Good Enough Project Management Practices for Researcher Support Projects

Christina Maimone
christina.maimone@northwestern.edu
Research Computing Services
Northwestern IT
Northwestern University
Evanston, Illinois

ABSTRACT

Successful provision of data and computational services in support of researcher projects requires implementing project management practices to counteract tendencies towards scope creep, miscommunication, and inaccurate resource forecasting. Good project management practices also support service metrics and reporting, which are essential for communicating the impact and value of researcher support services. These practices do not need to be complicated or onerous to be successful, but they do need to be applied intentionally and consistently. Key practices include: creating project summary documents, determining appropriate client management strategies, tracking project resources and status, and regularly reviewing projects' progress.

KEYWORDS

project management, research computing facilitation

1 THE PROBLEM

Researcher support staff from research computing, IT, library, and other organizations are increasingly providing data analysis, data visualization, software development, and other computational and technical support to researchers in the form of small and mid-sized projects. Those involved in such projects have likely experienced more than one of the common challenges and pitfalls of this type of work. For example:

- Changing research questions: The researcher changes the research question mid-project and expects a different type of support.
- Time and resource estimation: A project planned to take three months is trying to wrap-up at the end of two years.
- Project definition: Projects that never progress out of the exploratory phase or do not have a clear goal.
- Communication: Researcher input is needed for the project to progress, but the researcher is unresponsive.
- Credit: The staff member expects to be a co-author on a publication resulting from a project, while the researcher did not even plan to acknowledge use of the service.
- Sustainability: Support staff implement a software solution for a researcher. Their team is then expected to support and update the software for the rest of the researcher's career.
- Unmet expectations: The deliverables that support staff produce do not meet the researcher's expectations.
- Asymmetric knowledge: Support staff are frustrated by a researcher's seemingly unreasonable requests, but the researcher does not know how much effort is required to fulfill his requests.

These problems often arise from insufficient project management practices.

For large projects with multiple members, long timelines, or significant budgets, the need for project management planning, and even a project manager, is generally clear. These projects can often be successfully managed using the frameworks and approaches used for other large projects in an organization.

Many researcher support projects, however, are smaller in scale: one or two staff members, tens to a few hundred of hours of labor, and a timeline up to a year.[1] It is not as obvious which, if any, project management practices are useful for such projects.[2] The single staff member working on the project may have little experience with project management. Researcher support groups are unlikely to find analogous projects elsewhere in their organizations to use as models. It is difficult to see how project management plans for administrative systems or service operations that focus on detailed schedules, budgets, stakeholders, and the impact on university operations are applicable for a single staff member assisting a researcher with data collection or visualization. Project management frameworks can involve an overwhelming set of acronyms, certifications, and templates. Implementing such systems for small projects could easily require more time than the project work itself.

Yet small- and medium-sized researcher support projects do need to incorporate practices to counter tendencies towards scope creep, changing goals, poor time estimates, and miscommunication. What project management practices make a practical difference for the success of these projects and the groups offering these support services? How can project management principles be applied to

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[1] There is nothing magical about these values. What constitutes a small project may vary across contexts.
[2] Frameworks for, and research on, management of small projects is limited; see Rowe [10] for one take on small project management.

support innovative research involving a high level of uncertainty, dependency on the researcher, and need for flexibility?

This paper outlines a set of "good enough" project management practices for research support staff to implement themselves. These practices reduce the occurrence of the common issues noted above while remaining flexible enough to work in a research environment. The core practices of creating a project summary at the start of the project, adapting project communications to the researcher, and tracking a few key items for each project as it progresses provide a foundation for successful projects.

2 PROJECT SUMMARY

Before agreeing to support a project or starting work on a project,[3] it is critical to take time to define the scope of the project and what resources will be needed. This may seem obvious, but in the excitement of a new project, or uncertainty about how a project may unfold, it can easily be overlooked. Creating a brief project summary document at the start can save both support staff and the researchers they support significant time, frustration, and costs.

