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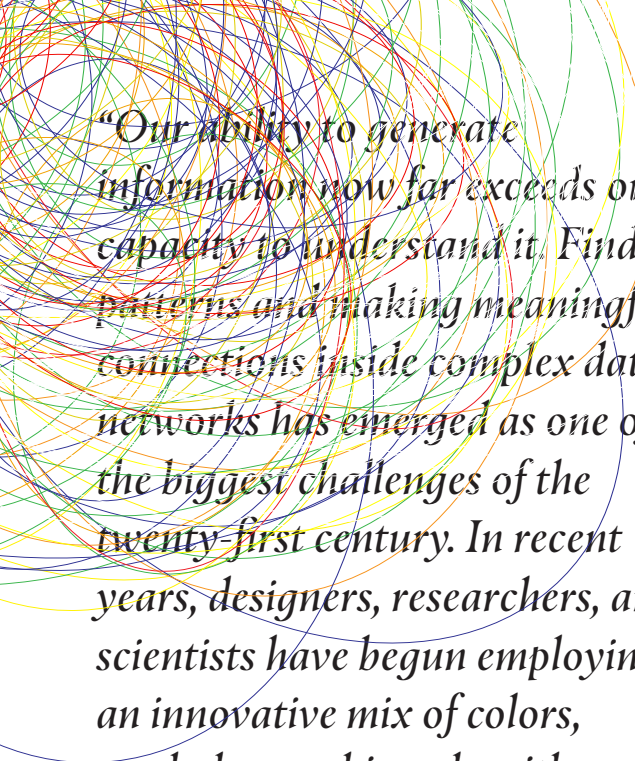
Dialogue Between Design and Science
Visualizing data and visualizing through data

International
Hybrid Conference

מכון
טכנולוגי חולון
Holon Institute
of Technology



FACULTY OF DESIGN AND ART
UNIVERSITY OF WEST BOHEMIA



“Our ability to generate information now far exceeds our capacity to understand it. Finding patterns and making meaningful connections inside complex data networks has emerged as one of the biggest challenges of the twenty-first century. In recent years, designers, researchers, and scientists have begun employing an innovative mix of colors, symbols, graphics, algorithms, and interactivity to clarify, and often beautify, the clutter.”

Manuel Lima,

Visual Complexity: Mapping Patterns of Information

In the age of big data, when digital technologies make it possible to absorb and process vast amounts of information, data becomes a significant engine for innovation and growth. Yet, data may become worthless if it is not possible to understand the existing relationships between its various components. In this context, visual tools become central to the needs of information accessibility, and they often make it possible to reach essential insights by identifying patterns that, in many cases, cannot be detected by other means. They make the understanding of the data simpler, and explain complex scientific phenomena. They can also be utilized to optimize the ways information is understood; for example, to quickly access information in emergency situations, to indicate potential future processes or to mediate information to influence public opinion on political issues. Concurrently, new possibilities enabled by applying big data and AI algorithms, make it possible to generate new visuals.

The field of information visualization requires, in many cases, collaborations between scientists and designers to maximize the effectiveness of the information. These collaborations not only make it possible to extract new knowledge from the data but also to develop new methodologies and aesthetics of visual expressions that take on new forms in various physical and virtual

mediums. This Conference aims to examine the potential of these developments and understand how scientists and designers can learn from each other through these processes.

The Conference will host lectures that refer to different aspects and contexts of applying data visualization and visualization through data. Among the topics which will be addressed are: perspectives for using enhanced visualization technologies as a tool for scientific and artistic research; interpretive aspects of data visualization and their potential implications; visualization of hidden structures of the public sphere in online social networks; the creative potentiality of generation images through text based on mega databases; using visual digital twins as a tool for urban planning and using advanced visualization technologies as a tool for enhancing social awareness and as a scientific methodology in social and political sciences.

