CHAPTER

1

Thinking About Careers

The last few decades have seen an increasing complexity in career options—it is no longer just choices between being a lawyer, a doctor, or an engineer. Even within industrial organizations, there are more positions connecting to numerous functional needs with defined roles and expertise. Organizations do not just look for chemists, but also look for surface analytical chemists, synthetic polymer chemists, or small-molecule synthetic chemists (among a dozen other descriptions if not more). Industries today look not only for project managers, but also for project managers who have had experience in regulated industries and have worked on implantable devices. This perhaps reflects the increasing complexity of problems and levels of specialization necessary to solve them.

To a new graduate or to someone who has recently started his or her industrial career, this presents a threat and an opportunity. It is not just the increased technical complexity of industrial problems—which someone graduating with an advanced degree or with some research experience will appreciate—but also the significant complexity in business issues and organizational structure.

Planning a Scientific Career in Industry: Strategies for Graduates and Academics
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A few years ago, an industrial group (of which I was a part) was engaged in theoretically predicting the behavior of surface-modified nanoparticles in solvent dispersions. We knew that the chemical nature of the modifying agents made a big difference. When we changed from alcohol functionalities to acid functionalities, or sometimes even when we changed the isomers in the surface modifying groups, the stability of the dispersions changed. We were struggling to understand how we could theoretically predict the behavior of these dispersions and presented this problem to a leading academic expert in this area. He said that while they had done much with model systems, they had not looked at the impact of such complex chemistries—after all they had the choice of ignoring these problems. We did not have that choice, because our real products needed understanding of real chemistries. We eventually did resolve the problem and that helped us predict the behavior of such particles, but we did not dot all the i's and cross the t's until much later. The necessity of solving more difficult problems drove us to explore a richness in science that would have otherwise passed us by. But even in doing so, there were a number of associated phenomena and questions that we did not answer—we did not have the time. And we have not gone back to answer those questions.

Problems in school are more of an exploratory nature—even when they have a specific goal. No product plan or sales expectations are tied to their resolution. Problems in the industrial sector, however, have a significant amount riding on their resolution—deadlines and pressures associated with deadlines become significant. Success or failure can cost an organization credibility in the marketplace and affect business plans. In the race to meet these deadlines, one often does not have the time or opportunity to understand every associated phenomenon; thus progress is often driven by good approximations—tested heuristically or by performance metrics.

At the same time, though it may sound contradictory, details are much more important in the industry than in

academia. For example, what are the impurities in the raw material stream? How does the reaction system change with changing different components? How much energy is required? What is the kinetics of a process and what is the economic viability? These details may not matter in a laboratory setting but may mark the difference between a successful program and a failed one.

Industrial jobs are highly open-ended. There is no closure at the end of a semester or a year or even a thesis. One does not always know where the end of your project may be or what would even define the end. Sometimes even the customer does not know what she wants—her initial ideas might change based on your results. One does not know what one may find and how that may change the trajectory or even the nature of the program. Such open-endedness of programs and plans also affects performance appraisal processes (as a new graduate will learn, this is one key component of career growth). Your performance is rated before all the i's have been dotted—in fact, you may not even have the opportunity to dot all the i's. The key, then, is to manage one's performance through the ups and downs of a program in a way that highlights contributions throughout the process, not just at the end.

Besides, early achievement or failure is not an end state either. One's early successes may lead to greater focus on the program with more upper management visibility than it is ready for—it could lead to much greater expectations and, potentially, to a failure. Past failures or successes may impact expectations or impressions of one's effort. To repeat an earlier statement: Understanding and implementing performance management becomes important.

An individual is but one function of a very complex network focused on achieving an objective. This implies that rewards or even the nature of success is not straightforward. There are no promises of "do this and you will get that": One often does not

know what one gets for doing something or where it might take one's career. Success is often less well defined. One's findings might result in proving that a certain technology is unfeasible, leading to the ending of a program. One's due diligence could lead to the team realizing that some other invention has been patented, and you should not be working on this approach. Are these successes?

One may have an invention; however, that may not lead to commercial success. There may be no use for this invention at that particular time, proper marketing plans may not be in place, or there might be miscommunication between various teams working on developing this technology further or the business climate that may lead to its stagnation or shelving.