A project summary, roughly analogous to a project charter in some project management frameworks,[2] defines the scope of work at a high level. The document should include the essential components of the project on which everyone with a stake in the project agrees. It provides a written record to refer back to should problems arise, and it is a convenient way to share the overview of a project with other team members and management. Writing a project summary is a useful practice for projects requiring as few as 20 hours of work,[4] and it is essential for larger projects. Developing a project summary document typically requires at least one initial meeting with the researcher and several hours of follow-up time to research options, investigate project materials, and estimate the time required to complete the project.

A project summary may reference general approaches for solving the researcher's problem, but it is not a work plan.[5] Estimating the time and resources needed for the project requires having an idea about how the work will get done, but detailed planning, specific steps of the project, and details about the approach do not belong in this document. For example, a project summary may indicate that the project will build a predictive model for categorizing documents in R, but unless the details are essential to the definition of the project, it does not need to reference the specific type of model, the steps required to create and test the model, or the how long each step in the process is likely to take.

2.1 Common Project Summary Elements

Depending on the scale and complexity of the project, a project summary can range in length from approximately one-half to three pages. Succinctness should be valued, and the summary can be informal in tone. An email to the researcher "summarizing the key details of the project we discussed last week" can often be more effective for engaging the researcher than a more formal document.

Nearly every project summary will include a few common elements.

Overview: briefly describe the goal of the project and what will be done to achieve that goal.

Deliverables: list at a high level the data files, software, code, or other artifacts that will be created and shared with the researcher.

Requirements and dependencies: list resources such as files or account credentials the researcher is expected to provide. If there are resource dependencies that will affect the project's start date or timeline, such as getting access to data or computational resources, note those here as well.

Researcher input: indicate what time, input, and feedback is required from the researcher to successfully complete the project. For example, are weekly meetings necessary? Are there key points in the project when feedback will be required? It is easier to cancel project meetings that are unnecessary than to increase requirements on the researcher later.

Timeline: include the start date, expected end date, and any uncertainty in or ranges around these dates. It is also useful to include an estimate of the total amount of work expected for the project. This could be expressed in a range of hours of work or full-time equivalents (FTEs). This helps a researcher gauge the effort required for different tasks and make appropriate decisions about resource trade-offs and prioritization.

Follow-up: note when and how the researcher should expect to hear from support staff next. At a minimum, ask the researcher to get in touch as soon as possible if the project summary does not conform to their expectations; consider requesting confirmation of the plan in order to start work.

2.2 Additional Considerations

Depending on the specifics of the project and the organization, the project summary may include additional components.

Team members: if anyone beyond the project summary author will be contributing to the project, indicate who will be involved and what their roles are.

Cost: list both known and possible costs for labor and resources; note when approvals are required for expenditures. Put details about payment logistics or cost breakdowns in a separate invoice or budget document.

Scope limitations: note anything that is out of scope of the project, especially if the proposed scope is only a subset of what may have been discussed during initial conversations with the researcher. Consider both the features and characteristics of the product or deliverables to be produced and the work to be undertaken to produce the deliverables. For example, if the project may require data entry or transcription, indicate that staff will not be performing these tasks. If this is part of a series of projects or ongoing work, provide information on how this project relates to others.

[3] According to the Project Management Institute: "A project is a temporary endeavor undertaken to create a unique product, service, or result."[6]

[4] Estimates of time and effort throughout are approximate. They are provided as reference for those looking for a starting point.

[5] For an example of an approach that combines elements of a work plan and project summary, see the XSEDE Extended Collaborative Support Services (ECSS)[12] program work plan template[4] and example[3].

Risks and unknowns: if the time and resource estimates included in the summary are based on unverified assumptions about the data or other project inputs, explicitly note those assumptions here. Where possible, indicate how violations of the assumptions will affect the project. For example, if the data is messier than anticipated, does that change the timeline or budget, or make the project infeasible? Also note if the approach or planned work is experimental or has a reasonable chance of failure, and how that might impact the project. For example, if the project involves building a predictive model, is there a chance that an acceptable accuracy rate may not be achievable?

