

**EIP**

# A Year in Patents - Part 1/4: Swapping Simulations for the Patent Profession

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On this day last year, I was in the depths of academia. A postdoctoral research fellow in applied mathematics, I was perusing my collaborators' comments on a draft manuscript for a journal article. Scattered on my computer screen lay graphs and output logs of simulations running on a supercomputer across the Atlantic. Our spirits were high. In the course of generalising a theory for astrophysical turbulence (my fellowship project), not only had we isolated subtle disparities in the extant theory, but we had also identified their mathematical genesis.

The joy of scientific discovery had nonetheless come with mixed feelings. The triumph in our success was dampened by a nascent sense of intellectual stagnation. Monotony reigned supreme: the task of writing and executing lines of simulation code seemed endless. The fact that deadlines for lectureship applications loomed on the horizon made me reflect critically on my academic career. Although I enjoyed conducting research and delving into the details of a given scientific problem, I enjoyed verbalising the discoveries even more. I was enthused by the craft of scientific writing. Arguments and counterarguments, critique and reasoning, distillation and taxonomy: it was the intellectual, written discourse of science that truly captivated my mind. Through this process of reflection, little by little, I opened up to non-academic career paths, in an effort to find a profession that values the craft of language yet is scientific to its core.

Suddenly, the patent profession seemed alluring. Patent attorneys are constantly in the

companionship of science, yet their writing is not confined to scientific articles and conference papers: it extends into the realm of law, where language arguably matters more than anywhere else. Patent attorneys' engagement with legal scholarship requires a heightened sensitivity to language. Additionally, as a service profession – catering to inventors and commercial entities – patent work involves frequent social interaction rather than being cordoned off in the academic ivory tower. As a relatively obscure career choice in the mathematical sciences, my decision to join the patent profession aroused curiosity amongst my friends and colleagues. Three months into the profession, I'm confident it is the right fit for me. In this series of quarterly blog posts, I will chronicle my experience as a trainee patent attorney, sharing details that my past self would have found insightful.

On the first day in the new job, I found myself on Mars. EIP, the patent firm at which I work in central London, has floors named after celestial objects. I was immediately struck by the sense of openness at the office, both in architectural and hierarchical terms, on Mars or in the Stars (the top floor). As a trainee working towards becoming a qualified patent attorney – I share office space with fully-qualified peers, and in fact the firm's founder sits right across the aisle from me – talk about learning by diffusion! Also noteworthy, in addition to the collegial atmosphere, is the seamlessness of operations, from IT systems to scheduling. Logging into my computer, minutes into my first day, I found my schedule already densely populated with meetings with colleagues ranging from the CEO to HR administrators.

Days are immensely variable. Blocks of independent work are interspersed with frequent training meetings with my supervisor, client meetings, interactions with colleagues, and professional development sessions. Time management is critical. I had to get to grips with recording time and operating in slots of 6 minutes each, the basic unit of legal praxis worldwide. Every unit is both accountable and valuable. Some researchers in academia are, of course, diligent organisers of their time and freedom – I wasn't one of them! Therefore, I find having an overall structure liberating rather than constraining; it allows me to be more productive in my day-to-day work.

Patent law involves, on the one hand, drafting and prosecuting patents (work undertaken by attorneys) and, on the other, litigating patents in court (the realm of solicitors). At EIP, distinct from many competing patent firms, attorneys and solicitors work in tandem. The resulting synergy was one of the key aspects that motivated me to join the firm. A strong scientific background is a prerequisite for training as a patent scientist. For me, this was of the essence, as I wished to build upon rather than abandon my prior experience. The extent of different individuals' scientific specialism varies, but the majority at my firm come from considerable research experience, and some from vast industry experience.

Notwithstanding the differences between academia and the patent world, qualifying as a patent attorney is a rather academic pursuit. The program of study concentrates on law rather than science, and training involves being supervised by a qualified patent attorney alongside sitting qualifying exams over three to four years.

Training is tailored to each individual. I am supervised by an attorney, who, like me, has a mathematical research background, and who is therefore perfectly positioned to extract the most out of me. He specialises in protecting computer-implemented inventions, including AI-related technologies, and has exposed me to the intricacies of AI from a legal standpoint. AI is, of course, omnipresent in technology and science, but it is a relative newcomer to the legal sphere. Fascinatingly, the legal regulations emerging around AI are encouraging further technological innovations as developers of AI systems seek to comply with new legal constraints.

Patent laws vary between territories (jurisdictions). Learning to appreciate the similarities and navigate the differences is an important part of training as a patent scientist. What makes this challenging is that laws are not only encoded in relevant Acts and Conventions, but they are also handed down via judgements on court cases and proceedings of appeals. Conducting research to inform a client on how certain laws compared in France versus Germany and the UK, it was crucial for me to account for the diversity of sources. Of late, the imminent launch of the Unified Patent Court (UPC) in Europe has captivated the attention of the patent law world. The introduction of a new court system shows that law is hardly ossified; it is changing continually, and remaining up to date with the latest conventions is crucial to any legal practitioner. Therefore, even fully qualified attorneys and solicitors regularly attend presentations and seminars to remain informed.

An important task of a trainee patent attorney is to learn to draft patent applications. A patent application both describes how an invention works and claims the scope of protection sought. Writing claims is akin to walking a tightrope: claims must at once be specific enough to delimit the invention from anything within the public domain, and broad enough to be commercially valuable. The stakes are high – once a patent application is submitted, no further information can be added. Sometimes even removing commas can be catastrophic! Strict rules on amendments prevent patentees from constantly moving the goal posts of their invention and thereby hindering wider innovation.

I have recently been involved in drafting a patent application for a client whose invention involves a machine learning algorithm. Innovations involving mathematical and computational methods often fall on the borderline of patentability and thus require

additional attention to the law. The most pleasurable aspect in drafting a claim is the scrupulous attention required to make it logically watertight, much like a computer program, with no single word lacking antecedence. Once submitted, a patent application is put through a comprehensive search and examination process, wherein an examiner at the relevant jurisdiction's patent office subjects the patent application to a number of tests that may undermine it, including the requirement that the invention defined by the claims is neither known nor obvious from what is already in the public domain. A strong claim is needed to hold firm against these tests.

Drafting patents is a process of co-creation with inventors. Throughout the process of patent prosecution, the patent attorney works with the inventor to ensure the patent gets granted. Learning to craft succinct emails to examiners and inventors alike is an invaluable skill for any trainee patent attorney; excellent communication is key to the profession. Furthermore, in so-called invention mining meetings, patent attorneys meet with inventors to determine which aspects of an invention, if any, are patentable and worth patenting. Sometimes meetings comprise consultancy and advising clients on relevant legal procedures. A highlight of my experience thus far has been advising a former colleague on patenting a research outcome of their PhD together with my supervisor.

In my first three months on the job, I have absorbed the basic principles of patent work, and how they connect to scientific research and innovation. My immediate priority now is to expand my knowledge of legal codes and their origins in case judgements and appeals. Building on what I have learned about drafting patents thus far, I will be turning my attention to prosecuting patents in the next few months, a process that I will outline in the next instalment of this series.