish it from others. Similar formats were grouped into categories.
2. Narrowed the list of formats to those most likely to be (a) effective in conveying typical research results and (b) feasible for research teams to develop and for ACRP to maintain.
3. Identified criteria for determining how well each format can support the research objectives of a particular project.
4. Developed rough estimates of the range of costs required to implement each format as a means of conveying typical ACRP research content, as well as any ongoing annual costs that may be required.
5. Organized the assessment of each format into a series of pages that can be used to help research teams select and implement deliverable formats applicable to their projects.
6. Prepared a summary of this resource guide to describe the overall benefits that non-traditional formats can provide and a recommended path to enable them.

Findings

The team's initial research findings included the following:

- Many organizations leverage a growing variety of formats to convey concise, attention-grabbing, intuitive, and informative research results.
- Many audiences have increasing access to electronic media, but this limits the time they have to review any one source.
- Some research results can be more easily understood by some audiences when presented in an alternative format (e.g., a summary format for executives, training modules for airport staff).
- Research teams and panel members have found it difficult to decide which tools to use to develop formats because of the vast and growing array of options.
- The ongoing operations and maintenance costs of many formats can vary greatly depending on

the need to (a) keep the specific research content up-to-date and (b) keep up with technological upgrades that can impact some formats over time.

Conclusion

A broad range of alternative formats is available for research deliverables. Properly applied, these alternative formats have the potential to expand the comprehension and application of ACRP research. Alternative formats will help practitioners find and apply relevant research results to meet their specific needs. Phasing in the use of these formats will encourage the proper degree of consideration and enable the development of the support required to make them successful.

Delivery Formats

The criteria described in this section are intended to help Senior Program Officers (SPOs), project panel members, and research teams select, develop, and implement alternative formats for delivering the results of ACRP research projects.

Factors to Consider when Choosing a Format

Costs

The costs of deploying research deliverables in any format are incurred during and after a research project and span conception, design, development, dissemination, operations, and maintenance. Some formats consume very few funds beyond the initial cost of conducting the research. Other formats require significant funds. The costs associated with a specific format can also vary greatly depending on the size of the audience, complexity of the material, and other factors. Being largely driven by labor expenses, costs can also vary greatly by the type of firm or firms selected to develop the product.

The remaining sections of this report present costs expressed as ranges of estimated fixed and ongoing amounts. Based on the experience of the research team, these rough order of magnitude costs are typical for deploying the types of results ACRP projects produce. These ranges should be considered as guidelines and not limits, as higher or lower costs may be warranted on a case-by-case basis. Some delivery formats show a wide range of possible costs, which indicates the wide variety of options that exist. These options, and a basis for choosing them, are explained in corresponding text.

Two factors that significantly affect the costs of many formats are audio/visual quality and changes following project completion.

- **Audio/visual quality** can significantly affect the cost of developing highly graphic formats such as websites and infographics. Producing high quality graphics requires artistic, design, and layout skills. Recorded content requires audio-visual equipment and editing software. Voice-overs may warrant professional actors. The costs of employing people with these skills and obtaining the use of necessary equipment have not traditionally been reflected in ACRP research projects. Project panels also may need to include members with specific skills related to the delivery format in order to properly provide direction. Projects that incorporate audio/visual content also require additional cycles of content and graphical review. Despite these challenges, audio/visual content can have a significant impact on the degree to which practitioners productively use research results.
- **Changes** after completion of the research project drive the level of operational costs required after a project concludes. Some changes may be prompted by a desire to update content to reflect current conditions. Such changes can be addressed at the discretion of ACRP or another party that governs the dissemination of the research results. Other changes are not predictable or controllable. Examples include updates to required software, bugs discovered after a project is finished, and web-links that need to be updated. The longevity of using a format must be weighed against the benefits that format offers. ACRP does not have a funding model that allows for the provision of ongoing operations after the research project has closed. Therefore, formats that require ongoing funding for operations must have a sustainability plan that identifies future

ownership and funding sources.

Benefits and Risks

Benefits are the incremental improvements gained by using one format over another to communicate and/or apply the research results. Benefits are realized by practitioners when they can accomplish tasks more quickly or efficiently. Benefits are also realized when they allow practitioners to do something that they otherwise could not do.

Risks are factors that can increase the costs or hinder the benefits of implementing a research delivery format. Plausible risks that are identified by a research team can be evaluated based on the probability they will occur, the impact they will have if realized, and the degree to which there are ways to mitigate the risk. Based on their experience, the research team has made a relative assessment to indicate whether these risk characteristics are high, medium, or low for each delivery format.

Factors to Consider when Choosing a Format to Convey Research Results

Following is a list of factors that should be taken into consideration when using a format to convey research results. The factors span the lifecycle of developing, deploying, operating, and monitoring the research product. These factors are described in detail for each format covered in this report.

- **Development:** These factors include the skills, talent, equipment, and time required to develop the format.
- **Deployment:** These options include hard copy, PDF, Internet, web-based, and CD/DVD. The method(s) chosen may influence the benefits and costs of using the format.
- **Operations and Maintenance:** Operational responsibilities involve keeping the content up-to-date and the format functional after project completion. These responsibilities include governing (i.e., determining policy, quality, value, and appropriateness), administering (i.e., providing support, fixing bugs, upgrading software, and updating content), and managing the research deliverables.
- **Monitoring:** Measuring the success (i.e., usage, impact, breadth of use) of deliverables in a particular format helps determine if the benefits expected have been realized and if the format should be considered on future research projects. Such monitoring can be done passively (e.g., hidden statistics on website usage) or proactively (e.g., through requests that users of the material respond to a survey).

Guidance for Implementing a Format

This document provides guidance to ACRP SPOs, panel members, and research teams who are responsible for selecting and developing a research product in an alternative format. Checklists of steps that are specific to each format are recommended for use by the individuals who fill these roles, as summarized below:

- **SPOs** oversee the research project and help the panel reach consensus. With regard to selecting and implementing a format for research deliverables, SPOs should ensure that all relevant factors have been considered, known risks and mitigation options are identified, proper controls are in place to manage a successful outcome, and any necessary TRB resources are made available.
- **Panel members** guide the objectives and outcome of a research project by establishing a scope, selecting a research team to complete the work, offering guidance at interim stages, and providing feedback on draft deliverables. It is important that panel members be familiar with the format

options available to the researchers and approved for use by ACRP. Panel members must then evaluate the benefits and costs of relevant formats to determine the best option(s) for presenting the type of desired research results. As research products are developed, the panel should offer both guidance and feedback on how well the chosen format(s) meet project objectives.

- **Research teams** carry out the project research and, in doing so, prepare the research deliverables in the chosen format(s). Research teams should propose which formats they plan to use and how they plan to develop them. As the work is carried out, the research team should convey any challenges encountered to the SPO. As is done with guidance and feedback on research methodology or content, the research team should incorporate guidance and feedback on the deliverable format(s) as they are developed.

Assessment of Alternative Research Formats

The remainder of this report presents descriptions and assessments of non-traditional formats that have been selected based to the factors and considerations described above. These non-traditional formats could reasonably be applied within the context of a research project. In fact, several of the formats have been or are now being implemented on a limited basis. Other formats have not yet been applied to ACRP research results. Traditional formats, namely printed publications already commonly used by ACRP, have been excluded from this report. Other non-traditional formats, such as games, electronic books, press releases, Request For Proposal (RFP) templates, and Wikis³ were also considered but were either merged into other similar formats or were excluded because they are less beneficial for the dissemination of ACRP research results. The alternative formats assessed are grouped into categories as follows, based on primary characteristics that distinguish them from each other and from traditional formats:

- Primarily electronic formats
 - Websites
 - Applications
 - Databases or libraries (interactive)
- Primarily graphic formats
 - Training materials
 - Presentation materials
 - Infographics
 - Videos
 - Webinars (recorded)
- Other formats
 - Research summaries
 - FAQs (frequently asked questions)
 - Social media
 - Standards and specifications

³ Website that contains information about topics but can be freely edited and maintained by a defined set of users or the public.

Primarily Electronic Formats

The alternative formats described in this section are distinguished from others because they leverage electronic media and can therefore be disseminated via online websites or computer-based software. These primarily electronic formats offer a wide range of capabilities for sharing both static content that will not change after a research project is complete and dynamic content that can be adjusted by practitioners or organizations willing to update the content.

Websites

Description

Websites are a series of online pages that contain a variety of textual, graphical, video, and audio content formatted for viewing within a web browser. Websites may provide static research results, dynamically updated research results, a forum for collaboration and content creation by various stakeholders, or a platform for delivery of an application or database. Microsites are a form of website that provides information on a specific topic and can be imported into or accessed via a link from a broader website. Wikis consolidate input from a variety of sources to provide users with detail information on a particular topic. Websites can be hosted on a server controlled by the owner, or they can be hosted through a commercial service provider.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether this research deliverable format is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$7,000	\$55,000	\$0	\$40,000	\$7,000	\$95,000

The costs discussed in this section cover a wide spectrum of website complexities. They range from costs for a simple information-only website hosted on a content management system to those for a purpose-built website that provides access to a database or application. The typical process for developing websites is described in more detail in the appendix.

Cost Considerations for Implementing the Format During a Project

- Design costs include those associated with meeting with and documenting stakeholder requirements and evaluating the content and functional needs that accommodate the current and future objectives of the project. Website design for ACRP research projects should be relatively straightforward; however, depending on the complexity of the website and the nature of any

database or application that may be hosted, the costs may range from \$1,000 to \$25,000, exclusive of the additional costs of a database or application that may support dynamic website content.

