Collective data-based drawings

A common ground for adaptive contributive design

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Abstract

The laboratory ALICE (Atelier de la Conception de l'Espace) at the École Polytechnique Fédérale de Lausanne (EPFL) advances a comprehensive approach to data-based drawing oriented towards architectural and urban co-design processes. This drawing methodology has been key in the contributive design process they have applied over the last seven years, covering a range of scales and contexts, both within the public and private spheres.

Contribution has become a relational strategy that unites a diverse range of participants, each hailing from various backgrounds and carrying unique needs, which come together around the drawing. For this reason, the cultivation of a robust drawing culture, from their teaching to their research and design activities, has become a cornerstone of ALICE's philosophy, where drawing is embraced not merely as a representational tool but as a constructive means for design work. Their methodology has now evolved to include data-based drawing techniques, skillfully merging precise surveying with qualitative data analysis, thereby bridging the gap between quantitative and qualitative facets of design.

This article explains this data-based approach to drawing through a series of projects developed in the Greater Geneva region. Throughout them, they explain how ALICE's situated data-based drawings facilitate intricate coordination among students, leading to real-scale interventions; explore the potential of transforming main roads into landscape infrastructures that promote sustainable mobility and urban development; or offer an innovative lens to comprehend the affective connections between citizens and their urban surroundings, transcending traditional cartographic representations. Finally, these efforts are summarised through the analysis of a single drawing showcased at the 2021 Venice Biennale, illustrating the potential of this methodology to harmonize the collective efforts of various stakeholders.

1 Contribution

Philosopher and art historian Georges Didi-Huberman has emphasized the significance of a table as a means to assemble the fragments of the world. The table serves as a shared surface for bringing together the tangible elements of our experiences. When laid out on this surface, the most intimate and concealed connections between these elements become visible, comprehensible, and open to our interpretation and engagement. It is easy to envision the architectural drawing as a situational and technical translation of these surfaces, a realm in time and space where shared interpretations and actions, as well as disagreements, can take place. In this shared space, we come together to shape and project our living spaces, endeavoring to derive meaning from them, from ourselves, and from the environment that unites us.

Since its creation, the ALICE (Atelier de la Conception de l'Espace) laboratory at the École Polytechnique Fédérale de Lausanne (EPFL) has been exploring the possibilities offered by the contributive process and its associated tools, in the pursuit of an alternative architectural practice[1]. This spatial practice is grounded in collective authorship, shared knowledge, and limited resources—a professional orientation equipped to confront the socioecological challenges that challenge our disciplinary history and how we teach architectural practice. The selection of the term "contribution" is influenced by the work of philosopher Bernard Stiegler[2], who, up until his untimely passing in the summer of 2020, delved into the concept of contribution as a means to transcend the typically passive role assigned to citizens in our democracies. He proposed an alternative to the exploitative relationships between the economy, the environment, and knowledge that lie at the heart of our climate emergency.[3]

Over the past seven years, ALICE has embarked on various design research projects through the contributive process, covering a range of scales and contexts, both within the public and private spheres. This journey has included endeavors such as a master plan in the municipality of Bussigny in Switzerland (2017) and the design of public spaces around the Saint Denis train station in Paris (2018). Most notably, since 2015, ALICE has been involved in a series of projects on the EPFL campus, beginning with the redevelopment of Place de Cosanday, the main public space at EPFL, in 2018. Another significant initiative was the "50 years 50 trees" project in 2020, which expanded the square and the surrounding public areas around the Rolex Learning Center. More recently, ALICE collaborated with the Vice Presidency for the Responsible Transformation of EPFL on the Campus Pieton project—a contributive process that coordinated the contributions of students, faculty, research institutes, and authorities for the pedestrianization of the EPFL campus. This effort involved more than 100 different actors and participants in the process (Fig. 1).

Throughout these projects, the concept of "contribution" has evolved into a relational strategy that unites a diverse range of participants, each hailing from various backgrounds and carrying unique needs. These contributors regularly convene at different stages of the design process, adopting a trans-scalar and trans-temporal approach to investigate the territory. A multitude of scales and temporal dimensions intersect

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[1]   We discussed the use of the contributive notion in a previous contribution: ALICE, "Contributive Workshops," STOA 5, University of Naples Federico II - DIARC, 2022, pp. 26-37.

[2]   As adequately framed by Félix Guattari in his essay "The Three Ecologies" (London and New Brunswick: The Athlone Press, 2000), our current climate emergency cannot be separated from its social dimension. Without acknowledging their interrelated nature, issues of climate injustice are prone to arise as well as climate negationism and political stalemates.

[3]   Bernard Stiegler, "L'archipel des Vivants. Des territoires laboratoires en archipel pour une politique et une économie des formes de vie." Etica & Politica/Ethics & Politics, XXII, 2020, 2, pp. 157-170.

within the drawings, and through an iterative series of contributive workshops and design synthesis, a set of guidelines or vectors for transforming the site takes shape. Within these drawings, these vectors function as emerging design tools and interfaces, orchestrating spatial production as an ongoing process of material modulation and stewardship. They rely on an analysis of the studied situation, not solely in its current state but as a realm of possibilities replete with diverse inclinations, agencies, and predispositions to be intensified, adjusted, and molded into new urban conditions. This process weaves together various ecologies and timelines, both in the long-term and in projects like Campus Piéton at EPFL (Fig. 2).

