# Growing a Community-Supported Ecosystem of Future Living: The Case of NICE2035 Living Line

Yongqi Lou(✉) and Jin Ma

Tongji University College of Design and Innovation, 281 Fuxin Road, Shanghai, China
louyongqi@tongji.edu.cn, majin.poly@gmail.com

**Abstract.** This paper reports a design-driven social innovation initiative titled "NICE2035 Living Line" that Tongji University College of Design and Innovation recently launched in collaboration with the local administrative authorities in Siping community (Shanghai, China). While there is great demand for social and economic innovations that can address the challenges the city faces today, urban communities, especially the old ones, lack the vitality needed to support the city to achieve its goal. The urban community has long been seen as merely a place for living and leisure, and therefore a place where innovation outcomes are consumed not generated. The NICE2035 Living Line project challenges this dominant view of communities and adopts a design-driven approach to building an ecosystem of innovation and entrepreneurship on a small street within an old residential community where the college resides. Within this ecosystem, labs and start-ups produce diverse prototypes of alternative future ways of living. This paper examines the purpose and function of the ecosystem (why it exists), the system elements (what is systematized), and the process by which the elements interact with each other (how the system operates). This preliminary study of the project provides a basic framework for further studies on the mechanisms of such complex sociotechnical systems.

**Keywords:** Social innovation · Urban community · Ecosystem
Design-driven innovation · Future living · NICE2035

## 1 Introduction

Today, few would doubt that innovation thrives in cities [1–4]. When imagining the most innovative places in a city, one would likely think of innovation companies, high-tech parks, downtown areas, the CBD, university campuses, and research institutions, etc. An urban community, however, often lies outside the scope of that vibrant image. This misconception has its roots in the developments of contemporary architecture and urban planning.

Ever since the influential *Athens Charter* [5, 6], a city has been defined as a functional site for four basic types of human activities: dwelling, working, leisure (recreation), and transportation (circulation) [7]; and to plan and organize the first three functions in a city was to separate them from one another [8]. Our understanding of


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cities has evolved since the 1930s. The *Charter of Machu Picchu* [9] in 1977 recognized the limitations of the notion of a "functional city" in its fragmentation of a living organism into a set of separated functional sectors. It proposed to reintegrate the divided components and restore lost interdependence and interrelationships and emphasized the value of culture, life, and humanity—especially ordinary citizens—in urban development. However, in the years after the *Charter*, dominant urban planning and architecture design still favors the disposition and management of the built environment over people and pays less attention to human activities (urban contents) and urban stewardship.

Following this tradition, the urban community[1] has long been regarded merely as the set and setting for daily life and leisure. Communal urban environments were and are designed as places where people can live and relax while consuming and enjoying products produced by other parts of the city. In a typical innovation chain—from invention, engineering, design, production, and distribution, to use and enjoyment—the community sits at the consumption end (back end) and is isolated from the innovation production occurring in other parts of the city.

If cities were vigorous and innovative enough to be able to maintain these communities purely as areas for life and leisure, there would be no problem. Unfortunately, most cities in the world now face the acute stressors of social, economic, environmental, and cultural deterioration [10]. Trapped in predicaments caused by natural disasters, social changes due to deindustrialization, weak economic recovery, or failing infrastructure, cities across the globe are seeking powerful drivers to innovate and address these challenges. To do so, a city must creatively integrate its diverse components and resources. Should urban communities be seen as inherent parts of the city organism? How communities might participate in the innovation process is a timely inquiry for researchers, administrators, practitioners, and—most importantly—the people who live in them.

Although the phenomenal "garage culture" in Silicon Valley that began in the 1930s and has flourished since the 1970s is a legendary example of the connection between community and innovation, the potential that urban communities have to drive innovation has not received sufficient attention. Our inquiry begins with a fundamental hypothesis: if there are appropriate conditions, an urban community will lead the innovation chain rather than become its tail, and community members will become creators rather than merely consumers. A new paradigm of innovation will occur through shifting the community from the back end to the front end.