Conference Chairs: **Dr. Yael Eylat Van Essen** (HIT);
Dr. Arnost Marks (UWB), **Dr. Jonathan Schler** (HIT)

10:00-11:50

SESSION 1

Data Visualization as a Way of Interpretation — A Critical View

Dr. Yael Eylat Van Essen, HIT — Holon Institute of Technology, IL

Data Visualization can turn data into knowledge in an age where databases reach sizes beyond human comprehension. Data visualization can assist in revealing hidden patterns and present complex realities and processes. Yet, although data visualization has become a legitimate and essential methodology in scientific research, it is important to note that it is the result of the specific qualities of the visual tools that determine how information is presented. Moreover, it is always an interpretive process, and therefore, it is never neutral. Even though it makes often obscure knowledge accessible to many populations, it is used in many cases as an effective manipulative tool to promote different ideological and political agendas. This lecture aims to critically examine the benefits and limitations inherent in information visualization practices while referring to examples based on analogue visualization techniques as well as on algorithmic-based visualization of large-scale databases.

Dr. Yael Eylat Van Essen is a researcher and curator specializing in the interface between art, design,

science and technology and museology. She received her PhD from Tel-Aviv University, followed by a post-doc at the Hebrew University in Jerusalem. She curated numerous exhibitions in Israel and abroad, among them **LifeObject: Merging Biology and Architecture** for the Israeli Pavilion at the Venice Biennale for Architecture. Her research interests include: digital culture theory, new-media art, digital heritage and museology, post-photography, resilience studies and speculative design, and she has participated in many academic conferences on these topics. She is a Senior Lecturer in the Design Faculty at HIT — Holon Institute of Technology and teaches at the Tel Aviv University.

Ukraine War Representations in Digital News Maps

Dr. John Fass, Royal College of Art (RCA), London, UK

The war in Ukraine has been the subject of intense media coverage all over the world not least in the form of daily, and sometimes hourly, updated maps of the battle space. These maps are available for consumers of online digital news to track changes in troop positions, movements of materiel and people, acts of aggression

and defence, and updates to the area of territory claimed and liberated. They are powerful signifiers of attrition, resistance, and domination, as well as abstract representations of a bitterly contested ground truth.

This talk will examine how and why the battlefield maps used by digital news media during the war in Ukraine vary between outlets, how the main signifiers operate to emphasise editorial policies and conflicting political positions, and how they have been analysed by geographers. The aim is to frame digital news maps in this context as constituting a visual discourse, one with a set of internal operating rules and influences which are evident as visual signifiers. Digital news-driven maps are subject to rapid change, not only in what they show but how they show it. In the detailed attention paid to representations on social media this has not gone unnoticed.

Dr. John Fass is a designer, researcher and teacher, currently Course Leader MA User Experience Design at London College of Communication. John studied photography before working in community-embedded social design in the post-socialist ruins of the former GDR. He has been a digital designer for thirty years working as an interface and interaction designer in multidisciplinary teams. John's research interests include externalization, interface ethics, and data

activism. He has presented research internationally, including at DRS, CHI, and DIS and is the co-author of *Design and Digital Interfaces* (Bloomsbury, 2021). As a teacher, John worked at the Royal College of Art on MA Information Experience Design for 8 years. He holds a BA (Hons) in Photography, an MRes with Distinction in Information Environments and a PhD from the Royal College of Art.

Social Topographies: Tech for Change and Critical Visualization

Dr. Meirav Aharon-Gutman, Technion Institute of Technology, IL

The aim of the research project is to mainstream social planning within the realm of smart cities. This will be accomplished by using innovative technology — a smart visual theatre — as a means for better understanding spatial-social challenges. It is the research premise that advanced visualization technologies create opportunities to enrich our toolbox and to critically address social challenges such as insecurity, poverty, housing crisis, etc. The Smart Social

Strategy Lab theatre uses a dynamic 3D model (known as Digital Twin) that supports data driven policy simulation as a means of decision-making utilised by leaders or in process of public participation. Inspired by the idea of the digital sand-box, a new prototype is proposed for urban policy formulation that employs geovisualization and geoanalytical techniques in order to create Social Topographies. The proposal revolves around the concept of social topography, based on the work of Gaston Bardet, a French city planner, and Pierre Bourdieu, who defined sociology as the science of social topography. The concept of social topography will be employed as both a theoretical and methodological construct. Modelling along the lines of social topography produces a space that contains the traditional categories of inequality (education, wages, unemployment), but also immerses them in space. Fusing society and space into a single texture creates a situation in which it is no longer possible to make spatial decisions that ignore social structures.

