

Let's Create a 'Concrete Causation' Standard for Software Inventions

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Much criticism of software patents is rightly aimed at the use of abstract claim language to cover a wider range of technology than the patentee invented and disclosed. [Mark Lemley](#), for example, highlights “functional” language in claims as particularly problematic, and proposes that a claimed function be limited to the disclosed “program and ones like it.”

But every computer program is itself an abstraction at some level, and computer scientists can use all kinds of abstractions to describe their programs and how they work. Unless there is a standard of concreteness for computer programs, Lemley's approach might simply push inventors to describe their programs in ever more abstract terms .

We need a concreteness standard for software inventions.

The Supreme Court suggested such a concreteness standard in *Diamond v. Diehr*, the 1981 decision that really opened the door to software patents: “It is for the discovery or invention of some practical method or means of producing a beneficial result or effect, that a patent is granted.” This meant the use of a patentable invention must, in practice, cause some desirable effect — even though patent law does not require an inventor to provide a correct theory of how the invention works.

Following *Diehr*'s lead, I propose the following “concrete causation” test as an elaboration of the longstanding doctrine excluding abstract ideas from patentable subject matter:

The utility of a patentable invention must be amenable to explanation by a single causal account that specifies the resources brought into play by the invention's use.

Here, I use “resources” broadly to refer to any manipulable quantities that have a well-defined causal role generally accepted by practitioners, including physical quantities such as mass, energy, charge, and momentum, as well as real-time computational resources like CPU cycles, network bandwidth, memory, disk space, and battery life. Causal accounts can use a similarly broad range of explanatory principles governing the involvement of such resources in causal processes. These principles could range from the conservation laws of physics to the scheduling disciplines implemented in operating systems.

Note my use of the word “amenable.” I'm not proposing changing the law to require the inventor to provide a correct causal theory of operation. Instead, one who alleges that a claimed invention fails to meet this test must show that the claim purports to cover multiple resource-specific causal accounts.

While this proposal is generally applicable across all technologies (for example, it would preclude patents claiming mechanical inventions in abstract geometric or kinematic terms), it would specifically address the most problematic uses of abstract language in software patents.

Let's take for example the commodity hedging methods the Supreme Court found unpatentable in *Bilski v. Kappos* (2010). Those methods consisted of two kinds of steps:

1. "initiating a series of transactions" – The initiating steps could be correctly implemented through any kind of process capable of being given legal effect, from paper documents, to recorded phone conversations (the primary approach at the time of *Bilski's* invention), to HTTP requests via the Internet.
2. "identifying market participants" – The identifying steps are specified in purely mathematical terms without regard to the computational resources that might be involved in their implementation.

So the utility of *Bilski's* claimed methods are not amenable to one resource-specific causal account, but many. *Bilski's* methods perform their hedging functions whether the market participants' option values are calculated on my office desktop PC or on the London Science Museum's [Difference Engine](#), and whether their transactions are completed via telephone or website. A patent examiner could simply cite such an observation in rejecting *Bilski's* claims as unpatentable subject matter.

A key advantage of my proposed "concrete causation" standard is its consistency with Supreme Court precedents, which allows the Federal Circuit to introduce it without need for legislation. The universal applicability of this approach conforms to our treaty obligations (to make patents available without discrimination as to the field of technology), suggesting it could become an international norm. The approach also upholds what I have identified elsewhere as the patent system's [metaphysical commitment to scientific realism](#).

By design, this proposal explicitly acknowledges that all of the "useful Arts" confront the common problem of having limited resources. This necessity is, after all, the mother of invention. The patent system exists for those working to do more with less, not for those seeking to corner the market on such efforts through abstract claim drafting.