PROJECT MANAGEMENT
In the Geospatial Community

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The Project Management Professional (PMP)® and the geospatial profession–Research and Development in Production (RDP)

How many of us are 100% confident and satisfied that we have all the necessary parts and pieces in place to tackle a new product or project? Whether it's with a shiny new piece of technology, the latest and greatest software, or simply a product that is new to us but uses well established tools and technology? When it comes time to complete the very first project using said technology or software are you as project manager (PM) adequately prepared? Are you certain that you have just what you need to make the project a swimming success? Exactly the right resources in hardware, software, staff count and expertise? Odds are incredibly high that you have answered "no" to at least one of these items, and further that it is our industries "new normal".

There was a time not so many years ago when care and caution were meticulously applied to nearly everything we did in our industry. Technology changes were extensively analyzed and debated. Most would not have dreamed of implementing a "new" anything without an extensive dedicated planning, research, development, and testing phase. As an output of that we would have a workflow that we had confidence in, ultimately getting all the kinks out before we tackled a "real job".

Upon receipt of the "new" item we would work to build a process that would satisfy the needs of our stakeholders and confidently meet the technical requirements of final products with repeatable/demonstrable results. In the research and development (R&D) phase we investigated how the "new" thing would fit into our old world. We accessed if it fit into our old workflows using our old tools, if it needed new ones or possibly a hybrid. The results were analyzed over and over, simulating real life situations as much as possible. We learned what we needed to do with the "new" thing in order to deliver a reliable quality product. Next we further developed that into a production flow. Taking the time to run many samples of data through the entire process documenting the results. It was then and only then, once we were satisfied with everything that we would release it into the production environment. And then only with much trepidation and dare I say skepticism on the part of many individuals that had been working with a prior technology.

It's also worth noting that back then new technology was released along very different timelines than current day. From the moment that the industry first heard of a new of a piece of technology to when it was available for use could take years. It would then take time, again often years, for an organization to make a purchase. While there were always new things it was not at the same volume or frequency as today. In current day it is not unusual for organizations to have purchased a new sensor before it is even off the assembly line.

But that was then and this is now. Now we are inundated with information regarding the release and upcoming release of technology. There is a race to market with software and technology the likes of which we have never seen before. As PM we have to be able to adjust to operating in a culture where the work that we manage is often leading edge. There are going to be changes occurring in even our most static or long term programs and products. It is critical that we are agile enough to adapt to the necessary changes when they happen.

Unlike in our not so recent past, rarely now do we have the luxury of taking our time in developing a process that is virtually flawless before we embark on the execution of a project. While that is surely a preferred approach from a risk standpoint, in this day and time we are not typically afforded that luxury. Schedule and financial constraints limit us, add to that pressure from our stake holders. The reality is that they are being exposed to the same barrage of information regarding available technologies as we are, and they tend to want it yesterday. Speed to market is a real driver on our projects.