- Development costs encompass the creation of the user interface underlying functional components, the end user interface, and the content. Depending on the complexity of the website and the nature of any database or application that may be hosted, the development costs may range from \$5,000 to \$25,000, exclusive of the additional costs of the database or application.
- Testing costs ranging from \$1,000-5,000 should be incorporated into the development costs of the project. Testing is required to ensure the functionality and usability of the website. For complex projects, testing may be undertaken as a discrete phase of the lifecycle and carry additional costs.

Ongoing Cost Considerations After Project Completion

- Deployment of a website can occur through an owner-hosted server, a commercial website hosting service, or—for very simple websites—through free hosting services. Depending on the host solution and the complexity of the website, costs for deployment could range from \$0 to \$15,000.
- Operations and maintenance of a website encompasses hosting, providing support for users, offering training for users, and maintaining the website’s functionality. Operations and maintenance costs can range from \$0 to \$25,000 annually, depending on the scale, scope, number of users, and level of activity of the website.

Benefits

- This format enables instant access by connected users through a desktop computer, mobile phone, or tablet.
- Websites provide flexibility for delivery of a wide array of platform and content options, with the website acting as the underlying infrastructure.
- Websites can accommodate content updates to keep research findings relevant over time. As appropriate, a website can extend the value and relevance of a research project beyond the time typically afforded by a static report or publication.
- The format facilitates direct engagement and collaboration with the user base. For example, depending on the nature of the research, a website can be designed to remain static or to dynamically incorporate increasing amounts of data contributed by new stakeholders.
- Websites convey information in a user-friendly, interactive, and customized format and are familiar to practitioners, who have become accustomed to seeking information from websites.

Risks

- Failure to stay within budget poses a significant risk due the technical nature of the format. The research teams that are most qualified to conduct the research and develop deliverables in traditional formats may not have the technical expertise to produce deliverables such as websites. Significant potential exists for a research team to underestimate the level of effort needed to be successful. (Probability: medium; Impact: Medium; Mitigation: Medium)
- Failure to manage operations successfully is a considerable risk. For example, if a proper sustainability plan is not put in place, competing interests may reduce the attention paid to maintaining the quality of the database. (Probability: Medium; Impact: High; Mitigation:

Medium)

Considerations During Development

The following factors should be considered during the course of the research project and during development of a website or webpages to convey the results. Some of these considerations may affect the determination of whether a website is applicable to a given project.

Development Factors

- Personnel (skills/talent) required: Technical project manager, website designer, content developer, and programmer.
- Equipment: Desktop computer, server with high-speed network connectivity, or hosted service.
- Requirements: Specific technical requirements must be identified and backward compatibility included where feasible.
- Testing: Testing must be thorough to ensure that links and any animated content on the website appear correctly when viewed. Testing should encompass the range of devices, browsers, and screen sizes on which they will be viewed.
- Appearance: Applications across research projects should have a consistent look and feel and be branded to be recognizably from the same organization (i.e., ACRP).
- Time required: 3–6 months

Deployment Options

- Intranet: This option limits access to authorized users.
- Internet: This option can offer limited or open access, as desired.
- Mobile Internet: This option involves tailoring for usability on mobile device(s).
- Quick response (QR) and similar codes: Scannable codes can be placed in guidebooks, blurbs, and other print or online material, including web pages. Such codes enable viewers to use a smart phone, tablet, or similar device to directly access additional electronic material (web pages, websites, etc.).

Operational Considerations

- Governance: Requires oversight of operations and maintenance phases as described above. If content is dynamic then policies for ownership, use, access, and content should be developed.
- Content management: Control content appropriateness, value, and quality.
- Administration: Resources to maintain daily operations and maintenance.

Monitoring Success

- Websites have a high ability to monitor use and gain feedback from users through direct engagement. Formal hosting providers have tools to track data regarding visitors.
- A website's success often is measured by the number of unique visitors in a given period of time. In addition to this metric, the monitoring aspects of the database or application that is being

hosted should be employed

Guidance for Using this Format in an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing websites as ACRP project deliverables.

SPOs

- Provide clear guidance regarding the risks and mitigation factors involved with this format to project panels that are reviewing proposals.
- Assemble a small group of 3–6 representative users, perhaps drawn from the project panel, which can be available to review the website during development.
- Help identify ACRP resources, other agencies, or organizations that can support application operations and maintenance.
- Encourage the use of templates as appropriate to foster a consistent design, look, and feel, and consistent graphics across all websites produced.
- Monitor the project schedule to allow sufficient time for the panel to review and provide feedback on the website before final design and development begin.

Panel Members

- Determine if the benefits offered by a website outweigh the costs and potential risks of this format. For example, this determination should evaluate the relative costs/benefits of a static website versus a dynamic one that is more costly to implement and requires ongoing maintenance, but that potentially extends the timeframe within which the research results will be relevant and useful to practitioners.
- Review research team resumes and references and validate the presence of the technical expertise needed to develop the proposed website(s).

Research Teams

- Assist in defining requirements (e.g., for website content, usability, and governance).
- Describe in detail why a website is a justifiable format for deploying the research results that address the problem statement.
- Provide a plan for carrying out each phase of website development and include costs for each phase.
- Describe the research team's approach to ensuring data security and data integrity.
- Provide resumes demonstrating that team members have the necessary technical skills and have experience developing similar websites. Specific roles (e.g., website designer, content developer, and programmer) should be specified or the proposal should explain why the roles are not needed.
- Provide a technical project manager to oversee the website development.
- Integrate the development of functional requirements and technical specifications as a specific task of the project.

- Identify one or more team members responsible for quality management.
- Identify risks and a plan to mitigate those risks.
- Provide a realistic plan and cost estimate for updating, operating, and maintaining the website.

Applications

Description

This format consists of software designed to provide information that satisfies a specific user requirement or business process. The software can be run on a desktop computer or mobile device as an installed application or through a standard web browser. The information provided can be derived from sources identified during the research project, external links that may be updated after the research project ends, or calculated by the application itself based on user inputs. Applications can provide a wide range of functions, including processing input to provide a result, communicating information to another party, simulating a real-world experience, delivering training content, or consolidating and displaying information from external sources.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether this research deliverable format is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$32,000	\$140,000	\$5,000	\$10,000	\$37,000	\$150,000

Applications have a lifecycle commonly referred to as the software development life cycle (SDLC), which encompasses design, development, and deployment phases.

Cost Considerations for Implementing the Format During a Project

- Design encompasses meeting with users; documenting their requirements; and designing a database, underlying code, and a user interface to address these requirements. Design is often carried out in an “agile” manner, meaning iteratively and progressively developing capabilities and checking with users to ensure that their needs are met. Costs for design of applications envisioned for ACRP research projects may range from \$1,000 to \$15,000, depending on the complexity of the application(s).
- Development encompasses the implementation and population of a database, if needed; programming or the application or configuring of off-the-shelf software products; and assembling the graphical components of the user interface. Development costs can range from \$25,000 to \$100,000, depending on the complexity of the application(s). Testing at critical junctures to ensure not only that the application performs as required but that user needs are adequately met is essential to a successful application. Testing is anticipated to cost \$5,000 to \$10,000 for the types of applications envisioned for ACRP research projects.

- Deployment of fully developed and satisfactorily tested applications can cost \$1,000 to \$15,000. Simple deployment of a mobile application on a platform vendor's online store can be quick, easy, and inexpensive. Deployment on server(s) on an organization's existing network may require discussions, deployment plans, additional testing, and possibly application reconfiguration.

Ongoing Cost Considerations After Project Completion

- **Operations** for an application will encompass hosting, if the application has been deployed in a client-server configuration; providing support for users; offering training for users; and managing the maintenance process. 3rd party tools, advanced services, user analytics, and other options can also increase the cost of operations if deemed beneficial. Operations costs can range from \$2,000 to \$4,000 per year.
- **Maintenance** of applications encompasses bug fixes; security patches; underlying software or hardware updates; data updates; and addressing new or changed requirements, if warranted. Maintenance is often supported by IT personnel who were not part of the development team. These personnel need to understand the software and hardware platform on which the application is built, but they may not know the functional requirements of the application itself. Ongoing maintenance costs can range from \$3,000 to \$6,000 per year.

Benefits

- This format provides an interactive experience that can tailor results to a specific practitioner's needs. Applications are therefore best suited to practitioners who will have a reoccurring need to perform the task or activity the application supports
- Applications can be accessed by users when and where the information is most useful, whether it be from their desktop computer or from a mobile device while working in the field.

Risks

- Mobile, desktop, and web-based applications (in descending order of likelihood) can become outdated, and in extreme cases obsolete, as the technologies used (i.e., programming languages, operating systems, and media formats) change. This risk can be mitigated by selecting established technologies that are less likely to change. (Probability: Medium; Impact: High; Mitigation: Medium)
- Many information system initiatives, which can broadly include applications, databases, interactive websites, and other formats, fail because of a lack of understanding of requirements, inadequate design, poor technical leadership, and insufficient management support. This risk can be mitigated by selecting a team that has previous experience developing similar applications. (Probability: High; Impact: High; Mitigation: High)
- People resist change, and practitioners may not use the application or tool, even if it is adequately designed, developed, and deployed. To avoid or mitigate this risk, the application must be easy to assimilate into user's work processes. In most IT settings, ease of assimilation can be fostered by management encouragement, training, and user support during the operational phase. In the context of ACRP research deliverables, the application must be designed well and be easy to access and use. (Probability: High; Impact: High; Mitigation: Medium).

