

## INTERVIEW:

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**ABSTRACT**

Cláudio Pereira de Sampaio, born in 1971, is adjunct professor at the Department of Design at the State University of Londrina - UEL. Married to Andréa Karam and father of Bruna Maria and Maria Vitória, he was born in Curitiba, but has lived in Londrina since 2010. Coming from a family of marketers, he has a degree in Product Design and a Master's degree in Design from the Federal University of Paraná, a PhD in Design from the Faculty of Architecture of the University of Lisbon (FAULisboa) and held a postdoctoral degree in Design from the Federal University of Paraná (UFPR). His journey in Design started early, at age 14, as a designer of perspectives and stands, and he worked in several offices before starting his graduation, which he concluded at 34. He started teaching and researching soon after, and since then he has deepened his academic training. at various levels, from Master to Post-Doctoral. His work in Design for Sustainability (DfS) started from a professional experience with industrial waste while he was still under graduation in 2000, and since then he has developed and coordinated several projects with an environmental and social focus. He translated foreign materials on the subject, developed methodology and tools

for the DfS, and delved into the systemic issues of sustainability, design, and innovation. He collaborated in the creation of research and extension groups such as DeSIn - Design, Innovation and Sustainability (CNPq), LeNSLab - UEL, linked to LeNS Brazil and LeNS Network, NINTER/UEL - Interdisciplinary Center for Studies on Waste at UEL, and the Fab.i-HU - Center for Digital Fabrication and Innovation in Health at the University Hospital of Londrina. He has four textile waste recycling patents granted by the INPI, has written almost one hundred articles and book chapters, regularly advises, and teaches in graduate programs, and is an editor and reviewer for journals in the field of Design. His current interests focus on the themes of design thinking (design methodologies, methods and processes, design and innovation management, team management), sustainable design (methodologies and tools, product-service systems and ecodesign) and new technologies applied to the design for innovation, including education. He is currently studying Architecture and Urbanism at Faculdade Pitágoras-Unopar, as he intends to develop projects that integrate Design, Architecture and Urbanism in a synergistic way.

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**RESUMO**

Cláudio Pereira de Sampaio, nascido em 1971, é professor adjunto no Departamento de Design da Universidade Estadual de Londrina - UEL. Casado com Andréa Karam e pai de Bruna Maria e Maria Vitória, é curitibano de nascimento, mas mora em Londrina desde 2010. Oriundo de uma família de feirantes, é graduado em Design de Produto e Mestre em Design pela Universidade Federal do Paraná, doutor em Design pela Faculdade de Arquitetura da Universidade de Lisboa (FAULisboa), e realizou pós-doutorado em Design pela Universidade Federal do Paraná (UFPR). Sua jornada no Design iniciou cedo, aos 14 anos, como desenhista de perspectivas e stands, e trabalhou em diversos escritórios antes de iniciar sua graduação, que concluiu aos 34. Começou a lecionar e pesquisar logo em seguida, e desde então aprofundou sua formação acadêmica nos vários níveis, do mestrado ao pós-doutorado. Seu trabalho em Design para a Sustentabilidade (DfS) começou a partir de uma experiência profissional



com resíduos industriais ainda na graduação no ano 2000, e desde então desenvolveu e coordenou diversos projetos com foco ambiental e social. Traduziu materiais estrangeiros sobre o tema, desenvolveu metodologia e ferramentas para o DfS, e aprofundou-se nas questões sistêmicas da sustentabilidade, design e inovação. Colaborou na criação de grupos de pesquisa e extensão como o DeSIn - Design, Inovação e Sustentabilidade (CNPq), LeNSLab - UEL, vinculado ao LeNS Brazil e LeNS Network, NINTER/UEL - Núcleo Interdisciplinar de Estudos em Resíduos da UEL, e o Fab.i-HU - Núcleo de Fabricação Digital e Inovação em Saúde do Hospital Universitário de Londrina. Tem quatro patentes de reciclagem de resíduos têxteis concedidas pelo INPI, quase cem artigos e capítulos de livros escritos, orienta e leciona regularmente em programas de pós-graduação, e é editor e revisor em periódicos da área do Design. Seus interesses atuais centram-se nas temáticas da interdisciplinaridade do Design, design thinking (metodologias, métodos e processos de design, gestão de design e inovação, gestão de equipes), design sustentável (metodologias e ferramentas, sistemas produto-serviço e ecodesign) e novas tecnologias aplicadas ao design para a inovação, incluindo a educação. Atualmente cursa Arquitetura e Urbanismo na Faculdade Pitágoras-Unopar, pois pretende desenvolver projetos que integrem o Design, a Arquitetura e o Urbanismo de forma sinérgica.