Project end and ongoing support: briefly outline expectations of ongoing service and support (or lack thereof) for project resources or deliverables, and the support team's ability to accommodate follow-up requests or updates. For example, if the support team will stop running or updating an active piece of hardware or software at the end of the project, this should be in the project summary. Details about resources, accounts, or credentials that may need to be transferred from the support team to the researcher are better addressed at the end of the project. When the support team actually stops running or updating a resource at the end of the project, it is useful to again notify the researcher with explicit details.

Authorship and ownership: be upfront around expectations for authorship on any publications, ownership of software or other materials created, and licensing or release arrangements. Original research and intellectual contributions should be respected, even when work is created as part of a service. These conversations can be difficult, but they are more difficult at the end of a project than at the beginning.

2.3 Scoping the Project

Factors to consider when developing the project summary, estimating resources, and determining project feasibility include:

State of the data or existing code: if at all possible, do not estimate the time or resources necessary for a project without seeing the data or existing codebase first. Data is rarely as clean as a researcher thinks it is, and code may not do what the researcher thinks it does. Do not make assumptions about or accept secondhand reports of either data or code —always verify, or at least include contingencies in the project summary to account for unknowns.

Alternative approaches: consider how a project could be accomplished with different resources. For example, hiring people to perform a task manually might be faster and more straightforward than automating it. Alternatively, the researcher may prefer an approach that could get 85% of the project done accurately in one-quarter of the time to a more complete solution. Involve the researcher in decisions about prioritization and resource trade-offs.

Historical underestimation factor: adjust initial time estimates based on experience with previous projects. If projects regularly require more total time to complete than estimated, or if completion dates are often missed due to competing priorities and unexpected developments, revise initial estimates accordingly.

Competing commitments: there are only so many hours in a day. The timelines of other projects, vacations, conferences, and other events will affect when staff can work on this project. Most people can only reasonably manage a project load of two to three projects that require innovation, creative work, or deep concentration. With more projects than that over a sustained period, some projects will be ignored or productivity will drop dramatically.[6] These competing priorities will affect project start and end dates.

Project phases: multiple sequential or concurrent projects may make more sense than one large project. They can be easier to manage, better allow for adjustments in the approach, and provide flexibility to accommodate changing schedules and competing priorities.

2.4 Exploratory Projects

If it will take more than roughly half a day[7] to investigate strategies for supporting a project and determine the time and resources required, this can be an indication that an exploratory project is needed as a precursor to further work. Exploratory projects are valuable to compare different approaches to a problem, determine whether a project is feasible, and conduct pilot studies to help estimate the time and resources needed for the full project.

For example, consider a project where a researcher wants to extract a few pieces of information from unstructured text documents —stock classes and shares, characteristics of plants' leaves, or who is to blame for political conflict. An exploratory project may be required to determine whether automated methods are likely to achieve the level of accuracy the researcher requires. The goal is not for support staff to fully develop such models but rather to determine whether an automated, manual, or hybrid approach will work best for the task. In some cases staff experienced with such a task may be able to make this determination in a few hours. But in other cases, further analysis of the data is needed. An exploratory project may have as its goal determining the feasibility of using automated methods for the text extraction task. Then a follow-on project can execute the approach most appropriate for the data and task.

Treating an extended project scoping and estimation process as a separate project in and of itself, with a brief project summary of its own, helps prevent scope creep and cases where support staff effectively start work on the project without completing the project summary. Even projects that are primarily exploratory in nature should have bounds around staff time, the scope of the exploratory work, and the topic of the research that are worth communicating upfront. An exploratory project may not need to involve the researcher; communicating the key details to other team members and management is still useful.

