

# Video streaming: how do the socio-economical models shape our research questions?

Natacha Lapeyroux<sup>1,2,3b</sup>, Bénédicte Toullec<sup>2b</sup>, Vincent Carlino<sup>2,3b</sup>,  
Anne-Cécile Orgerie<sup>1a</sup>, Thomas Maugey<sup>1a</sup>

<sup>1</sup>IRISA/Inria, <sup>2</sup>ARENES, Univ. Rennes, <sup>3</sup>CHUS, UCO Nantes

<sup>a</sup>Computer Science/Image Processing, <sup>b</sup>Information and communication science

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**Abstract:** According to a various number of studies, the environmental and social impacts of video streaming is huge and growing. Today, the work of researchers in the field of image processing only accelerates this explosion by contributing to the emergence of new technologies. At best, researchers are simply trying to improve the efficiency of streaming systems, which, due to the rebound effects, also contributes to “accelerating the acceleration”. In this talk, we give an overview of the socio-economical models ruling most of the video streaming platforms, and we show that the research questions tackled nowadays are directly shaped from these models. We also show that these models irremediably lead to bigger videos and more videos. Tackling the reduction of video streaming impacts will only be possible by questioning these models.

## 1 Socio-economical model behind the dominant video streaming platforms

In order to critically engage with this model, it is first necessary to examine its socio-economic framework and the position that users occupy within it.

Our approach, grounded in the sociology of media and digital uses, also draws on insights from the work of Human-Computer Interaction (HCI)<sup>1</sup> which has examined how video streaming platforms use persuasive design to shape user consumption. These platforms operate on a captology model (Computer As Persuasive Technology) by implementing mechanisms designed to retain attention and extend usage [1]. Research has shown that the number of videos watched during a viewing session is correlated with certain features designed to trigger automatic content playback at the end of a video (autoplay), to suggest targeted content based on algorithmic data collection (recommendations), and provide endless content (infinite scroll) [2]. These features have been defined as deceptive patterns (or dark patterns) because they are attention-capturing tools that reduce users’ agency<sup>2</sup> guiding them toward certain content, causing them to lose track of time, and leading to feelings of regret [3].

This reduction in agency is especially pronounced in contexts of ritualized (or “passive”) consumption, where the primary goal is entertainment. In such situations, users willingly cede autonomy [4], allowing themselves to be guided by algorithmic browsing [5]. These deceptive patterns have given rise to new modes of consumption, such as binge-watching [6], binge-scrolling [7] (with

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<sup>1</sup>*Human-Computer Interaction (HCI)* is the interdisciplinary field that studies the design and use of interactive computing systems, focusing on the ways humans interact with technology and how those interactions can be improved.

<sup>2</sup>*Agency* refers to the situated capacity of individuals to act intentionally and exert influence within, and sometimes against, the social, cultural, or technological structures that shape their actions.

the rise of short-form videos) and have contributed to the emergence of Fear of Missing Out (FOMO) phenomenon [8].

These modes of online video consumption are driven by an economic model predicated on the attention economy in which users' attention, time, and engagement are converted into sources of economic value within a system of platform capitalism and surveillance<sup>3</sup> [9, 10, 11]. From this perspective, platforms that generate most of their revenue from targeted advertising, have a strategic interest in prolonging users' engagement by deploying design strategies rooted in algorithmic governance [12]. This model also exerts socio-cultural consequences in addition to its ecological impacts. The content suggested in the recommendations may oscillate between similarity and serendipity [13]; recommendations can lead to processes of enclosure (rabbit holes, filter bubbles, misinformation, polarization) [14, 15]; and the massive consumption of videos may impact individual well-being through phenomena such as addiction, attention loss, and feelings of regret [16].

Rethinking this model also entails examining the contexts in which users retain agency and exert control over their online video consumption practices. During instances of instrumental (or active) consumption, users tend to preserve a greater sense of temporal control by employing features such as the search bar, channel subscriptions, or watch-later functions [4].

## 2 The link with the research questions tackled and not tackled nowadays

*“Learning-based Video Compression: from TV to the Metaverse”, “Generative AI for Image/Video Coding”, “Building a Realistic Virtual World from 360° Videos for Large Scale Urban Exploration”, “Advances in Next Generation Video Coding”, “Learned Image Coding”, “Realistic 3D Graphics Representations and Compression”* are representative examples of topics of special sessions, keynotes, given in some of the reference conferences in the field of video coding<sup>4</sup>. One can see that these topics, that can be considered as “hot topics”, gather research works that consciously participate to the rising of new video technologies such as new image modalities (*e.g.*, virtual/augmented reality, 3D images, etc.) or to an increase of processing complexity (*e.g.*, AI for coding). In the socio-economical model depicted before, they directly participate to the trend of more videos, more technology, new markets, etc. These topics are sometime even directly given by the main actors of the field: *e.g.*, keynote on *“Video Compression in the Wild: Learnings and Opportunities from a Video Streaming Company”*.

This is however not the case of all research works proposed in these conferences. Some other works for example aims at developing more efficient streaming systems. Generally motivated by a sincere desire to reduce the impact of video systems, these works aim at increasing their efficiency. We can see works, for example, targeting a reduction of the AI algorithms complexity when applied for compression, or works taking into account energy expense in the optimization of video transport from the server to the client (*e.g.*, sessions on *“Energy and Complexity Management in Video Coding”, “Coding energy improvements”, “Green Image Coding”*). Although these studies aim at reducing the impact of emerging technologies, they do not question them and they do not choose to propose alternatives. Therefore, these studies are part of the same socio-economic context as the ones mentioned before.

This talk will present a joint work between Inria/IRISA, a computer science lab, and ARENES, a multidisciplinary laboratory in social sciences and humanities. We will propose an analysis of the literature on the mechanisms behind the socio-economical model of the dominant video streaming

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<sup>3</sup>A system of platform and surveillance capitalism combines the infrastructural dominance of digital platforms, which organize and mediate online interactions, with the logic of surveillance capitalism, which extracts and commodifies user data as a means of prediction, profit, and control.

<sup>4</sup>These examples and the following are taken from IEEE VCIP 2023 and 2024, IEEE PCS 2024 and IEEE ICIP 2025

platforms and their link with the current research works that are mostly tackled nowadays in the video coding community. This interdisciplinary approach facilitates a comprehensive understanding of environmental challenges by integrating both technical and systemic perspectives on platforms, while simultaneously considering their social impacts.

Finally, we will emphasize that digital sufficiency will only be possible by exploring research questions that free themselves from these socio-economic models: *e.g.*, how to limit the video data growth? How to create video streaming platforms that do not rely on addiction or continuous attention capture? How could computer science researchers integrate these socio-economic issues into their research? How research in socio-economics and in information and communication sciences may contribute to the emergence of new models? How might our interdisciplinary research impact companies in the streaming industry?

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