In this context, akin to Didi-Huberman's notion of the table, drawing becomes an essential tool in the collective development of ideas. It itself transforms into a common ground and a translation mechanism that bridges the gap between different participants and their areas of expertise. It articulates the inherent ambiguity of the possible and sets in motion the vectors of transformation.
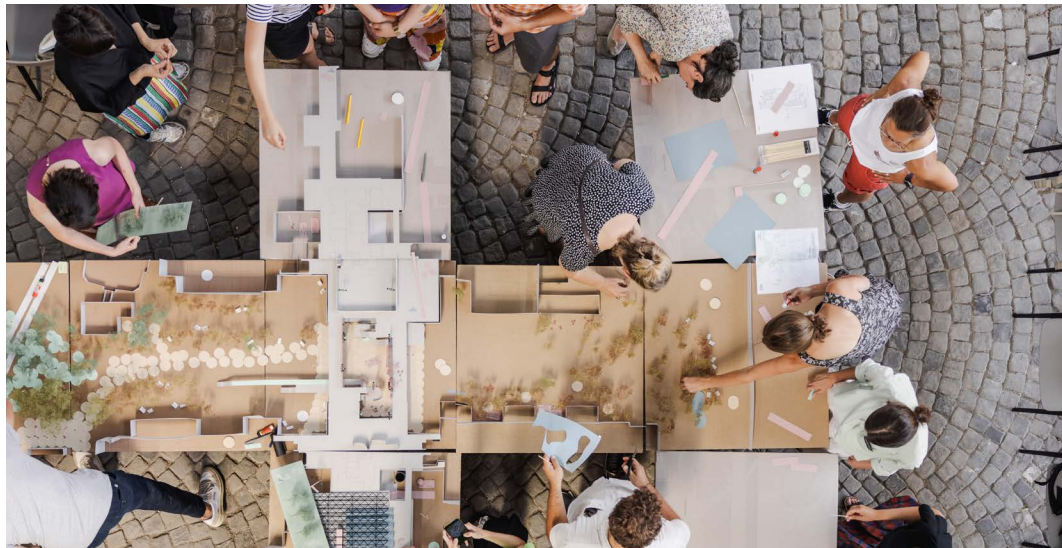
FIGURE 1 Contributive workshop Campus Piéton, EPFL ©Niels Ackermann

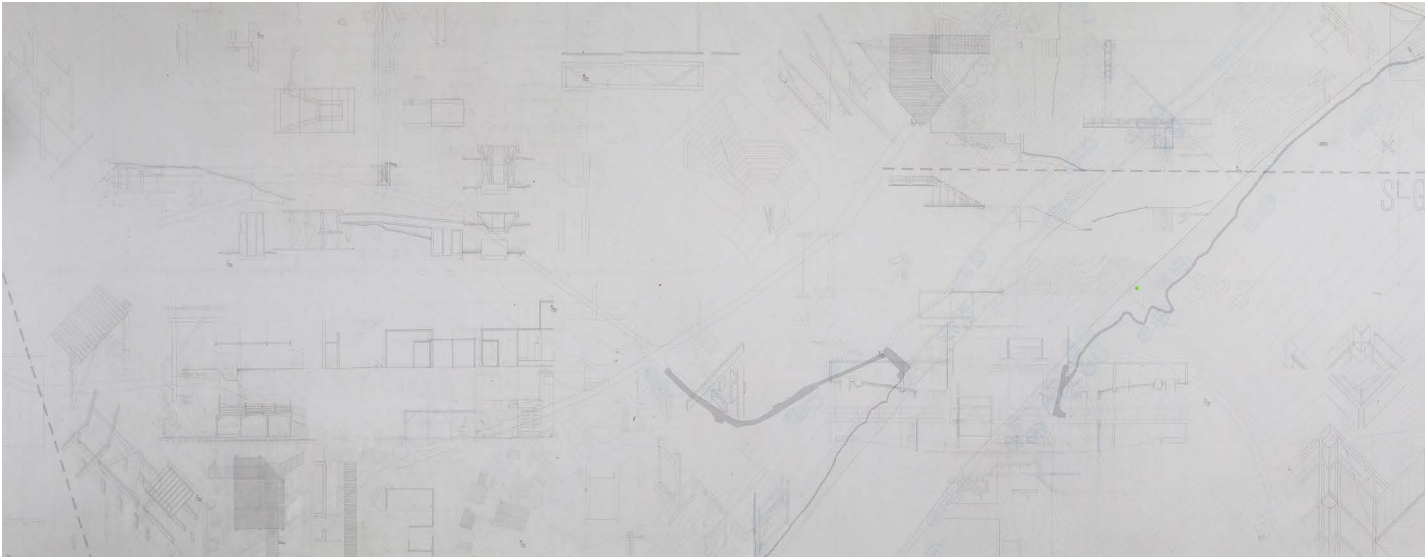FIGURE 2 Contributive workshop Campus Piéton, EPFL ©Niels Ackermann

FIGURE 3 Collective hand drawing based on data based cartography of Geneva ©ALICE EPFL

2 A new drawing culture

Expanding the contributive process, ALICE has placed at the core of its research and teaching endeavors the cultivation of a robust drawing culture. As part of this culture, it has encouraged students from the very first year of their architectural education to view drawing not merely as a representational tool but as a constructive one that articulates personal and collaborative design efforts[4]. This drawing culture has evolved over the past 15 years, embracing various formats and media, ranging from traditional hand-drawn techniques to computer-aided methods, all while upholding fundamental principles throughout (such as rigor, the importance of collective work, embodied experience, trans-scalarity, and constructive thinking) (Fig. 3).

More recently, we have developed data-driven drawing methodologies as the latest iteration of our drawing culture. These methodologies involve computational imaging and sensing through the specific use of QGIS, CAD, and 3D modeling software. By applying the same fundamental principles we've cultivated in traditional drawing techniques to the use of these software tools, we have redirected them to not only enhance a quantitative approach to data but also establish a qualitative and embodied connection to it, while benefiting from their efficiency (Fig. 4, 5). This hybrid approach has enabled us to expand object-oriented and location-based forms of graphic representation to incorporate mixed, partially undetermined, and relational orientations. It results in drawings that effectively encompass precise situated quantitative aspects as well as qualitative ones, making the process comprehensible and instrumental in facilitating collective discussions and collaboration with citizens and stakeholders, many of whom lack prior design training.

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[4] Our understanding of the diagram has a Deleuzian root. The diagram is not a representation or summary of reality but a key device in the production of reality. The diagram helps work and modulate emergent processes, helping articulate territorial potentials into new material organizations.