Dr. Meirav Aharon-Gutman is an Urban Sociologist, a faculty member at the department of Architecture and Town Planning at the Technion and the Principal Investigator of the Smart Social Strategy Lab. Dr. Aharon-Gutman is an acting member of the National Council for Planning and Building. She received her Bachelor's degree (1998), her Master's degree (2001), and

her Ph.D. (2007) from Tel Aviv University's Department of Sociology and Anthropology and completed postdoctoral fellowships at the Hebrew University (2007) and Columbia University (2008). Aharon Gutman is a Fulbright (twice) and Marie Curie Award scholar.

SPECIAL PRESENTATION:

Immersive Media Visualization

Roland Haring Ars Electronica, Linz, AU

Deep Space is a unique technological instrument and environment. It enables to create interactive visuals of complex realities based on a vast amount of data often of a scientific origin. It poses a specific range of challenges for designers to properly exploit possibilities and opportunities in each individual project, based on the nature of data, and the potential possibilities for interactivity. The domains developed within this framework range from virtual anatomy for medical faculty, cultural heritage projects and collaborative interactive practices.

Roland Haring studied Media Technology and Design. Since 2003, he has been a member of the Ars Electronica

Futurelab and one of the driving forces behind the lab's research and development efforts. His activities include several large R&D projects with academic, artistic and commercial partners and collaborators. Currently, Roland Haring is the Technical Director of Ars Electronica Futurelab and co-responsible for its general management, content conception and technical development. With his many years of experience in the (software) technical management of large-scale, research-intensive projects, he is an expert in the design, architecture and development of interactive applications. Since 2014 he has been leading the Deep Space 8K technical developments.

From Visualizing Textual Data to Generating Visuals from Text

Moderator: **Dr. Arnost Marks**, Sutnarka Faculty, University of West Bohemia, Pilsen, CZ

This session will be formed as a moderated dialogue between **Dr. Jonathan Schler** (computer scientist and Zachi Dinar (designer). The dialogue will revolve around the challenges and possibilities of visualising complex

data with new tools and innovative design approach. The debate will be forwarded by two short presentations by the two speakers.

Dr. Jonathan Schler's presentation, HIT — Holon Institute of Technology, IL

We live in a world that is full with data. On average, people create 2.5 quintillion bytes of data every day, more than 333 billion emails and over 650 million tweets. These data sources (as well as additional data streams) are a gold mine for AI technologies that disrupt the ways we act and behave. In this talk — I'll briefly review the infrastructure that is required for handling these amounts of data, the unique possibilities that these large amounts of data provide us and call out a missing piece of new and revolutionary visualization techniques that haven't made similar progress yet, encouraging an interdisciplinary collaboration for matching up the hype on this part as well.

Zachi Dinar presentation, HIT — Holon Institute of Technology, IL

The super-hyped buzzword, AI, is affecting almost every known category while mixing technology and culture. In the field of design, it disrupts the ideation process, the creation and actualization process, and

raises doubts about the role of designers. It is apparent we didn't reach the pinnacle of the revolution and currently, we're only scratching the surface. In order to move forward and discuss future possibilities, this talk will walk through the evolution's timeline of AI tools focusing on design and creation and a bird's view of the present landscape of tools and the skills needed to manipulate and operate the algorithms.