2.5 Changes

Research can be messy, and research questions and objectives can change as a project proceeds. If, during the course of a project, the scope or resources needed change significantly, it is useful to revisit

[6] Switching between tasks can consume up to 40% of person's productive time.[1]

[7] While staff members are learning how to create project summaries effectively, more time will be required. Once they are experienced in writing such documents, then extended planning periods are an indication of the need for an exploratory project.

and revise the project summary. In cases of major changes where the project significantly exceeds the bounds of the initial project summary or requires a new line of investigation or deliverable, cancelling the project and instead starting a completely new project with a new project summary can provide clarity moving forward.[8]

In situations of high uncertainty or when changes are anticipated, consider defining a series of smaller projects instead of one large one that needs to be updated frequently. Alternatively, an agile project management framework may be a good fit.[11]

3 PROJECT COMMUNICATION

One component of a good project summary is information for the researcher on when and how support staff will next contact them. This is the first step in an on-going process of client management. Project management is often focused on the work itself —what will happen and when. Client management is focused on the researcher: making sure they are informed, happy, satisfied with your work, and confident in the abilities of the support staff. Determining the appropriate communication strategy for a given researcher is at the core of client management.

3.1 Objectives

In calibrating communications to a researcher, three principles can help.

(1) Throughout the project, the researcher should know when to expect to hear from those working on the project next.
(2) Communicate frequently enough and in enough detail that the researcher is not sending emails or making phone calls asking what is going on with the project.
(3) The researcher should rarely be surprised by developments in the project, especially if they are negative or deviate from the plan.

For some researchers, satisfying point (2) can mean communicating as little as necessary to complete the project. Others would be happy with daily updates. When a researcher is requesting updates more frequently than is reasonable, it is often because point (1) is not being met. Clearly establishing that the next update should be expected at the end of the week can curtail demands for more frequent updates.

To prevent surprising a researcher with bad news, it is crucial to think through possible project risks and communicate them as soon as they are identified. A conversation about how the project must contend with a foreseen obstacle that was previously discussed is more productive than a surprise conversation about what's gone wrong with the project. No one can foresee all issues with a project ahead of time; brainstorming with colleagues about what issues might arise is a useful exercise. When unforeseen problems do come up, try to present possible solutions or alternative approaches along with the problem.

3.2 Researcher Preferences

Researchers, like the staff supporting them, vary in their communication preferences:

- Email vs. in-person vs. call/video
- Scheduled updates vs. need-based interactions
- Hands-off vs. detail-oriented
- Direct vs. indirect

Researchers provide clues about their communication preferences. Consider:

- How quickly they respond to emails or phone calls.
- Whether they explicitly ask for meetings or phone calls, or respond to inquiries made via one form of communication with a different one (e.g. they respond to an email with a phone call).
- The time of day and day of the week they typically engage.
- The length of their emails.
- Whether they volunteer information or primarily answer questions.
- The type of deliverables they have requested: everything, the code, just the output, etc.
- Whether they want access to code repositories and other materials during the project or only at the end.

When in doubt, it can be useful to explicitly ask how the researcher prefers to be contacted with updates or when their input is needed. Adapting project communication according to the researcher's preferences will help ensure the researcher is happy and that support staff get the input from the researcher required for the project.

3.3 Delegates

The lead researcher for a project may not be the best person to answer detailed questions about the project. A graduate student or postdoc may be more familiar with the code or data and may have more availability for meetings and correspondence. When a researcher designates another member of the research team to answer questions or attend project meetings, it is worth clarifying what the scope of the delegated authority is. Is the student or postdoc only a proxy for support staff questions about project inputs, or do they have the authority to make decisions affecting the project approach and outcome? Does the researcher want the research team member to decide when to escalate issues or questions, or should the research support staff make this decision? The lead researcher should always be copied on project planning documents, be asked to approve costs and financial expenditures, and be given copies of the deliverables. When in doubt about other issues, include the lead researcher on communications.

3.4 Researcher Input

Even if communication to the researcher is ideal, communication from the researcher may not be. In such cases, review the requirements for researcher input and meetings included in the project summary and be explicit about the consequences for the project. These consequences will depend on the specifics of the project. For example, if a researcher has missed the last two scheduled weekly meetings, this may mean that the project completion date is delayed, other work on the project will not be completed, or the support staff will make the decision on how to proceed. In extreme cases, it may be necessary to cancel or suspend a project when a researcher is not engaged.

