If it Smells Good, Develop It

By John Benson

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1. Introduction

I believe, as I'm starting this post, this will be the first post in the general category of "product development." Not only does your author have a deep history in this field (albeit in supervisory control systems for electric utilities, not in the subject of this post, Fragrance Development). I know that, although the secondary knowledge is quite different in these two markets, that basic-steps for developing a new product and many struggles are very similar.

2. The Right Scent

On the 11th floor of a nondescript office building on 57th street in Manhattan, pipette-wielding technicians in white lab coats hunch over glass vials and digital scales, carefully concocting perfumes. This is the Experimental Lab at Givaudan[1], one of the world's largest fragrance manufacturers, and the work these technicians are doing is as meticulous as that of engineers layering silicon on a microchip. Their job is to produce trial batches of perfumers' scent formulas—typically as many as 250 a day—which will be evaluated, tweaked and made again until one version is finalized. The walls are lined with thousands of jars and containers, each holding a unique aromatic substance—and in the room beyond sit another 50,000 trial vials, stacked on shelves that seem to recede into infinity.[2]

"You come in, and it just looks scary," says Givaudan vice president perfumer Stephen Nilsen. "But each bottle is a secret, a mystery. There's a story in each one."

For thousands of years perfume ingredients were simply distilled from flowers or extracted from plants. Then, in 1868, the first organic scent molecules were synthesized, opening a panorama of new olfactory possibilities. The market may celebrate a perfumer's artistry, but innovation in the luxury-fragrance industry is ultimately driven by the chemists whose experiments bring new aroma molecules into existence.

"We are at the ideation, proof-of-concept, wacky-science stage of the process," says Paul Jones, director and principal scientist for International Flavors and Fragrances (IFF), another leading fragrance company. In IFF's labs in Union Beach, N.J., Jones and his fellow organic chemists build models of speculative scent molecules and draft hypotheses before running raw materials through chemical reactions to see what new smells emerge. The goal: to create a scalable, custom-crafted chemical compound that IFF can use to competitive advantage.

The landscape of fragrance creation – a global market that data company Statista projects will be worth upward of $65 billion this year – is rife with trade secrets. Perfume formulas are rarely patented – they are fiercely guarded as trade secrets instead – but the engineered molecules themselves are routinely patented and trademarked, remaining exclusive "captives" to their inventors for years until going on the market.

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[1] https://www.givaudan.com/

[2] Jeanna Bryner, Scientific American. April 14, 2026 (May 2026 on-line issue), "Inside the labs where chemists engineer luxury perfumes," https://www.scientificamerican.com/article/how-chemists-engineer-the-signature-smells-of-luxury-perfumes/

Before even starting a reaction, Jones says, fragrance makers must consider the intellectual-property concerns for a molecule. "The analytical science is so good that if you don't have IP-protected materials, then your creation is open for everybody to copy." The stakes are especially high in the luxury market. "The difference between a fine fragrance and a consumer fragrance, like [one used in] laundry detergent, is that fine fragrance has allure and sophistication," he says—an element of "sparkle" such as a hit of Saffiano, a molecule developed by IFF that smells like suede, "so when you put it on, you're like, Oh, wait a minute."

This molecular tinkering also yields replacements for endangered or restricted natural ingredients. Increasingly the fragrance houses are employing soft chemistry to achieve these goals, using biological processes such as fermentation or enzymatic transformation. "Think about how fermentation by yeast turns sugar into alcohol," Nilsen says. "We have enzymes and strains of microorganisms that can similarly digest sugar or transform molecules to create complex molecular structures that can form the foundation for making beautiful smells."

These molecules have the added benefit of being more sustainable. One example Nilsen cites is Ambrofix, a woody, amber-scented molecule that serves as a replacement for ambergris, a substance produced in the digestive tracts of sperm whales. Originally derived from sclareol, a compound in clary sage, Ambrofix is now produced via cane sugar fermentation. "We used to need thousands of acres to grow enough plants to make it," Nilsen says. "Now we have a bioreactor where we use a hundred times less land to create the same molecule."

