RIT Space Exploration Project Design Document Standard Format and Sample Content

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***Abstract*—A standard format for Project Design Documents is key to organize and document the many projects members of RIT Space Exploration wish to pursue. The goal of the SPEX Standard is to organize, refine, and archive space exploration research. Documentation is vital to sharing and maintaining the wealth of ideas and information developed by all students at RIT. Project Design Documents aim to provide a foundation for new projects to grow, or premature projects to develop months or years in the future. A standard for project design documents and reports shall provide SPEX with a robust method to maintain a healthy ecosystem of projects in all stages of development including the event where a SPEX member goes on co-op or graduates.**

The abstract is a brief summary of the design document. Typically it includes the purpose of the design document, key goals or objectives, and justifications. Be sure not to confuse the abstract with the introduction. It is easiest to write the abstract after the rest of the paper has been written. That way you can choose key information from the sections that you've already completed and string them together in the abstract. Consider the abstract to be your elevator pitch to anyone reading this design document. What are they reading? What is the goal? Why is it worth my time? The abstract is what will show up in Google results and other search engines, and what people will read when they are deciding what is worth their time and brain power.

NOMENCLATURE

If you include mathematical expressions or express variables in the design document, list them with their corresponding definitions here as a list. The two lines below make it look nice when defining units/values to constants.
Note that math terms and non-math terms are separated and alphabetized, regardless of the order in which they are defined. (Recall terms $like this$ are in the math environment) Read more about advanced nomenclature formatting here: https://www.sharelatex.com/learn/Nomenclatures

PDD	Project Design Document
RIT	Rochester Institute of Technology
SPEX	RIT Space Exploration

The sections included here are required. Additional sections and subsections may be added as necessary.

I. INTRODUCTION

The introduction is a place to give background and context before diving into the subject matter. Establish context for the work you are about to propose and the main ideas of the proposition itself.

Examples of proper formatting, organizational techniques and content make writing Project Design Documents as easy and painless as possible. Writing documentation such as design documents and reports is a lot of work, but it supports the continued growth of knowledge and experience in science and engineering for SPEX as a whole. In technical research and academia, communicating one's thoughts and ideas is arguably more important than the ideas themselves. For example, when applying to a grant from a scientific foundation, receiving funding to continue research impinges on how the motives and techniques of a research group resonate with the goals and objectives of the foundation.

In the case of SPEX, a PDD carries value in the act of documenting ideas and effectively communicating them with others within and external to RIT Space Exploration.

II. PRIMARY OBJECTIVE

At the end of the day, whether the project "succeeds" or "fails" is judged against the objectives it sought to meet. Note that results that contradict expectations/hypotheses are not failures if the scientific & engineering methods are followed along the way. Sometimes our expectations are wrong and that can be just as successful as getting data we thought we'd see. What matters are what questions you intend to answer. This is the main purpose or main goal the project hopes to achieve.

The SPEX Standard defines format and style guidelines for project documentation. The Project Design Document Standard controls these guidelines as applicable to young, exploratory ideas.

The ultimate goal of a PDD is to capture all ideas (including ones that are beyond our capability, interesting ideas, or things we just dont have time for, in addition to the ones that we actually work on and develop) and archive them such that if a student goes on coop or graduates, these ideas would not leave with them.

Secondary Objectives are lower priority or bonus objectives that are significant but not the main focus of the project. This template does not have secondary objectives.