FIGURE 4 Raw geographical data ©ALICE EPFL

FIGURE 5 Raw data transformed into rasters ©ALICE EPFL

 By establishing connections between geographic elements and their potentials through data, Geographic Information Systems (GIS) allow for a meticulous examination of the landscape. This transforms the software into a tool for adaptive design processes, operating simultaneously at territorial and embodied scales. Furthermore, these methodologies possess a dual collective dimension (Fig. 6). On one hand, by collecting vast amounts of data, they aim to allow the multiplicity of the territory to voice its characteristics and possibilities. On the other hand, by exploring the unifying and communicative qualities of spatial drawing, these methodologies empower us to involve the various stakeholders as co-designers. Consequently, this approach recognizes the infrastructural and mediating attributes of architectural drawing, merging analysis and co-design into a collaborative endeavor (Fig. 7).
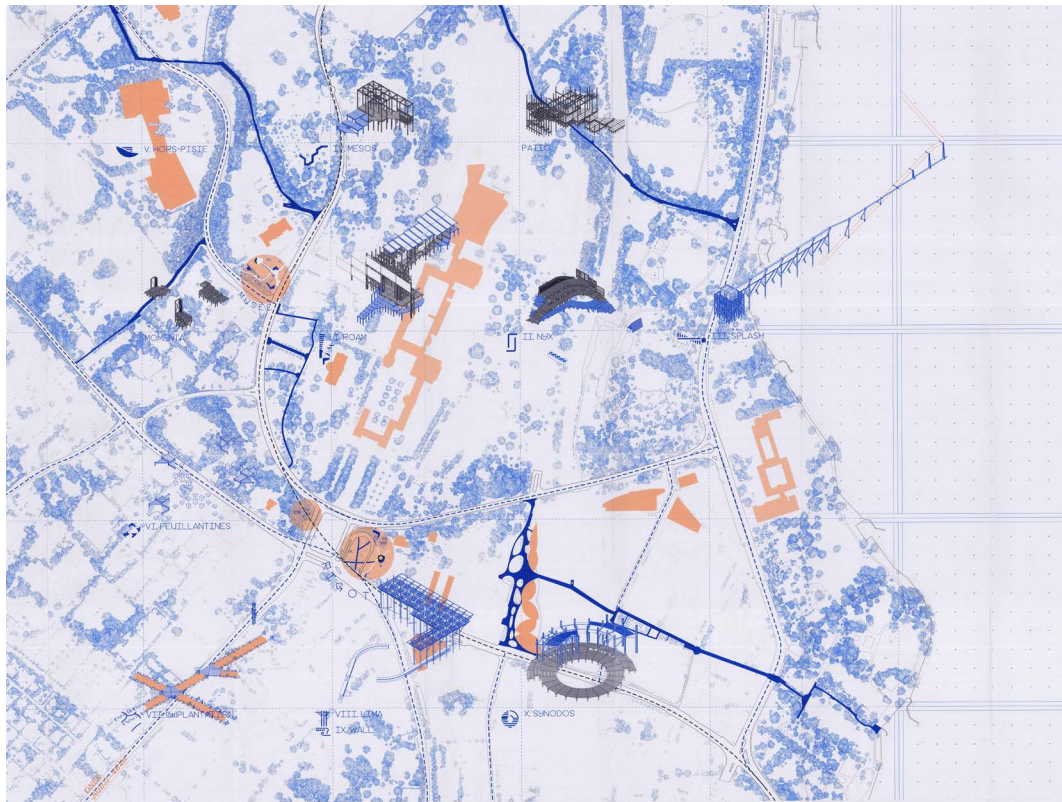
FIGURE 6 Data-based drawing of Geneva shores combined with spatial interventions by students ©ALICE EPFL

FIGURE 7 First year students projecting on collective drawing ©ALICE EPFL

3 The Greater Geneva case

In 2019, ALICE was chosen by the Fondation Braillard as one of seven teams for the "Visions prospectives pour le Grand Genève, Habiter la ville-paysage du 21e siècle"[5] consultation. The ambition was to gather knowledge and develop scenarios for the evolution of the Greater Geneva agglomeration by 2050. ALICE's approach for this project involved using the concept of metabolism to understand the complex interplay of socioecological processes shaping the city. This endeavor combined the contributive approach and data-based drawing, integrating various temporal perspectives and actors to establish vectors and orientations that serve as catalysts for creating new and coherent horizons for the territory (Fig. 8).

In this context, a series of projects unfolded over the past three years, rooted in a foundation of collective data-based drawings that formed the common ground for multimodal landscape infrastructures, 1:1 interventions created by students, and affective cartographies involving local residents, among other initiatives.
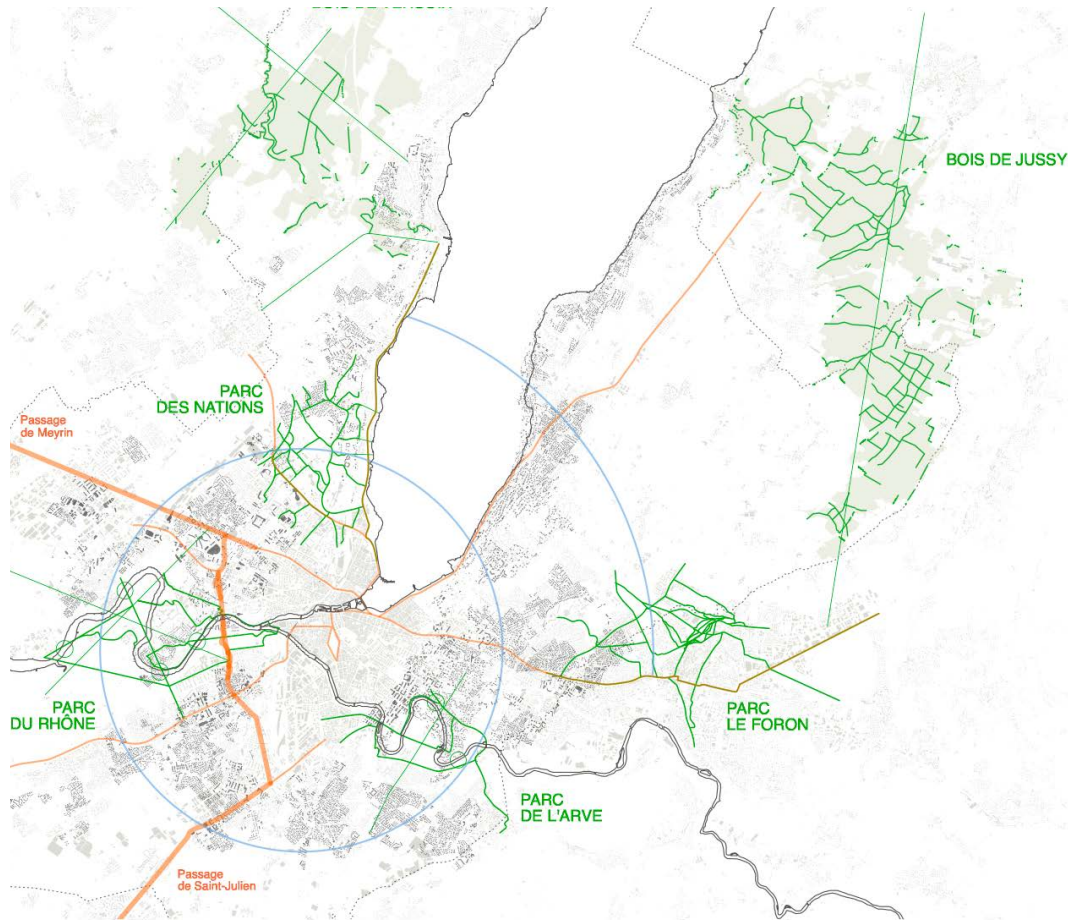
FIGURE 8 Grand Geneve main diagram ©ALICE EPFL