## KEYWORDS

Design; Sustainability; Innovation; Waste; Interdisciplinarity.

## PALAVRAS-CHAVES

Design; Sustentabilidade; Inovação; Resíduos; Interdisciplinaridade

## INTERVIEW

### 1. *What paths did you take to develop research in design for sustainability?*

I was born in Curitiba/PR, where I was raised on the outskirts, or as they say in Curitiba, I was the typical poor village boy who played football on streets with open-air gutters. I remember well

that my mother always had those calendars with pictures of European cities full of flowers. This image of a clean and well-kept city was almost a dream for me in the late 70's, and it was my first reference of what a city could be, although on the periphery I saw something quite different. But I was also lucky enough to have been a child in Curitiba in the years when Jaime Lerner was mayor, and to see in real time the transformations he made in the city, making it more beautiful, friendly, and safe, and in some neighborhoods a little similar even with those European cities on the calendars. I believe that this helped to awaken in me, even in my teens, the desire to be a designer and architect. That was my first glimpse of what a sustainable city would be, although I didn't know yet that term.

However, my first conscious contact with sustainability issues in design only occurred when I was already in the university. I started my undergraduating course at the Federal University of Paraná (UFPR) much later than most students, at the age of 29; I was still a 14 teenager when I started my Industrial Design Technician course at the former CEFET/PR, which allowed me to start working in the area as a draftsman very early on, at 15 years old. So, when I decided to enter the UFPR I had already worked for at least ten years with projects of different types. As soon as I graduated, I also started an office with some friends, and we developed our own line of office products made with the reuse of industrial steel waste.

It was an incredible experience, which aroused my interest in looking for new projects with an environmental differential. My undergraduate TCC was a compact and clean urban vehicle that used compressed air propulsion, a French technology that provided for recharging air cylinders using electrical energy. While still at graduation, my first contact with scientific research in sustainability was in a scientific initiation where I investigated the use of wood residues to create products, under the guidance of Professor Dalton Razera. As soon as I completed my graduation, I was invited by prof. Dr. Aguinaldo dos Santos to do an internship at the Center for Design and Sustainability (NDS) at UFPR. I can say that I learned to be a researcher at the NDS, where I spent five years developing projects on various topics, from waste revaluation to product-service systems (PSS). During this period, I completed my master's degree focusing on PSS for returnable packaging for Volkswagen car industry. I also started teaching at Universidade Positivo (UP), where I had the opportunity to apply what I learned at NDS in teaching Design, both at undergraduate level - Graphics and Product - and at

postgraduate level, when I created the first course of Specialization in Ecodesign from Curitiba and, as far as I know, from Paraná.

In 2010, I was approved in a public selective process for teaching at the University of Londrina (UEL), and I moved to Londrina, a medium sized city of Paraná state, where I still live. At UEL I was finally able to create my own space for research and development, together with Professor Suzana Barreto: the DeSIn research group (Design, Sustainability, and Innovation), in which we have the issue of textile waste as the main topic of investigation. The work in this group over the last twelve years resulted in four textile recycling patents in partnership with researchers from other departments at UEL, as well as a system and business model for textile recycling in the city of Londrina (Bank of Textile Waste), in partnership with a cooperative of recyclable collectors in the city. This system is currently being implemented and has approved public funding for equipment acquisition. During this period between 2010 and 2022 I also advanced in my training, taking a specialization in Strategic Design Management at UEL in 2012-2013, a PhD in Design at the Faculty of Architecture of the University of Lisbon (2013-2017) and a postdoctoral fellow at UFPR in 2018-2019. After closing this training cycle, I decided in 2020 and during the pandemic, to start a new undergraduating course in my second passion: Architecture and Urbanism.