This paper presents a case of a social innovation initiative entitled "NICE 2035 Living Line" that Tongji University College of Design and Innovation recently launched in collaboration with the sub-district "Siping community" in Shanghai, China. "The Living Line" is the first project under the umbrella title of "NICE2035." We see the NICE2035 Living Line project as an ecosystem of urban community-supported social innovation. We approach the Siping ecosystem three ways: its purpose and function (why the system exists), the system elements (what is systematized), and the

[1] The notion of "community" used in this paper denotes a residential area. In the Chinese context, residential neighborhoods, areas, and districts are all called "communities" (社区).

processes through which these elements interact with each other (how the system operates). This preliminary examination provides a basic framework for further studies on the mechanism of such complex sociotechnical systems.

## 2 Project Set-up, Paradigm, and Approach

On February 4, 2018, the Tongji University College of Design and Innovation and the Siping sub-district office (Yangpu District, Shanghai) announced the launch of the "NICE2035 Living Line" project. "NICE 2035" stands for "Neighborhood of Innovation, Creativity, and Entrepreneurship toward 2035," a program put forward by the College of Design and Innovation. It is an umbrella title for a collection of social innovation initiatives grounded in the Siping community—the neighborhood where the College is located. The Living Line project is the first prototype cluster that kicked off.

The Living Line—Lane 1028 of Siping Road—houses a series of research labs and innovation enterprises. Each explores future living with distinct focuses ranging from food and dining, entertainment, new materials applications, mobility, and new ways of working, to co-creation incubation, robotics, and advanced manufacturing. The first group of units that settled on the Living Line include the Tongji-Dadawa Sound*Lab, Tom's BaoBao Food Lab, NoCC Fashion Lab, Neuni Material Lab, Design Harvests Rural Lab, Aroma Art Fragrance Lab, Timemore Coffee Lab, Hiwork Working-Space Lab, Xuberance 3D Printing Lab, Fablab O Maker Workshop, 021-NICE Incubator, NICE Crowd-funding Platform, and DomiBox 24 h Unattended Shop.

The Living Line is a co-creation hub where rich interactions occur between ideas, people, labs, resources, and capital. It intimately connects Tongji to its neighborhood: the wider Siping community. The university brings in its global knowledge community and talents to Siping to establish labs and start-ups that produce prototypes of alternative futures of living; the community accommodates this group and interacts with it on Lane 1028—a small street now simply called "the prototype street" by participants. The prototype street functions as a living lab—an open-innovation ecosystem operating in a real urban setting and providing for the innovation needs of tangible and intangible environments. This small street has become a complex place that integrates product research and development labs, an innovative education unit, prototype stores, co-creation spaces, as well as an incubator into an urban social system. The participants become new community members. The products of the Living Line are a variety of prototypes for future living scenarios. However, these are not the "end-products" by any means. These prototypes are directly connected to venture capital, private equity, and industries. Cultivated within this ecosystem, innovations will have a greater chance of adoption and translation into the real businesses that feed new industries, new models, new economies, and new technologies. In doing so, the initiative will be able to contribute to enhancing the competitiveness of Shanghai regarding service, manufacturing, consumption, and unique culture. Figure 1 summarizes the innovation paradigm of NICE20135 Living Line.