Dr. Jonathan Schler is a researcher in the field of automated text processing based on machine learning algorithms. More specifically, he focuses on both theoretical frameworks as well as application to practical authorship problems in several aspects, such as: authorship verification for historical texts, authorship profiling for detection of mental health conditions, authorship profiling for fake users, and editorship profiling. In parallel during the last 25 years, Dr. Schler was involved with several companies in the area of machine learning at the internet scale. One of the systems he was involved in, is responsible for processing over 100 billion transactions per day. Dr. Schler serves as the head of the computer science school at HIT and is the co-author of dozens of research papers and patents in the field of AI and big data.

Zachi Dinar is a designer and creative entrepreneur in the field of digital design for more than 20 years. He

specializes in strategic vision, crafting visual concepts and delivering digital experiences. Was the co-founder of major product design studios abroad and in Israel, focusing on the development of long-lasting products. He supports hundreds of companies, startups, and enterprises, from idea to successful product launch for all mediums, both digital and offline.

Currently, he is the head of the visual communication department at HIT while teaching design for more than 15 years. Participated in and curated design shows locally and globally.

Zachi is a speaker and a workshop facilitator. A design, philosophy, and technology researcher with a never-ending passion for design and aesthetic experiences.

Dr. Arnost Mark is a deputy director of the Institute of Interdisciplinary Studies of Art, Design and Advanced Technologies at the Ladislav Sutnar Faculty of Design and Art, University of West Bohemia. Received MA in Biology at Charles University (Prague) and Ph.D. in Social anthropology (University of Cambridge). Worked in many positions on management of EU Research and Development programmes in the Czech Republic. Managed several major projects in Research and Development financed by EU (CEITEC). Run preparation of projects using culture as a critical development element (Pilsen2015 — European Capital of Culture

(ECOC), engaged in ECOC Wroclaw, Sienna etc.). Founded the Institute of Digital Economy in Prague. Chaired the National council for Creative industries. Currently member of the Board of the Chemnitz2025 European capital of culture. Advisory position on the strategic development of the academic and public institutions to do with research and development and international partnerships. Until recently, vice-dean at Sutnarka Faculty, responsible for international projects, exhibitions and conferences.

12:50-14:10

SESSION 2

The Hidden Structure of The Public Sphere in Online Social Networks

Sagit Alkobi Fishman, HIT — Holon Institute of Technology, IL

In this lecture, a visualization system developed as a means to research is introduced, making visible and critically analyzing the hidden structure of the public sphere in online social networks. The motivation and rationale underlying such an endeavor stem from a variety of interrelated wonders: How personalization algorithms shape the online social interactions in such platforms? Is the emerging structure sort of a digital Agora, namely, does it encourage diversity and pluralistic encounters as expressed, for instance, in the declared vision of the currently largest platform? Data inaccessibility, algorithms' non-transparency, and the complexity of social networks posed a challenge at the early stages of the system's design. Nevertheless, the challenge invited an opportunity, and as demonstrated, the developed visualization system enables us to simulate social networks data and expose intriguing insights about the partition of the democratic dialogue in online social interactions.

Sagit Alkobi Fishman has been a new media scholar and a digital artist for over a decade, recently focusing on

information art and the intersection between visualization and complexity. Alkobi Fishman has an academic background in computer science (BA, Technion – Israel Institute of Technology), philosophy and digital culture (MA, Tel-Aviv University), and integrated design (MDes, HIT — Holon Institute of Technology). Her interests reside in realms encompassing technology, society, science, and the visual arts, exploring questions about the emerging digital cultures and subcultures of our age.

A Digital Twin of Pilsen

Dr. Karel Jedlička, University of West Beohemia, CZ

There is a real world outside. And there is an unquenchable human desire to describe it, however changeable it may be. I'm a surveyor and a cartographer by education. Therefore grown up on plans and maps as real-world models. But nowadays? Two dimensions of a map are not enough. The more dimensions, the better! Everyone wants 3D, 4D... I have even seen a "9 dimensions cinema" leaflet, walking on a beach on my holiday.