Considerations During Development

The following factors should be considered during the research project and while the application is being developed. Some of these factors may impact the determination of whether the application format is appropriate for a given project.

Development Factors

- Personnel (skills/talent) required: Technical project manager, application designer, database designer (if a database is required), application developer, and creative designer (depending on the nature of the interface).
- Usability: The way users will interact with the application) should be considered in the design phase.
- Equipment: Development and test environments should be established that mirror the environment in which the application will ultimately be published. Integrated development environment (IDE) software, code repositories, and database platform (if required) should also be considered.
- Platforms: All possible platforms, including devices, operating systems, and screen sizes should be addressed in the development and testing phases.
- Backward Compatibility: Specific technical requirements must be identified and backward compatibility included where feasible.
- Scalability: Scalability should be considered during design so that the application and the platform on which it is deployed can adequately support the range, frequency, and duration of anticipated users.
- Revisions: It is important that the project plan allow for editing the application based on panel and editorial feedback before creation of the final deliverable for the research project. If edits need to be incorporated in an application after submission of the final deliverable, unexpected costs and delays may result.
- Testing: Applications must be thoroughly tested to ensure that they work as desired based on documented requirements. Testing should encompass the range of devices, operating systems, screen sizes, and other variations in the environments in which they will run.
- Appearance: It is suggested that across research projects, applications be branded to have a consistent look and feel, and so that they appear to be from the same organization.
- Time required: 6–12 months.

Deployment Options

- CD-ROM or DVD: Applications may be provided on a physical CD-ROM or DVD or provided online as ISO images, which allow users to download and burn their own CD/DVD.
- Download: Applications may be downloaded from designated FTP sites or websites maintained by ACRP, TRB, other organizations, or vendors of hardware on which the application can run.
- Cloud-based: Applications may be hosted in the cloud (i.e., on servers operated and maintained by a vendor and accessed via the Internet) and deployed as Software as a Service (SaaS).

Operational Considerations

- **Governance:** Oversight of operations and maintenance phases is necessary, as described above. If content is dynamic, then a policy for identifying and approving updates should be established.
- **Administration:** If the application is installed at practitioner's organization, IT staff may need to be involved in the deployment and maintenance phase. If hosted, then site administration will be required. Depending on the degree of usability, users may need to be trained. Users may also require ongoing support.
- **Inventory management:** Applications made available on CDs/DVDs must be replicated, stored, and shipped or made available for download. If the application is hosted, then the host website must be made available to practitioners.

Monitoring Success

- The success of applications is measured by the frequency, duration, and depth of use. Counters, third-party analytics, and other tools can be incorporated to provide usage statistics.
- Direct feedback from users after they have used the application for an ample period of time (i.e., 6–12 months) can help determine if the application is providing value and warrants ongoing operational and maintenance costs.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing applications as ACRP project deliverables.

SPOs

- Highlight to the panel and research team the importance of matching the complexity of the application with the target audience's capabilities.
- Provide clear guidance regarding the risks and mitigation factors involved with this format to project panels.
- Assemble a small group of 3–6 representative users, perhaps drawn from the project panel, who can be available to review the application during development.
- Help identify ACRP resources, other agencies, or organizations that can support application operations and maintenance after the research project is complete.
- Encourage the use of templates as appropriate to foster a consistent design, look, and feel, and consistent graphics across all websites produced by ACRP.
- Plan for flexibility in project budgets and schedules to allow for changes that may occur in technology and requirements as the project is carried out.
- Incorporate ample time into the schedule for panel reviews, testing and any resulting in-scope changes

Panel Members

- Determine if the benefits offered by an application outweigh the costs and potential risks of this format.

- Review research team resumes and references and validate the presence of the technical expertise needed to develop the proposed applications.
- Assist in defining requirements for the application.
- Participate in reviews during any required development.
- Be available to test the application at the interim stage and upon completion.

Research Teams

- Assist in defining requirements for the application (e.g., for content, usability, and graphics).
- Describe why an application is a justifiable format for deploying the research results that address the problem statement.
- Describe how the SDLC phases will be carried out and include costs for each phase in the proposal.
- As a part of the research, provide a document that lists the functional and technical requirements the application will meet.
- Define the high level success criteria for the project.
- Describe the design of the application simply using both text and a diagram or other visual.
- Create detailed design, requirements, and visual descriptions (e.g., wireframes, comps, or similar) for the system or appropriate subcomponents.
- If agile development will be used, explain the number of sprints (iterations) expected, cost/burn per sprint, goals of every sprint, and when application progress will be demonstrated.
- Describe the research team's approach to ensuring data security and data integrity.
- Provide team member resumes that demonstrate the technical skills needed and the team's experience developing similar applications. Each development role should be specified, or an explanation provided if it is not needed.
- Include opportunities in the project and application development schedule for representative users to review the application in various stages of development.
- Provide a beta and production test plan to ensure that the application meets requirements.
- Identify risks and an adequate plan to mitigate those risks.
- Provide a realistic plan and cost estimate for operating, updating (as needed), and maintaining the application.
- Recommend organization(s) that can operate and maintain the application after completion of the research project.

Database or Interactive Library

Description

A database or interactive library is a computer-based collection of data that allows users to query the information they require and, in some cases, add information pertinent to the topic. The database is stored on a centralized computer that is accessible over a network by desktop computer or mobile device through

an installed application or over the Internet through a web browser. The data within the database consists of information gathered during the research project, and may be updated through an established sustainability program.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether a database or interactive library is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$8,000	\$60,000	\$6,000	\$110,000	\$14,000	\$170,000

The costs addressed in creating a database or interactive library cover a wide spectrum. Potential database solutions range from simple web-based databases through services such as Sharepoint, to complex, custom-developed, application-centric databases.

Databases have a lifecycle similar to that of applications, though they are much simpler in the overall design and development.

Cost Considerations for Implementing the Format During a Project

- Design encompasses meeting with and documenting stakeholder requirements, evaluating the data integration points with related systems, and designing a database structure that accommodates current and future needs for data collection, organization, and access. It is anticipated that database design for ACRP research projects will be relatively straightforward, but depending on the complexity of the database and its host platform, costs may range from \$2,000 to \$10,000.
- Development that would be carried out as a part of a research project’s scope encompasses the configuration of commercial-off-the-shelf database software, database design within that software, population of the database, and creation of a user interface. Depending on the complexity of the database and its host platform, costs may range from \$6,000 to \$50,000. This cost does not include the development of the content, which is assumed to come from the research that is conducted. These development costs do however consider the cost of formatting and loading research results that are prone to this format into the designed database.
- Testing is required to ensure that the database functions as required; however, testing tasks should be integrated within the development phase, as opposed to being conducted as a discrete phase of the lifecycle.

Ongoing Cost Considerations After Project Completion

- Deployment of a database typically occurs through the development of a customized application or through a website. Depending on the nature of the end user interface, costs for deployment could range from \$1,000 to \$10,000 per year.
- Operations and maintenance of the database encompasses hosting, providing support for end

users, offering training for users; and maintaining the database functionality. There is a significant range in the level and cost of ongoing support required to maintain databases because of variability in the level of change within the data. A database intended to be a repository for relatively static data, would have operations costs on the low end of the spectrum. A database intended to house data that require periodic (not necessarily annual) updates to maintain the relevancy of the research over time would have operations costs in the midrange. A database intended to provide a mechanism for ongoing stakeholder contribution of data may require full-time operational support and would be at the high-end of the cost range. Operations and maintenance costs can range from \$5,000 to \$100,000 annually, depending on the scale, scope, number of users, and level of activity of the database.

Benefits

- This format enables targeted search of data and custom report development by an end user. Databases are appropriate for purposes that require the ability to find specific detail related to a definable set of criteria.
- The format also allows for content updates to keep research details current. Databases are an appropriate way to maintain a set of relevant data over time.
- A database or interactive library can enable contributions of data from multiple sources to create a more comprehensive resource. Databases are therefore an appropriate way to develop a knowledge base that extends beyond the constraints of the original research project.

Risks

- Failure to stay within budget poses a significant risk due to the technical nature of the format. Research teams that are most qualified to conduct the research and develop deliverables in traditional formats may not have the technical expertise to produce deliverables such as databases or online libraries. There is significant potential for a research team to underestimate the level of effort to be successful. This risk can be mitigated through detailed scope expectations and adequately evaluated references for the technical team members. (Probability: Medium; Impact: Medium; Mitigation: Medium)
- Failure to manage operations successfully is a considerable risk. If a proper sustainability plan is not put in place, competing interests may reduce the attention paid to maintaining the quality of the database. This risk can be mitigated by requiring research teams to develop a sustainability plan that is reviewed by panel member(s) with appropriate experience. (Probability: Medium; Impact: High; Mitigation: Medium)

Considerations During Development

The following factors should be considered while the database or interactive library is being developed during the course of the research project. Some of these factors may affect the determination of whether this format is applicable to a given project.

Development Factors

- Personnel (skills/talent) required: Technical project manager, database developer, information science specialist, application developer (if required).
- Usability: The way users will interact with the application should be considered in the design of

the database.

- Equipment: A server with high-speed network connectivity or hosted service. Specific technical requirements must be identified and backward compatibility included where feasible.
- Time required: 3–6 months.

Deployment Options

- Proprietary server connection: Limits access for a more controlled environment.
- Web-based: Can grant limited access or offer open access.
- Mobile: Accessible through mobile website or proprietary mobile application.
- Accessible: Databases can be accessed via applications websites or downloaded.