The conventional innovation model is linear. It begins with technological inventions firstly developed by engineering and industrial design, then distributed through commercial marketing, and finally consumed by end users. This is a technology-pushed

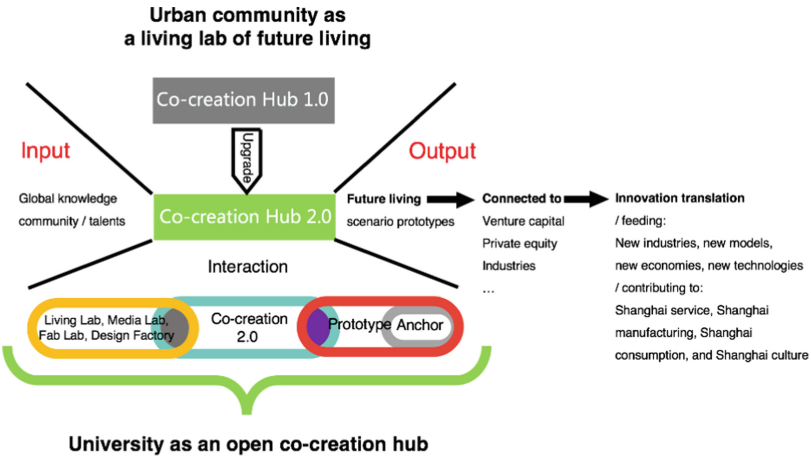


**Fig. 1.** The paradigm of NICE2035 Living Line. Copyright © Yongqi Lou, 2017.

and market-pulled innovation model [11]. The Living Line overturns this model by shifting the role of the urban residential community in the innovation process from the passive consumption end to the active innovation source. In vivid contrast to the conventional model, the initiative adopts the approach of design-driven innovation, which creates new meanings for application of technology and creation of new markets.

From the conventional perspective of urban planning and governance, "residents"—the community's members—are seen as the objects that need to be looked after. The old model is: people create fortunes for society, family, and individual during working hours in their working places; once back in the community, their activities shift to living, leisure, and social communication. We challenge this dichotomy and ask whether the community resident can also play the role of the urban innovator in the place where he/she lives.

Our choice to use a community as the focus for this initiative has several reasons. First, the community is close to all kinds of problems that people encounter in the city and therefore is a natural setting for experimenting solutions. This explains the key idea of developing the community as a living lab for future living. Second, the urban community is close to consumers, and thus is close to potential human needs for alternative futures. Their in-depth understanding of their needs as users will allow inhabitants to creatively invent, choose, or apply technology and translate innovations into appropriate businesses. Third, the urban community has greater diversity regarding its cultures, education levels, professions and disciplines, ages, and social relationships in comparison to general institutions and enterprises. Fourth, the community has a higher tolerance for failure thanks to its informal organization, which is a great advantage of community-supported innovation [12].

## 3 The Case Exploration Framework: A Systems Perspective

As introduced above, the Living Line is a social innovation initiative that cultivates a community-supported ecosystem of open-innovation for future living. By calling it an ecosystem, we emphasize that it is "a complex network or interconnected systems. [13]" Before taking a closer look at this project, it would be useful to consider two fundamental concepts: *system* and *social innovation*.

Meadows [14] began her renowned treatise *Thinking in Systems* with: "A **system** is an interconnected set of elements that is coherently organized in a way that achieves something…. [A] system must consist of three kinds of things: elements, interconnections, and a function or purpose."

This is a powerful starting point [15]. Richard Buchanan called this "a commonplace definition," a definition that rests upon variables—a relationship among "X" in the process of "Y" that achieves "Z." [16] To further grasp what a system is—if it does exist—Buchanan suggests that one must ask him/herself the following questions [16]:

1. What is systematized? (What are the components?)
2. How does the system operate? (What are the interactions among the components?)
3. Why does the system exist? (What are the purposes/goals/values?)

We adopt these three themes as a framework to examine the NICE2035 Living Line project: (1) the purpose of the Living Line; (2) the components (i.e., the contents) of the Living Line system; and (3) the interactions occurring within the system.