[8] If "cancelling" a project is politically difficult, consider "rescoping" the project instead.

4 PROJECT TRACKING

Once the project is started, keeping track of time spent on the project and the status of the project helps with future planning and allows managers and stakeholders in the service to stay informed without needing to interrupt staff work to request updates. A focused spreadsheet, possibly supplemented with a time tracking system, can be sufficient for recording key project details and sharing them with others.[9] Key fields may include:

- Project name: something short to be used to refer to the project
- Researcher details: name, email, department, university role
- Dates: request date, start date, anticipated end date, completion date
- Project status
- Project type or category
- Brief project description
- Project lead and other team members
- Link to project summary document
- Links to other project materials or names of code repositories

The set of fields may evolve over time but keep them to the minimal set necessary for high-level reporting and informing team members and management of current activities. Be clear about which fields are internal, for team-use only, and which may be reported to or viewed by the organization's leaders. These are different audiences with different needs, so sometimes the same information may need captured or summarized in two different ways for the different audiences.

4.1 Project Categorization

What type of project is this? The specific categories will be domain-dependent but resist the urge to create too many. Categories are only useful to the extent that they help aggregate comparable projects for reporting or review. It may be useful to have one set of categories to summarize work to external audiences and a different set of categories to assign or track work internally. For example, external categories may reflect the schools of the researchers, formal service categories, or funding sources. Internal categories may group projects by skills required or the primary project task (e.g. data collection, data visualization, application development). When categorizing projects by the type of work, remember to include a category for exploratory projects.

4.2 Status

Consider tracking project status at two levels: 1) high-level categories that would allow someone quickly reviewing a portfolio of projects to get the information they need, and 2) brief details (less than a paragraph) that might be relevant to other team members or direct managers. Status categories might include:

- Future: anticipated or planned upcoming work that should be considered in scheduling and time estimates
- Active: projects that have started and are being actively worked on
- Pending client: further progress on the project is dependent upon input from the researcher
- On hold: work on the project has stopped for reasons other than waiting on the client for input; if a project remains on hold for an extended period, consider updating the status to cancelled
- Completed: the original scope of work has been completed
- Cancelled: projects terminated before the completion of the original scope of work; no additional work on a cancelled project is expected
- Lack of capacity: projects that are consistent with the service offering but cannot be supported due to lack of staff capacity

Supplementing these categories with a field for brief status details allows those working on the project to provide clarifications and caveats on the status category and summarize next steps on the project.

4.3 Documentation

Include links to project documentation, code repositories, or other resources along with the project tracking information. If someone other than the project lead needs to access these materials, either while the project is active or after it has completed, this makes it easy to find them. To keep the project tracking spreadsheet or database tractable, link to external documents with longer explanations or project details rather than including them directly. Consistently naming projects across platforms —for example using the same naming conventions for code repositories and entries in the project tracking system —also makes tracking projects and finding materials easier.

4.4 Time Tracking

Estimating the time required to support novel research projects is difficult. People are subject to the planning fallacy[8] —they tend to overestimate project benefits or success rates and underestimate project costs. People can help counter the biases leading to these errors by evaluating new projects in reference to other similar projects that have been previously completed.[5]

Having information on both the time estimated for a project at the beginning, and the actual amount of time required to complete the project, is critical for improving future estimates. Be sure to include the time required for communications, administrative tasks, and other activities necessary to support the project. Similarly, track both the expected end date and the actual project completion date to capture errors in estimating how the work on a project will fit with other priorities and activities. The estimate of the total amount of work required for a project could be correct and yet the the end date may have still been missed because adequate space was not made in an individual or team's overall work schedule for the project.