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5   Fondation Braillard. https://braillard.ch/activites/presentation-finale/
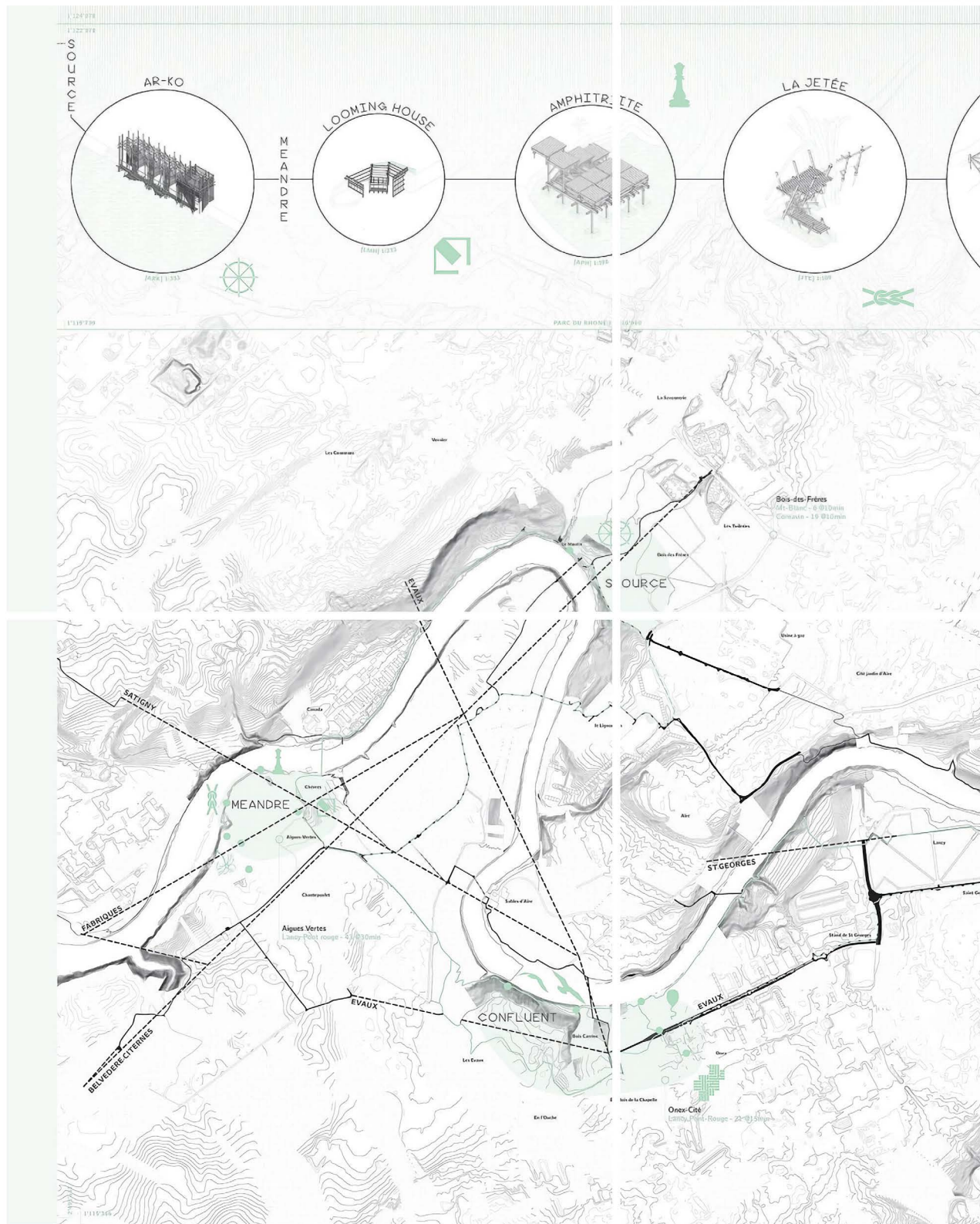
FIGURE 9 Student interventions thorough the Rhone shores ©ALICE EPFL

NEURONE

[NRN-I] - Sécurité 1:100

ESTUAIRE

Genthod

GENTHOD 1:10'000

Les Bains De Savigny

Gare Creux-de-Genthod
Cornavin – CEVA @30min

Débarcadère Bellevue
Mt-Blanc – CGN @60min*

Gare Genthod-Bellevue
Cornavin – CEVA @30min

LE LÉMAN

1'122'878

1'126'078

CONFLUENT

[HRN-I] - Absorbatory 1:50

CANOPÉE

Gare Cornavin
Source – 19 @10min
Confluent – 19 @10min
Estuaire – CEVA @30min

Débarcadère Mt-Blanc
Estuaire – CGN @60min*
Source – 6@10min

INSTANTS PASSAGERS

[ISP-?] 1:335

[ISP-3] 1:333

Les Chamolles

Le Rhône

JONCTION

L'Arve

Bois de la Bâtie

I-LAND

[ILD-?] 1:100

ESTUAIRE

HÉRON

[HRN-?] 1:100

[ILD-?] 1:100

Gare Lancy Pont-Rouge
Source – 21 @15min
Méandre – 43 @30min
Confluent – 21 @15min
Estuaire – CEVA @30min

ESTUAIRE

1'124'078

1'122'878

1'119'719

SOURCE

MÉANDRE

CONFLUENT

1'115'366

2'493'931

2'498'960

2'502'177

Houses

----- Vecteurs

Balade architecturale

Variations des 2 et 3 juin

◯ Transports

Distance entre les points = 12m

Ar-Ko: ARK   ∅ = Fréquence de passage
Looming House : LMH
Amphitrite : APH   *Pour descendre, les passagers
La Jetée : JTE   s'adressent à l'équipage;
Neurone : NRN   pour monter, téléphoner au
Canopée : CNP   0848 811 848 min. deux
Instants Passagers : ISP   heures avant l'heure de départ.
I-Land : ILD
Héron : HRN