So how do we balance the need to get technology/software into play as soon as possible and still acknowledge/manage the project risks? We change our mindset and project management
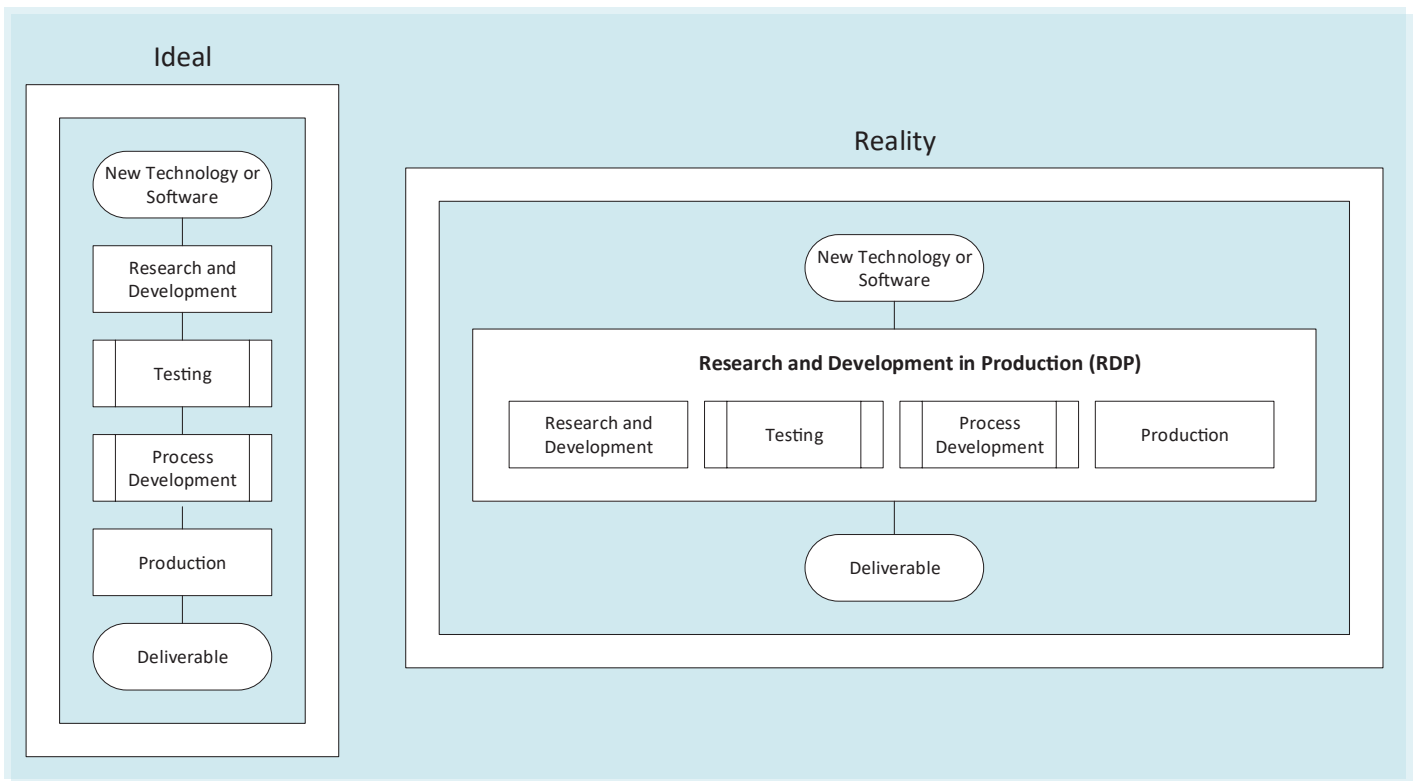
style to one of what we will call Research and Development in Production or RDP. This involves clearly acknowledging and defining the project risks of performing research and development like activities while in a production environment. The constraints are production based requirements and schedules tied to real world deliverables. Because of the high tech/high cost nature of our industry, having 100% redundancy on standby is simply not practical.

It is necessary to think through the entire project lifecycle from this perspective, understanding that unlike a project that is using established predictable resources and tools with known/predictable shortcomings the RDP project will be in a constant state of change. While all those changes are occurring what remains the same is the final expectations of schedule, quality, scope, and cost. The PM will have to manage the project successfully through them all.

The RDP project is very risk management focused. Much of the execution and control phases are focused on adapting to the outcomes with each step or miss-step that is taken. Because of the unpredictable path of the RDP project we can easily find our project hemorrhaging money and time. The PM approach must be heavily invested in the review of outcomes at increased intervals to allow for quick adjustment. Because the workflow is unknown, either in part or in whole, the key performance indicators (KPI) that might typically be used to gauge project health are no longer reliable. Revised metrics and KPI's must

be developed and modified as needed on an RDP project.

The key to success with the RDP project is ultimately to take action and make adjustments quickly. To facilitate that the PM should consider breaking the RDP project into its key components such as staff, hardware, software etc., scrutinizing them first independently and then again as a whole. Because each RDP project is in essence new, it is critical that each one be reviewed with fresh eyes and that no assumptions be made.