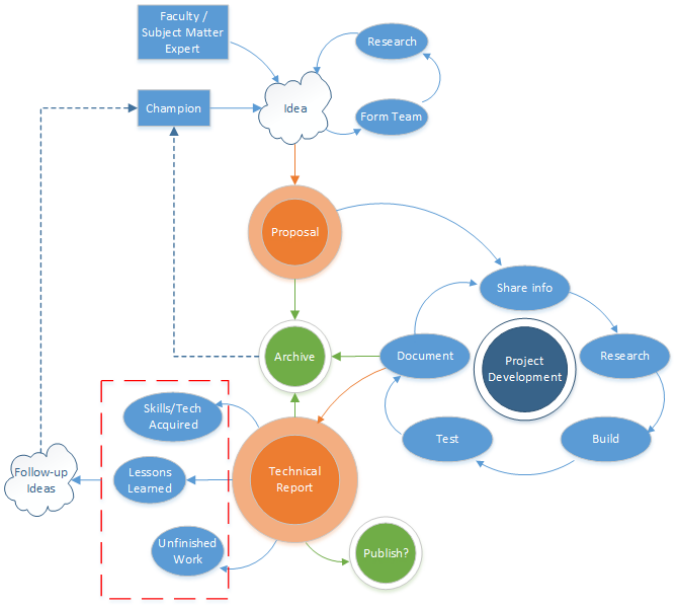

Fig. 1. A PDD is the first piece of documentation to be archived in the project life cycle. Since the life cycle can be iterative, a new design document may also refer to one or more previous SPPs.

III. Benefit to SPEX

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[this help section is not yet defined]
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By writing design documents and familiarizing undergraduate and graduate students from any discipline with this type of approach and execution, SPEX members will be better equipped convey their ideas to others in a methodical and organized manner. Ideally, an abundance of ideas and projects encapsulated in PDDs would outlive their respective authors and continue to sustain SPEX with valuable research opportunities invariant of individual members' absences due to co-ops or graduations. Perhaps in the future, SPEX design documents may be used as baselines for grant applications and other funded research efforts.

```
Below I have used subsections to identify key ideas
in this section. These particular subsections are
not required as part of the SPEX Standard, but serve
as an example of using subsections in a text.
```

A. Mindset

Firstly, it gets people in the right mindset for thinking about what is important and what needs to be considered before taking off on a project. Publishing a PDD imbues a sense of formality that hopefully makes its way into the level of seriousness and merit that is desirable for SPEX to pursue.

B. Traceability

Similarly, a PDD serves to provide the foundation for traceability in requirements and objectives to projects as they grow and change. This prevents blockers such as feature creep, rabbit holes, and spun tires, and hopefully prevents good projects from dying by getting too off track.

C. Accessibility

```
Note below that LaTeX uses weird formatting when it
comes to quotation marks. The style below is correct
to display forward quotes `` at the start of the
phrase and backquotes '' at the end.
```

Having a "plug-and-play" template is the first step to learning how to one's own SPP. It removes a major barrier of starting from scratch, providing example content to which one could refer when creating their own. LaTeX may prove to be daunting for some people, but it is arguably better to encourage people to learn LaTeX than to rely on something like Microsoft Word.

IV. Implementation

```
What path do you anticipate the project to take?
```

In the ideal case, every project begins with a design document. That design document gets sent around to SPEX members (and non-members) to draw support and build a team. Research and work takes place, documented along the way until an ending point is reached (e.g. project completion, end of the semester, team attrition, etc.).

At the end of the project (or end of semester, whichever comes first), the team writes a report of the project with what they did, if it was successful, and recommendations for future projects. A future SPEX member might pick up where the last paper left off, and the cycle repeats.

A. Deliverables

```
When all is said and done, what will you have to
show for it? Examples: Hardware, software, poster,
ImagineRIT demo, presentations, technical papers...
```

B. Milestones

```
Be as detailed as you can, but it's okay if there
are unknowns. At the very least, specify how many
semester you expect the project to take until it
reaches completion.
```

V. Externalities

```
Things not directly related to the work or outcomes,
but related to the project as a whole.
```

A. Prerequisite Skills

```
Which skills do team members need to have before
work can start (not including skills that will be
learned "on the job")?
```

