Points of View, Frames, Scenarios… and Models[1]

Puntos de vista, marcos, escenarios… y modelos

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Abstract

This paper explores the conceptual distinctions and interrelations between "point of view", "frame", "scenario", and "model". I introduce the concept of "model" as a bridge between a subject's point of view and the relational structure that constitutes the frame, using the notion of a model as applied in System Dynamics (SD) and Possible Worlds Semantics (PWS) as a starting point. I conclude by offering a generalization of the four concepts.

Keywords: point of view, frame, scenario, model, perspective.

Resumen

Este artículo explora las distinciones conceptuales y las interrelaciones entre "punto de vista", "marco", "escenario" y "modelo". Introduzco el concepto de "modelo" como un puente entre el punto de vista de un sujeto y la estructura de relaciones que es el marco, tomando como punto de partida el uso del concepto de modelo en Dinámica de Sistemas (Ds) y Semántica de Mundos Posibles (SMP). Termino haciendo una generalización de los cuatro conceptos.

Palabras clave: punto de vista, marco, escenario, modelo, perspectiva.

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0. Introduction

Enrico Brugnami's central question of this symposium (whether perspective, point of view, frame, and scenario refer to the same concept or contain meaningful distinctions) raises foundational issues. This paper aims to analyse these concepts, introducing a complementary one: model, both as found in computer simulation models (e.g., System Dynamics, SD), and Possible Worlds Semantics (PWS).

In what follows, for the sake of clarity, I will adopt the assumption that point of view (PoV) and perspective are equivalent terms, as they share essential characteristics. A PoV represents a specific lens from which a phenomenon is interpreted or experienced. It encompasses a subject's attitude, conceptual and non-conceptual content, and the conditions of possession, factors that define how events or realities are perceived.

Manuel Liz's (Liz, 2024) concept of a *frame*, in another article of this volume, refines this distinction. While a PoV includes the subject and their conditions of possession, a frame abstracts away from the subject and focuses on the structures of attitudes and content. This allows for a more generalized way of framing a problem. In Liz's system, a frame consists of the attitudes toward content (both conceptual and non-conceptual), which ultimately shapes how the content is organized and interpreted.

1. Let´s Consider Models

1.1. Why Introduce the Concept of Models?

A point of view refers to the specific position or context from which a phenomenon is accessed. Thomas Nagel, in *The View from Nowhere* (Nagel, 1986), argued that points of view are inherently partial, contrasting with an idealized objective view. Models formalize this partiality into structured representations, enabling objective analysis while retaining the situated perspective embedded within.

In practice, points of view are not merely subjective but can be formalized into models, structured representations designed to predict, explain, or simulate phenomena. Introducing the concept of model allows us to bridge subjective points of view with objective analysis, addressing questions like:

- How can two divergent models represent the same reality?
- Are models reflection of reality, or do they actively construct it?

Introducing the concept of *model* is critical because it extends the analysis from subjective perspectives to more structured representations. When we ask which of two models is better, or if one model is better than another, or how it is possible that two very different models can account for the same reality, we are implicitly questioning whether models are snapshots of reality or whether they simply provide different interpretations based on the perspectives embedded within them. There's also the question of whether the causal realities presented in the models are the same as those in the actual world. To answer these questions, the notion of perspective or point of view is very helpful. To exemplify this, let's consider what I call the Colosseum metaphor.

1.2. The Colosseum metaphor

Let's imagine that we travel to Rome and are told that we must see the Colosseum because it is impressive. We have never seen it before (it is our first time in Rome) and we want to check it out. If we climb up to the Domus Aurea (in Ortega's manner), we can see it from there, but we can also see it by walking around it on the way to the Palatine Stadium. That is, we see the building from two different perspectives, but both are equally valid, providing different yet complementary insights (complementary understandings of the Colosseum's grandeur).

The same happens with models. They can model a reality in completely different ways. Models offer diverse representations of the same phenomenon, each shaped by specific assumptions and objectives. Are they equally valid? Yes, as long as they achieve their goals, explaining historical data, making predictions, or guiding decisions. In the same way, both views of the Colosseum are equally good for realizing that it is an impressive building.