Operational Considerations

- Governance: Requires oversight of operations and maintenance phases. If database content will be dynamic, then policies for ownership, use, access, and content will need to be developed.
- Content management: Controls are needed to preserve content appropriateness, value, and quality.
- Administration: Resources are required to maintain daily operations and maintenance.

Monitoring Success

- The success of databases is measured by the accessibility and quality of content. For this format, the amount of information and traffic does not determine the measure of success.
- Ongoing evaluation of the content provided by subject matter experts is needed to ensure that quality is as required; the need for ongoing evaluation and governance protocols is greater for dynamic databases that accept user contributions of content.
- Periodic review of data sources and the user base is needed to ensure the target audience is being reached.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing databases or online libraries as ACRP project deliverables.

SPOs

- Make sure panel and research team members are familiar with TRB's Transport Research International Documentation (TRID), Research In Progress (RIP), and Research Needs Statements (RNS) databases, and encourage them to augment and not replicate the resources and capabilities of these existing databases.
- Provide clear guidance regarding the risks and mitigation factors involved with this format to project panels that are reviewing proposals.
- Assemble a small group of 3–6 representative users, perhaps drawn from the project panel, who

can be available to review the database or interactive library during development.

- Help identify ACRP resources, other agencies, or organizations that can support operations and maintenance of the database or interactive library after the research project is complete.
- Monitor the project schedule to allow sufficient time for the panel to review and provide feedback on the database or interactive library before final design and development begin.

Panel Members

- Determine if the benefits offered by a database or interactive library outweigh the costs and potential risks of this format.
- Review research team resumes and references and validate the technical expertise needed to develop the proposed databases or interactive libraries.
- Assist in defining requirements for the database scope, scale, and complexity (e.g., stand-alone through common software application, accessible through website, or integrated into custom application).
- Assist in defining requirements for the database content, usability, and governance model.

Research Teams

- Assist in defining requirements (e.g., for database or interactive library content, usability, and governance).
- Describe in detail why a database is a justifiable format for deploying research results that address the problem statement.
- Describe the research team's approach to ensuring data security and data integrity.
- Describe how the team plans to carry out each SDLC phase and provide cost estimates for each phase in the proposal.
- Provide team member resumes that demonstrate the necessary technical skills and show experience developing similar databases.
- Provide a technical project manager to oversee the database development.
- Integrate the development of functional requirements and technical specifications as a specific task of the project.
- Identify a quality management role in the team.
- Identify risks associated with development of a database or interactive library, along with an adequate plan to mitigate those risks.
- Provide a realistic plan and cost estimate for operating and maintaining the database or interactive library after completion of the research project.

Primarily Graphical Formats

This section describes research deliverable formats that are distinguished from others because they present information in a graphical format. Many graphical formats may rely on digital technology, but their primary value is that they convey information in an intuitive graphical format.

Training Materials

Description

Training materials can be valuable in enabling the implementation of a new process based on best practices. The following formats are most likely to achieve the desired result within the structure of ACRP research projects:

- **Workbooks:** Textual material containing lessons, examples, exercises, and quizzes to train a user. This material can be developed for self-paced learning by users or for classroom use led by a trainer. A workbook could serve as a final research product or be incorporated as an appendix with other final deliverables.
- **Train-the-trainer materials:** Textual guidance that supplements core content and provides the reader with instructions on how to best present the content to trainers for them to teach end users. Train-the-trainer materials often include information on how to prepare for and conduct an effective training session, learning objectives and training goals, suggested time requirements, key points, and questions for participants, along with explanations of core content.
- **Reference materials:** Compilations of content from ACRP research projects or other industry sources that can supplement core training material and easily be incorporated as appendices in final deliverables.
- **E-learning (web-based) materials:** Training materials that are presented via an interactive web-based course, either in real time (e.g., as a live webinar) or on demand as a pre-recorded webinar. Both formats may include online testing features. For on-demand formats, each user typically proceeds at his or her own pace and may self-certify after completion. E-learning materials may incorporate videos, demonstrations, and text as well as quizzes to engage users and assess their mastery and understanding of the material.
- **Lecture or demonstration series:** Training materials that are provided for a third-party to use during in-person lectures, live demonstration, a series of classes, or live or pre-recorded webinars and that present research in a single presentation or as part of a modular series. A wide range of resources could be developed to support this type of training material, including take-home readings and homework activities, group learning tools such as project activities and role playing exercises, class notes, open-book exam questions, study guides, worksheets, discussion questions, tip sheets, bibliographies, videographies, experiments, and extra credit assignments.
- **Videos:** Training materials that are presented via recorded video and that may involve lectures, slide presentations, or demonstrations. Videos are likely to be included as content on a CD or made available as a download associated with a final research product

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether this research deliverable format is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$50,000	\$0	\$25,000	\$1,000	\$75,000

Cost Considerations for Implementing the Format During a Project

- Design and development of training materials involves an understanding of how users learn and the learning environment that is best suited for the material. Costs will vary depending on the complexity and scope of the process and the presentation method that will be used. A simple step-by-step set of instructions may take a few hours for the core research team to create, whereas a video series or web-based instruction covering a comprehensive training course may require significant effort and specialized skills.

Ongoing Cost Considerations After Project Completion

- Deployment of training materials for an ACRP project can be achieved through inclusion within a guidebook or as a supplemental electronic file. To expand dissemination, material can be uploaded to a website. Training materials for web-based instruction will require a hosted platform.
- Maintenance requirements for training materials tied to a single research project are generally minimal. If a dissemination method is chosen that requires maintenance of a website or hosting account, ongoing fees may be incurred.

Benefits

- This format can aggregate research data from several projects into content that can be applied quickly in the field.
- Training materials are easily adaptable by industry associations to leverage and present content to their stakeholders, permitting ACRP's research to reach an even broader audience more quickly.
- The format is easily adapted for use in live presentations as well as print or electronic products.
- Training materials can provide specific instruction on how to implement a particular practice.
- The format enables users to put research results into action.
- Training materials can be developed for use in multiple ways, from individual, self-paced learning to classroom-style group learning.
- The format has minimal ongoing administration requirements.
- Training materials are well suited to operational audiences that want to quickly apply research results.

Risks

- The primary risk in the development of training materials is the difficulty inherent in creating teachable and learnable material from highly technical raw research. If the subject matter is highly technical in nature and the developer of the training material is a technical expert, the outcome may not have the simplicity needed to be easily implemented by an end user who is not also a technical expert. This risk can be mitigated by having a specific plan for how to reach the target audience and including on the research team a member who is experienced in conducting trainings and developing training material.
- Some practitioners may resist taking training courses—or using training materials in general—because of time constraints, lack of compensation for time spent in training, or failure to see its value. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

The following factors should be considered while the training materials are being developed during the course of the research project. Some of these factors may affect the determination of whether training materials are applicable to a given project.

Development Factors

- **Personnel:** Developing simple step-by-step instructions can generally be accomplished by a typical research team; however, complex courses will likely require an experienced training professional. In addition, if a technical delivery method is chosen, such as a web course or video series, specific skill sets in web development or video production will be needed.
- **Equipment:** Specialized equipment will only be required if video production or a web-based platform will be used. Basic video equipment can be suitable for typical productions. For web-based programs, development software or a hosted template-based platform will be required.
- **Time:** Once the underlying research and data have been compiled, development may require 1–2 weeks for simple step-by-step instructions, or 2–4 months or longer for video or web-based courses. Materials to support a lecture series could take a month to develop.

Deployment Options

- Text-based training materials, such as workbooks, reference materials, or materials supporting a lecture-style series, are easily printed and may also be made electronically available via PDF or HTML on a webpage.
- Videos and static or interactive online training materials are native to the digital environment. They may be deployed on websites, via CD-ROMs or DVDs, or housed within specific platforms, such as YouTube, Prezi, or other third-party environments. Online training materials also can be shared via email and social media.

Operational Considerations

- Text-based formats and recorded videos have no ongoing operational burden
- Web-based training materials require ongoing maintenance of the host website and the associated database; however, the operational considerations can be minimal if the nature of the course is static.

- Ongoing governance will be required if web-based training materials are expected to change over time (e.g., via regular or periodic updates).
- Ongoing administration requirements may include hosting of training materials on a website or social media platform.

Monitoring Success

- Successful dissemination of training materials can be measured by the number of times the material is visited, viewed, presented, and shared. Success may also be measured by how many people use the material and by survey feedback. Web-based platforms may be able to measure the comprehension rate of the material through test results and survey feedback.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing training materials as ACRP project deliverables.

SPOs

- Check the project scope to ensure that the proposed training materials are not redundant or unintentionally competitive with materials from other industry training providers, including agencies and associations.
- Assemble a small group of 3-6 representative users, perhaps from the panel, who can be available to review proposed concepts for the training materials prior to design and development. This small group should review both the content and its intended delivery format.
- Monitor the project schedule to allow sufficient time for the panel to review and provide feedback on the training materials before final design and development begin.

Panel Members

- Review research team resumes and ensure that the project proposal incorporates appropriate personnel with expertise in developing and conducting training material.
- Review the concepts and delivery methods of planned training materials and provide comments for the research team prior to approving the beginning of design.
- D
- Participate in design reviews with the project team and in test of the training material before final acceptance.

Research Teams

- As part of the proposal, explain why the proposed training material format(s) and delivery method(s) are appropriate for deploying the research results and user-friendly for the target audience.
- Provide resumes and references for team members, including appropriate team members with expertise in training for the chosen format and delivery method.
- Provide opportunities in the proposed schedule for panel members to review the training material

concept(s) prior to design and development.

