

## ARTICLE REPRINT: **PROJECT PROFILE: CAPTURING AND TRANSFERRING A METHODOLOGY**

### Abstract

From the archives, early in our career we worked with a client to document a methodology for combinatorial chemistry to allow the client to sell the methodology to other companies. The author's role was simply to help with the analysis and to take the lead role in designing and developing the application exercises (we called "canned labs" at the time) that would give the learners hands-on experience using the methodology.

At least ten years later, when pitching a project to a different client team, one of the selection team members asked about the combinatorial chemistry project on the author's bio. After struggling to explain it simply the prospective client cut in—he was very familiar with the project as it was touted as one of their "success stories" for how to do a technology transfer. (Apparently, there were other attempts that didn't go anywhere near as well.)

### Thanks for your interest!

The following pages contain an extended version of an article that was previously published in "Building Capability," the PRH Consulting quarterly newsletter.

We are interested in your feedback—please contact us at one of the numbers below to let us know what you think about the article. Also, we invite you to browse the other articles and presentations available in the "Library" section of our website.

*Peter R. Hybert*, Founder and Principal Consultant

**PRH Consulting Inc.**  
20 Danada Square West, #102  
Wheaton, IL. 60187  
[www.prhconsulting.com](http://www.prhconsulting.com)  
(630) 682-1649

## Project Profile—Capturing and Transferring a Methodology

By Peter R. Hybert

### What is Combinatorial Chemistry?

Just so you can follow the story, here is a thumbnail description of combinatorial chemistry. Imagine normal chemistry where you mix different chemicals in a test tube and then see what happens. Combinatorial chemistry is like taking twenty-four miniature test tubes and systematically doing experiments in each one at the same time. In the pharmaceutical business, this results in more compounds to try out using the high-throughput screening process. (High throughput screening is variation on the same idea—a large number of similar compounds are tried against various biological targets instead of one at a time. As an aside, the high-throughput screening process was invented first—part of the reason combinatorial chemistry was invented was to provide a greater number of compounds to feed the screening process!)

There are different ways of doing combinatorial chemistry but one of the most prevalent (at least in this situation) was using small plastic beads (maybe a little bigger than corn meal) to coat with various chemicals so that they can be easily moved into different solutions more quickly to, again, try out more reactions.

At the time, this was a new technology—our clients had created a complete practice, including ideas, methods, tools, etc. As an aside, many of the tools were really low tech—one of the subject matter experts (all of which were PhD chemists) literally used a Sears 3/8” variable speed drill and a band saw to customize plastic specimen trays used by biologists to make “plates”—imagine a block of plastic with twenty-four holes, each wide and deep enough to fit about 1/3 of a crayon<sup>1</sup>.)

### How Do You Sell a Technology?

The business was using the technology to discover pharmaceutical compounds. Every molecule they discovered went into a database and was registered just in case it was found to have a use later. And they did discover some very useful compounds. (One chemist told me that one of the most successful compounds was an accident—something about an impurity that got into one of the tubes. Oh well...as long as it works.)

Then, they were approached by a non-competing company to buy the technology. The buyer didn't want the compounds, they wanted to learn how to do combinatorial chemistry! Of course it is not easy to establish a value for a technology but the process is not dissimilar to establishing the

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<sup>1</sup> I read an article recently that mentioned a 144 well plate!

value of a business. You look at what it is worth to the buyer over time. And, you build in non-compete/ non-resell agreements as appropriate to protect your business.

But once you decide to sell, you have to determine what you are selling. What will the buyer actually take with them? How does the seller make the claim that they are finished selling? After all, if you are training the buyer's people, they aren't ready until they can use the methodology on their own. What if they quit or get hit by a bus or just don't get it? The answer is that the methodology has to be made explicit and documented. That is what we did

## **The Solution**

Of course, we (the consulting team) didn't know anything about combinatorial chemistry. Our role was to facilitate the process of capturing the know-how of a group of really bright PhD chemists. (Trust me, they were skeptical at first!) It turned out to be a good thing that our expertise was the process of capturing know-how and not chemistry, though. It allowed us to surface and work through some areas in which they thought the method was well-defined and well-understood but wasn't. In fact, there were several fairly fundamental disagreements about what was "in" and what was "out" of the boundaries of their combinatorial chemistry methodology. Were the actual reactions and results "in" or "out?" If a chemist wasn't using the modified plates but was doing combinatorial chemistry using a different technique, was their work "in" or "out?"

The essence of what we (as a combined team) delivered was

- Definition of the work
- Definition of key supporting knowledge, skills, and tools
- Documentation of a series of "chemistries" (i.e., the formulae and results)
- Development of training materials for instruction and simulated experiments

(We called the simulated experiments "canned labs"—they led to known results but took the learners through the use/ practice of all key equipment and procedures used in the methodology.)

## **Project Process and Team**

The first thing our project team did was check out some high school chemistry books from the library and try to get at least a little familiar with basic concepts and equipment—you only want to look so ignorant.

After that, however, it was a pretty much the same as any training project. We first analyzed the work, then broke out all the supporting capabilities and related equipment and resources. We assumed an incoming knowledge of chemistry so only identified and addressed things that were specific to combinatorial chemistry. This was followed by a group design meeting in which we defined the learning process (for the buyers), deliverables (i.e., support materials), and a plan to develop the materials.