In this seemingly chaotic environment, how does one become ready for an industrial career? What should one be thinking about or planning for? Can one even plan an industrial career—especially in today's world of *ad hoc* job elimination, month-by-month planning driven by Wall Street analysis? Is it even practical to ask and hope to rationally understand whether one is making the right choices in one's livelihood options such that these choices align with ones own needs or goals? If it is accepted that such careers and programs in the industry are nonlinear, is it feasible to aspire to do A or be B or make plans for what one needs to do to get there? Can one even hope to know if one really would fit into being B or whether doing A is a right choice?

One begins by recognizing that these are in fact opportunities, if one is ready for them—opportunities to try new roles and new functions, opportunities to challenge new problems, and opportunities to define and redefine oneself, to learn, adapt and grow, if one is ready. Challenges are opportunities to be continually successful. The nonlinearity allows for one to drive one's own career—simply because no one else can drive or define your career. Not because no one will want to

but because the plethora of opportunities and the unpredictability of career trajectories makes it impossible for another person to do so. No one can say with any confidence "You are good at X; do the following and you will be successful." Industrial workplaces are strewn with brilliant but frustrated people who were not ready or did not adapt to the workplace that requires much more than just academic genius.

The complexity of functions and nonlinearity of opportunities requires that an individual recognize the environment, understand oneself, and be prepared by having multiple scenarios planned. It provides an opportunity to explore, experiment, and plan because one's career is not defined only by the first decision one takes. Let us look at a scenario of a generation or two ago where if you had joined as an engineer in an electrical company, your career path in this company was largely defined. You would, perhaps, have started on a project, and as you proved yourself, you would have been appointed into bigger projects and then at an appropriate time got your first promotion and there you would go. Once you started in one position, options of career trajectories were few. Your performance would define how far you would go within those few options.

In today's world, there are many more choices available with regard to the nature of your job. For example, with a degree in physics, you could as likely be a banker or a financial analyst as you might be a professor, a researcher, or a technical manager. Even your first job is not well-defined. Often, your job can change between when you are interviewed and when you start working. Jobs can change at any point based on volatility in the marketplace, change in a customer's needs, or business strategy. Even if your project is successful, it is impossible to predict what project you may be working on next year. There is more volatility in your career. Increasingly, you will find programs being shut down. Frequently, you will have to find

new projects or new jobs. But these are also opportunities to reinvent yourself.

So, in such a situation, it is up to you to proactively define your career. The uncertainty can affect your career if you are not ready for it. However, if you are, it opens up avenues for change in ways that were not possible decades ago. To be ready, you need to understand the workplace and recognize opportunities to solve problems. More importantly, you need to spend enough time introspecting, understanding who you are, knowing your own needs and goals, knowing your passions, recognizing new skills that will help you grow, and learning to what extent you can adapt and what you can challenge. Stepping back for a moment, you can see why you need to truly understand the important factors in the working of a company in a specific industry and rigorously plan for what you truly want.

Consider your thesis: You began work on a difficult and somewhat new problem. You analyzed the work done in that area, you reviewed theories that worked and those that did not, and you identified the different aspects that worked or identified those that failed and those that may have had internal contradictions. Based on your analysis, you extended some theories with a hypothesis or two, or you developed new hypotheses and then tested them with experimental data or observations leading to some conclusions. You did not just go with a gut feeling on what you thought a new hypothesis might be. And yet, we often make our career decisions based on gut feeling. Often, such decisions are made on the basis of a single industrial experience, or experience of our academic advisers who may have limited understanding of or exposure to industrial processes, or even based on some recent experience that may have biased our instincts. If we take so much care to perform due diligence on a research project, should we not go through a similar process of analyzing the workplace and our own needs in planning our careers?

Planning for your career should be no different than an entrepreneur planning a start-up venture. You need to consider your life needs, your skills, your strengths and weaknesses, your market needs, and your access to networks and to the market, and you need to build strategic plans based on multiple scenarios that account for these factors.

You will invest a significant part of your conscious life, your intelligence, and your creativity in your career. Your sense of achievement and satisfaction will depend on your strengths, weaknesses, and needs and how those align with your career choices. Billions of people do not have the choice of choosing or shaping their careers. As a knowledge worker,[1] you do. You are privileged to be able to choose a career that is fulfilling. You can choose to value and take advantage of that privilege, or you could follow the crowd and miss out on opportunities that are right for you.