- Identify risks with the training material format and delivery method and provide an adequate plan to mitigate those risks

Presentation Materials

Description

Presentation materials are an appropriate method for communicating research summaries and training materials from ACRP research projects. Research summaries and training materials have been previously addressed; therefore, this section will address the two primary types of presentation formats

- Slide presentations: This structured medium is used to display static written or graphical information in a sequential order. Electronic slide (e.g., PowerPoint) presentations are simple to develop and can be shared in almost any setting.
- Animated presentations: This structured medium is used to display written or graphical information in a dynamic order with a high degree of visual movement. Animated presentations can be challenging to develop and usually are displayed in limited environments.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether this research deliverable format is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$10,000	\$0	\$5,000	\$1,000	\$15,000

Cost Considerations for Implementing the Format During a Project

- Design and development of effective presentations requires an understanding of how to communicate material in a manner that is easily understood and at the proper level of technical detail to the target end users. Costs will vary depending upon the presentation method being used and the level of technical detail being communicated. Slide presentations may take a few hours of time from the core research team, whereas animated presentations covering extensive technical detail may take up a significant portion of the research project and require specialized skills.
- Deployment of presentations for an ACRP project can be achieved through supplemental electronic files to a guidebook, files uploaded to a website, or through a web-based platform.

Ongoing Cost Considerations After Project Completion

- Maintenance requirements for presentations are generally minimal. If dissemination requires ongoing presentations to be given over a period of time to different target audiences, modifications may be required to maximize the presentations' effectiveness.

Benefits

- This format provides specific information tailored to the target audience.
- Presentations enable dissemination of research summaries and training materials.
- Presentation materials can be used in multiple ways, from support for individual learning to group presentations.
- The format is portable and easy to share.
- Presentation materials present minimal ongoing administration requirements.

Risks

- The primary risk in the development of presentations is incompatibility with the target audience. A presentation can be considered as a mere introduction to a guidebook and can turn off end users if it is not developed at the appropriate level of technical detail. This risk can be mitigated by having a specific plan for how to reach the target audience and by having a team member who is experienced in developing presentations. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

The following factors should be considered while the presentation materials are developed during the course of the research project. Some of these factors may affect the determination of whether presentation materials are applicable to a given project.

Development Factors

- Personnel required: Developing slide presentations can generally be accomplished by a typical research team, however, complex animated presentations will likely require a team member with experience in the application being used.
- Equipment: Specialized software may be required for development of animated presentations.
- Time required: Once the underlying research and data have been compiled, development may require 1–2 weeks for slide presentations or 2–4 months for animated presentations.

Deployment Options

- Slide presentations are easily deployed in print and digital formats. Animated presentations can only be deployed in a digital format on portable media such as a CD/DVD or on a website.

Operational Considerations

- Presentation materials present no significant operational burden. If presentations will be given after completion of the research project, consideration should be given to updating or revising the slides as appropriate for differing target audiences.
- Ongoing governance is not required.
- Ongoing administration is not required.

Monitoring Success

- Successful dissemination of presentations can be measured by the number of times the presentation is visited, viewed, and/or shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing presentation materials as ACRP project deliverables.

SPOs

- Direct panel members to define the key points that they would like to be drawn out in presentations during the project scoping phase.
- Monitor the project schedule to allow sufficient time for panel members to review the draft presentation materials before final development begins.

Panel Members

- Define the key points that should be drawn out through presentations during the project scoping phase.
- Review research teams' concepts for presentations along with other interim deliverables and provide comments and feedback before final design and development begins.

Research Teams

- Explain why the chosen presentation format(s) are appropriate for presenting and deploying the research results.
- Provide opportunities in the schedule for panel members to review the presentation concept(s) prior to design and development.
- Develop a plan for identifying potential Presentation points throughout the course of the project.

Infographics

Description

Infographics are visual representations of information, facts, or other data arranged into a graphical format. Infographics can be static or dynamic. Static infographics typically are printable images, such as a collection of numbers or statistics overlaid with relevant illustrations, tables, or photos in an engaging design. Dynamic or interactive infographics, such as data cards, present blocks of information organized in a layered manner such that when users click on or hover over the top layer, additional details or data appear. Interactive infographics allow users to select, limit, and manipulate elements of the infographic, whereas static types do not.

Factors to Consider When Choosing this Format

The following benefits, costs, and risks should be described to and evaluated by panel members and research teams when determining whether infographics are applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$3,000	\$20,000	\$1,000	\$10,000	\$4,000	\$30,000

Cost Considerations for Implementing the Format During a Project

- Design of static infographics encompasses assessing research findings for data, statistics, and processes that can be better visualized in a graphic format, and finding or creating images or photos that complement, supplement, or amplify the data. Design costs will vary depending upon the complexity and size of the design and other direct costs for buying photos or artwork to use in each infographics. The cost of design of static infographics envisioned for ACRP research projects may range from \$1,000 to \$5000 per infographic.
- Development of dynamic infographics encompasses assessing research findings for data, statistics, and processes that can be better visualized and presented graphically with interactive features that allow users to alter or manipulate the results. Web development includes graphic design, coding, and user testing. Costs for development of infographics envisioned for ACRP research projects may range from \$2,000 to \$15,000 per infographic.

Ongoing Cost Considerations After Project Completion

- Deploying static and interactive infographics can cost \$1,000 to \$5,000, including the cost of printing static infographics or online posting of dynamic infographics. These one time charges may be repeated if moving to a different on-line location or reprinting hard copies.
- Maintenance requirements for static infographics are minimal. Dynamic and interactive versions may require hosting on a web server and basic monitoring and maintenance to ensure the product continues functioning as intended. Maintenance costs for infographics envisioned for ACRP research projects may range from \$0 to \$5,000 per set of infographics per year.

Benefits

- Infographics synthesize research results with concise graphical representations.
- This format enables end users to easily identify and digest a research project's most noteworthy outcomes and findings.
- Infographics are easily disseminated and sharable, and can be well suited for use in presentations.
- Infographics generally involve minimal ongoing administration requirements.
- This format is well suited to audiences that do not have a lot of time to read long documents.
- Infographics can be used in posters, websites, or with other graphical formats.

Risks

- The most significant risk associated with infographics is that, by summarizing or highlighting only selected findings, data, or other outcomes, they may lack sufficient detail, context, and background information needed by technical end users. This risk can be mitigated by pairing infographic products with addendums that provide users with the underlying data or descriptions that explain or supplement the graphical presentation. In other words, the value of an infographic to technical audiences may be limited because the format prioritizes summary over detail. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

The following factors should be considered while an infographic is developed during the course of the research project. Some of these factors may affect the determination of whether infographics are applicable to a given project.

Development Factors

- **Personnel required:** Developing all types of infographics requires individuals experienced in data visualization, graphic design, and web standards. Developing interactive infographics like data cards also requires team members with web development, programming, and testing expertise.
- **Equipment:** Specialized equipment needs are minimal, but research teams will need graphic design and/or web development software.
- **Time required:** Once the underlying research and data are compiled, development may require 1-3 months, depending on the type and complexity of the infographic.

Deployment Options

- Infographics are easily deployed in print and digital formats. Digital formats are used on websites and in presentations, and are embedded in other formats; they also can be shared via email and social media. Dynamic infographics are generally hosted on a website that allows the dynamic features to function.

Operational Considerations

- The operational burden of infographic formats is low.
- The ongoing governance requirements of infographic formats are minimal or nonexistent.

- Ongoing administration requirements for infographics include hosting of dynamic infographics (e.g., data cards) on a website or social media platform.

Monitoring Success

- Successful dissemination of infographics can be measured by the number of times the infographic is visited, viewed, and shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing infographics as ACRP project deliverables.

SPOs

- Monitor the project schedule to allow sufficient time for the panel to review the infographics before final design and development begin.
- Assemble a small group of 3–6 representative users, perhaps from the panel, who can be available to review the infographic concepts prior to design and development.

Panel Members

- Determine if the benefits offered to end users by an infographic outweigh the costs and potential risks.
- Assist in defining design specifications (e.g., size, resolution, color palette, imagery) and development requirements (e.g., coding format, software compatibility, web hosting) for the infographic.
- Review research teams' concepts for infographics along with other interim deliverables to provide comments and feedback before final design and development begins.
- Be available to review static infographics and conduct testing on dynamic ones.

Research Teams

- Explain why an infographic format is appropriate for presenting and deploying the research results.
- Provide resumes and references that demonstrate team members' creative and technical skills, as well as experience with developing infographic formats.
- Provide opportunities in the schedule for panel members to review the infographic concept(s) prior to design and development.
- Identify risks with using infographic formats and provide an adequate plan to mitigate those risks.

Videos

Description

Videos are an appropriate method for communicating research summaries and training material for an

ACRP project. Research summaries and training materials have been addressed in prior sections; therefore, this section will focus on the four primary types of video formats.

- **General:** Using recorded live action videos that convey information about one or more topics, a general video may be used for presentation purposes and/or to disseminate research summary information.
- **Screen captures:** Step-by-step recorded videos, possibly with audio, can show how a computer application or website is used.
- **Lectures:** Recorded live action videos can be used to convey educational material.
- **Press/media Releases:** Recorded live action videos can be used to convey news about a particular event or activity. As an example, this format could be used throughout a research project to inform potential research subjects or participants about upcoming engagement activities at trade shows or conferences.
- **Webchats:** Web-based live discussions between two or more parties interested in a particular subject. This format may be used to effectively communicate case studies or expert analysis on a specific subject.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether a video format may be applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$30,000	\$0	\$5,000	\$1,000	\$35,000

Cost Considerations for Implementing the Format During a Project

- Design and development of videos requires an understanding of how to communicate material in a manner that is easily understood and at the proper level of technical detail to the target end users.
- Development of high quality videos can be expensive and requires experience producing similar content. Costs will vary depending on the presentation method being used and the level of professionalism required.
- Simple videos may be produced during the course of the research effort with a basic video camera, whereas professional-quality videos need to be scripted, staged, directed, and edited, all using professional-quality equipment and perhaps professional actors.