1'119'739

0 m 100 200 300 400 500   1 km
1 : 10'000
0 m   5   10   15   20   25   30 m
1 : 333
0 m   1   2   3   4   5   10 m
1 : 100

2'498'960

2'502'177

On the banks of the Rhône River and its surroundings, ALICE's teaching team and 250 first-year architecture students from EPFL collaborated on creating constellations of 1:1 installations. This transformed the territory into a laboratory where students made individual and collective contributions to redefine the relationship between inhabitants and their natural and built environment. The constellations provided urban strolls to be explored by bike or on foot, with each installation hosting events for small groups throughout the summers. In the 2022 edition, students constructed a constellation on Avenue des Grands-Commun, a significant urban axis on the outskirts of Geneva that extends into the forest, bridging the city and the surrounding wooded areas. These light structures offered new community spaces and programs for residents and visitors to experience and enjoy, including activities like gardening, performances, water-based activities, cooking, and communal meals (Fig. 10). As a pedagogical tool, the situated data-based drawing proved highly effective in coordinating the efforts of hundreds of students across various scales and timeframes. ALICE's team prepared a data-based drawing that combined a precise survey of the context in its different scales with a proto-structure that served as a framework for student work[6]. The projects were then conceived, designed, and constructed in a 1:1 scale, integrating both hand-drawn and CAD-based drawings and considering the embodied relationship to public spaces facilitated by the proto-structure provided by the data-based drawings (Fig. 9).

FIGURE 10 Public space intervention design and built by first year students ©ALICE EPFL

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6   For further details on the notion of protostructure, see Agathe Mignon's doctoral thesis "Protostructure, archéologie et hypothèse d'une architecture-support" (EPFL, 2019), Link, and Dieter Dietz, Dario Negueruela del Castillo, Agathe Mignon, and Julien Lafontaine Carboni, "HOUSE 1 Protostructure: Enhancement of Spatial Imagination and Craftsmanship Between the Digital and the Analogical," Digital Wood Design. Innovative Techniques of Representation in Architectural Design, Lecture Notes in Civil Engineering, Volume 24, pp. 1229-1252, Link. From the latter piece, "the protostructure constitutes at once both a material and immaterial support of students' interaction. Its material dimension as a physical construction is invested and complemented by the immateriality of the guiding scheme. Furthermore, the three-dimensional field of the protostructure locates every individual proposition or intervention in relation to the ones from the other participants, vertically and horizontally. It embodies each collective situation in a physical medium. At the same time, a temporal framework locates every action into a broader system. Thereby a set of rules is shared by all actors, enabling them to interact within a gravitational system of structural logic and to operate with similar vocabularies (types of response) in order to construct common knowledge."

Closely linked to the first-year Grands-communs project and using the same data-based drawing as a starting point, the Design Research and Research teams of ALICE, in collaboration with OUVEMA UNIL (Observatoire universitaire du vélo et des mobilités actives from the University of Lausanne), delved into the transformative potential of main roads on the outskirts of Geneva becoming landscape infrastructures. This transformation could lead to a shift toward a sustainable mobility paradigm while enhancing urban qualities in the areas they traverse.

This project, named "Passage-Paysage," focused on three main road axes crossing the Canton and connecting the city center to its hinterland, passing through former villages and industrial infrastructures. Through an innovative blend of survey methods, ranging from multimodal site visits to experimental planning and the data-based drawing methodology, these roads were evaluated with consideration for factors like walkability, environmental qualities, their relationship with the surroundings, and their impact on public health (Fig. 11, 12). Subsequently, a territorial and architectural strategy was defined for each road, with a particular emphasis on nine key sites where the diagnostic showed that landscape intervention at an urban scale would be most needed. In these nine sites, the combination of experimental planning and the data-based drawing methodology facilitated a trans-scalar and transdisciplinary approach, allowing each intervention to be in dialogue with the architectural, urban, and territorial scale of the pre-existing conditions (Fig. 13, 14).

FIGURE 11 Passage paysage project ©ALICE EPFL

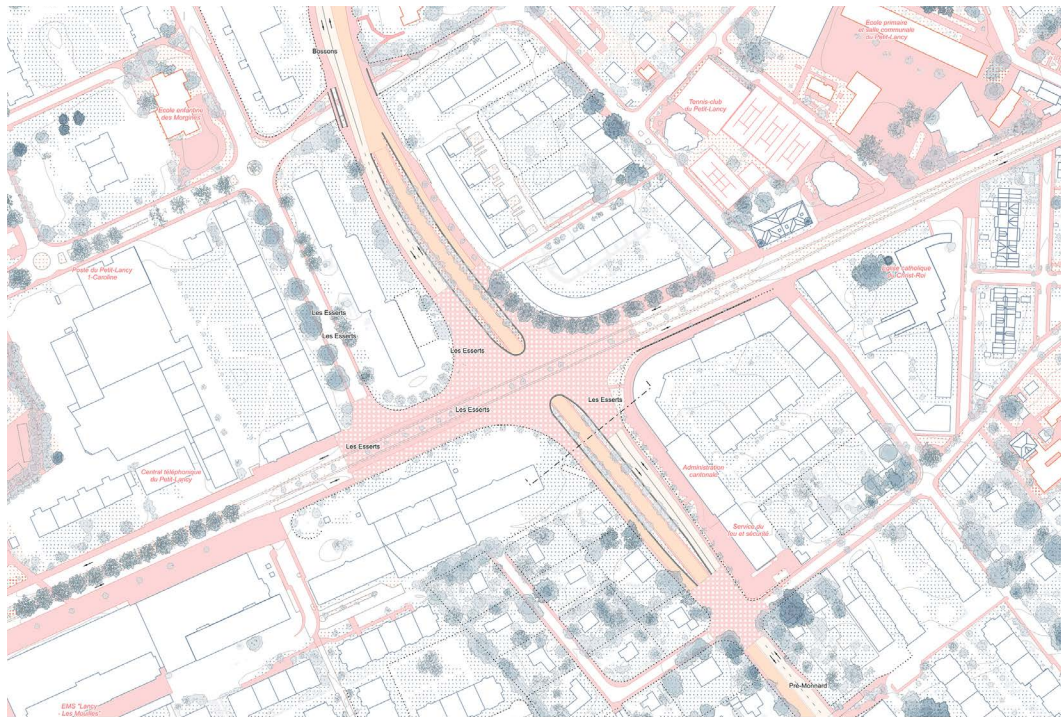FIGURE 12 Territorial section of one of the axis ©ALICE EPFL

