Nicolò Ceccarelli

2CO-COmmunicating COmplexity

Selected contributions to the Conference
September 8 - 9, 2022

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2CO3-COmmunicating COmplexity

Selected contributions to the Conference September 8-9, 2022

edited by
Nicolò Ceccarelli

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FrancoAngeli

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The conference was organized by the Department of Architecture, Design and Planning of the University of Sassari.

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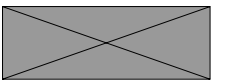

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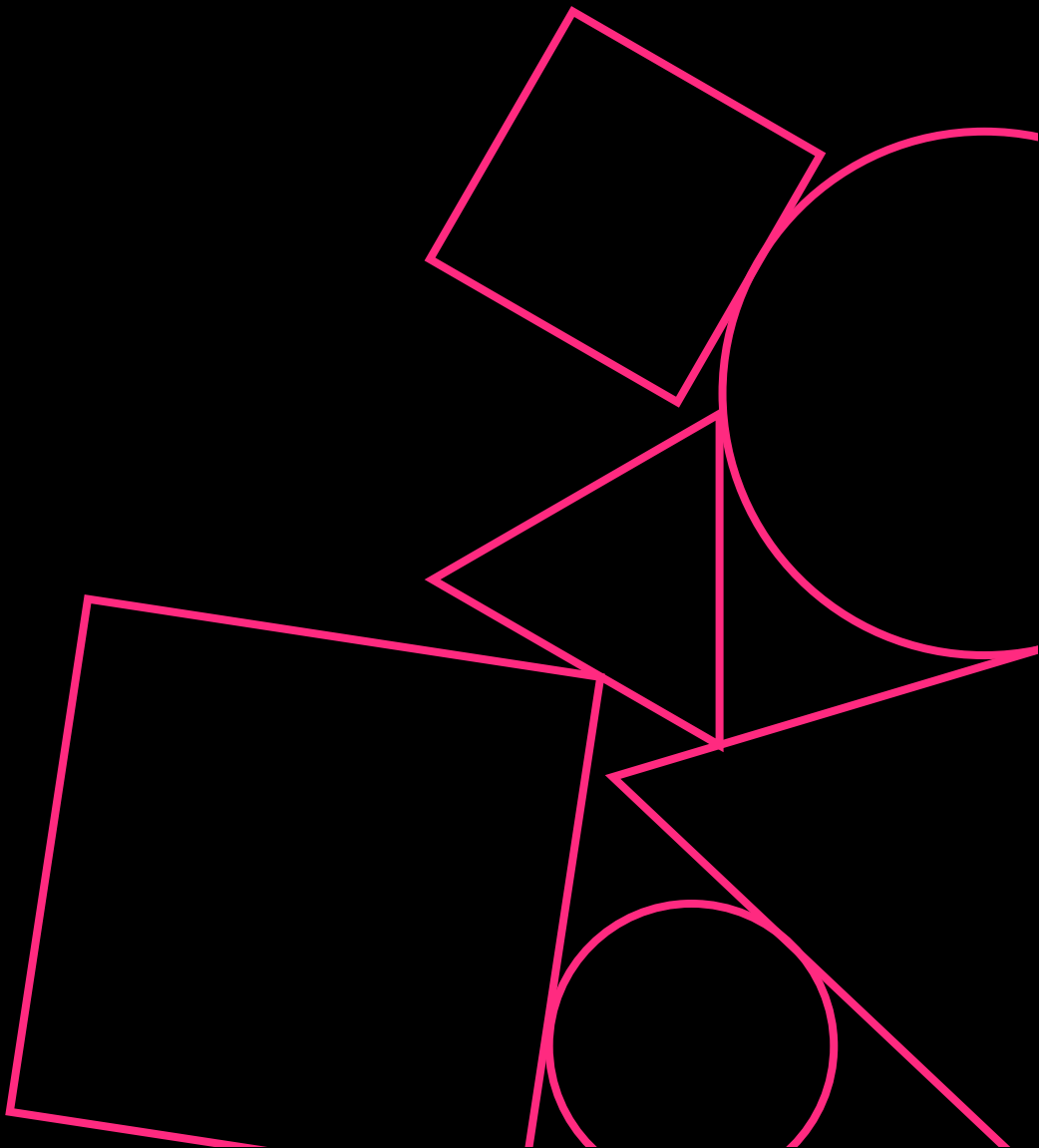
2 Junior Track