Ongoing Cost Considerations After Project Completion

- Deployment of videos for an ACRP project can be achieved as a supplemental electronic file to the guidebook, uploaded to a website, or hosted through a web-based platform.

- Maintenance requirements for videos are minimal and only necessary if the videos are hosted on web-based platform.

Benefits

- Videos provide specific information tailored to the target audience.
- This format facilitates dissemination of research summaries and training materials.
- Videos can be used in multiple ways, from individual learning to group presentation.
- The format is portable and easy to share.
- Videos have minimal ongoing administration requirements.

Risks

- The primary risk in the development of videos is potential incompatibility with the target audience. A poorly produced or unengaging video may turn off end users. This risk can be mitigated by having a specific plan for how to reach the target audience and having a team member who is experienced in developing videos. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

The following factors should be considered while the video is being developed during the course of the research project. Some of these factors may affect the determination of whether the video format is applicable to a given project.

Development Factors

- **Personnel required:** Developing basic videos can generally be accomplished by the typical research team members. Professional-quality videos will require that a team member have professional video development experience.
- **Equipment:** Basic video cameras can be used to create basic videos, but professional-quality cameras, microphones, sets, and lighting are needed for professional-quality videos.
- **Time required:** Once the underlying research and data are compiled, basic video development may be accomplished in 8–24 hours; production of a professional-quality video may require 1–2 months.

Deployment Considerations

- Videos are easily deployed in digital formats and can accompany a guidebook on a CD-ROM or DVD, or be accessed via the Internet.
- Internet-based videos can be stored on private web servers or on a public website.
- Use of a private web server limits content access and will require operational support.
- Multiple public websites exist that can host videos in either privately controlled or publicly viewable modes. The privately controlled modes for professional video hosting sites require membership licenses; however, social media outlets exist that allow non-cost accounts to provide access control.

Operational Considerations

- There is no operational burden for videos.
- Ongoing governance is not required.
- Ongoing administration is only required if the videos are posted to an Internet site that requires administration.

Monitoring Success

- Successful dissemination of videos can be measured by the number of times the video is viewed and shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing videos as ACRP project deliverables.

SPOs

- Direct panel members to define the key points that they would like to be drawn out in videos during the project scoping phase.
- Suggest or require standard formats, introductions, and styles for recording that ACRP may establish or recommend.
- Ensure that the proposed schedule allows sufficient time for the panel to provide comments and feedback on the videos before final design and development begins.

Panel Members

- Define the key points that should be drawn out using video(s) during the project scoping phase.
- Review the resumes and references submitted by the research team to validate the presence of the necessary technical expertise (for complex or professional-quality videos).
- Review research teams' concepts for videos along with other interim deliverables provide comments and feedback before final design and development begins.

Research Teams

- Explain why the chosen video format is appropriate for presenting and deploying the research results.
- Consider including interviews or statements from practitioners who represent the intended audience to build credibility and rapport into the video.
- Provide opportunities in the schedule for panel members to review the video concept(s) prior to design and development.
- Provide detailed schedule and cost information as needed for complex or professional-quality videos, if proposed.

Webinars (Recorded)

Description

Webinars typically are created by recording presenters who have gathered in advance to record a prepared audio presentation with accompanying slides. Recorded webinars can be scheduled, replayed, and made available online for download.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether a recorded webinar is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$2,000	\$10,000	\$0	\$6,000	\$2,000	\$16,000

Cost Considerations for Implementing the Format During a Project

- Development of recorded webinars encompasses distilling research findings for information to highlight, describe, and/or explain; outlining and creating presentation content; and recording the webinar. Costs for development of recorded webinars envisioned for ACRP research projects may range from \$2,000 to \$10,000.

Ongoing Cost Considerations After Project Completion

- Operations costs for recorded webinars can range from \$0 to \$3,500 per webinar, and generally include the costs of online hosting of the recorded audio/visual file and communicating its availability and location to end users.
- Maintenance requirements for recorded webinars are minimal. Recorded audio/visual files may require ongoing hosting on a web server on TRB premises or using a cloud-based service provider with webinar-hosting capability, and basic monitoring and maintenance to ensure the product continues functioning as intended. The cost of maintenance of recorded webinars envisioned for ACRP research projects may range from \$0 to \$2,500 per webinar or related series of webinars.

Benefits

- Recorded webinars can be made available on demand.
- Recording allows the producer to control quality.
- Webinars accommodate the needs of both auditory and visual learners.
- This format is portable and easily disseminated.
- Recorded webinars require few specialized skills or equipment to produce.

Risks

- The most significant risk associated with recorded webinars is that their value and utility are

dependent upon the skill and talent of the presenter (both content and delivery) and, to a lesser degree, the producer. This risk can be mitigated by review and feedback from the project panel. (Probability: low; Impact: medium; Mitigation: low).

- A secondary risk of this format is that recordings can be hard for users to find (e.g., buried within a website's archives), slow to load/download, or suffer from poor visual/audio quality. This risk can be mitigated by quality control oversight by the panel and by planning for long-term hosting needs before the project is complete. Search engines and tools may also make it easier for practitioners to find the content they desire. (Probability: Low; Impact: High; Mitigation: Low)

Considerations During Development

The following factors should be considered while recorded webinars are being developed during the course of the research project. Some of these factors may affect the determination of whether a recorded webinar is applicable to a given project.

Development Factors

- Personnel required: Producing recorded webinars requires individuals with experience operating webinar software and requires skilled presenters.
- Equipment: Specialized equipment needs are minimal, but research teams will need webinar software or services.
- Time required: Once the underlying research and data are compiled, development and production may require a few days or a few months, depending on the complexity and format of the content being presented.

Deployment Options

- Recorded webinars are a well-established format and easily accessible for many users. Software programs for viewing audio/video files are widely available at little to no cost.
- Several digital file format types are available that combine the audio and visual elements of a recorded webinar.
- Web-based hosting is simple and inexpensive. Recordings can be hosted on TRB's website or on third-party platforms such as YouTube or Vimeo.

Operational Considerations

- The operational burden of recorded webinar formats is quite low.
- It is suggested that recorded webinars share some common and standardized elements (e.g., proper use of NAS, TRB, and/or ACRP logo(s); information about the project sponsors; and references to panel members/oversight committee). However, post-production ongoing governance requirements are quite low.
- Ongoing administration requirements for this format include hosting the recorded file on a website.

Monitoring Success

- Successful dissemination of recorded webinars can be measured by the number of times the

recording is downloaded and/or viewed

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing recorded webinars as ACRP project deliverables.

SPOS

- Suggest or require standard formats, introductions, and styles for recording that ACRP may establish or recommend.
- Ensure that the webinar concepts, outline, draft presentation slides, or other visual components are provided with interim deliverables to allow time for panel comments and feedback prior to production.
- Keeping in mind that TRB schedules webinars well in advance, coordinate any webinar resulting from a specific project with the ACRP program director so that it can be submitted to TRB for consideration and scheduling.

Panel Members

- Vet research teams for a demonstrated commitment to high quality presentation and possession of the necessary subject matter expertise and presentation skills.
- Remind the research team to contextualize findings in the webinar so that the findings are widely relevant to the airport community.

Research Teams

- Plan to present research findings in a visually compelling manner— large data tables and lengthy written explanations are not well suited to this format.
- Practice making the presentation and using the webinar software in advance to ensure a fluid and fluent delivery.
- Remember that users will be interested in the topic but will not be experts. Present high level conclusions while being prepared to provide details and methodologies in response to anticipated questions. If the webinar will be recorded during a “live” session with attendees, be prepared to answer questions as part of the recorded format.
- Honor scheduled recording and presentation commitments.
- Supplement ACRP’s marketing of the webinar to attract the maximum number of interested attendees.

Other Formats

This section describes research deliverable formats that do not have a single predominant characteristic that distinguishes them as a group from traditional formats.

Research Summaries

Description

Research summaries are widely used and with traditional deliverables, such as ACRP guidebooks, as well as in non-traditional deliverables, such as websites. These summaries are important in communicating specific elements of the research and can be of great value for disseminating results in a concise and intuitive manner. The most notable summary formats include:

- Case studies, which describe how one or a group of related practitioners resolved an issue.
- Effective practices, which provide guidance based on successful results achieved by other relevant practitioners.
- Headline statements, which draw attention to important, noteworthy facts or findings in a single, attention-grabbing phrase.
- Position statements, which paraphrase the policy or stance of an association or group, such as IATA or ACI, on a specific issue.
- Recommendations, which provide guidance based on analysis of effective practices.
- Tips, which provide a series of short, user-friendly recommendations for achieving an objective quickly and efficiently.
- Timelines, which graphically communicate progress over time and present data chronologically.
- Abstracts, which highlight research objectives, methodology, results, and conclusions so the reader can quickly grasp the scope and findings of the research by reading less than a page of text.
- Fact sheets, which are one-page or two-page handouts that cover key points and facts from the research results.
- Talking points, which provide preparatory material for presentations and include brief statements that summarize the most important findings.
- Posters, which are highly graphic, visual presentations of research results, usually on large output designed for display at a conference or for hanging on walls.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether one of these research summary formats is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$10,000	\$0	\$0	\$1,000	\$10,000

Cost Considerations for Implementing the Format During a Project

- An abstract, a fact sheet, and key talking points can all easily be created directly from guidebook content. The primary effort is expended on determining what exact points should be included to achieve the desired outcome. For each summary format to be effective, it must cover the necessary elements without unnecessary elaboration. The cost to deploy these formats is minimal, as they should only take a few hours of effort to implement.
- Posters may require slightly more design, development, and deployment costs than the other formats noted given the requirement of a design layout, often including graphics. This format may require the support of a design specialist, depending on the complexity of the poster.