FIGURE 13 Example of road transformation ©ALICE EPFL

FIGURE 14 Example of road transformation ©ALICE EPFL

The Research team has recently concluded a series of data-based affective cartographies that offer an alternative perspective on the urban space of the commune of Vernier in the northern part of Greater Geneva. The project began with fifteen walk-along interviews conducted with the inhabitants of Vernier[7], which were recorded, transcribed, and geolocated. The transcripts were then analyzed using QDA (Qualitative Data Analysis) software Atlas.ti, resulting in a series of time-stamped snippets classified under various categories related to place attachment. This time-stamped data was then linked to GPS tracks, effectively

combining discrete territorial data with qualitative information extracted from conversations and inspired by the surroundings. These maps seek to capture the emotional connections of citizens with their daily environments, highlighting the relationships between the physical environment and memories, perceptions, and experienced landscapes. They offer a means of creating more intricate spatial representations than traditional cartography, particularly concerning the perceived boundaries of the commune. Beyond the administrative demarcation, these boundaries appear diffuse and tied to individual or collective experiences (Fig. 15).
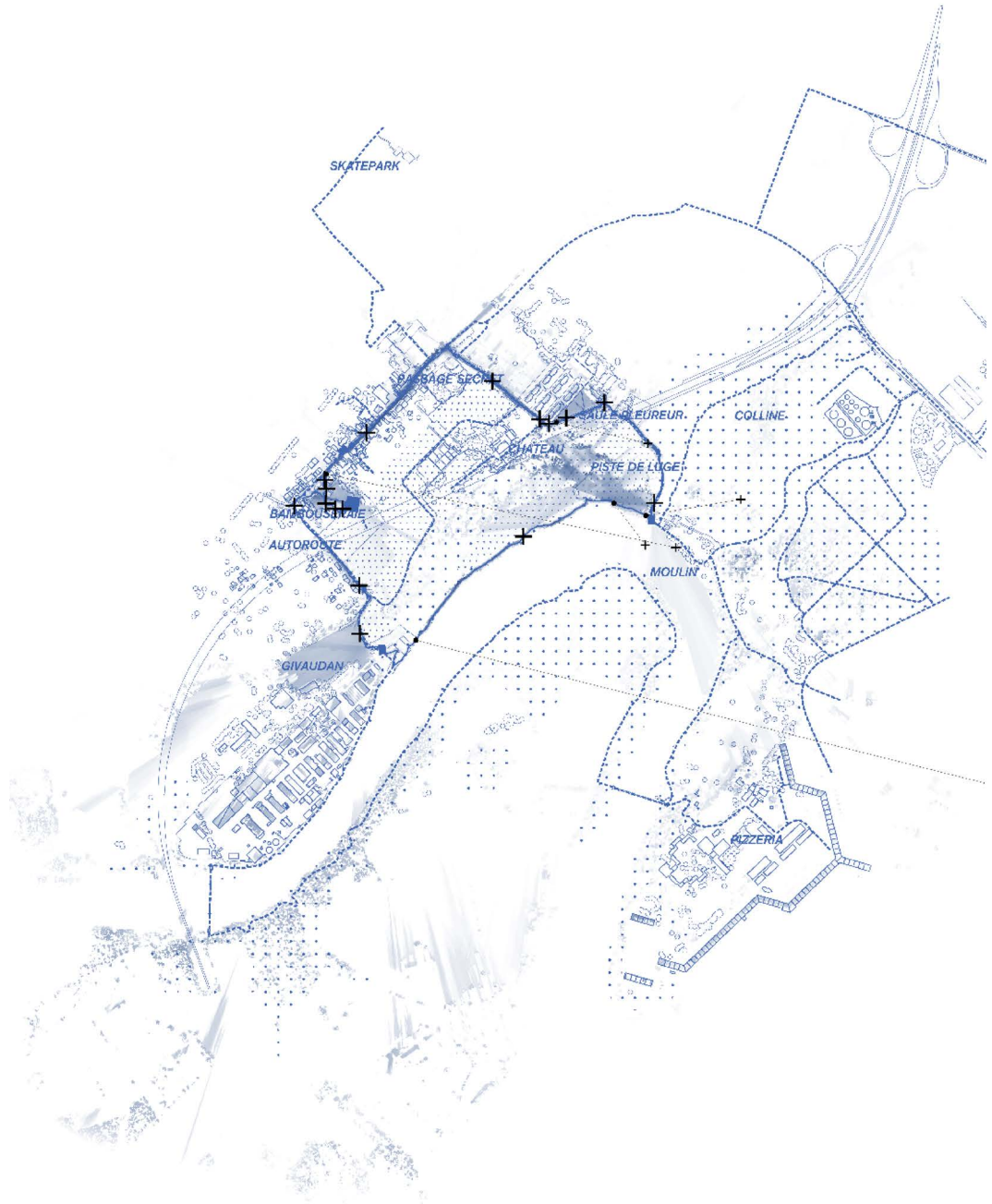

FIGURE 15 Example of interview mapping ©ALICE EPFL

Each interview is mapped, creating figures referred to as constellations of varying scales, which depict the intricate relationship between an inhabitant and a living territory[8]. Some constellations are highly concentrated, while others extend over significant areas, and some form a network of disconnected places, physically distant yet linked by familiar routes (Fig. 16).

