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Jacinto Duverger received his Bachelor's Degree in Economic Cybernetics from the University of Donetsk, Ukraine in 1988 and his Master's Degree in Information and Communications in 2007 from a joint program between the University of Las Villas and Guantánamo University. Since 1994 he has worked almost exclusively on the development of the Health Trends Analysis Units (Unidad de Análisis de Tendencias en la Salud, UATS) throughout Cuba, participating in their conceptual design, installing their first computer network, and more. Born in the country's easternmost province, Guantánamo, his fascination with programming and Prospective Methodology led him to create health software that helps provincial UATS track and forecast health events and to engage in proactive strategic health planning.

Most recently, Duverger developed a software package to study the financial sustainability of Mexico's new catastrophic illness coverage program. Duverger sat down with *MEDICC Review* to talk about software development, strategic health planning methodologies, and training the new generation of Cuban public health leaders.

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MEDICC Review: What's your job description?

Jacinto Duverger: I do the systems analysis, design, and software programming that support epidemiological surveillance. The users are provincial health workers who may have a problem or question about the trend of a disease or are conducting research. In essence, I provide technical assistance and support to health workers. But developing software has taken me beyond epidemiological surveillance to the creation of tools for strategic planning and the study of health financing.

MEDICC Review: Your training is in computer programming and economics. How did you end up in the health sector?

Duverger: I started working for Guantánamo's Provincial Hygiene and Epidemiology Center, at their UATS, a few months after it was founded in 1993. I helped implement many early surveillance programs and saw first hand the beginnings of the national epidemiological surveillance system. That was my first glimpse of the big picture, of how this system was going to function nationally.

UATS' strategic component brings together health professionals searching for new technologies to apply to surveillance. Initially, we were thinking of focusing on how to predict the behavior of different diseases based on mathematical and econometric forecasting models. However, at a surveillance methodology workshop in 1995, a UNICEF representative, the late Chilean Dr Luis Zuñiga, reinforced the notion that health is primarily a social phenomenon and although econometric methods are good, they aren't enough to explore all of the factors influencing health trends. He suggested we explore something known as Scenarios Construction. which utilizes econometrics as well as qualitative processes. I was immediately captivated by this concept and more importantly, realized its potential to innovate. This was my introduction to Prospective Methodology.

MEDICC Review: What exactly is Prospective Methodology? Where does it come from and what does it have to do with disease surveillance and health planning?

Duverger: There are many terms used for this – in Latin America it's known as Prospectiva, in other parts of the world it's called Futures Studies or Prospective Studies. [There is no consensus in the field on preferred terminology, Eds.] This methodology doesn't solely predict the future based on what has already occurred, but rather anticipates the future based on probable scenarios that forecast changes and emerging issues. This anticipation guides strategic action. Essentially, Prospective Methodology is a systematic approach to search for what the future might be, and what we, as health planners, would like it to be. It's an exploration of what is achievable.

There are mainly two schools of thought. English-language authors emphasize the use of technology to construct scenarios based on quantitative input, while the French Prospective approach is more qualitative; it's based on the idea that the future is constructed with feelings, will, desires, intentions – human factors. Since Scenario Construction demands fluidity and participation, and social actors play a major role in that construction, understanding human factors is an important feature of this approach. What we've done is take the best of both worlds – combining quantitative and qualitative methods and adapting them to the Cuban context.

The process usually goes like this: after we're presented with a strategic question or problem, the first step is understanding the past and present by identifying social factors and actors and their interaction. Next is an exploration of the future; we identify driving forces of change and human interests, while attempting to understand the motivations of the actors. Finally, different scenarios are constructed with degrees of probability of occurrence. A preferred

scenario is selected and becomes a guide to action. We've developed software that uses this methodology for health surveillance, with the purpose of providing information for agile decision-making and action.

MEDICC Review: How does this software help health workers and planners?

Duverger: Prospective Methodology provides a rich variety of tools including Scenarios Construction and econometric techniques, matrix-based frameworks such as the SWOT (Strengths, Weaknesses, Opportunities, Threats) Matrix with quantitative values, and weighted group judgment procedures which yield information used to prioritize issues. For example, using some of these techniques we might identify 15 factors that influence a health problem, and can determine that by changing only three factors, the health problem can be improved up to 85%. In financially constrained settings, it's essential to allocate resources to actions that can have the greatest impact.