The project team consisted of representatives of three locations in which combinatorial chemistry was being performed. Part of the team selection criteria was also to gain representation of the various methods for performing combinatorial chemistry. This ensured buy-in but also that the methodology, as documented, was comprehensive.

## What Did We Learn?

There were a lot of things to learn from this particular project but we only have space for a few.

***“There is no one way.”*** We immediately found that there was only general agreement about the methodology. When you dug into the details, you quickly discovered that each individual chemist had his/ her own spin. In fact, some were *very* different. The tricky part was that these folks were highly self-motivated, independent, and, let’s say, confident. They were used to doing their own thing in their own labs and letting their results speak for them. They were willing to provide input to the process but didn’t really see a value in actually creating a common way of doing their work. They certainly weren’t going to change their own approach to “conform” to the standard process. (And, in some cases, it seemed that perhaps there was some resistance to sharing their “tricks of the trade”...)

Eventually though, they couldn’t help but chime in—after all, who can resist an interesting argument among fellow professionals? We found a way to create a new, common view of the methodology, in which the key elements of all the approaches were incorporated, at least to some degree. If we had tried to be too prescriptive (e.g., at the task level) it would not have worked.

***Focus on outputs (or accomplishments) and criteria first.*** In this project, this was how we were able to get alignment. As an aside, it is always interesting to me that on almost *every project* we have to work through what the real outputs are and how to tell a good one from a bad one. People often have a lot to say about tasks but far less often have clear descriptions about what the tasks produce—they assume everyone knows!

This project was no exception. As one example, we discussed whether there was a certain way the reactions were organized—was there a planned “plate layout?” (In other words, can we assume that they had a logical reason for what reactions took place in which part of the plate—maybe few mixtures on the left and more on the right?...Or something?) It took awhile to even explain the question and initially their answer was “no plan—you just make the plate.” But after discussion, it turned out that they *did* have some reasons for how they did it and they *did* think about it before they started—they had just never *articulated* the thinking.

A key point: capturing a methodology will always require shifting know-how from unconscious to conscious performance. Or, you could say from “tacit” to “explicit” know-how. This means getting people to explain what they are thinking about when they are doing something. The bummer is that, once you extract the knowledge, there is a danger that subject experts don’t recognize what you contributed. They may think that all you did was finally grasp what they were trying to tell you—they may not know that they *couldn’t* really explain it until they went through the

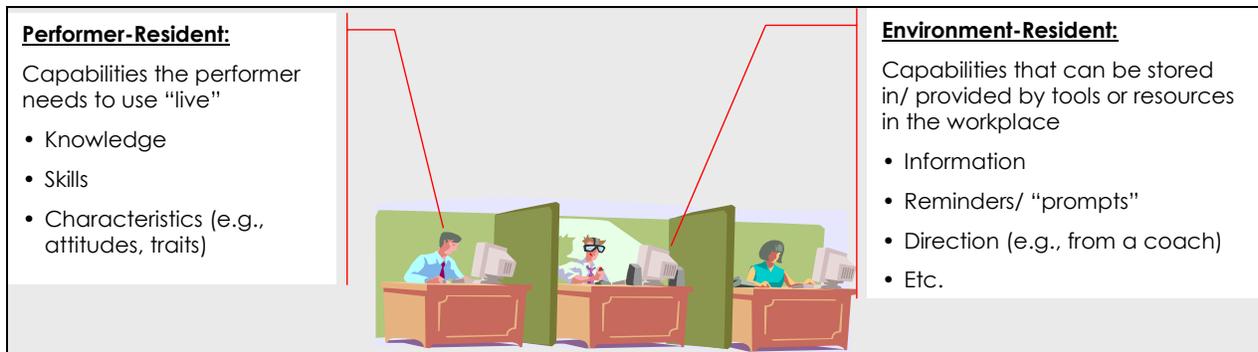
process of you writing it down, asking clarifying questions, and then having them figure out how to correct it!

***Work with a group to establish a structure and individuals to work out the details.***

(We do this with all our projects, by the way.) Working with the team was critical for defining the framework of both the methodology and the training. But, when it was time to actually develop the training, we worked one-on-one with individual SMEs. Since the big picture was well understood, it was then possible to focus individuals on targeted areas and move much more quickly than would be possible with a group. But, if we had started with individuals, we would never have built consensus on what we were trying to do and how we would do it.

Though this is true on all projects, it is especially true on a methodology process since the methodology is usually one of the core business processes. There is a lot at stake in getting it right and getting it agreed upon.

***Figure out “the nature of the work.”*** We will address this topic more in a later issue but, though you need to capture the outputs, tasks, knowledge, skills, etc. at a detailed level in order to document and train/ support the methodology, you also need to develop a “big picture” view of the work. Understanding the work environment, the “buckets” or domains of know-how, things that need to be “performer-resident” vs. things that can be put into a tool or reference will help you design the overall system of tools, training, and information in a way that fits the work.



## Conclusion

A methodology is really nothing more than the combined set of information and know-how for performing a work process reliably. To transfer that methodology requires training and performance/ information support (in addition to equipment/ hardware). It will only work if you approach it systematically and at the detail level.

***Every training project is like a methodology transfer project.*** Maybe we are stretching the point but if your training (or knowledge management or methods or tool development) project requires capturing and documenting a way of doing something and then creating materials and process to transfer it to others, then your project will probably share many of the characteristics of this project. There are proven ways to succeed—we can help if you are interested.