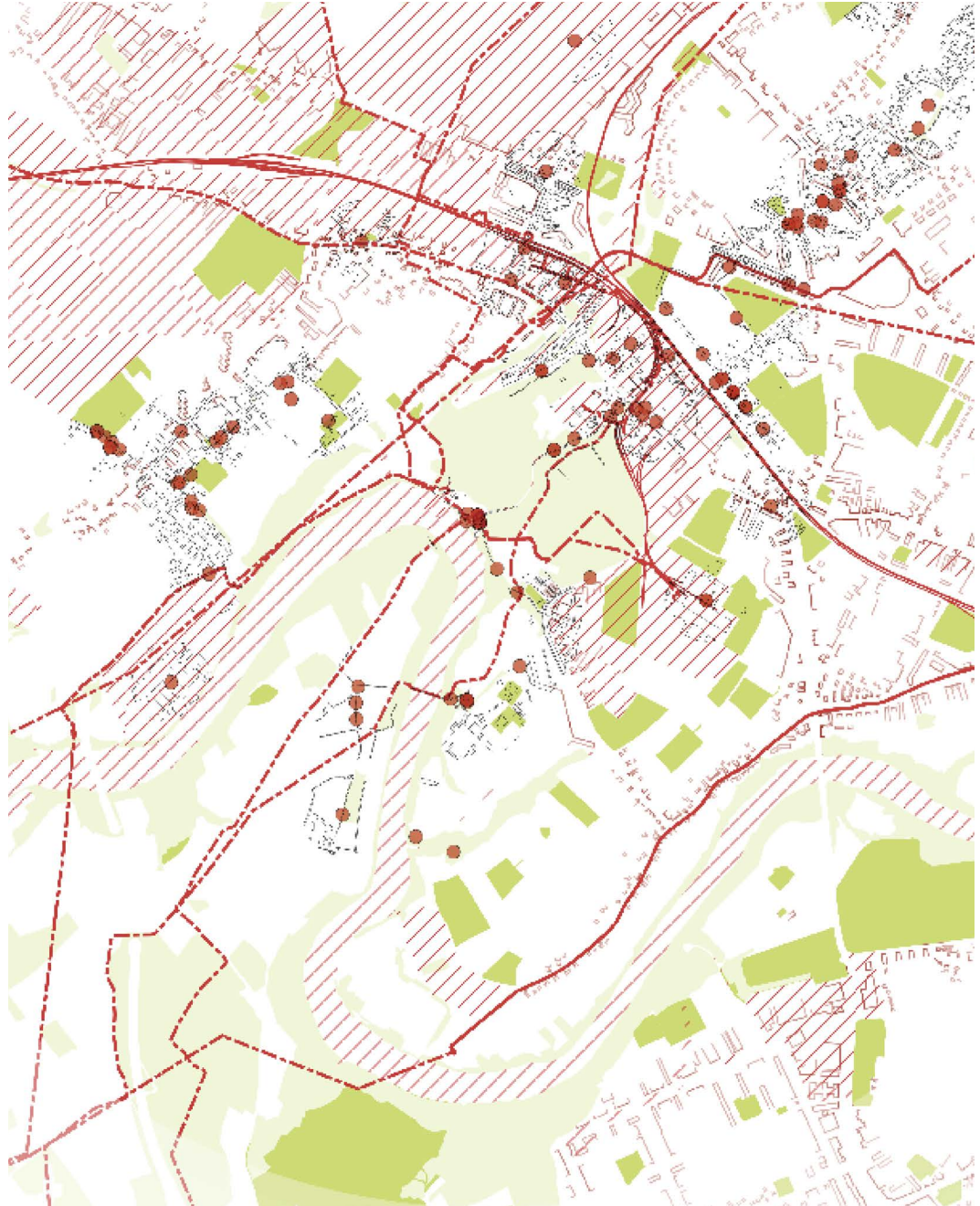FIGURE 16 Atlas of risk and health ©ALICE EPFL

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8   The term comes from Walter Benjamin's work on historical materialism. Against the network, the constellation doesn't think of equivalent nodes but of active materials that react and transform each other, where their uncertain connections offer new insights into the assemblage they form together. These materials are lively, demanding interpretation.

At the intersection of these individual experiences emerges a collective and lived image of the commune (Fig. 17). When superimposed, they create a drawing that reveals the lines of force and intensity within the commune, unveiling the most significant shared areas, zones that may appear empty, and connections with other territories.
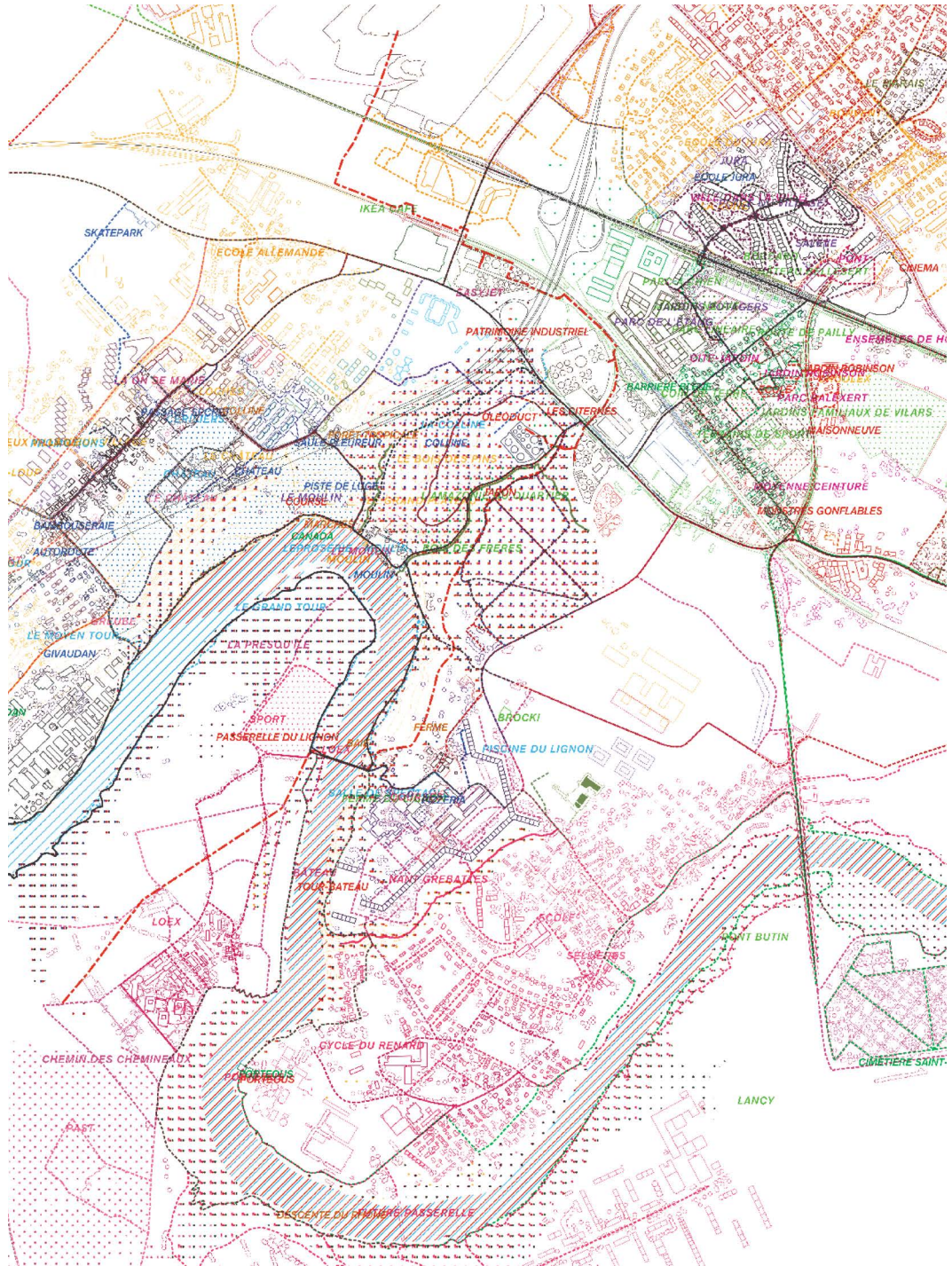

