Suppose a team of software developers wants to make a smartphone app that helps people with high blood pressure track the sodium in their meals. Their expertise in coding and design will guide them in making an app that is reliable and easy-to-use.

But when it comes to understanding how to tap research-grade nutrition data for a wide range of foods and ingredients, the developers may lack crucial knowledge in nutrition sciences.
The University of Minnesota’s Lisa Harnack, DrPH, director of the Nutrition Coordinating Center (NCC), has an idea that could knock down that barrier. Harnack aims to give app developers packages of code that will help them draw from the NCC’s Food and Nutrient Database (http://www.ncc.umn.edu/products/features/food-and-nutrient-database-2/), a treasure trove of comprehensive nutrition data, without needing a researcher’s expertise. This resource would bring developers better information to fuel their software—and, in turn, help patients living with nutrition-related chronic diseases.

For people with a wide range of health conditions, from low blood sugar to Crohn’s disease, controlling a diet could mean the difference between robust health and harmful symptoms. The NCC database provides information on a wide spectrum of foods, including the basics, like apples and beans; brand-name prepackaged foods, like lunch meats and frozen dinners; and even a number of menu items from major restaurants, like McDonald’s.

All told, there are 165 nutrients and components tracked in the database for its nearly 18,000 foods.

“Because our database was developed for research purposes, it’s very complete and carefully curated,” Harnack said, adding that an updated version of the database comes out each year. “We’ve gotten phone calls and emails from app developers working on diet-tracking apps. They need a food and nutrient database like ours.”

Ingredients for market success

Countless nutrition apps exist on the market today, but most share a common problem: incomplete or inaccurate information. The NCC’s database, used by researchers studying a wide variety of health conditions, contains more foods and nutrients (http://www.ncc.umn.edu/products/comparison/) than other research-quality databases.

To get the project started, Harnack applied for and received support from the U of M’s MN-REACH (https://mn-reach.umn.edu/) program, one of only three Research Evaluation and Commercialization Hubs nationwide established by the National Institutes of Health. MN-REACH aims to improve health care by fueling the development and application of new diagnostic tools, medical devices, and pharmaceuticals.

Charles Muscoplat, Ph.D., co-principal investigator and member of MN-REACH leadership, said researchers need to interact directly with their new invention’s intended users to get a better picture for how it can best benefit those users and succeed in the market. MN-REACH provides faculty with the resources and incentive to reach out to the users and decision-makers who will adopt their technology.

“It is not an easy process, but the information MN-REACH helps researchers gather guides product development, increases efficiency both in terms of the timeline to market and the financial requirements, and boosts the probability of success,” Muscoplat said.

Discovering what users need could even lead to a whole new approach to commercialization. That was the case for Harnack, who originally thought developers wanted a software tool to pull data from the NCC’s database into their apps. Through her interviews with developers, she was surprised to find that
wasn’t the case—in part because developers didn’t know how to interpret the data they would then have.

Instead, what they asked for was a resource to guide them in programming database-driven app features so they don’t need the expertise of a nutrition scientist. The NCC’s database is a collection of data files that are “deeply relational,” meaning that data in one data file is related to data in other files in ways that allow the data to be used in many ways (e.g. to calculate calcium in one slice of cheese, one ounce of cheese, one cup of shredded cheese, etc.). Nutritionists understand the relations between the data files thanks to their nutrition training. But for programmers figuring out the relations can feel like solving a Rubik’s cube for the first time.

Harnack decided to change her approach and provide app developers with prewritten code that takes care of much of the programming that requires nutritional expertise, giving developers the pieces they need to build their app successfully. For example, one code segment can help developers build a function that streamlines the way users search for and find a specific food entry in the database, which developers could not do without extensive knowledge of the relational database. In short, these code snippets, and the instructions that come with them, will help developers hit the ground running—and will prevent limited scientific nutrition expertise from slowing them down.

“Dr. Harnack’s project highlights that investing time early on to understand why app developers value the nutritional database—and how they would utilize the unique dataset—will enable her to benefit patients sooner by designing a valued and desired product,” Muscoplat said.

The project should be finished in the next month or two, Harnack said, after which the packages of code will be ready for developers to license. In the meantime, she has been fielding several inquiries a week from companies interested in licensing the database.

“It makes me excited to think that if more apps use our database, the quality of info they’re going to provide to their users is going to improve,” Harnack said. “It could really help people who have special dietary needs.”

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