Given the complexity of the Living Line system, its contents are highly heterogeneous. Building on Richard McKeon's work, Buchanan [17, 18] identifies four kinds of interactions: "thing-to-thing interaction, person-to-person interaction, person-to-environment interaction, and person-to-idea interaction." Borrowing this schema as a clue to grasping the interacting units of the system, we look into the contents of the Living Line system from four aspects: things (objects), people, environments, and ideas. In other words, one might regard the Living Line system as a system of things or objects, a system of people, a system of environments, or a system of ideas. These are four different areas the system's materials cover. To comprehend the process or mechanism of how the system operates, we must explore the interactions among these contents.

The Living Line's social innovation characteristic echoes nicely with the system framework of purpose, content, and interaction. The common characteristic of social innovation initiatives, identified by Ezio Manzini, is that "they emerge from the creative recombination of existing assets (from social capital to historical heritage, from traditional craftsmanship to accessible advanced technology), which aim to achieve socially recognized goals in a new way. [19]" In essence, social innovation creatively integrates existing resources in an innovative way to achieve social purposes. Previously dormant and irrelevant things now become valuable resources and constitute the contents of the social innovation system or network. The purpose of every social innovation system has a salient emphasis on the well being of society. And, among the interactions in such systems, people play a key role. We will bear these considerations in mind when studying the case.

## 4 Designing for the Ecosystem of the NICE2035 Living Line

### 4.1 Revitalizing the Community by Innovating Future Living

The purpose of the NICE2035 Living Line project is to revitalize the community in ways that create a new economy; the project's focus on innovating on future ways of life paves the way toward this goal. We will analyze the purpose on two levels: the city of Shanghai, and the Siping Community.

Like cities all over the world that are confronted with new development challenges, Shanghai is now under great pressure caused by industrial transformation, an aging population, and environmental concerns, to name but a few issues. Inspired by the national policy for mass innovation and entrepreneurship, Chinese cities in general are paying increasing attention to their innovation capacity to compete against each other for social and economic advantage. Shanghai is trying to build up its unique identity to advance the city's competitiveness in a race that involves big cities in the Yangtze River Delta and the Pearl River Delta, including Shenzhen. Various nationwide innovative city ranking surveys show that Shanghai and Shenzhen are battling for second place while Beijing sits squarely at the top [20, 21]. While Shenzhen is rising rapidly thanks to its energetic high-tech enterprise environment, Shanghai is a city known for its great tolerance, diversity, individuality, and entrepreneurship. In addition, Shanghai has a unique cultural heritage—its people's profound appreciation for exquisite quality of life. Therefore, instead of competing against other cities on the level of high-tech or hardware innovation, the city of Shanghai's opportunity lies in innovation on future ways of living by exploring human needs. The path for Shanghai to achieve leadership in innovation should be grounded on insights into high-quality future living and the ability to choose, invent, apply, and distribute technologies that support such living.

In the recently released *Shanghai Master Plan 2017–2035* (also known as "Shanghai 2035") [22], the municipal government recognized that communities (urban residential areas) should be playing a more important role in developing Shanghai into a more attractive, humane city. Although living and leisure are still regarded as the main functions of urban communities, there is a growing awareness that communities may have the potential to create an environment for innovation and entrepreneurship. However, the focus is still limited to individual personal development, rather than the possibility that the community can be one of the major arenas for innovation and entrepreneurship. To reboot community vitality, the government is calling on young people to go to these communities. Herein lies a paradox: if the community fails to offer attractive contents to engage young people in meaningful activities, how can the community develop into a place aimed at young people?

Yangpu district was the locality for Shanghai's heavy industry for over a century. To shift from "industry Yangpu" to "knowledge Yangpu," the district government began to work with Tongji University to develop the "knowledge economy circle around Tongji" a decade ago. Siping community is a sub-district of 2.75 square kilometers, with a population of over 100,000, sitting at the core of the circle. It is a combination of old residential quarters and excellent educational resources—including Tongji University—embedded within. However, the Siping community tends to be