But talking seriously, nowadays, it is a common habit to create a 3D, time-aware model of the real world, instantly communicating back and forth to reality — a “digital twin”. Hence, I will present an example of such a model of reality — a digital twin of the City of Pilsen in the Czech Republic. My talk will focus on traffic-related issues and the challenges modern cities face and the ways they can be described, monitored and controlled. I will show not only the visible face of the digital twin but also an inside view.

Dr. Karel Jedlicka works as a researcher at the University of West Bohemia, Department of Geomatics. He is a deputy chair of the Plan4all Association and a co-founder of the traffic modelling Startup RoadTwin.

Karel’s research theoretical background lies in modelling, analysis, and even simulation using multidimensional (geographic) data structures. In particular, Karel actively researches multidimensional aspects of Geographical Information Systems. Primarily Karel focuses on the influence of transport on city life by designing and developing interactive traffic models for Digital twins of Smart cities.

Predict with AI Techniques Continuations of Yayoi Kusama Tentacles Artwork

Michal Pustejovsky, Sutnarka Faculty, University of West Bohemia, Pilsen, CZ

Shai Gul, HIT — Holon Institute of Technology, IL

Visualization of a surface from a sampled data set is challenging, since incorrect sampling can lead to multiple surfaces while the data set supposes to determine a unique surface. Yayoi Kusama is famous for her modern artworks, where patterns on surfaces characterize some artworks and may be considered to have been inspired by mathematical ideas.

In this study, her tentacles artwork which is constructed of different tentacles lying in the three-dimensional space is explored, where each of the tentacles has been (kind of) topped and tail, see Figure 1. The team — designers and mathematicians have tried to predict the continuation of each topped and tail tentacle from the initial sampling. Various mathematical ideas are employed, leading to surprising results. First, with the help of a designer, each surface (tentacle) has been sampled. Second, an algorithm to explore a continuation of this data with various computational tools — numerical and statistical — has been designed and

applied. Lastly, the obtained continuation of the surfaces in three-dimensions in the same orientation and location are printed, and the differences between the original and the generated construction are compared.

Dr. Shai Gul earned his Ph.D. in Mathematics, Discrete Geometry in 2015 from Bar-Ilan University (Israel). In 2016, he began lecturing at HIT — Holon Institute of Technology (Israel) and is now a Senior Lecturer in Mathematics. Shai's research is in Discrete Geometry, particularly in addressing problems of the plane. More recently, Shai founded the Mathematics Design Lab at HIT which he now heads and operates with students from different disciplines — designers (industrial, interior, visual communication), computer science, and applied mathematics — exploring intermediate mathematics and giving visualization to abstract mathematical concepts. The Lab strives to give face and form to these esoteric notions and describe the modelling process for creating a tangible, touchable sculpture designed to intrigue and invite simple understanding of ideas which usually reside in the heads of mathematicians only.

Michal Pustejovsky is a graduate of the New Media Studio of the Academy of Fine Arts in Prague. He has also studied at the Berlin University of the Arts and the Bezalel Academy of Arts and Design in Jerusalem. His

work focuses on the transformations of the concept of space-time in the modern world, its impact on society and its depictions through art. His minimalist works integrate the latest discoveries of quantum theory with innovations in art history, often touching upon developmental design. Michal has exhibited his work throughout the Czech Republic, Europe, and other continents. He is also the founder of the startup company Rgbloop where he is developing a 4k multichannel media player for galleries and artists

From Simple Charts to Professional Infographics — Applied on Large Scale Social Good Data