Genoa Loci Interactive Game

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Abstract. Generative design is a valuable tool to engage citizens in interactive activities and allow them to discover hidden treasures in their cities. Such potential has been leveraged by the authors, combining a physical experience with a digital application, designed to collect data during the event Genoa Loci, and ultimately visualize them, producing graphic feedback that could be collected as a prize. Genoa Loci has been organized in February 2020 by TEDxGenova, a non-profit organization devoted to sharing knowledge and valuable ideas within the city of Genoa, Italy. The gamification approach has been extremely valuable in involving both young and adult users in the activity, and ultimately improve the perception that citizens have about a strongly stereotyped area of Genoa. The article describes how the activity was organized and managed via the design of a custom web application and shows the results and the final impact of the experience on the participants.

Keywords. Gamification / Generative design / Phygital experience / Path visualization / Active citizenship

1. TEDxGenova and the Genoese context

Genoa has one of the most extended medieval centres in Europe, about 2 square kilometres densely populated with alleys, called *caruggi* in dialect. Buildings almost touch each other, creating a maze of narrow spaces that elude the possibility of an overall view. Different architectural styles overlap, from the remains of medieval walls to 14th-century mansions to Gothic arcades occupied by contemporary premises and historic stores. Craft activity has strongly characterized the city's history: many workshops are still in operation, and valuable votive shrines donated by the guilds still decorate the numerous crossroads (Leone, 2010).
However, despite the undeniable historical and architectural value of the area, sociological and cultural processes linked to urban, economic, and social transformations have distorted its image; in particular, the Genoese historic centre has long been the victim of a strongly negative prejudice that has fueled stereotypes and collective beliefs based on the urban decay of some areas, indicated as notorious and dangerous

(Leone, 2010). In this context, the goal of the case study hereby presented was to strengthen the sense of belonging of the citizens and let them discover an area that they too often avoid.

Genoa Loci has been organized by the authors as volunteers of TEDxGenova, a non-profit organization born in 2015, devoted to the organization of annual independent conferences in the TED format in Genoa. The goal of TEDx conferences is to share knowledge and valuable ideas at a local level, operating under a license granted by TED itself (Anderson, 2016). In addition, TEDxGenova team often organizes happenings in the city, aimed at reactivating its social fabric and engage citizens in innovative and fun activities.

Genoa Loci is a gamified experience that took place in February 2020. Participants were invited to walk around the historical centre using a web app to get directions on the route to follow, which was solely determined by their answers to a series of questions proposed by such app. The experience aimed to gently push citizens to explore the historical centre, by leveraging the value of data generated by their wanders. By designing a final visual prize (the visualization of the walking path of each participant), it has been possible to positively involve both young and adult users in an activity requiring commitment and dedication (Zichermann & Cunningham, 2011).

Fig. 1. A girl following the web app that gives her directions around the historical centre, February 2020 (Credits: Luca Bobbio).

2. Genoa Loci: methodology

To start playing, participants must go to one of the five access gates to the game area and scan a QR code with their smartphone. The QR code contains a URL that refers to the application, together with an identification code associated with the gate, so that the starting point is known to the system. From that moment on, the application guides players through the alleys, and indicates a path based on their inputs. At each crossroads (3-way intersection + the route travelled to reach it), the application presents the player with a multiple-choice question, drawn from the 15 questions included in the test. Each question offers three possible answers and, depending on the one selected, the application directs the player to a new intersection in which to answer the next question. In this way, the path generated is entirely customized by the player's choices.