monotonic in its function, environment, business, and demographic structure. It consists of the earliest and largest workers' residential quarters in China built in the 1950s; over two-thirds of its residential quarters were built in the 1970–'80 s. Portions of this community are suffering from long-term social and economic stagnation and the problems associated with an aging population. Many residential areas look worn out due to the poor building, facilities, and public space quality. Few shops and business in the streets and lanes of this community address the lifestyles attractive to young people, and even fewer are culturally relevant—despite being next to the university. Among numerous faceless, cheap restaurants and hardware shops, some officially prohibited business also exists. Lane 1028 of Siping Road is a typical small street within this community. The lane is about 200 m long and 7 m wide, once occupied by hardware stores and building materials shops, remotely connected to the everyday life of residents living in that area.

The justification for the NICE2035 Living Line was obvious: the city of Shanghai provides an ideal test bed for innovation of future living, and the Siping community is eager to improve quality of life across all aspects and upgrade its economic impact. Yongqi Lou, the Living Line's initiator, sees this as a great opportunity for the university to contribute its knowledge spillover towards enabling the community to generate the new economy. He phrased the purpose of the Living Line in this way: "In the global knowledge era, the knowledge community is becoming the subject of innovation. We must unleash the university's resources and creativity and establish a suitable platform for more entrepreneurs to create new future ways of living. By doing so, the consumption end will be the driver for industrial transformation [23]".

### 4.2 Things, People, Environments, and Ideas

The conditions at both the city and community levels require the Living Line project to consider unique contents that can be produced by this particular community. What are the resources? What could be the contents? Who will be the players? What are the ideas or values that drive the contents? We will approach the contents that the Living Line system integrates from four aspects.

**Things**

When viewed from the perspective of things and physical objects, the most significant elements in the Living Line system are labs, an incubator, start-ups, and other stakeholder entities. Among the labs installed in the Living Line, there are several anchor projects that were chosen for their potential to set the tone for the rest of the prototype street. For example, Tongji-Dadawa Sound*Lab initiated by Musician Zheqin Zhu in collaboration with Yongqi Lou is a sound-based lab that explores the possibilities for integrating music, algorithms, media design, interaction design, and AI and data design into social and public applications. Artists work closely with leading researchers and designers worldwide to redefine music as the impetus to stimulate cross-boundary, cross-disciplinary, and cross-cultural frontier explorations. Tom's BaoBao Food Lab is another example. The Founding CEO of Baobao, Qihua Tong, is passionate for the art of making the highest quality steamed buns (also called baozi in Chinese)—a delicious street food that has over one thousand years of history in China—with the finest local

ingredients [24]. The first overseas branch of Baobao was opened in Boston in 2016. The food lab on Lane 1028 nonetheless takes a more future-oriented turn. It aims to redefine the idea of dining and related experience through combining Chinese traditional food culture with product, service, process, and environmental design to forge a well-respected Asian food brand that faces toward the future rather than the past. Around such anchor projects, more labs have converged. The Living Line is turning into an environment where researchers, designers, and scientists explore how we will eat, live, dress, work, move, and consume entertainment, and how technologies such as AI, big data, and robotics can become enablers. The Living Line community is interdisciplinary by nature.

**People**

The Living Line initiative is, for all intents and purposes, a system of people. It is a network between the grassroots leader Yongqi Lou, the participating entrepreneurs, venture capitalists, government officers, old and new residents in the Siping community, and the networks that participants bring into this initiative—for example, talent clustered around the College of Design and Innovation. Among people who have landed on the Living Line, the heads of anchor projects share some common characteristics. First, they appreciate the vision of NICE 2035 and are willing to work together toward the same goal. Second, they have had successful entrepreneurship experiences before and are now open to taking risks in a new entrepreneurship experience with a goal that they value. They can afford to fail in this experiment. Third, they are motivated because their labs on the Living Line have the potential to reshape their existing business and bring them to a new level. Therefore, instead of waiting for investments, they invest in the labs with their own money, their own ideas and core technology, and their own teams, paying market rates to rent shops facing the street.