2. Points of view and Frames. Structural Distinctions

Manuel Liz (Liz, 2024) has characterized frames based on our definition of point of view (Liz & Vázquez, 2015: chapter 2):

- A point of view (PoV) can be understood as having the structure: <S, Att, n-CC, CC, Cp>. Here, S represents the subject, Att denotes the attitude, n-CC stands for non-conceptual content, CC for conceptual content, and Cp for conditions of possession.
- A frame, in this context, is a PoV excluding the subject (S) and the conditions of possession (Cp). Therefore, a frame is structured as <Att, n-CC, CC>. Frames consist of structures of attitudes and contents.

I will use both definitions and explore their applications in two types of models: system dynamics models and possible worlds models.

I will also analyze the notion of scenario that Liz extracts from these previous definitions, which is as follows: A scenario is constituted by the conditions of possession (Cp) necessary for adopting a certain family of frames or PoVs.

Models should not be seen merely as reflective mirrors of reality, but as structures that provide specific points of view, framing our understanding of complex systems. This perspective is particularly useful when considering how models are constructed in disciplines like System Dynamics (SD) and Possible World Semantics (PWS).

3. Models, Frames, and Scenarios

3.1. System Dynamics (SD)

System dynamics exemplifies the interaction between models, frames and scenarios. SD models are widely used in numerous fields of science and engineering. In SD modeling, the starting point is the identification of structural factors that may causally explain certain behaviors. When scientific knowledge or data cannot provide this information, the "mental models" of certain individuals, who may be involved in the systems being modeled, become the primary source. From this point, various models are developed, culminating in the creation of a computer simulation model.

In a previous work of Margarita Vázquez Campos and Manuel Liz (Vázquez & Liz, 2011), we show the idea that models function as structured points of view, facilitating a deeper understanding of real-world systems through a blend of conceptual and non-conceptual content. We emphasize that models are not mere replicas of reality but tools that guide our actions and decisions by framing specific aspects of a system. SD models, for instance, integrate subjective inputs (like the mental models of experts) with objective structures, making them ideal for examining the interplay between frames and scenarios. Adopting a model's point of view can reshape our understanding of a system.

A model in SD is a simplified representation of a real-world system, constructed to understand and predict the behavior of that system over time. The application of SD models in predicting and controlling systems in different scenarios facilitates their progressive improvement, justification, and convergence.

A scenario in SD is a specific set of conditions, parameters… used to explore the potential outcomes of the model, that is, to simulate different futures. In SD,

a scenario is a specific set of conditions, parameters, or data that are used to run a simulation. It allows for testing different outcomes based on varying inputs. This is where the notion of *frame* becomes vital: the assumptions embedded within a frame shape how the model is constructed, how questions are formulated, and which aspects of the system are considered. The frame is the perspective from which the model is built, and it helps define the scope of the scenario being tested.

A frame in SD would be the specific perspective from which the model is built. Occasionally, the construction of simulation models of the modeling processes themselves can alter the frames from which decisions are made.

While Frames in SD are the theoretical and methodological assumptions underlying model construction, such as the identification of causal variables, scenarios in SD instantiate these frames by specifying parameters and conditions, allowing for simulation of different futures. For example, a climate model might test scenarios under varying carbon emission levels.

Frames refers to the assumptions we made when approaching to a system, how data are collected and interpreted, how questions are formulated and what aspects of the problems are considered. Frames are abstract and stable.

Scenario refers to the data and assumptions we made when running a specific simulation. We want to see how the model behaves under specific circumstances or data. Through a scenario, we can see what are the outcomes under specific conditions. This way we can test hypothesis and evaluate decisions. Scenarios are concrete and flexible. The same frame can be used to explore different scenarios. For instance, in the case of climate models or economic forecasting, each scenario is valuable for testing hypotheses and for understanding how different variables interact over time. Importantly, the same frame can be used to explore multiple scenarios, providing a rich tool for decision-making.

Scenarios operationalize frames by introducing specific parameters and conditions, enabling simulations of alternative futures. For example:

- A public health model might frame disease spread through population density and contact rates.
- Scenarios could explore outcomes under varying vaccination rates or policy interventions.

SD models evolve through iterative testing of scenarios, refining frames and enhancing explanatory power.

3.2. Models, Frames and Scenarios in Possible Worlds Semantics (PWS)

PWS models evaluate the truth of statements across potential worlds. Here, the distinctions between models, frames, and scenarios become even more formalized.