2. *Indicate the main activities that you have been carrying out in the form of research-teaching-extension.*

Currently my work focus is organized in three distinct fronts. As a lecturer, I teach design subjects that are my specialty (Wayfinding and Signage Systems, Packaging and Sustainability), and in which I seek whenever possible to include sustainability fundamentals and methods as a component of design activities from the initial stages. As a researcher, I have two main fronts: the first, focused on the issue of textile waste, with the creation and implementation of a system for the recovery of textile waste (Banco de Resíduos Têxteis - BRT) in a cooperative of solid waste collectors; the second, with the creation and implementation of a center for digital fabrication and innovation (Fab.i HU) in public health at the University Hospital of Londrina (HU). This center is currently in operation, thanks to a partnership between the areas of Design and Physiotherapy. In extension, I work in an interdisciplinary initiative

(NINTER/UEL) formed by researchers from different fields of knowledge, whose object of study is the creation of solutions to the problem of urban solid waste.

3. *How do you see the potential of waste in building a circular and clean economy?*

I like to approach the issue of waste from different perspectives: from an economic point of view, waste can be seen as something whose value can be recovered, which implies looking for alternatives to revalue it from a market perspective; from an environmental point of view, I seek to approach waste from life cycle design strategies that seek to reduce environmental impacts if it has already been generated (corrective approach) or, ideally, avoiding its generation (preventive approach); From a social point of view, I try to look at the waste from the impact it generates on the quality of life of people and communities, but also as an opportunity to create value for them, whether through the creation of new sources of work and income or even possibilities for creative self-expression. I believe that all these perspectives, if well explored and combined, converge towards the possibility of a circular and clean economy and, more than that, towards a more sustainable development of the place where the projects are developed.

Although solid waste can be seen as something that must be eliminated, we know that in practice it is not so simple to eliminate it completely. It is at this point those interventions are needed that also consider waste as a resource, which can be reinserted into technical cycles and feed new value chains. Another aspect that cannot be disregarded when creating systemic solutions in waste is the political and legal component, as they are often the ones that help to make viable (or sometimes inviable) promising initiatives; in this sense, it is important to seek to build alliances with different social actors (public authorities, companies, third sector, academia) that reinforce the potential of success of a given project. The political dimension also implies seeking to influence better public policies, and in this sense, I seek to act actively in the review and formulation of legislation on waste in the city of Londrina, participating in public audiences and other types of events together with the NINTER/UEL group, of which I am a member.

4. *Do you believe that waste is a design flaw? Is it possible to eliminate waste in search of full circularity?*

On a theoretical and ideal level, yes, if we adopt natural systems as a zero-waste reference. However, our production and consumption systems are still highly inefficient, largely due to the energy paradigms based on fossil energy adopted in the last hundred years, but also economic due to a system focused on capital accumulation at the expense of efficiency in the use of resources by humanity. In this logic, everything becomes a commodity, even basic resources such as water. Another good example of this waste paradigm is the unequal access to food in countries: while some throw large amounts of food away daily (just go to any Brazilian shopping mall at lunchtime to see the indecency that this represents), others do not even have access to the basics to survive; in addition, in our country a good part of the food is lost in transport and storage. It is, therefore, a challenge that goes beyond design, architecture, urbanism, but which includes the need to review the entire system of life that we currently adopt.

5. *How has design impacted the face of the COVID-19 pandemic and what lessons should we take for the future?*

Design, Architecture, Urbanism and Engineering are professions aimed at creating the artificial, or as well defined by Herbert Simon, they are the “Artificial Sciences” (SIMON, 1969). These areas of knowledge focus on the concrete, on the real, on the mark that human beings leave on the world through their artifacts (or artifices). In this sense, it is understandable that designers, architects, urban planners, and engineers generally have a problem-solving attitude towards the world and reality through the creation of artifacts that range from visual communication, a product, a built space or even an entire city. Therefore, it is understandable that when problems as significant as a pandemic emerge, these areas are among the first to act, and usually together with other essential areas, such as health. In my case, this is what happened: as soon as the pandemic broke out, we were called to collaborate on several fronts, including, for example, the production of face shields, masks, and other PPE for public hospitals.

I believe that better understanding the nature (ontology) of these problems in terms of their chaotic and complex characteristics helps us to seek better ways of approaching and intervening (epistemologies) in these problems. Such types of problems imply a rapid capacity for observation and creative and appropriate response, and only then seek to extract knowledge of the situation in a retrospective way (SNOWDEN, 2005). In situations like a pandemic, things happen very quickly, requiring quick responses, so there is no time for long periods of analysis and theorizing about the problem. This need for agility in an emerging and ambiguous context finds in the way of operating Design, centered on empathy, creativity and experimentation, a promising path of possibilities for action and response.