Time tracking can be as simple as recording the number of hours spent working on each project. Rounding to the nearest hour is generally sufficient unless greater detail is required for billing. Recording time daily helps improve accuracy. Time tracking software can

[9] When a spreadsheet is not meeting the needs of the service, consider project management software or a service that allows relational data models. See Piña and Sanford [9] for a discussion of an instructional design team's experience in such a situation. Larger teams are more likely to need or benefit from software with features lacking in a spreadsheet.

be useful, but entering dates and hours in a separate spreadsheet can work for simple projects or small teams.[10]

4.5 Service Metrics and Reporting

Project tracking information should be designed to support reporting on the support services being provided. Different stakeholders have different concerns. Research deans may be most concerned with the impact the service has on research output, while those responsible for funding a service may be concerned with how efficiently the service is operating. Some common classes of metrics include:

- Research outcomes: number and financial amounts of grants awarded, papers published, and citations
- Researcher engagement: researchers supported, university schools or departments supported, hours of researcher time saved
- Service operations: number of projects, hours of support provided, wait times for projects to start, number of projects turned down for lack of capacity
- Service evaluation: researcher/client satisfaction with the service, researcher/client willingness to recommend the service

Service operation and researcher engagement metrics may be compiled from standard project tracking information. Data on research outcomes and researchers' evaluation of the service will require separate data gathering efforts.[11] Whatever the metrics of interest are, make sure the information needed is reported regularly and kept up to date to make responding to ad hoc requests for data and routine reporting much easier.

Projects often span fiscal years, academic years, and other time units that may be important for reporting. Knowing which unit of time to include a project in can be tricky. Reporting on the number of projects started and/or completed during a period of time is one option, but future projects, cancelled projects, and projects that are on hold or pending researcher input can complicate the accounting. Consider including a column in the project tracking spreadsheet that assigns projects to the most appropriate unit of time for aggregation to make counting easier.

5 IMPLEMENTATION

It is unlikely that the first project management system put in place will work perfectly. Starting with one or two practices, however imperfect, and building from there is better than doing nothing at all to counter project scope creep, overruns, and communication.

Individuals can implement the above practices on their own, and they are useful at the individual level. Implementing new project management practices across a team can be more complicated. Addressing staff concerns and incorporating staff into the implementation process can make the process smoother. One ongoing practice that helps to reinforce project management procedures and allows team members to learn from each other is regularly holding project review meetings. Soliciting feedback from researchers after a project ends can help evaluate the success of project communication strategies.

5.1 Staff Concerns

The project management practices outlined here only work if staff view them as beneficial and are invested in implementing them. A common view is that research is too messy to be managed like an industry or business project. Others may resist having their complex work reduced to a line on a spreadsheet. Engaging staff in the development of project management processes can improve adoption.

Let staff identify problems and solutions. One way to start a conversation on project management practices is to review past projects. What went well? What problems arose? What would have made the project run more smoothly? Have the identified issues come up on other projects in the past? After staff identify one or two opportunities for improving future projects, engage them in brainstorming solutions. The ideas they generate may match the practices outlined here, or they may come up with new solutions to try. Either way, if the staff who must implement project management practices are the ones who have identified the problems such practices are intended to address, engagement and compliance are likely to be higher than if practices are only imposed from above.

Share how project tracking information is used. When introducing project tracking, be clear and upfront about why project tracking information is being collected. How will the information be used, and who in the management hierarchy will see what pieces of project tracking information? Help staff provide information that will actually be useful for reporting and decision-making while allaying fears that they will be micromanaged or penalized based on the data they generate. Common concerns include: being penalized for estimating the amount of time required incorrectly or spending too many hours on a project, whether project metrics reported to leadership will appropriately account for changes or delays caused by researchers, and work being undervalued if it does not directly lead to publications or grants. When project data is used in decision making, or a senior leader responds to a report, share this with staff. Knowing that the data is being used and that senior leaders are aware of their work helps provide motivation to maintain project tracking practices.

Delegate tool choice. Ask staff what tools they want to use to track time, share documentation, and record project status. Let the team collectively choose tools that fit with their work and communication styles. Reducing annoying barriers to entering data and following procedures can improve compliance.

