

**Complexity in healthcare daily life:  
Can we conciliate different perspectives using computer simulation**

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***Chica o vieja***

Complexity is lived differently by all health actors, depending on their a priori experience and the health context. This can be illustrated by the pictures of Chica o vieja, in which two different perspectives can be analyzed: the one of young woman looking backwards and an older woman look left.

In this presentation I will illustrate how daily care and health intervention design can be confronted to this kind of conflicting perspectives, hampering ideal decision-making. I will argue that computer simulation can help to analyze this type of situation by formalizing the different perspectives and testing different scenarios.

**What was the intervention/project/policy/situation/problem about?**

One typical problem in daily healthcare or the design of intervention is that the analysis of a health situation or the case of a patient results in different perspectives. This can be due to a lack of data, the contextual effects or the a priori knowledge, which are hard to make explicit.

In this example, the same picture present two different interpretations

- This is one young lady
- This an elderly women

**Give some elements that illustrate the complexity of the situation**

Based only on this picture no one can clearly decide which option is the right, the best one. We would have to take another perspective, stimulate and stress the picture, to ask the lady to 'move' to decide.

However we can analyze the picture and see that very few elements change from one perspective to another:

- scarf remains the same
- coat is the same
- feather is the same.

The main differences are

- The young lady's ear is the elderly woman's eye
- The young lady's chin is the elderly woman's nose
- The young lady's necklace is the elderly woman's mouth

This type of analysis can help you recreate another pictures



As simple as these differences are, this analysis cannot help decide how old this women is. However would this women be an ill patient, you would have to decide what type of care is appropriate.

### **What did you try to solve the problem?**

It is interesting to discuss of the role of time. While the analysis of this picture is static, what would you know better if you had a snapshot movie, if you'd see that lady move. Even small motions could help you see if she's fast or slow, let you see a glimps of what part is her face.

This is typical from complex situation: you have to understand its 'motion', its dynamics to have an ideal impact. Critical sources of complexity such as feedback loops, delays can only reveal through time evolution.

Computer simulation can help to induce this type of 'motion' based on other contextual factors. You can also design scenarios to imagine what could happen under different circumstances.

### **What were the results (positive but also negative effects, and any unintended effects)?**

Another advantage of the computer language is that help you decompose and formalize the description of the situation. This aspect can help you conciliate the different perspectives and try to build a consensus, not only about the description of the situation but also the best suited action to influence it.

Indeed, the different scenarios allow you testing new policies, considering larger consequence that the ones intended. In addition, by stimulating the imagination, these scenarios help to develop innovative and contextual solutions. This is different from "by the book" interventions that is the ones we would like to copy-paste.

However, while these scenarios can help understand/explain how the health system, or population health state evolve, those insights should still be interpreted with care. Indeed, complex matters are hard to predict

### **How were opportunities in the context created and/or seized to foster positive change?**

Computer simulation might yet look as a marginal research tool, designed by engineer disconnected from the fields. In order to anchor computer simulation within reality with foster the recourse to field expert to inform the design of these simulation. This can help them to make their experience explicit and communicate this knowledge either to other experts, either to politics which have to make decision.

### **What strategies and/or techniques were used to deal effectively with complexity?**

As this type of tool allows multiplying scenarios, just as an experimental lab, simulation should be multiplied and refined to analyze and identify the most likely / worst/ best possible scenarios. The more scenarios are investigated, the more the final decision is likely to be successful. In addition, the simulation tool can facilitate a good communication of the decision.

### **What key mindsets and competences do individuals or teams need to better deal with complexity?**

Thinking complex is not easy. This might be hampered by the education of health actors which might tend to present solutions that are simple (direct causality) based on a statistical significance. This type of tools has proved necessary in a large range of situations. However, it also proved to be underperforming in other cases.

Health care actors should be trained to analyze and recognize complexity, in quite the same way they are trained to complete statistical analyzes. They should also be encouraged to discuss and point out complex effects and their solution. Simulation can help structure such discussion.

Defining a system perspective and defining its dynamics can only be beneficial. Evaluating long-term and overall consequences of policies can also certainly improve the efficacy of the health system as a whole.