In this sense, I believe that one of the biggest lessons we can learn is to further improve this quick response capacity, seeking to continually improve our processes of understanding problems, creating, and testing solutions, that is, the design process itself. Another lesson is that we must seek to create conditions to anticipate, as much as possible, new situations like the pandemic that may happen again. In my case, this anticipation is being made from an approach focused not only on products, but mainly on adaptable, modular, autonomous, and expandable systems that, when a new pandemic occurs, can support public health. For this reason, we are implementing an innovation center at the University Hospital of Londrina where we will use digital fabrication technologies to quickly develop and manufacture health products in case of need.

6. *Which technologies do you consider most promising to achieve sustainability in the design of systems-products-services?*

From an environmental point of view, when we understand that just increasing the eco-efficiency of products is not enough to create a more sustainable future, we need to look for another way of approaching the problem. Reducing unsustainability will not produce sustainability. In this sense, I see the idea of dematerialization of the economy as promising, both in the production and consumption of goods and services. Dematerializing implies maintaining (or even raising) the level of benefit for the user, but with a significant reduction in the material burden associated with meeting a certain need. Thus, I understand all technology that makes it possible to make this idea of dematerialization

to be promising. If we consider that one of the central elements currently in any type of product or service that we create is information, then any technology that allows us to improve the flow of this information becomes interesting, which leads us to the so-called Information and Communication Technologies, or ICTs. These technologies, combined with search and data processing solutions, whether Small Data or Big Data, along with the use of Artificial Intelligence and other resources that optimize decision making, seem to me to be especially promising in the design of any product-service system. That will be developed from now on. Therefore, I understand that these subjects should be studied more intensively in schools of Design, Architecture and Urbanism.

Furthermore, ICTs are closely related to the new forms of production that have emerged in recent years, which lead us to the concept of Industry 4.0. Digital Fabrication Technologies such as 3D printing, 3D scanning, CNC machining, laser cutting and others have been around for decades, but in recent years they have reached a more mature stage of development and adoption and can now be incorporated into product-service systems in a more efficient way. The same occurs with Virtual Reality and Augmented Reality technologies, which have also been around for a long time, but which are now mature enough to be widely used, notably in creating new interaction experiences with users. There is, therefore, a wide variety of technologies, especially those linked to information, that designers, architects, and urban planners who wish to remain relevant need to know more and more, and which will be increasingly used to increase the level of sustainability of products and services.

*7. How do you envision a more sustainable future in our world?*

I try to think about it in terms of how nature itself manifests and functions. Nature favors diversity, the flow of energy and information, the complexity of interactions and exchanges, constant change, and balance. We are also part of that nature, although our artificial world has brought us such a level of comfort and detachment from the natural world that we sometimes forget about it. I believe that one of our biggest challenges as designers, architects and urban planners is to develop solutions that are increasingly in balance with the natural flows of the planet, on the one hand seeking to avoid or reduce impacts to the minimum necessary, in

a preventive way and, on the other hand, helping to restore balance through corrective and regenerative solutions. We need to complement the approaches we already know and master, focused on eco-efficiency (such as Ecodesign), with interventions increasingly focused on dematerialization in production and consumption, which implies a radical but necessary change in the way we live; more than that, we also need to start designing, more and more, solutions that go beyond the anthropocentric paradigm, starting to look at other creatures as deserving of existence and quality of life.

It seems to me that the non-anthropocentric (or post-anthropocentric) design path offers a promising path to this. Therefore, I imagine that a more sustainable future is one marked by valuing diversity, variety, and complexity of interactions (both human and non-human), more efficient flows of energy and resources, rapid reintegration with the planet's natural flows, understanding of the change as natural and even desirable, and the balance inherent in life as dynamic rather than static. Regarding diversity, it is necessary to consider that a sustainable future implies respecting the different ways of seeing and thinking about what it is like to live in this world; within the scope of design areas, this implies an increasingly pluralistic, democratic, and participatory way of acting. On the other hand, it is important that this participation could be increasingly qualified and well-informed, so that we do not fall into a sterile democratic activism that can even be counterproductive (MURPHY, 2012). I believe that, at the end of the day, what we really need to have a more sustainable future is a profound revolution in human consciousness itself, and this has proved to be a huge challenge given recent events that include, once again, the resurgence of the threat of nuclear war.