Ongoing Cost Considerations After Project Completion

- No maintenance costs are associated with research summaries, as they are a summary of completed research and do not require any modifications or updates once the final guidebook has been published.

Benefits

- This format synthesizes research results with concise information, making them well suited to practitioner audiences that have little time for reading long document.
- Research summaries enable end users to easily identify and digest a research project's most noteworthy outcomes and findings.
- Most of these formats are easily disseminated and sharable; also, they are well suited for use in presentations.
- Research summaries require virtually no ongoing maintenance.
- Research summaries can be deployed using a variety of presentation formats to best accommodate the target audience.

Risks

- The most significant risk associated with research summaries is that by summarizing or highlighting only selected findings, data, or other outcomes they may lack sufficient detail, context, and background information needed by technical end users. This risk can be mitigated by including references within the summaries that direct the user to the relevant sections of the guidebook or background information for further understanding. (Probability: Low; Impact: Low; Mitigation: Low)

Considerations During Development

The following factors should be considered while the research summary is being developed during the

course of the research project. Some of these factors may affect the determination of whether the summary format is applicable to a given project.

Development Factors

- Personnel required: In most cases, developing research summaries requires no specialized expertise beyond that of the research team involved in developing the guidebook. Additional support may be required to enable dissemination through complex or technical methods.
- Equipment: No special equipment is required to develop research summaries.
- Time required: Once the underlying research and data are compiled, development may require 1–2 weeks, depending on the approach to development (e.g., individual or group-based).

Deployment Options

- Research summaries are easily deployed in print and digital formats. Digital formats are used on websites, presentations, and embedded in other formats; they can be shared via email and social media.

Operational Considerations

- Research summaries have no ongoing operational, governance, or administrative requirements.

Monitoring Success

- Successful dissemination of research summaries can be measured by the number of times the summary is visited, viewed, and shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing research summaries as ACRP project deliverables.

SPOs

- Direct panel members to define the key points that they would like to be drawn out in research summaries during the project scoping phase.

Panel Members

- Determine if the format(s) chosen for the research summaries will meet the expected benefits.
- Define the key points that should be drawn out as research summaries during the project scoping phase.
- Examine research teams' concepts and format for research summaries along with other interim deliverables to provide comments and feedback before final design and development begins.

Research Teams

- Explain why the chosen research summary format is appropriate for presenting and deploying the research results.

- Provide opportunities in the schedule for panel members to review the research summary concept(s) prior to design and development.
- Develop a plan for identifying potential research summary points throughout the course of the project.

Frequently Asked Questions (FAQs)

Description

Frequently asked questions (FAQs) are a series of questions that are commonly asked by individuals working on a particular issue, task, or activity. Providing responses to FAQs helps others who may have the same or similar questions. The FAQs can be developed proactively during the course of research for publication with the guidebook content or developed as a supplement to the guidebook after dissemination activities.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether FAQs are applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$5,000	\$0	\$5,000	\$1,000	\$10,000

Cost Considerations for Implementing the Format During a Project

- Design and development of FAQs can be a simple process of documenting questions that arise from within the research team along with the resulting answers. FAQs also can be generated from a research summary by reworking the content from a direct set of facts or talking points to a question and answer format. Costs will vary depending upon the presentation method being used and the level of technical detail being communicated. FAQ lists may be compiled from the research team one question at a time over the course of the research project, but they should take no more than a week or two to fully compile and refine.

Ongoing Cost Considerations After Project Completion

- Deployment of FAQs for an ACRP project can be achieved as an appendix or supplemental electronic file to a guidebook, uploaded to a website, or through a web-based platform.
- Maintenance requirements for FAQs would be appropriate to develop when a set of FAQs is specifically developed to answer common questions that arise during dissemination activities.

Benefits

- FAQs provide specific information that address common questions.
- This format can be utilized in multiple ways, from individual learning to group presentations.

- The format is portable and easy to share.
- FAQs have minimal ongoing administration requirements.

Risks

- The primary risk in the development of FAQs is the possibility of enabling responses that are incorrect or opinion based. Answers to FAQs are assumed by the user to be factual and correct and not an opinion. This risk can be mitigated by having a plan to proactively identify FAQs throughout the course of the research and have the subject matter experts develop the responses. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

It is suggested that the following factors be considered while FAQs are developed during the course of the research project. Some of these factors may affect the determination of whether FAQs are applicable to a given project.

Development Factors

- Personnel required: Developing FAQs can be accomplished by the research team's subject matter experts.
- Equipment: No specialized equipment or software is necessary.
- Time required: FAQs can be identified throughout the course of the research project; final development may require 1–2 weeks.

Deployment Options

- FAQs are easily deployed in print and digital formats.

Operational Considerations

- FAQs present no significant operational burden. Responsive FAQs may be developed after dissemination presentations, if required.
- Ongoing governance is not required.
- Ongoing administration is not required.

Monitoring Success

- Successful dissemination of FAQs can be measured by the number of times the FAQs site is visited, viewed, and shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing FAQs as an ACRP project deliverable.

SPOs

- Direct panel members to define the key points that they would like to be drawn out in FAQs during the project scoping phase.
- Monitor the project schedule to allow sufficient time for the panel to review and provide feedback on the FAQs before final design and development begins.

Panel Members

- Determine if the use and format of the proposed FAQs will achieve the expected benefits.
- Define the key points that should be drawn out as FAQs during the project scoping phase.
- Review research teams' questions to ensure that they adequately represent the types of questions practitioners are expected to have. Review the answers to ensure consensus on the most appropriate and accurate answer to each question.
- Ensure that the questions and answers are at the appropriate technical level for the intended audience.

Research Teams

- Explain why the chosen FAQ format is appropriate for addressing the research results.
- Provide opportunities in the schedule for panel members to review the FAQ concept(s) prior to design and development.
- Develop a plan for identifying potential FAQ points throughout the course of the project.

Social Media

Description

Social media platforms can be very effective for disseminating research results. To leverage the power of social media, however, research results would need to be created in or adapted to specific formats or features that are specific to social media platforms. Relevant social media formats and features that could serve ACRP research products include:

- **Hashtag campaign:** A promotion that unfolds on social media platforms that use and encourage others to use one single hashtag for easy tracking of related information.
- **Key findings:** Content that focuses on key findings but is formatted specifically to be easily posted and reposted multiple times on social media platforms (e.g., content expressed with the fewest possible number of characters; content that is linked to or made up of photos, graphics, or other visuals).
- **Sharing:** Content or a campaign that encourages social media users to share themed images or content with each other; or, content that one agency shares externally across social media in support of a theme or contest.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether a social media campaign is applicable to a

particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$1,000	\$20,000	\$0	\$10,000	\$1,000	\$30,000

Cost Considerations for Implementing the Format During a Project

- Social media content can come directly from the guidebook content or, ideally, it can developed as research results are being formulated. The primary effort associated with the design and development of social media content is the determination of what social media platforms and features should be used to achieve the desired outcome.
- To successfully deploy social-media-friendly content, researchers should make sure their target audiences use and collect information from the various websites and applications on which the content will be distributed. Costs associated with determining target audience preferences can vary depending on how well the research team knows its audience.

Ongoing Cost Considerations After Project Completion

- Maintenance of the social media campaign is the primary cost. Effective social media engagements are based on relevant messages being shared among users. Ongoing effort is required to keep the message in front of users over time and ensure the success of the campaign.

Benefits

- Social media campaigns provide specific information tailored to the target audience.
- This format enables dissemination of research summaries
- Social media messages can be easily disseminated to a large number of users in real time
- Information can be easily shared among users, creating organic growth of the message
- This format has minimal ongoing administration requirements.

Risks

- The primary risk in a social media campaign is the lack of a proper strategy to engage with the target audience. Different social media platforms have different groups of users, and investing time and effort in a platform that is not compatible with the target audience will be a waste of time. Further, the nature of the content must be properly aligned with the means of communication. This risk can be mitigated by having a social media strategy developed by a team member who is experienced in social media campaigns. (Probability: Medium; Impact: Medium; Mitigation: Low)

Considerations During Development

It is recommended that the following factors be considered when developing a social media campaign during the course of the research project. Some of these factors may affect whether this format is

applicable to a given project.

Development Factors

- Personnel: Developing social media campaigns should be performed by individuals with significant experience and understanding of the full spectrum of social media platforms.
- Equipment: No specialized equipment or software is required.
- Time: Development of a strategy will likely take 1-2 months of ongoing collaboration between the social media expert and the team members. After this, and once the underlying research and data are compiled, development of messages will take 1–2 hours at a time.

Deployment Options

- Social media campaigns are deployed in digital format through specific Internet-based applications. Some applications enable a user to post articles, comments, pictures, and videos, whereas others are focused on a specific element or two. The way in which social media is utilized throughout the project should be based on a strategy tailored to the nature of the specific research project.