Some elements to consider/review during your RDP projects' life cycle:
- Are the differences between your organizations well-established projects and RDP projects clearly identified and elevated amongst appropriate stakeholders?
- Have you weighed your risk differently/appropriately? It's one thing to acknowledge risk as with all projects but and another to schedule it realistically when there are so many unknowns.
- Project staff:
  - Are they adaptable and quick to identify issues and potential issues?
  - Do they have the level of skills that you believe are needed? This is a key question on all projects but it is even more relevant with an RDP project.
- Resources:
  - How confident are you that you know what resources

level courses that aim to introduce scripting for RS analysis. Indeed, it has inspired me to adopt several chapter in my own graduate level remote sensing course.

While no book on this topic can be exhaustive, the book provides a good balance of breadth and depth. The book openly addresses its gaps, and all chapters provide suggestions for further readings, but there are a few improvements in both conceptual content and R code that future editions should include. The overview of RS is well written, and includes a thoughtful discussion of resolution tradeoffs most ecologists have to evaluate when selecting RS datasets in Chapter 8, revisiting the discussion in a time series context in Chapter 11. Notably missing from these discussions however is consideration of spectral resolution, which significantly impacts RS analyses even in a multispectral context. Furthermore, future users should be aware that the book explicitly focuses on Landsat and MODIS data, fortunately, several of the methods presented can be adapted to processes and analyze other multispectral datasets.

Although the R code is typically well described, it is not introduced and commented uniformly. Some chapters, particularly towards the end, would benefit from more detailed instructions for replicating presented figures and additional comments for more complex lines of code (e.g., for-loops). In addition, there are several small sections in the book with irreproducible code, but these errors are not an appreciable detriment to the concepts presented. This would be quite beneficial to several users because presented figures are clear and nicely formatted and the code provides streamlined approaches to problem solving. In fact, most of these errors can be easily fixed by the reader, especially one with previous R experience. Thus, it is recommended, but not necessary, that users have some fundamental understanding of coding principles and feel comfortable with troubleshooting and debugging. Overall, *Remote Sensing and GIS for Ecologists: Using Open Source Software* meets its objective of introducing typical RS procedures and OSS solutions to ecologists and RS users wishing to expand their programming knowledge. This work certainly fills a gap in the literature, as very few books give such attention to using R code specifically for RS. The electronic version of the book (Kindle) is particularly effective as a resource for R users of all levels, as the many additional resources and websites referenced in the book are easily linked to and accessed in tandem with the text.

The presented content meets the needs of the target audience and allows RS data to be more accessible to ecologists. This book is further recommended to students who use RS data regularly, but desire a more structured procedure for pre-processing and analysis in R, and any environmental scientist interested in terrestrial RS.

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you really need? When dealing with unknowns this is no easy exercise.
- Do you have the correct hardware/software?
- Is programming or training support immediately available if needed?
- Are you ready to increase/decrease change entirely on short notice?
● Controls:
  ◆ Do you have increased controls in place? The touch points need to be very frequent. There need to be more checks and balances than with a regular project.
● Communications:
  ◆ Is there a very clear and detailed communication plan?
  ◆ Is there the ability to elevate concerns immediately at all levels?
  ◆ What is the planned response time to all concerns, and can all management levels agree to operate under that plan?

The RDP project resembles all projects in that a PM should be reviewing and controlling all phases. The RDP project typically demands a more assertive and agile approach with an even more in-depth risk management plan throughout its lifecycle.

As RDP projects grow in frequency the PM will need to be sure to manage the ongoing risks that they present through to a successful delivery. With technology advancing at increased rates we can all look forward to managing a project portfolio that contains more RDP projects through to success!

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Raquel is very focused on process based approaches that unite program and business objectives, resulting in portfolio success.

If you have questions or topics that you would like to see discussed, please email them to PMP@asprs.org.