GUIDELINES FOR WRITING RESEARCH RESULTS

A comprehensive guide to understanding the requirements of summary Research, Development and Technology reports.

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Revised October 2019

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OVERVIEW TO RESEARCH RESULTS

The Federal Railroad Administration's (FRA) Office of Research, Development & Technology (RD&T) periodically produces brief, plain-language reports called *Research Results* that summarize the findings of projects associated with track, rolling stock, train control and communications, or human factors research.

These summary reports are written for nontechnical and technical audiences and include figures and tables. *Research Results* are intended to present the purpose for undertaking a given research project, methods used in the study and a brief description of findings and recommendations, if applicable. The publication of *Research Results* may be followed by a longer *Technical Report* on the same study, which offers a more in-depth analysis of the research conducted, complete with technical specifications and results. However, they may also be used for intermediate project reporting after a significant milestone has been reached or in lieu of a full *Technical Report* for short projects.

The following guidelines are to assist *Research Results* author(s) with preparing drafts that meet RD&T's submission standards so that the drafts are ready for our internal review process, and can be approved for final publication on FRA's eLibrary.

FORMATTING & READABILITY

FRA's *Research Results* Template is formatted to meet our agency's report writing guidelines and standards. All *Research Results* draft submissions must use the *Research Results* Template. Draft submissions not formatted according to the template will be considered not meeting FRA's report writing standards and thus, will be returned to the original author(s) for re-formatting.

Research Results Formatting Requirements:

- Limit to a maximum of four pages.

- Submit reports in Microsoft Word XML *.docx* format.

- "TITLE OF REPORT" should be all caps and on one line or two lines maximum.

- **DO NOT** modify heading styles, spacing, font, language preference (default set to: American English), image size or layout of the template:

  - 1" margins

  - First level bullets are indented 0.25" from the left margin. Sub-bullets are indented an addition 0.25" for each descending bullet level.

  - Arial 10-point font for text. See the template for details.

- Follow the GPO Style Manual requiring, among other things, one space between sentences.

- Use the "built-in" bibliography feature. Learn how to add a citation and create a bibliography.

- Use "references" feature to insert references/citation. Learn how to [add citations in a Word document.](#)

- Follow APA's references format. See the "[REFERENCES](#)" section for more details.

- Use the accessibility checker to ensure the *Research Results* is 508 compliant. Click here for information on how to [Use the Accessibility Checker](#).

Figures & Tables

- Include at least three figures to illustrate or support the important points of the *Research Results*. **ALL** figures and tables must have a short caption and **MUST** include alt-text title/description. See this: [Video: Improve accessibility with alt text](#).

- Figures may be graphs, drawings, photographs, equations, etc.

- Equations should be captured as images and the alt-text should be spelled out as such: $g = K_C - K_I$ [g (meaning less than zero) equals K subscript C (fracture toughness of the material containing the flaw minus K subscript I (stress intensity factor dependent on the applied stress, flaw size, and geometry.]

  - If the paragraph above or below the equation provides an adequate description of the equation then the alt-text can be, "See paragraph [above or below] equation for description."

- Figures are generally included in the *Research Results'* Summary, Methods and Results sections.

- Tables **MUST** not have merged nor split cells and **MUST** have alt-text title/description.

- We highly recommend not using tables in *Research Results*. If you do, convert tables to figures for *Research Results* (that is, present the table as an image and annotate it as if it were a figure).

- Provide figures that are appropriate within the given context so readers may easily interpret it.

- If a contractor or other company owns the graphic and the graphic was never published, then you would add a copyright attribution under the graphic, e.g., © TTCI.

- If the graphic is published and/or altered by the author then a copyright attribution should be added under the graphic and a reference citation should be added to the caption.

Helpful Tips:
- Keep figures simple.

- Number figures consecutively.

- Images should be in png, jpeg, or jpg format.

- Background of figures should be white, not shaded; this helps to create the best contrast and make the information clearly discernable.

Writing Guidance

- Strive for clarity, concision, accuracy, and objective tone.

- Use American English, not UK English (e.g., center, not centre; behavior, not behaviour; organization, not organisation).

- Maintain consistency with acronyms, abbreviations and terminology

- For each section, ask: "Does this information belong here?"

- Avoid using passive voice.

- Check sentences for subject-verb agreement.

- Apply the proper verb tense throughout the report (i.e., use past tense for research work completed in the past).

- Follow publishing rules when it comes to accents.

- Run spell check in Microsoft Word prior to submitting the draft report.

- The draft report should read as if it is the work of one author.

BASIC STRUCTURE OF RESEARCH RESULTS

These guidelines accompanying the *Research Results* Template will help determine whether the right type and right level of information being presented in each section and subsections. I.e., does this information belong here? *Research Results* should answer for readers the questions of Who, What, Where, When, Why, and How.