Operational Considerations

- The extent of the operational burden for social media campaigns is based on the strategy. If the campaign is intended to do an initial announcement of the guidebook publication, there will be no significant operational burden. If the campaign is intended to provide ongoing dissemination or enable ongoing engagement with end users, however, there will be a significant operational burden, although it is likely that the support can be provided through volunteers.
- Ongoing governance may be required if there is a long-term strategy for ongoing engagement.
- Ongoing administration may be required if there is a long-term strategy for ongoing engagement.

Monitoring Success

- Successful dissemination of social media campaigns can be measured by the number of times the messages are visited, viewed, followed, and shared.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing social media campaigns as ACRP project deliverables.

SPOs

- Direct panel members to define the expectations they have from the social media campaign during the project scoping phase.
- Ensure that there are opportunities in the schedule for panel members to review the social media campaign strategies prior to their final design, development, and implementation.

Panel Members

- Define the expectations that they have for the social media campaign during the project scoping phase.
- Review research teams' proposed strategies for social media along with other interim deliverables to provide comments and feedback before final design and development begins.
- Determine if the media chosen for social media campaign meets the expected benefits.

Research Teams

- Explain why the chosen social media campaign platforms are appropriate for presenting and deploying the research results.
- Provide opportunities in the schedule for panel members to review the social media campaign strategies prior to their design, development, and implementation.
- Develop a strategy for identifying specific social media engagement plans throughout the course of the project.

Standards and Specifications

Description

Standards and specifications address processes, structure, or steps established by authority, custom, or general consent as a requirement, guideline, or example to follow (adapted from Merriam-Webster's Dictionary). Standards and specifications can be based on tested results, consensus of experts, or documented best practice. They can be offered as a guideline for practitioners to follow if and as they wish, or they can be mandated by regulators. Based on the Code of Federal Regulations (45 CFR 160.103), standards setting organizations (SSOs) develop and maintain standards for data elements and information transactions and are accredited by the American National Standards Institute (ANSI). Committees, agencies, consultants, and—in the case of ACRP—research teams can develop standards and specifications and submit them to regulators and SSOs or offer them to practitioners as guidelines. Standards and specifications typically take the form of a document that is formatted to delineate individual items. A standard can also be formatted as a request for proposals (RFP) that organizations can use to procure products or services.

Factors to Consider When Choosing this Format

It is suggested that the following benefits, costs, and risks be described and evaluated by panel members and research teams when determining whether a standard or specification format is applicable to a particular project.

Costs

<i>Implement (during project)</i>		<i>Ongoing (after project)</i>		<i>Total</i>	
Low	High	Low	High	Low	High
\$5,000	\$10,000	\$250	\$10,000	\$5,250	\$20,000

Cost Considerations for Implementing the Format During a Project

- Development of a standard or specification is not very expensive, ranging from \$5,000 to \$10,000 once the underlying research has been completed. With the inclusion of the underlying research, cost ranges can vary from medium (\$25,000 to \$50,000) if a consensus of expert opinions is needed to high (\$100,000 to \$500,000) if scientific testing is required.

Ongoing Cost Considerations After Project Completion

- Operational costs are very low, ranging from \$250 to \$1,000, if the standard or specification is deployed electronically, or low, ranging from \$5,000 to 10,000, if hard copy printing is required for what tend to be large documents. These costs occur once, unless reprints or hard copies are desired and may therefore be incorporated into the initial project costs.

Benefits

- Research projects apply a regimented, consensus-based approach to developing standards and specifications that give them credibility among practitioners and SSOs.
- Standardized RFPs can offer expertise and provide specifications founded on best practice to procurement and project managers who may not have sufficient expertise.
- Based on industry problem statements, research projects may extend standards into needed areas that SSOs and regulators are not well equipped to address.
- The impact of this format can be very high if a regulator or SSO adopts a standard or specification that is developed as a result of a research project.
- If so adopted, practitioners throughout the industry can benefit from having a new well-founded guideline.

Risks

- The most significant risk is that a SSO or regulator will not adopt or adapt the standard or specification. This risk can be reduced if the SSO or regulator helps develop the problem statement or endorses the project after it has started. (Probability: Medium; Impact: High; Mitigation: Medium)
- There is also a risk that practitioners will not use the standard or specification if it is presented as an optional guideline. This risk can be mitigated by identifying a common need among practitioners during the problem statement or proposal stage. (Probability: Medium; Impact High; Mitigation: Medium)
- Standards and specifications can become obsolete if the technology or process they reference becomes outdated. The likelihood of such obsolescence should be considered before the standards or specifications are developed. Steps can be taken to adjust the scope of the standard or specification to offer greater longevity. (Probability: Low; Impact: High; Mitigation: Low)

Considerations During Development

It is recommended that the following factors be considered while the draft standards or specifications are developed during the course of the research project. Some of these factors may affect the determination on whether the format is applicable to a given project.

Development Factors

- Personnel required: Standards and specifications should be developed by individuals who are experts in the field and who have practical experience in developing the items to be standardized or specified.
- Equipment: If data collection, direct measurement, or testing will be involved, then highly specialized equipment may be required.
- Time required: Testing may require varying periods of time (30 – 120 days depending on the subject matter) for valid results to come in. Consensus-based standards also require time (30–90 days) for representative practitioners to review and comment on the standard or specification.

Deployment Options

- Standards and specifications are easily deployed as PDF and/or hard copy documents. If the number of items and characteristics of the items to be standardized or specified is high, consideration should be given as to how readers will find relevant details.
- Detailed tables that are a part of some standards and specifications may be included in a website or application, so there is an opportunity to deploy standards and specifications in conjunction with another format.

Operational Considerations

- The operational burden of standards is low because they take the form of a document that is only revised when underlying conditions or industry needs change.
- Standards and specifications must evolve as new requirements, technologies, or results become available. It is suggested that the governance, administration, and inventory management become the responsibility of the adopting SSO or regulator.
- SSOs can consider adopting, adapting, or referencing the standard as a requirement or guideline.
- If presented as guidelines, practitioners can adopt the standard or specification as they deem relevant, thus transferring the operational burden to the practitioner.

Monitoring Success

- The success of standards and specifications is based on whether a SSO or regulator adopts the standard. This is easily identified through follow-up contacts with such organizations.
- If the standard or specification becomes a guideline that is not specifically endorsed, then monitoring its success can be more difficult. Follow-up contacts with a representative number of practitioners would be necessary to determine if the standard or specification is being broadly used.

Guidance for Using This Format Within an ACRP Project

The following steps are recommended for ACRP SPOs, panel members, and research team members when considering, choosing, and implementing standards and specifications as ACRP project deliverables.

SPOs

- Often there is no definitive right or wrong way to standardize or specify a given item. The process therefore relies heavily on achieving consensus, which can be difficult to attain, especially when highly technical content is involved.
- SSOs or regulators that may adopt a standard or specification should be identified early in the project and invited to become involved, either as participants on the panel, or as liaisons. They can provide guidance on any policies or protocols that should be followed, including a possible public review period, in order for the standard or specification to be subsequently adopted.
- Standards and specifications can be incorporated into an interim deliverable review cycle, so long as the panel has sufficient time (a minimum of 30 days) to review and comment on the draft standard or specifications.
- The project schedule and budget can be prolonged by 12 months or more if data collection, direct measurement, or testing will be required to establish the standard or specification.
- Research document formats may need to be altered to support the lists and tables often found in standards and specifications.

Panel Members

- Panel members who participate in the consensus-building process should have direct experience with the subject matter and access to the detailed results of the research.
- Standards and specifications are detailed documents that necessitate thorough review. This will require significant time.

Research Teams

- SSOs or regulators that may endorse the standard when it is complete should participate in the development of the problem statement or be identified in the proposal and later involved in the project.
- The unmet need and target audience for a proposed standard or specification must be clearly demonstrated in the proposal.
- The breadth of items to be covered must be clearly defined in the proposal.
- A sample of how items will appear in the final standard or specification should be provided as early in the project as possible.

Appendix: Basic Process for Website Development

In general, website development follows a standard software development lifecycle. Taking this approach will help the project team to meet the scope, schedule, budget, and quality objectives of the project. The basic steps can be grouped in stages as follows:

Review, Assessment, and Analysis

- Identify stakeholder requirements.
- Develop work plan.
- Develop cost estimates.
- Identify team requirements (developers, designers, quality assurance staff, database administrator, etc.).
- Document hardware and software requirements.
- Develop supporting documentation.
- Validate planning documentation with stakeholders.

Specification Development

- Identify technical specifications (general layout, site navigation, dynamic elements, and technical requirements).
- Develop technical specification document.
- Validate specification documentation with stakeholders.
- Refine work plan, cost estimates, team requirements, and hardware/software requirements.

Design and Development

- Design layouts and navigation as a prototype.
- Validate prototypes with stakeholders.
- Document design changes and integrate into prototype.
- Develop test plans and procedures for quality assurance.
- Assess and understand the database requirements.
- Develop the database and populate it with sample data.
- Develop content templates.

Content Development

- Develop project-specific content within templates.

Coding

- Develop database-driven functions for the website.
- Develop programming documentation.

Testing

- Conduct testing according to the developed test plans.
- Include tests for integration, stress, scalability, load, resolution, and cross-browser compatibility.
- Develop testing reports and review error logs.
- Address issues through redesign, development, and coding as required.

Search Engine and Social Media Optimization

- Prepare meta tags and submit the URL to search engines and directories.

Maintenance and Updating

- Develop maintenance and update plan.
- Conduct analysis on a periodic schedule and address all lifecycle steps as required.
- Fix bugs during maintenance windows.
- Perform ongoing promotion, technical maintenance, content management, and updating on a regular schedule.