Involve staff in reporting. Enlist staff in creating metrics and reporting on the impact of projects. Ask them what they want stakeholders to know about their work. Determine which metrics best capture the main trends they are seeing qualitatively. What challenges are they facing in providing the best service they can and how can these challenges be captured? People are more likely to actively engage in project tracking activities when they use the data themselves to report on their work.

[10] Recording cumulative hours in a single cell of a spreadsheet is not a good practice. It is easy to forget whether hours for a day have already been added, and typos can erase hours of work. A system that records hours by date helps avoid confusion and errors.
[11] See below for a discussion of service evaluation.

5.2 Project Review Meetings

Regularly reviewing project summaries and tracking data helps reinforce the practices outlined here and provides opportunities for a team to discuss whether implemented practices are working well. Scheduling special review meetings, or dedicating time as a part of other regular team meetings, to share new projects and review the statuses and outcomes of existing projects establishes a practice of sharing project information among team members. Perhaps as importantly, it also provides an impetus to keep project tracking data up to date. Reviewing projects systematically can help spur conversations around ways project management can be improved in the future.

- Why was the time estimate for the project inaccurate?
- What is the researcher's preferred communication style?
- What unanticipated challenges arose in the course of the project?
- What work remains to complete the project?
- Is the work being done consistent with the original scope of the project?

Projects can be reviewed in one-on-one meetings between team managers and staff, but conducting project reviews as a team helps team members learn about both project management and new technical approaches from each other. The group approach also reinforces a collaborative approach to project management and helps maintain support for the practices.

6 PROJECT COMPLETION AND FEEDBACK

At a minimum, it is important to explicitly communicate to a researcher when a project has ended. This is often a multi-step process. Start by providing the project deliverables and telling the researcher that work by the research support staff has been completed; provide an opportunity for the researcher to ask questions or identify any problems or missing components. This is also the time to initiate any resource transitions. When any researcher concerns have been addressed, communicate that the project is done. The researcher may have additional questions after the project has ended, but a clear statement that the project is over is useful for both staff and the researcher. It can help to avoid zombie projects: those that move from a "completed" status back to "active" when a researcher's view of a project does not match support staff's view.

As project management practices develop, soliciting researcher feedback at the end of the project can help to ensure that practices are in line with researcher needs and that researchers are happy. This process may start informally with the service lead sending a check-in email to the researcher after the project ends. As resources allow, this practice may evolve to scheduling a wrap-up meeting or phone call with supported researchers.

A standardized feedback form can also be used to gather data for reports and metrics. Keeping any form or survey simple makes it more likely you will receive quality responses to the questions that are most important for evaluating and improving service. Each question should be tied to a key metric for reporting or provide information on which service leads can act. Questions to consider including:

- Were you satisfied with work on the project?
- Would you recommend the service to a colleague facing a similar challenge?
- What can we do better in the future?

For closed-ended questions, if the metric to be reported is the proportion of people satisfied with or willing to recommend the service, answer choices could be as simple as Yes or No.[12] If the metric to be reported is *how* satisfied people are with the service, or the average satisfaction, then a Likert scale with more options may be appropriate.[7] Open-ended questions should be limited and focused to provide actionable feedback for both successful and unsuccessful projects.

7 CONCLUSIONS

The practices outlined here are only a starting point for developing a project management system appropriate for the specific context of an organization undertaking computational and data-intensive researcher support projects. Ultimately, the success of project management practices can be assessed by the extent to which they make the provision of researcher support services easier. With successful practices, fewer projects should fall subject to common pitfalls, clients should be happy with the service, reporting on group activities should be easier, and staff should be better able to plan and manage their work.

These criteria can also be used to determine when additional project management practices are needed. Are multiple team members having trouble coordinating work? Does the team manager need more detail on the progress of a project? Are project summaries being revised mid-project more often than expected? These may be signs that additional practices can help projects run more smoothly.

Avoid the temptation to add a new step in the process for every new issue. There will always be special cases that can be addressed as they arise. Project management practices should help with common, recurring issues. If the answer to "What happens if we don't do practice X?" is "nothing," or the question evokes memories of a single problematic project, consider whether the practice is still worth the time it takes to implement.

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