



## **Using SIPOC to Define Your Research Agenda: A Tool for Junior Faculty**

by Nicole Radziwill

Every fall is tenure season in our department. Packages for promotion and tenure must be delivered to the department secretary by Sept. 15, letters of support are appended to the files by Oct. 15, and recommendations by the promotion and tenure committee are made by Nov. 15.

Approval from the dean can take up to another month, so notifications to the faculty members, who wait with bated breath all semester, occur on or around Dec. 15. The submissions, which typically consist of at least two heavy three-ring binders—chock full of evidence of the excellence the candidates have achieved in teaching, scholarship and service, sit in our copy/coffee room on public display until the process is complete.

Because I am a tenure-track assistant professor, my department encourages me to peruse these documents to get a better sense of our organization's tenure standards. I have found leafing through these tomes nothing short of fascinating. I'm impressed by the great accomplishments of my colleagues—their teaching innovations, their expertly crafted research studies and their creative contributions in service to the department, the university, their professions and the local community.

What I am unimpressed with, however, is the common lack of cohesion I see as each person attempts to define his or her personal research agenda. To receive an “excellent” rating in scholarship, according to the promotion guidelines for our department, faculty members must provide a “demonstrated contribution to knowledge through a focused, goal-directed program of research and other scholarly activity.”

Unfortunately, as I read my colleagues' research descriptions in their tenure packages, I noted that several candidates obviously fell short of providing a comprehensive, unified and accurate description of the respective research agendas into which their studies fall. Without a structure for personal accountability, which is essentially the function of the research agenda, the ability of the researcher to generate new results can languish in the absence of cohesion. It



is this lack of cohesion, despite the excellence of the individual studies, that can unwittingly undermine a tenure bid.

Granted, it can be difficult for faculty members to focus all of their great ideas into overarching research goals and to thematically unify those goals into a program that is conceptually clear and useful to other researchers in the academic community. With that in mind, I have identified an easy way to craft and continually improve a research agenda so research results have ongoing applicability: the suppliers, inputs, processes, outputs and customers (SIPOC) diagram.

SIPOC is a Six Sigma tool believed to originate three decades ago at IBM. It is often used by Six Sigma Black Belts to identify all relevant elements of a business process prior to launching an improvement activity for that process. The technique, which assumes that any value-adding activity is likely to be embedded in a supply chain, has been used to characterize manufacturing processes at a high level, improve communications, document algorithms, and design and improve training curricula.

If you are a tenure-track faculty member, SIPOC can also be used to define and continually improve your personal research agenda because you and your research are embedded in a supply chain. You transform inputs from your suppliers into outputs your customers will use in their research or apply in practice. That's why SIPOC can be an applicable tool for you.

To use SIPOC, all you need to do is reflect on and write down:

1. Who your suppliers are.
2. What inputs you need from them (and when).
3. What value-adding processes you will apply to convert those inputs into new knowledge.
4. How you will communicate that new knowledge through tangible outputs.
5. How those outputs will find the customers who need them.



This must be done once for each of your broader research goals and revisited periodically to determine whether changes are needed.

Here are some questions to get you started in the process of outlining your own SIPOC elements:

**Suppliers:** What disciplines must you draw from? What scholarly journals should you be continually trolling for new results and insights? What conference proceedings should you monitor for the latest emerging results? What magazines, trade journals and other industry publications will contain up-to-date insights about new developments, applications and challenges related to your broader research goal? What physical instrumentation must you be supplied with or what research facilities must you access to carry out your research tasks? Most importantly, who or what is your research subject, and if you require many subjects, are they available?

**Inputs:** What keywords will you use to search for new information flowing into your supply chain? What data will you gather? And do you have suppliers, in the form of instruments or people, who are ready and available to help you generate that data? What techniques will you learn and perfect in order to conduct productive research processes?

**Processes:** You have a unique combination of skills, background, interests, perspectives and experiences. What value are you going to add, drawing from these distinctive aspects of yourself, to the inputs you bring into your research supply chain? This is the creative and highly personal part of your research supply chain. It can include studies you design, simulations you run, or disparate topics or disciplines you bring together to generate new knowledge. What is it that you, as a researcher, are uniquely positioned to deliver?

**Outputs:** At which conferences should you present your emerging results? In which journals should you publish the comprehensive reports of your findings? In which venues should you perform, and to which audiences, if your field is performance-based? Ideally, you should select outputs that are consumed as inputs by your target customers.

**Customers:** What specific person—or type of person—will be watching and waiting for your results to appear in your target outputs? Your customers are the people in your research supply chain who are waiting for you to be their supplier. If you’ve developed a cohesive, focused, goal-directed program of research, someone (or some community) will be waiting for your results to inform next steps or newest ideas in his or her focused, goal-directed research programs.

Why are customers important? Simple: If you don’t have customers in your research supply chain, you are unlikely to get many citations. You need citations as an acknowledgement that your work is useful and is being recognized by the academic and potentially professional community. “Build it and they will come” works in the movies, it worked for some e-commerce ventures before the dot-com bust, and it might even work for a tenured professor, but it won’t work for the junior faculty member who needs his or her work recognized to hurdle the summit of tenure.

Using SIPOC, you can periodically review each of the five elements to see how they can or should change in response to changes in the external environment, such as newly published results from other researchers or new trends in funding. For example, if interest in a particular area is waning or if research facilities are being decommissioned, these events can adversely affect your research supply chain, and you may have to reconceptualize your current lines of investigation. If your target customers aren’t reading the journals or attending the conferences your outputs are appearing in, you should consider what it would take to present your work in more utilitarian places. If you can’t identify any customers for your research after conducting the SIPOC exercise, you should thoughtfully reexamine your broader research questions and maybe save those for the days when you will roam the blissful Elysian fields of the tenured faculty member.

SIPOC has helped me understand how all of my research interests point back to two unifying themes:

1. **Quality consciousness:** how awareness, alignment and attention contribute to the emergence of a quality culture.



2. **Quality informatics:** data-intensive quality and process improvement, often using machine learning algorithms.

These themes were not always apparent to me. For example, one of the topics I study is how to more effectively manage federally funded research facilities that build and develop multi-million dollar scientific instrumentation. Using SIPOC, I realized I was using the same suppliers and inputs for this line of inquiry as I was using to understand how awareness and alignment contribute to productivity improvement. As a result, I recognized that my work in this area had been contributing to my overall understanding of quality consciousness.

An individual on the tenure track has already been identified by his or her department as an emerging leader in teaching, research and service. Because accountability is a cornerstone of leadership, SIPOC can help a tenure-track faculty member develop his or her leadership abilities by providing a structure for personal accountability in the area of research that integrates the needs and interests of current and potential customers for that research.

Applying SIPOC for career development returns accountability to the individual researcher by providing a specific way to organize and prepare for the important career milestone of applying for, and hopefully achieving, tenure.

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