A model in PWS is a formal structure used to evaluate the truth of statements within possible worlds. M=<W,R,v>, where W is a set of worlds, R is a relation (often of accessibility) between worlds, and v is a truth function.

A frame in PWS is a simpler formal structure F=<W,R>. Different types of frames (reflexive, transitive…) correspond to different modal systems. Frames simplify models, focusing on the relational structure between worlds, independent of truth functions.

I am going to interpret a scenario in PWS as the truth function v.

The set or truth values that propositional variables and formulas take in each world determines whether a formula is valid or not in that model.

4. Comparative Analysis: Points of View, Models, Frames, and Scenarios

What can we extract from that we have seen in SD and PWS to generalize about the differences between a point of view, a model, a frame and a scenario? By synthesizing the ideas of *points of view, models, frames,* and *scenarios*, we arrive at the following generalization:

Point of View (PoV): Approach from which something is accessible. PoV is the lens or framework from which a phenomenon is approached. It includes the subject, their attitude, and the conceptual and non-conceptual content.

Model: Formal representation including variables, relationships, and truth assignments (in PWS) or dynamics (in SD).

Frame: Structure defining the relations based in which models are developed. In the case of SD, it defines the assumptions and attitudes from which a model is constructed. It provides the structure for organizing the contents and data within the model.

Scenario: Concrete description or specific instance within a model. It is a specific set of conditions or parameters used to explore different outcomes within a model, allowing us to simulate different futures or test hypotheses.

The distinctions between these concepts are summarized as follows:

Concept	Definition	Example
Point of View	Perspective from which phenomena are accessed.	Viewing the Colosseum from different vantage points.
Model	Formal representation of a system	An SD model predicting economic growth or Climate models predicting global warming.
Frame	Abstract structure defining relations and assumptions within a model.	The <W,R> structure in PWS.
Scenario	Concrete instance within a model or frame.	Simulating disease spread under a vaccination scenario

Based on Liz and Vázquez's definition of a point of view (Liz & Vázquez, 2015: chapter 2), as well as Liz's contributions (Liz, 2024), Section 2 provides a formal characterization of what constitutes a point of view, a frame, and a scenario. In Section 3, I focus on defining models, frames, and scenarios within the contexts of system dynamics (SD) and possible worlds semantics (PWS). The notions of a model and a scenario in system dynamics seem clear, and I offer a tentative interpretation of what a frame might be in this context. In possible worlds semantics, models and frames are well-defined, and I propose an interpretation of what a scenario could represent.

I aim to summarize all this in a table that outlines the definitions of point of view, model, frame, and scenario in our formalization, SD, and PWS. However, in doing so, I realized that our formalization lacks a definition for what constitutes a model. Additionally, I have not addressed what a point of view means in SD or PWS.

	Point of View	Model	Frame	Scenario
Our definition	<S, Att, n-CC, CC, Cp>		<Att, n-CC, CC>	Cp necessary for adopting PoVs
System Dynamics		Computer representation of a real-world system	Specific perspective from which the model is built	Specific set of conditions, parameters…
Possible World Semantics		<W,R,v>	<W,R>	Truth function v

To fill these gaps, I make several assumptions:

- In our formalization, a model could be understood as a point of view without a subject.
- In SD, a point of view might correspond to a model in execution.
- In PWS, a point of view might represent an agent evaluating a formula within a model.

Finally, I propose a generalization of these concepts:

- A point of view, in all cases, consists of a subject + frame + scenario (or a subject + model).
- A model is a formal representation (or a frame + scenario without a subject).
- A frame is the foundational structure of a model (i.e., excluding the scenario).
- A scenario comprises the particular instances.

	Point of View	**Model**	**Frame**	**Scenario**
Our definition	<S, Att, n-CC, CC, Cp>	<Att, n-CC, CC, Cp>	<Att, n-CC, CC>	Cp necessary for adopting PoVs
System Dynamics	A model running	Computer representation of a real-world system	Specific perspective from which the model is built	Specific set of conditions, parameters…
Possible World Semantics	Someone evaluating a formula in a model	<W,R,v>	<W,R>	Truth function v
Generalization	Subject + Frame + Scenario	Formal representation	Structure base of the model	Specific instance

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