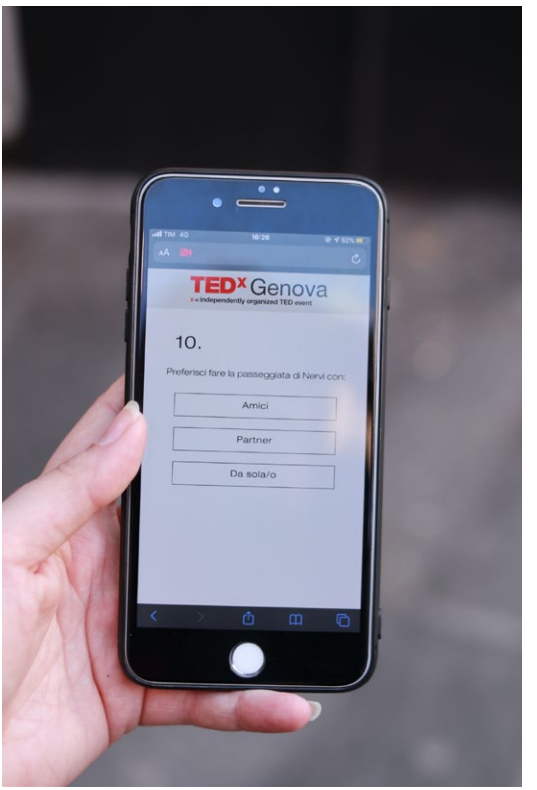

Fig. 2. The UI of Genoa Loci's web application, February 2020 (Credits: Luca Bobbio).

The questions do not have a "correct" answer but are rather structured as a personality test; mainly focused on Genoa and its traditions, the questions record three different traits of the participant, which contribute to the definition of a generative image. The final output of the experience consists in the generation of a unique

illustration, representing the path taken by the player in the game area (Huang et al., 2014); in addition, the answers provided during the test profile the player's personality in the light of three parameters, measured by simple subtraction or addition of scores depending on the selected answer.

The three traits are:
Parameter G: the user's relationship with the city of Genoa.
Parameter S: how much the user is a dreamer / pragmatic.
Parameter T: how innovative / traditional the user is.

Each of these 3 parameters has three possible degrees:
Parameter G: True Genoese / Occasional Genoese / Tourist.
Parameter S: Dreamer / Flexible / Pragmatic.
Parameter T: Visionary / Enthusiastic Innovator / Lover of Tradition.

The results of the G parameter control the background colour of the illustration, the S parameter controls the colour of the path travelled by the player and the T parameter controls the shape of the checkpoints.

3. Genoa Loci: algorithm

Genoa Loci was made possible by modelling the play area using a graph on which the application moves the player. Starting with the road map of the area, all intersections between two or more streets were marked as nodes in the graph, along with the points at which the streets curve, to allow for path reconstruction. The result is a connected graph, in which three pieces of information are associated with each node:

- - An alphanumeric identifier, consisting of either a letter or a number.
- - The degree g of the node, that is, the number of arcs to which the node is connected.
- - The coordinates of the node, expressed in pixels, taking the upper left corner of the map image as (0,0).

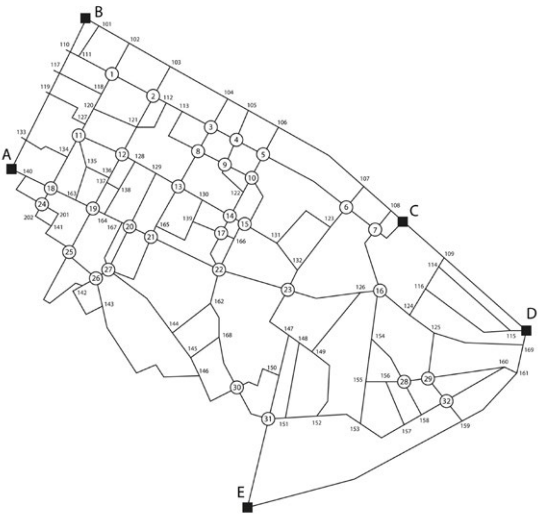

Fig. 3. The map of the game area.

Next, all nodes with degree g=4, identified in Fig. 03 with an identifier less than 100, were selected, and a route to another node in the same set, different for each arc, was designed for each of them. The route is specified as a set of codes, representing the nodes that must be traversed to travel it. In this way, each node of degree 4 is connected to 4 other different nodes, themselves of degree 4. These nodes represent the set of possible stages in the game.