FIGURE 17 Superimposed interviews ©ALICE EPFL

4 Perspectives

The culmination of these pedagogic, design research, and research processes was encapsulated in a single drawing, which was exhibited in the Italian Pavilion of the 2021 Venice Biennale. This drawing represented the collective contributions of students, professors, researchers, citizens, authorities, and many others. It showcased the potential of the methodology as a tool for orchestrating the efforts of multiple entities, disciplines, and visions (Fig. 18).
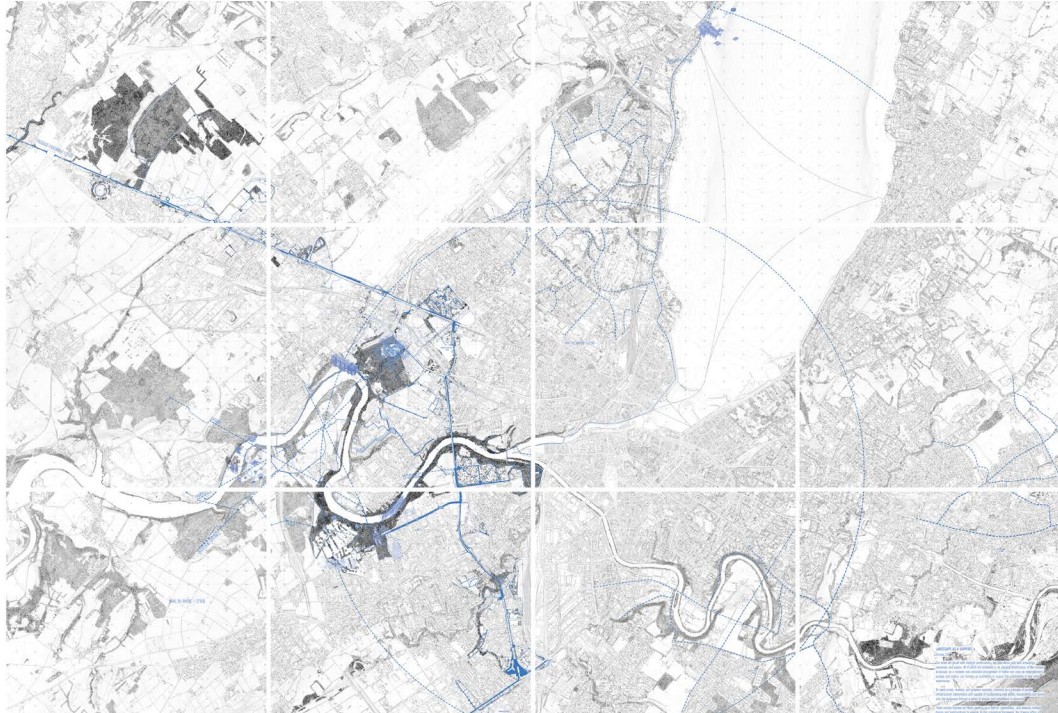

FIGURE 18 Landscape as a support (Collective drawing showing ALICE's interventions in Geneva)

The common ground, created through the collective data-based drawing and the contributive approach, enables the collective authorship needed to navigate the complex processes shaping the city. It serves as a fertile ground for embracing a wide array of voices. This shared and dynamic canvas ensures spatial coherence across different projects while maintaining the necessary flexibility for inclusive and participatory development over time. However, it's essential to acknowledge the challenges associated with this methodology and its tools. On one hand, the involvement of numerous actors in the contributive processes necessitates a commitment from governance structures to support these processes. Unfortunately, this commitment is not always guaranteed, and it has posed obstacles in various projects, jeopardizing the realization of collective work involving citizens, students, and researchers. Furthermore, despite the increasing availability of GIS data worldwide, it's crucial to recognize that the Canton of Geneva in Switzerland has invested significant resources in conducting a precise survey of the built environment using GIS technology[9]. The amount of data available in the canton surpasses that available in other Swiss cantons, not to mention in other regions around the world.

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9   SITG (Système d'Information du Territoire à Genève). https://ge.ch/sitg/

Despite these challenges, it's paramount to advocate for collective situated processes that view the city as an evolving web of relationships, entities, social structures, cultural movements, and historical, biological, and geological trajectories. The movements interconnecting these dynamics are often invisible, intangible, and immeasurable but remain active and impactful. Visualizing them, not as raw data or graphical representations, but as embodied spatial entities, is critical when confronting the complex issues facing regions like Greater Geneva, transcending the boundaries of a single project or profession.

The various forms of interventions undertaken by ALICE have fostered the emergence of an open, productive, and affective continuum without imposing the constraints of a single system. This approach has been recognized and supported by the Geneva authorities, promoting a much-needed change and fostering innovation in how we define the canton's built environment within the context of the ecological transition[10] (Fig. 19).

FIGURE 19   Tracing a vector onto the Rhone river by first year students ©VictorMaréchal

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10   Onex Micro-territoires. https://www.ge.ch/dossier/concertation/demarches-terminees/onex-micro-territoires-experimentons-espace-ur-
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