Layout of the Book

The second chapter of this book introduces (a) the framework within which a technology company may be understood, (b) the industry within which it operates, and (c) jobs within this industry. While most readers with technical backgrounds would not be strangers to the technology industry, this chapter attempts to introduce business aspects of the industry and *how*

[1]Knowledge workers are employees engaged in primarily understanding or analyzing knowledge and shaping entities based on knowledge. Knowledge workers in today's workforce are valued for their ability to interpret information within a specific subject area. They will often advance the overall understanding of that subject through focused analysis, design, and/or development. They use research skills to define problems and to identify alternatives. Fueled by their expertise and insight, they work to solve those problems, in an effort to influence company decisions, priorities, and strategies.

business strategy frames jobs in the industry. It introduces the reader to choices that companies make in measuring their performance, their strategies, and positions in the marketplace as well as how they choose to organize themselves to succeed. While each of these areas requires multiple books for in-depth analysis, this chapter presents an overview while drawing the reader to the connections between these choices that a company makes and the nature of jobs as defined by these choices, provoking the reader to analyze the implication of such jobs vis-à-vis his or her own career goals and life needs.

The third chapter provides the framework to think about the nature and kind of jobs based on your own skills, personality, strengths, and life needs. It uses your life needs to provoke your passions and interests and then helps development of job maps based on your skills and strengths that overlap with these passions and align with your life needs. While it does not provide extensive tools for self-analysis[2,3] (there are numerous other books that effectively provide such analysis), it helps you understand skills needed in the market, the kinds of problems that the industry faces, and how your skills may be appropriately developed to solve those problems. It critiques the commonly held belief that specific jobs require specific personalities and suggests strategies that different personalities may use to solve problems effectively. Through these tools, it lays the groundwork to develop a strategy map to guide you through your needs and your ambitions.

The fourth chapter focuses on knowledge and tools relevant to you as you start out in the industry. Beginning

[2]B. Harrington and D. T. Hall, *Career Management and Work-Life Integration: Using Self Assessment to Navigate Contemporary Careers*, Sage Publications, 2007.

[3]I. B. Myer, *Gifts Differing: Understanding Personality Type*, Davies-Black Publishing, 1995.

with new employee orientation programs in companies, it describes the kind of knowledge that you should be looking for within these programs. Problem solving is your key strength, the biggest reason why you were hired; this chapter elaborates on more contextual and broader understanding of problem solving and how it defines your job. The chapter describes the role of performance metrics and processes of performance appraisal in the context of career growth. Your supervisor and your team are often key stakeholders in the appraisal process; the chapter talks about getting to know them, understanding your relationships with them, and managing expectations.

The fifth chapter focuses on processes and tools that help you establish yourself in your company. It begins by highlighting that as a new employee in a technology company, building your technical credibility is your first major goal and provides tools and strategies to manage technical projects and establish your technical credibility. Technical credibility is not just about your technical work; in recognizing this fact, the chapter includes discussions to help you understand communication and collaboration in an industrial environment and how you can leverage these processes better. Finally, it introduces you to your biggest support system in the industry: your network and your mentor(s).

The final chapter introduces a new employee to a broader and more complete vision of leadership and how that will help the new employee long term but must be learned and practiced right away. It introduces the new employee to the fact that she is a de facto leader in certain areas and responsibilities already. It shares modes of leadership that are not often idolized in popular media—such as consensus based and nonhierarchical forms of leadership. It also discusses how industry (and real life) always has multiple leadership needs that have multiple leadership skills and that good leaders often build multiple intelligences through practice.

This book is about you, how you could potentially plan a career that makes most sense to you, and empower you to build a career that aligns with your interests. It asks you what you want to do and asks whether that is really what you want to do or whether the opportunity cost of such activity is onerous. It also provides for strategies to plan and succeed at what those goals may be. Most importantly:

1. It attempts to define industrial careers through various parameters that are based on how the industry operates.
2. It provokes you to think about your own needs, skills, and expectations.
3. It provides you with tools and points you to resources to help you make choices and develop skills for a career that would be most fulfilling to you.