A project's prerequisite skills are most easily

B. Funding Requirements

```
Estimate costs that would be needed to meet
objectives.
```

C. Faculty Support

```
Identify faculty that will be involved (or would
need to be involved) to meet objectives. Note that
if a professor is the Principal Investigator (P.I.)
for a project, there still needs to be a student as
the SPEX Project Champion.
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D. Long-Term Vision

As SPEX student members get more experience writing these papers, thr group will build a library of meaningful work and be able to save it in an organized manner. Knowledge will be preserved and easily shared. Perhaps Project Design Document could eventually get published, in a journal or otherwise...

ACKNOWLEDGEMENTS

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APPENDIX A
PROJECT LIFE CYCLE

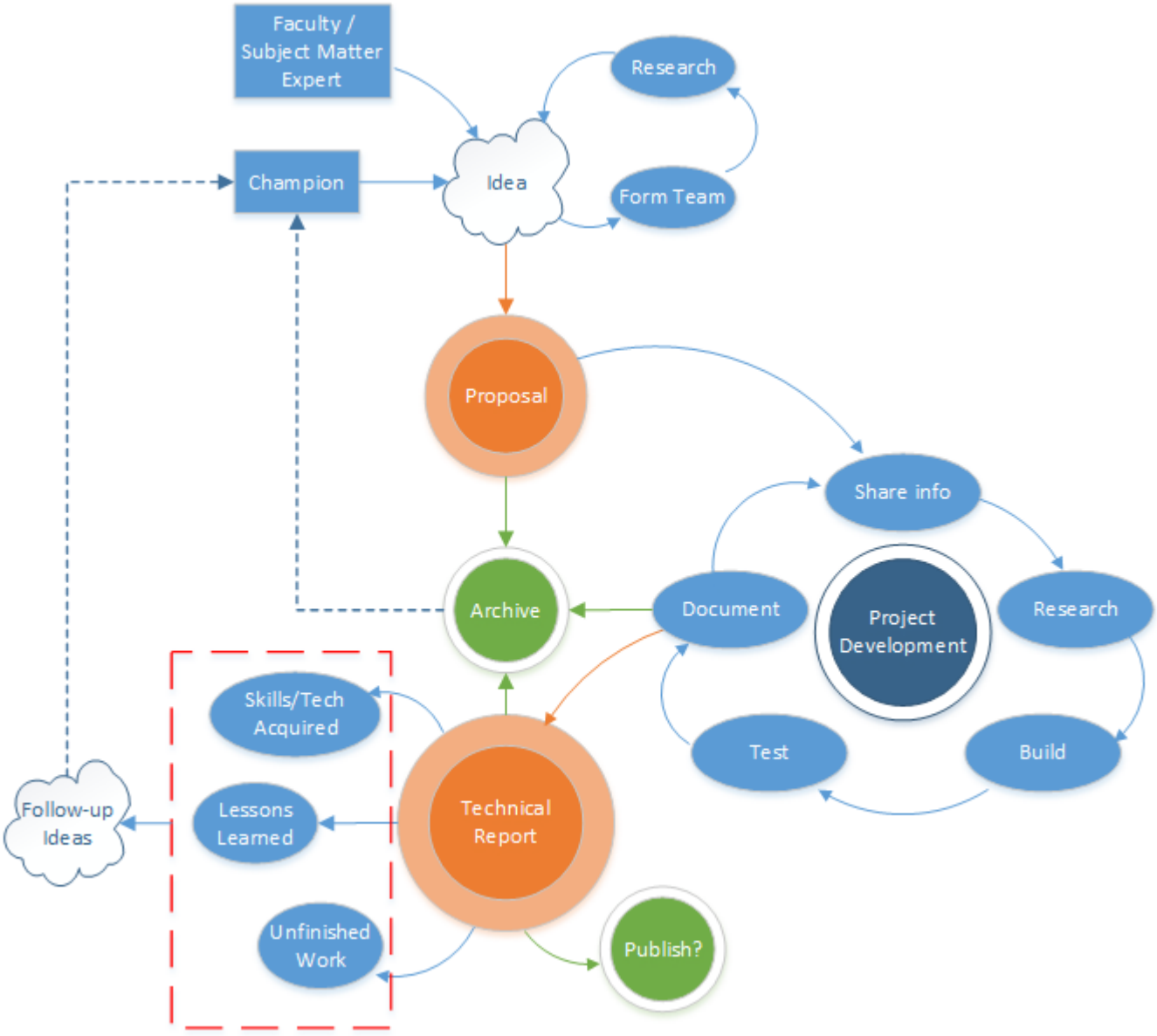

Fig. 2. Enlarged version of the diagram in Figure 1.