Every *Research Results* have the following elements and subsections:

- HEADER
- TITLE OF REPORT
- SUMMARY
- BACKGROUND
- OBJECTIVES
- METHODS
- RESULTS
- CONCLUSIONS
- FUTURE ACTION
- REFERENCES
- ACKNOWLEDGEMENTS
- CONTACT
- KEYWORDS
- CONTRACT NUMBER
- DISCLAIMER
- FOOTER

HEADER

The *Research Results* Template header includes the FRA logo, *Research Results* logo and the *Research Results* document number. **DO NOT** modify this information or change the logo position. Note: The FRA Technical Writer/Editors generate the *Research Results* document number once the draft is finalized and prepared for publication.

TITLE OF REPORT

Research Results are nontechnical and technical summaries of research findings, not full *Technical Reports*. Therefore, the title should not be the same as the one for the related *Technical Report* to be released afterwards. Instead, it should operate similar to a newspaper headline, by catching the readers' attention and generating their interest to continue reading.

SUMMARY

Approximately 250–300 words. This section is to deliver a high-level overview of the work undertaken in the research study and its outcome. It includes information on:

- A synopsis of the main findings(s) from the research

- The principal participants involved
- The reason for undertaking the research
- The methodology applied
- A condensed version of key conclusions reached

Include a figure in this section to help illustrate important points. Add alt text to figures.

BACKGROUND

Approximately 200 words. This section establishes the context for initiating the research (e.g., in response to rail-related accidents or to a Congressional mandate to develop safer conditions), as well as which entities were involved in funding and participating in the project. Including references to prior related work (e.g., *Technical Reports* and previously published *Research Results*) is recommended. If applicable, also include a brief description of the researchers' expected findings at the end of testing and inspection phases.

OBJECTIVES

Approximately 150 words. This section describes what the research is intended to achieve. A well-written objective is concise, reasonable, measurable and time-bound.

METHODS

Approximately 150 words. Although discussion of methodology typically conveys highly technical information, it is important to keep in mind that the audience for *Research Results* will range from those with limited technical knowledge to those with highly specialized knowledge. Technical language and details are appropriate if the content remains comprehensible to a general audience. Include a figure in this section to illustrate the methods applied in the study. Do not forget to add alt-text to the figure.

RESULTS

Approximately 250 words. This is the main section of the *Research Results* to set out the findings or results from the study.

Include an appropriate figure(s) in this section to help illustrate important points. Add alt text to all figures.

CONCLUSIONS

Approximately 150 words. This section summarizes the chief takeaways and insights gained from the research, and reinforces for readers the value of the work undertaken and its future implication. If the results from the study were not definitive, future work or next steps may be recommended in the following section.

FUTURE ACTION

Maximum 1–2 paragraphs, approximately 50–75 words. If results from the study did not lead to definitive answers and further research work might be necessary or beneficial, then this section would outline recommended actions to take in the future, including any work currently being planned based upon the given *Research Results* study.

REFERENCES

The *Research Results* Template is automatically formatted using the APA Citation Style. However, authors may choose to use the APA or IEEE Citation Style. Remember: Bibliographic citations must be accurate due to intellectual property law.

- Use the "built-in" bibliography feature to Add a citation and create a bibliography. The *Research Results* Template includes this feature.

- For information and guidance on APA Citation Style, visit APA.

- For information and guidance on IEEE Citation Style, visit IEEE.

- Verify bibliographic references, footnotes or bracketed citations and ensure all URL links work.

ACKNOWLEDGMENTS

Maximum 1 paragraph, approximately 50–60 words. This section offers an opportunity to recognize the various individuals and organizations who participated in or contributed towards the research project.

FRA staff should not be acknowledged for providing funding. If appropriate, they can be acknowledged for technical contributions.

CONTACT

Following the placeholders provided in the template, include the name, official title, complete business address, phone number, and email address of the primary point of contact for the project. This is typically the RD&T Program Manager who is operating as the FRA lead for the study. Listing a second point of contact is optional; it can be any other major collaborator who is also involved in the research or another FRA contact such as a RD&T Division Chief or Director.

KEYWORDS

List any keywords pertinent to the subject matter of the report, including RD&T core subject matter terms (i.e., track research, rolling stock research, train and control communication, or human factors). If certain terms are being mentioned frequently, be sure to add them to the keywords. With the right set of keywords, readers have a greater likelihood of finding the *Research Results* when conducting a search in eLibrary.

CONTRACT NUMBER

Enter all contract numbers as they appear, in the report, e.g., F33315-86-C-5169. Consult with the RD&T Program Manager about this information. Authors must fill in this information.