*8. How does 3D printing / rapid prototyping / additive manufacturing fit into this sustainable future?*

My first contact with digital fabrication technologies was in 2006, when I was still a researcher at UFPR and helped specify the purchase of a 3d printer for the Design department. At the time these technologies were still quite expensive and only available abroad, but in the following years there was a revolution in the market, in part due to the expiration of patents from companies such as Stratasys. Since then, manufacturers have emerged all over the

world and, in 2012, we acquired the first 3D printer from the Design department at UEL and, as far as we know, from the entire university. We explored its use in several disciplines of the Graphic Design course and formed a study group with some students to learn more about the technology (SAMPAIO et al, 2013). In 2013 I had the opportunity to visit the world's first 3d printing fair in London (3DPrintShow), which completely fascinated me. There I could foresee the immense potential of these technologies for use in several areas, including education, health, construction, transport, entertainment, just to name a few.

I returned to Brazil with a head full of ideas, and we continued to explore different uses in the classroom and, in 2020, with the outbreak of the pandemic, we were called to collaborate in a collaborative way with several makers in the city in the production of face shields for the Hospital University of Londrina (HU). It was a decisive experience that influenced our decision to create, in 2021, a center for digital fabrication and innovation within the HU. This experience has allowed us to see in a concrete way some of the main characteristics that make 3d printing (and other digital fabrication technologies) something desirable for a more sustainable future: the gain of autonomy of local actors (reducing the dependence of the HU on the purchase of health products and supplies, which started to be lacking during the pandemic), the gain in efficiency (producing only what the HU needs at a given time), the economy of resources (reducing costs in the acquisition of products and supplies), and an improvement in the adaptation to users' needs (the use of digital models that can be customized allows quick changes whenever necessary, facilitating the production and testing of prototypes in a fast way). It must be considered, however, that 3d printing equipment and supplies are still produced, for the most part, by Chinese manufacturers, which also implies a technological dependence that could be reduced with a greater incentive and investment on national manufacturers. Another sustainability challenge to be faced refers to the end of life of products and materials in 3d printing, which often uses non-recyclable polymers, as there is still no clear strategy on this in the country and, as far as we know, in the world.

### 9. *What could you leave a message for researchers in this area?*

Whether in the case of solid waste, digital fabrication, or any other object of study, and based on my own experience, I can leave here at least two messages: the first, that it is important as researchers to always maintain an attentive and critical position in relation to any topic that we choose to study, develop, and apply. In environmental aspects, attention is needed not only to products and materials, but also to a broader view of the entire system that involves the use of a certain technology, to identify any problem points in the various stages of the life cycle. Only then can we adopt better environmental strategies that minimize impacts at each stage. This expanded and systemic attention is also valid for economic, social, political, legal, and other aspects, which leads me to a second message: the importance of systemic thinking in Design and Sustainability research.

For me, it made all the difference to seek a deeper knowledge in a different field of design, but fundamental for any area that works with socio-technical systems: systems science and systems thinking (SAMPAIO, 2019). Learning to look at the world and reality in terms of systems helped me to understand the different interactions that occur at different levels in a complex system that involves people, technology, economics, politics, and other elements, as well as the different points of view that different actors in this system often have about a given reality. So, in addition to constant attention to critical and reflective thinking, I would recommend that any researcher working with sustainability delve into systems thinking.

I said there were two messages, but I would like to leave a third one, of a more personal nature: that of seeking, in every place we go, to leave a positive mark on people's lives. Throughout the different places and projects I've been participated, I've been able to build an enormity of very rich personal relationships, and this is one of the greatest achievements we can have as researchers, but mainly as people. Being able to meet, for example, a former undergraduate scholarship holder doing a master's or doctorate or running his own design business, or even a former colleague or former advisor at some event and give his/her a hug is something that makes me deeply happy and fulfilled. So, this would be one last message: build good relationships, humbly but assertively; find and help people grow, and rejoice in their

achievements, because in the end these achievements will be yours too. We are not separate from anyone, and that has a name: interdependence.

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