Dr. Michael Fire, Ben Gurion University, IL

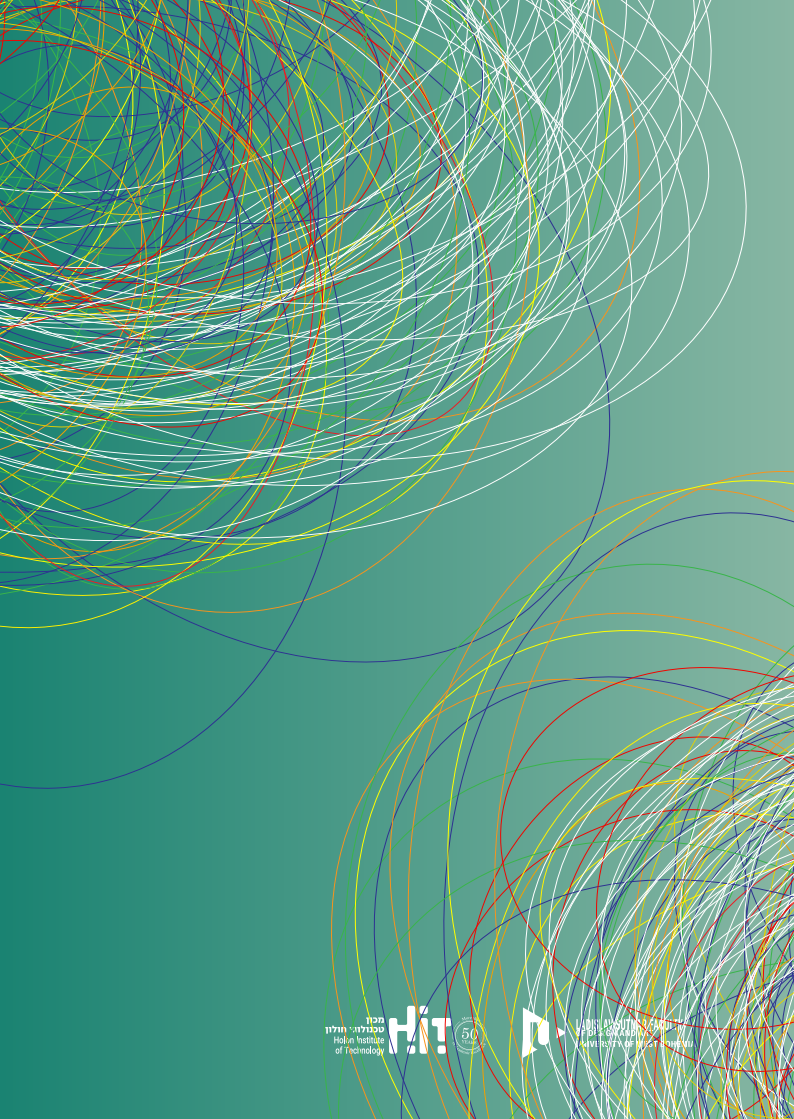
This talk will give an overview of the Data Science for Social Good Lab's decade-long journey to improve its research visibility. It will demonstrate the lessons which have been learnt in creating engaging professional visualizations for academic articles in various fields, such as cyber security, transportation, network science, and more.

The talk will demonstrate how this lab at Ben Gurion University utilizes the power and diversity of online freelancer markets, such as UpWork and Guru.com, and hires them to become valuable creative partners. This joint work helps create eye-engaging infographics and short videos that receive media attention and are noticed among the millions of papers published each year.

Dr. Michael Fire is a Senior Lecturer (Assistant Professor) at the Software and Information Systems Engineering Department at Ben-Gurion University (BGU), and the founder of the Data Science for Social Good Lab. Michael was the recipient of the Moore/Sloan Data Science Fellowship and the WRF Innovation Postdoctoral Fellow in Data Science at the University of Washington. For excellence in his PhD studies, he was awarded the Kreitman Prize. Michael's main research interests lie in big data, machine learning, social network analysis, and security and privacy. Michael also has gained extensive hands-on experience as a data scientist working for several companies and organizations.

Conference Chairs: **Dr. Yael Eylat Van Essen** (HIT);
Dr. Arnost Marks (UWB), **Dr. Jonathan Schler** (HIT)
Scientific advisor Sutrnarka Faculty: **Josef Kortan**

Graphic Design: Sapir Mazon, Tom Plotniarz, with the instruction of Aviv Lichter



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