The operation of the routing algorithm works as follows: once the player reaches a stage, the game logic takes the 4 outgoing arcs from the node, removes the one from which the player arrives, and assigns one of the answers to the question to each remaining arc. At this point, when the player selects his answer, the game directs him to the path assigned to that arc.

The area where the game was played is characterized by poor network connectivity; therefore, a single page application architecture was chosen to minimize the exchange of information with the server and thus related problems during the activity. For the same reason, directions provided by the device's GPS system were not used (Modsching et al., 2006); instead, ad hoc directions were written for the experience. Once the desired intersection is reached, the user reports it to the application via a dedicated button. To facilitate recognition of the stops, the application refers to them by the street names that generate the intersections.

4. Results and findings

At the end of the activity, the server recorded a total of 211 paths generated, or the number of users who have successfully completed the process of 15 questions.

Considering that 40% of users have played as a couple or as a family, collaborating from the same device to build a single path, we can estimate that about 700 people have walked through the alleys of the historic centre.

Fig. 4. Two players comparing their results, February 2020 (Credits: Luca Bobbio).

The paths obtained through generative graphics take different forms, symbolizing the spatial experiences lived by the participants, sometimes radically different from each other (Pandey, 2014). Looking at the data visualizations, we can see that all paths have at most two "truncated" points, where the line appears broken in either direction; these two points represent the entry point to the web app and the exit point, the place where the 15th question was answered. In cases, however, where one of the two blind spots should not be visible on the map, the player has ended the game at a previously visited down point, making the exit point graphically "invisible". Paths can be divided mainly into two major types: linear or closed. In linear paths, players rarely retraced the same path several times, cutting across the entire length of the game area without incurring any particular "loops." In the closed paths, on the other hand, players answered questions by selecting answers that brought them back to their steps several times, thus generating figures that were wider or narrower depending on the distance to the checkpoints. The illustrations then took on all possible combinations in terms of background color (3 variables), trail color (3 variables) and checkpoint shape (3 variables), thus highlighting at least 27 different personalities in the participants.

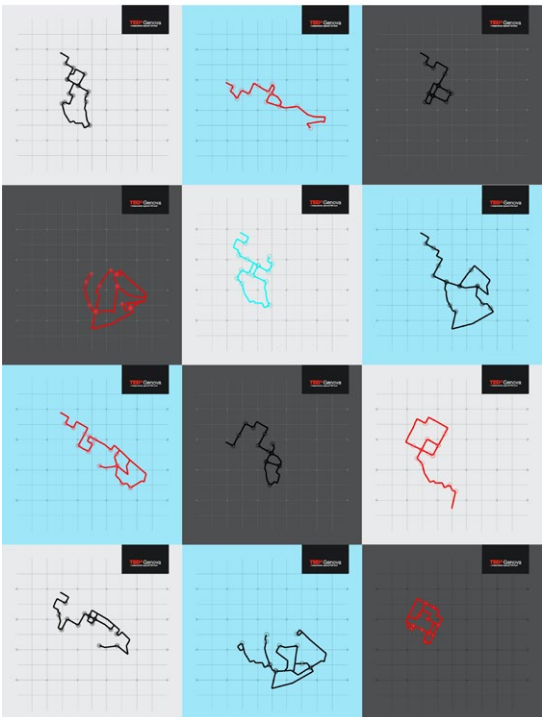

Fig. 5. A sample of the data visualizations generated by the algorithm.

The initiative has produced encouraging results from several points of views (data collected via survey from a sample of 187 respondents). 32% of participants said they were thrilled to be able to compare their journey with that of friends and relatives. As for the relationship with the city, the feedback was even more positive: one in two players (50%) said they were "happy to be able to explore an area of the city that they know little about. "And one in three players (32%) said they were happy to be able to "deepen the relationship with their city". But the most significant result from the point of view of the redevelopment of the Genoese historic centre is the following: to the question "after playing at Genoa Loci, did you re-evaluate the alleys you crossed?", more than half of the participants (55%) replied "Yes, positively".

Acknowledgements

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