**Environments**

As an ecosystem, the environments that constitute the Living Line initiative deserve a closer look. There are two kinds of environments: tangible environments such as the spaces on Lane 1028 and intangible environments that provide resources to feed the project, such as the group of participating organizations and networks. Preparing the project took several years, including space renovation, interaction augmentation, talent convergence, and ecosystem improvement. During the entire process, Tongji's College of Design and Innovation promoted and helped develop each participating unit. Whenever a new lab was inaugurated, the bond between the College and the community was strengthened and consolidated further. These projects together formed a small network of interconnected activities, adding to the overall environment. In addition to these two major organizations, the cluster of labs, start-ups, and the incubator together form a small intimate environment for individual units on the Living Line. The interaction between the labs allows ideas conceived in one lab to be advanced by integrating input from other labs. Each lab contributes to the innovative environment and each benefits from it.

**Ideas**

The Living Line system consists of rich and diverse ideas and values, too. Ideas produced by labs as the first fruits of the Living Line are the most understandable

components in this system. However, this is also a system made up of stakeholders' visions, values, and interests. To address the Living Line system, we need to understand its inherent diversity and heterogeneity on that level. To sustain itself, the system must create the conditions for harmonious and orderly interactions among the ideas [16]. The most important thing is not seeking to avoid conflict—conflict is inevitable for complex systems such as the Living Line. Instead, creating mutually beneficial conditions serves to unify the conflicting ideas into a larger whole—the system continues to work without falling apart.

### 4.3 Interconnection and Interaction of Things, People, Environments, and Ideas

Viewing the NICE2035 Living Line system based on these four kinds of contents—things, people, environments, and ideas—clarifies the key components of this system and their distinct focuses. However, the system is more than the sum of its components, because it is the process of mutual influence, reciprocal action, and dynamic exchange between the components that allows the system to operate [16]. Examining the interconnections and interactions reveals the mechanism of the system. Although it is not the purpose of this paper to comprehensively study the mechanism of the Living Line system, we have seen many interesting patterns emerge from the project that intensively reflect the dynamic interactions and interconnections between the system components within and across various contents. They overturn the old models in the community building and design industries and point to the underlying mechanism of the complex sociotechnical system that is the Living Line. In the following section, we will introduce some of these.

**A New Business Model**

The typical business model of traditional design is that the designer is paid for the service he/she provides: the designer offers a plan for the final design product and in turn is paid by the client at a rate according to the professional standard. For example, the payment for an architecture design, interior design, landscape design, etc. is normally 1–10% of the construction cost. In this model, the designer is engaged in one tiny portion of the entire industrial chain. However, the prototype start-ups on the Living Line take a distinct business model. The designer is more than a service provider: he/she is the (co-)founder of a new enterprise, one who invests in the enterprise and participates in implementing its ideas. In this case, the designer's reward is calculated based on the enterprise's value assessment or market value. Design-driven entrepreneurship is an opportunity for design to create a new economy of unprecedented scale.

The business model is an example of interconnections between the system components in the "things" aspect. The economic factor integrates start-ups, capital, industry, and the innovation chain as a whole.

**The Cluster Effect**

A clustering phenomenon occurred during the preparation and launch phases. The NICE2035 Living Line attracted about one hundred participants acting as partners (lab/start-up/incubator leaders), coordinators, sponsors, or volunteers. Although their

domains are diverse, they are working on like-minded enterprise entities and share a common vision for design-driven innovation in the next economy. By clustering together in the community, they make meaningful connections with capital, new resources, and other companies. Such connections may be translated into the real business and the business may lead to the realization of products, revenue growth, and even scaling-up [25]. The cluster effect is obvious when the prototype street was coming into being, when the first group of entities joined in and the spaces were made available. How did such an effect happen when there was nothing but a vision and ideas?