DISCLAIMER

A standard disclaimer statement is required in the footer of *Research Results*. The *Research Results* Template is formatted to include this information. **<u>DO NOT</u>** modify the content of this disclaimer or change the position.

FOOTER

The *Research Results* Template footer indicates the type of RD&T publication (i.e., *Research Results*) and the page number. This information is automatically updated. **<u>DO NOT</u>** modify this information or change the logo position.

WRITING STYLE & REQUIREMENTS

U.S. Government Printing Office's (GPO) Style Manual

For rules related to grammar, spelling, punctuation, and general form, FRA uses the U.S. Government Publishing Office's (GPO) Style Manual as a reference guide. The latest edition (*GPO Style Manual*, 2016) is available for purchase at GPO's Online Bookstore: United States Government Publishing Office Style Manual 2016 Paperback | U.S. Government Bookstore. It is also available free of charge on GPO's website:

Style Manual: An official guide to the form and style of Federal Government publishing 2016.

Writing in Plain-Language

Writing in plain language is essential to helping readers with the following:

- Finding key information

- Comprehending and interpreting key information

- Using information to meet their needs

The more clearly and directly you communicate, the more likely your readers will understand the information you are trying to convey, and can appreciate the value of the research undertaken by your team.

Helpful Hints:

- Use common terminology, not code or jargon (e.g., Task Order)

- Spell out acronyms at their first mention

To see how the plain-language approach improves the readability of a document, compare the examples below.

> *Before:* The following enumerated summary is intended only to highlight certain information contained elsewhere in this report.

> *After:* This summary highlights information contained in the report.

> *Before:* Longitudinal rail stress (LRS) is caused by environmental temperature changes due to solar radiation and air convection in conjunction with the boundary constraints on continuous welded rail.

> *After:* Longitudinal rail stress (LRS) is caused by the effects of heat and wind on constrained continuous welded rail.

For more information about the Federal government's plain language initiative, visit the plainlanguage.gov website.

508 Compliance

All FRA *Research Results* must be compliant with the requirements of Section 508 of the Rehabilitation Act, which mandates that all electronic documents be accessible to people with

disabilities. Since the *Research Results* Template provided by your RD&T Program Manager is 508 compliant and has been formatted to meet this requirement, **<u>DO NOT</u>** modify any formatting aspect of the template—including those related to fonts, heading styles, page numbering, table of contents, footnotes and/or endnotes, graphs and images, and bulleted lists, as applicable.

For more information on Section 508, visit Section508.gov | GSA Government-wide Section 508 Accessibility Program.

REPORT SUBMITTAL PROCEDURE

Once the drafting phase of the *Research Results* is completed, you are then ready to submit your document for RD&T's internal editorial review process. In this section, we provide "Helpful Tips" and a "Submission Checklist" to assist you in preparing your document for final submission.

After you submit the draft to the RD&T Program Manager leading the project, our Technical Editing Team will coordinate the editorial review process within RD&T to obtain approvals from the Program Manager, the Division Chief, and the Director. Important to keep in mind that as the draft continues to undergo further editorial review, the Program Manager may follow up with the author(s) regarding questions or issues that have come up during the editorial review.

With the successful completion of the approval cycle, the Technical Editing Team prepares the document for final publication. The finalized PDF version is forwarded to our Web Master, who uploads the *Research Results* onto FRA's eLibrary for public view.

Helpful Tips:

- Engage with your FRA Program Manager acting as the point of contact for your research study with any questions you might have about the *Research Results'* style, formatting, template, etc. prior to the end of the period of performance of your contract.

- Visit our eLibrary to view examples of recently published *Research Results*.

Submission Checklist:

- ✓ Did the authors use the *Research Results* Template and follow the guidelines provided by the RD&T Program Manager?

- ✓ Is the content properly formatted according to the *Research Results* Template, such as using the correct font type and size?

- ✓ Is the appropriate content entered into each subsection of the *Research Results*? (i.e., Summary, Background, Objectives, etc.)

- ✓ Do each of the figures have meaningful alt-text descriptions?

- ✓ Do all URLs have descriptive hyperlinks? I.e., avoid generic phrases like "Click here" and instead, provide the title of the webpage to indicate the content of the linked page if readers were to click on the hyperlink and be re-directed.

- ✓ Are all URLs linked to the correct Web destinations?

- ✓ Is the reference section properly formatted per the recognized standard (APA or IEEE)?

- ✓ Did the author(s) run spell check in Word one last time to catch any spelling or grammatical errors?

- ✓ Has the document been reviewed in Word's Print Preview for a final visual check?

- ✓ Is the document saved as a Microsoft Word XML, *.docx*?

✓ Did the author run an accessibility check and is the document fully accessible?