MEDICC Review: How has the application of this methodology evolved?

Duverger: The basic idea was to take the methodology and create user-friendly software to aid epidemiologists and health planners in decision-making. Working together with a mathematician, we developed the mathematical models, and then I designed preliminary versions of the software. Health professionals in Guantánamo started using it in pilot academic projects – for example, to model acute myocardial infarction in the province and project the spread of leptospirosis. These preliminary exercises yielded actionable results.

In mid-1997, the methodology and its software were put to the test constructing possible epidemiological dengue scenarios through 2001. The most probable scenario predicted almost exactly the situation that eventually came to pass – a dengue epidemic in November, 2001. From a methods perspective, this was impressive. Subsequently, both the methodology and the software started to become known throughout the country and the national UATS recommended its use to the provincial units. We didn't invent Prospective Methodology, of course, but we applied it to the Cuban public health context.

MEDICC Review: Guantánamo is one of Cuba's least-developed provinces. Why is this type of innovation happening in a largely rural province?

Duverger: In 1995 – precisely because we had lower levels of human development compared to the rest of the country – an important cooperation project to improve environmental health conditions was launched with Italy. So we received some funding from that project for basic tools – this was important, as was collaboration with a Norwegian non-governmental organization, which donated computers to our entire network in 2001. We've also had consistent support from the Ministry of Public Health. Through provincial-level projects, we've positioned ourselves as a hub in the field [of software development].

MEDICC Review: How are the methodology and software disseminated and applied elsewhere in Cuba?

Duverger: In addition to traditional venues – conferences, symposiums, and scientific journals – a very important dissemination and capacity-building opportunity has emerged. The National School of Public Health (Escuela Nacional de Salud Pública, EN-SAP) has launched a five-year degree training program for pro-

vincial health directors, in which Strategic Prospective Methodology is taught. We also participate in national events and present our work; health workers from other provinces use our software and give us feedback. And so it's a reiterative process. For me, the software development process is never completed.

Additionally, I've just finished a master's program where my thesis was precisely on this topic of transferring this technology to practitioners in the field.

MEDICC Review: Have you had an opportunity to work internationally?

Duverger: Actually, there's great interest around the methodology and its application internationally. I taught a strategic planning course in Mexico City for Social Security Program directors from different countries. The Pan American Health Organization took notice and the Peruvian National Office of Epidemiology invited me to introduce this methodology to their provincial secretariats of health. Most recently, we collaborated on a project with the former Secretary of Health of the State of Tabasco (Mexico), Dr Hilda Santos Padrón, which allowed us to enhance the software. This was an enormous project for which the Inter-American Conference on Social Security awarded Dr Santos Padrón second prize for the Inter-American Award for Research on Social Security 2007 [A prestigious award whose past recipients include graduates from MIT, University College of London, UC Berkeley, and National Autonomous University of Mexico, Eds.]

MEDICC Review: How did this project utilize Prospective Methodology?

Duverger: As part of Mexico's health sector reform, a health insurance plan was instituted to protect the population from catastrophic illnesses – by 2010, all eligible Mexican citizens are supposed to be covered. We were asked to develop software to model probable scenarios regarding the financial sustainability of the coverage and selecting the criteria for the illnesses to be covered. This project allowed us to create independent modules for each technique and improve the software overall.

In addition, Prospective Methodology traditionally uses what is known as cross-impact analysis, but we made an innovation to our methods by utilizing elements of fuzzy sets from mathematics; all of these changes were included in the new software. Based on simulation modeling, we select the most probable model and update it by introducing current social, economic, political, military, climatic, clinical, and other relevant factors. In this way, the scenario is transformed. The software even considers the order in which events may occur, allowing us to monitor scenarios over time, based on new input information and new developments. For health planning this is essential because planners can adjust programs based on a modified scenario. This form of health monitoring is known as Prospective Surveillance.

MEDICC Review: Is this methodology used elsewhere?

Duverger: I know the UN Federation of Associations' Millennium Project has applied Prospective Methodology to health issues and other fields...I think this methodology will grow in importance because it's a very open methodology and takes strategic health planning to a higher level.