We observed two types of connections that led to the cluster effect at different stages: personal relationships among individuals and social ties between person and network. The former played a more crucial role when the initiator Yongqi Lou first activated and promoted the project; the latter was more salient when the project was becoming visible.

As Manzini observes [26], grassroots initiative leaders play a crucial role in a social innovation on both a personal level and an institutional level. First, the activation and promotion of the initiative "cannot be separated from the personalities, energy, and charisma of their promoters." Second, a social innovation relies on the initiator's "capacity to create around [himself/herself] a group of capable enthusiasts, to create an organization." The developing trajectory of the Living Line supports such an observation. The first group of Living Line partners joined because they had either long-term or unforgettable experiences of working with Lou. Lou personally worked together with invited partners on the anchor projects from the big picture to details such as the content for the opening show. His partners were impressed by the vision and approach proposed by Lou and excited about the prospect of the community. The preliminary cluster took shape mainly based on personal relationships with a leader they trust. Having created around him "a group of capable enthusiasts," Lou and the key partners began to establish an internal executive committee that will make decisions for key issues of managing and promoting the Living Line. In this phase, person-to-person interaction is the dominant kind of interaction.

Once the anchor project participants were on board, they, along with their networks, formed a magnetic field that kept drawing new partners closer. Here, social ties now act more significantly in expanding the cluster. When new partners contact, communicate with, and become an ally of a network, they are interacting with an environment. After becoming members of this community, these partners and their resources become part of the environment for other partners and newcomers. In this way, the cluster grows.

The cluster effect also occurs in the interaction between ideas, people, and the environment. For example, when the Sound Lab Director Zheqin Zhu proudly presented the first artwork "Sound Glaze" at the Living Line launch ceremony, she could barely contain her delight, "just a couple of days after I posted this work on my social networks, guess what: I received four major invitations asking for collaboration. People from genetic engineering asked if I could turn genetic information into sounds. And there are invitations from a real estate business, a train transportation firm, and a huge computer company." Director of the Timemore Coffee Lab shared a similar experience, saying that it was during the process of getting to know other Living Line partners that

he met a traditional arts and crafts master and was inspired to collaborate on a new series of coffee products. The idea-to-idea interaction and person-to-idea interactions enrich the environment of the Living Line and create more meaningful encounters among people and ideas.

The cluster effect helps to shape a mutually beneficial environment. The more allies that join, the more resources and opportunities each partner may enjoy.

**Community by Choice**

Unlike the conventional residential community configurations, which were not chosen by their own members, the Living Line is a community by choice. The previous principle of building a community is content follows container: the physical space and environment (the container) of a community is pre-determined by the real estate developer, and then people move there and have all kinds of activities (the content)—in doing so, a community comes into being. A typical problem that troubles the modern city is that the urban community lacks meaningful encounters between residents and therefore becomes stagnant. This is not surprising, considering that people often become members of a community mainly thanks to their economic status.

The community that the Living Line aims to foster is a community by choice, whose principle is container follows content. The initiator planned the "products" to be realized and built up the alliances between partners, capital, and local government first, and then he managed to locate a possible place to host the whole project. This pattern will also apply when the Living Line is ready to be scaled up. When the Lane becomes saturated, and the business of the labs and start-ups continues to expand, the future living prototypes will spill over and need a new container (space) to accommodate them. Then, the core members of the Living Line will reach out to capital and government to secure to a new location: it could be a once prosperous, now abandoned department store building, or a factory, or even another street. In addition to entrepreneurship activity, this pattern also applies to housing projects. If there is a group of people with shared needs for living, leisure, and work, and they wish to live in the same area, the NICE2035 program can help them to get connected with designers, developers, and other stakeholders to build their homes based on their choice. Healthcare and care service for the elderly provide vast potential scenarios in this case.

The community by choice embodies a significant strand of interactions between people and their environment. People's activities lead to the new environment, and the new environment facilitates and nurtures the desired activities.