Perfumery innovations aren't happening just in synthetic chemistry labs. Botanists are hybridizing flowers to produce specimens that yield superior scents, and eco-friendly extraction techniques, such as the use of supercritical carbon dioxide and microwave technology, are gradually phasing out hexane, a toxic petroleum solvent long used to extract aromatic molecules from botanicals. Advancements in upcycling are also bringing fresh ingredients to perfumers' palettes. According to Bernard Blerot, vice president of R&D for naturals at IFF, one of the latest notes to be introduced this way is Oakwood, the result of a patented CO_2 extraction process using excess wood from the largest barrel producer in France. "The smell is interesting because it's dry and warm at the same time," Blerot says. "It's different from sandalwood or vetiver or patchouli," giving perfumers an additional note they can now use.

Author's comment: Since your author is a wine aficionado, I know quite a bit about wine barrels, although the following text is from the referenced source.

French oak barrels are made from pedunculate oak (Quercus robur) or sessile oak (Quercus petraea) grown in the forests of France.[3]

American white oak (Quercus alba) is the oak used for American oak barrels. Most American oak used in barrel making is grown in the eastern half of the United States.

Back to Reference 2.

[3] The Role of Oak in Winemaking, Types of Wine Oak Barrels, https://www.wine-production.com/wine_production/oak_barrels_winemaking/types_wine_oak_barrels.htm, Copyright 2026.

The luxury market's appetite for new scent molecules draws on neurobiology: smell is tightly bound to emotion and memory. We are hardwired to experience scent the way we do, says neuroscientist Rachel Herz, author of the 2007 book "The Scent of Desire," and this trait makes us naturally inclined to seek out the transient hedonic moments perfume can provide. "Our perception of scent and the activation of emotion take place in the same part of the brain, so our experience of scent is fundamentally emotional, and this is different from all of our other sensory experiences," she says. "It makes us feel something even if we don't recognize it or understand that there's some background to it. And when that feels good, it is a deep, innate pleasure that doesn't come with logical or cognitive overlay. It's really pure, and I think that's why there is such a drive for it."

As we walk around the Givaudan lab, Nilsen waves bottle after bottle of aroma chemicals under my nose. One smells like cold air, one like pencil shavings, another like passion fruit mingled with onions. (I find it a bit weird, but "we use it all the time," he says.) I smell raw materials: rose absolute, pink pepper, jasmine. At the end of the tour, he shows me Carto, a robot that enables perfumers to "sketch" compositions before they even go to the Experimental Lab for trials. One side of the machine is a glass chamber containing 300 perfume ingredients; the other is a computer screen.

"Somebody came to me recently and said they wanted a fragrance that smelled like a rainbow mango," Nilsen says. "I was like, I don't know what that is. So, I came in here and said, what might be there? Ethyl butyrate, some citrals, some green notes—a green apple, a little pear. Some peach." He taps these notes and more into Carto, and the mechanism swings into action, measuring the ingredients into a sample vial. Nilsen removes the result as though from a vending machine and hands it to me to sniff. It smells like mango but brighter, zestier and more complex. A mango I might even want to wear on my skin.

"It's nowhere near being a finished perfume," Nilsen shrugs, "but it just makes you happy, doesn't it?"

Final author's comment: I believe the above is a good article on product development, even though it significantly outside of my area of expertise (I'm an electric engineer, not a perfume engineer, if there is such a thing). However, as I pointed out in the introduction, all types of product development share challenges, so I decided to use this.

The steps in product development typically include:

- Idea Generation: Identify market needs and brainstorm potential solutions.
- Research and Analysis: Conduct market research and analyze competition to refine the idea
- Concept Development: Create a product roadmap and define the product scope
- Prototyping: Build a prototype or minimum viable product (MVP) for initial testing
- Testing: Execute testing phases to gather feedback and make necessary adjustments
- Launch: Introduce the product to the market and monitor its performance

These steps can vary slightly depending on the specific methodology or industry, but they provide a solid framework for product development.