**Technology Tie-ins**

Although a community-in-place sits at the heart of the Living Line system, people, tangible and intangible resources, and ideas are not confined to the physical spaces on Lane 1028. People move around with other obligations running in parallel to the Living Line enterprise; their networks are intangible and are diffused around the city or even the world. More importantly, the open innovation happening in the Living Line welcomes talents and resources from everywhere. Outside Lane 1028, the Living Line project is also a diffused innovation organization—small and connected. Technology, especially digital media, has promising applications to integrate different components of the Living Line system, and stimulate and maintain connections required for the system to sustain and grow.

The NICE2035 program is developing a location-based crowd-funding platform that aims to weave people, ideas, resources (both tangible and intangible), and physical places together. This platform will support any Living Line member—be it a unit or an individual—to start a co-creation, crowd-funding, or crowd-sourcing project. Once the project is completed, co-creators or co-funders will be able to redeem their points through either the online platform or offline encounters. This digital platform will provide an online-offline holistic service to start-ups and innovations.

Digital media is characterized by its openness, effectiveness, and flexibility, and it is easier to make information related to needs and solutions more accessible to a broader body of community members. Ideas encounter the available resources that otherwise may not be known. The peer-to-peer connection offered by the platform brings members closer to each other and creates a virtual environment to spark off new activities. Technology may serve as a special tie that triggers and sustains interactions across all kinds of components in the Living Line system.

## 5 Concluding Remarks

The Living Line project is the first prototype cluster of the greater NICE2035 program. It embodies the key feature of the program and has demonstrated a promising approach to stimulating creativity and innovation in the city. The NICE2035 Living Line project is a bottom-up initiative that intentionally creates the conditions for creative forces in university and community to meet, collide, fuse, and collaborate. It converts an old urban residential community into a living lab of possible future ways of living. All experiments are carried out based on the hypothesis that an urban community can move beyond its role at the consumption end (back end) and become a source (front end) of the innovation chain and industrial chain; the community members, instead of merely being end-product consumers, are also creators.

While cities are facing the challenges presented by industrial transformation and communities lack vitality due to the homogeneity of social activities, universities contain extra creativity and innovation capacity that has yet to be fully utilized. Unleashing the university's overflowing creativity into the community reenergizes the community and triggers future living oriented innovations. To allow such innovations to further develop into businesses and contribute to the new economy, the Living Line cultivates a community-supported ecosystem for entrepreneurship. In the process, the university college activated various dormant resources and creatively integrated them into an ecosystem.

The practice of design-driven, community-supported social innovation is emerging. The body of literature that studies the mechanism and process of such practices remains scarce. We report and analyze this case from a systems perspective, approaching it from its purpose and function (why the system exists), its components (what is systematized), and the process these components interact with each other (how the system operates). When analyzing the components (the contents) of the Living Line system, four systems perspectives emerge: a system of things, a system of people, a system of environments, and a system of ideas. A sociotechnical system as complex as the Living Line comprises all these areas. These four areas serve as four places to discuss distinct

elements of the system most relevant to that angle. To grasp the system as a unified whole, not merely a sum of its contents, we use several themes to illustrate important segments of "the process of mutual influence, reciprocal action, and dynamic exchange between the components." The interconnections and interactions in the business model, cluster effect, forming a community by choice, and technology tie are part of the mechanism of how the Living Line system operates. We hope that this case study will offer some insights into a possible perspective and framework for further, more comprehensive study of the mechanism of such complex sociotechnical systems.

The Living Line project is still in its infancy and has a long way to go. It will continue to produce materials for people to further study the key issues in a grassroots design-driven social innovation initiative. For example, which organizational structure can most effectively steward the operation of the initiative? What impact will interactions between old and new community members bring to the initiative? Will the ecosystem change as different participating units develop at different speeds? Each milestone of the Living Line will open a new window enabling us to further see how the process and mechanism adapts, changes, and evolves.

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