



MIT CHINA FUTURE CITY LAB

ANNUAL REPORT

2018





MIT CFC

CHINA FUTURE CITY LAB

Research, Impact and Solve China's Urbanization Challenges

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EXECUTIVE SUMMARY

China's extraordinary economic boom has gone hand-in-hand with fast urbanization. In the past 30 years, China has urbanized 350 million people, and will continue to urbanize another 300 million in the next 30 years. This rapid pace of urbanization requires technological, policy, as well as social innovations to ensure long-term sustainability.

In November 2017, MIT launched a unique new urban research and innovation program: China Future City Lab (CFC Lab). CFC Lab looks to advance city life in China through an ambitious range of research and entrepreneurship education projects. CFC Lab is housed in the Department of Urban Studies of MIT's School of Architecture and Planning, and is affiliated with the Department's Center for Real Estate. It has also established strong collaborations with the Media Lab, Senseable City Lab, and Sloan School of Management at MIT. The China Future City Lab consists of three foundational pillars. First, the Lab supports a wide range of basic research projects, investigating aspects of urban and environmental economics and policy, with a special focus on China and also international comparative studies. Second, the Lab houses a program known as the MIT-Tsinghua Future City Innovation Connector (FCIC), which supports startup teams applying ideas to China's urban challenges. The FCIC also aims to identify innovative concepts and technologies that could be implemented in China. As a third element of its activities, the China Future City Lab is engaging with Chinese cities that will serve as "living labs" or testing sites where MIT researchers will have a unique opportunity to test and deploy their urban-focused innovations.

We believe complex and multi-disciplinary research and innovation require long-term commitment. CFC Lab initiated a Consortium membership to enable closer knowledge exchange and cooperation between the academia and practitioners. CFC Lab is also establishing long term collaboration with leading Chinese research institutions like Tsinghua University and the Chinese Academy of Science, to advance new knowledge of Chinese wisdom on sustainable urban development. It will have a far-reaching effect on global urbanization.

The CFC Lab has three core research themes:

1. New city development: mechanisms, efficiency, and sustainability
2. Urban networks: vibrancy and innovation
3. Green cities: urban growth and the environment

The core research advances new knowledge of Chinese urbanization and identifies the demand for innovation. It explores how rapid and profound changes are driven by technological advancements such as pervasive sensing, the growth and availability of continuous data streams, advanced analytics, social networks, and distributed intelligence. The Future City Innovation Connector (FCIC), jointly launched by CFC Lab and Tsinghua University, embraces these exciting new opportunities. FCIC supports innovative projects addressing the rapid growth of Chinese cities. It draws upon the work of MIT researchers and labs to identify innovative concepts and technologies. FCIC is the first program of its kind that explicitly aims to apply the newest developments in urban research and technology to the immense urbanization occurring in China, which should be powered by technological innovation and new business ventures.

In 2019 the Lab will continue to enrich its research program and develop deeper engagement with Consortium members to build FCIC's ecosystem of city innovation work. The Lab will also establish partnerships with Chinese municipal governments to implement city living lab projects.

We truly appreciate our partners, advisory board members, and especially the Consortium members for their support and engagement. CFC Lab's leadership strongly believes its work will promote an innovative and energetic vision for the research and practice of sustainable urban development, which will greatly influence the urbanization in China for years to come.

Oct 20, 2018
Cambridge, MIT

Siqi Zheng, Faculty Director
Zhengzhen Tan, Executive Director

OUR VISION

Connect MIT's innovation resources with Chinese urbanization challenges to become a leader in future city research and innovation.

OUR GOAL



Research



FCIC



Course



China Engagement

Year 1

2018

- Establish Consortium research framework
- Establish CFC Lab's Chinese city database
- Develop six research subjects under three topics, publish 5+ papers

- Help 16 startups to launch pilots in 5+ cities in China
- Build FCIC's platform support for tech startups and industry partners, establish cooperation with Tsinghua University, the Chinese Academy of Sciences, the Leping Social Entrepreneur Foundation, and others.

- China Urban Research Seminar
- Digital City Workshop

- Build urban innovation connector ecosystem with Chinese urban development industry
- Organize real estate event, Forum on Future Chinese Cities (MIT)
- Organize the international event, MIT China New City Forum (Beijing, China)

Year 2

2019

- Advance multiple research subjects under three topics, publish 8+ papers
- Publish the whitepaper "New Cities in China: Efficiency, Mechanisms and Sustainability"

- Help 30+ startups to launch pilots in 8+ cities in China
- Launch successful ventures in China
- Deepen FCIC's earlier work connecting technology startups and industry giants, establish cooperative relationship with more top Chinese institutions

- China Urban Research Seminar
- Digital City Workshop
- China Connector: Urbanization, Technology and the Innovation Market
- Economic Analysis of Urban Development and the Environment

- Improve urban innovation ecosystem and establish partnership with Chinese municipal government
- Organize real estate event, Forum on Future Chinese Cities (MIT)
- Host the 2019 Annual Meeting for Asian Real Estate Society (Shenzhen, China)

Year 3

2020

- Advance multiple research subjects under three topics, publish 10+ papers
- Publish whitepaper on "Urban Vibrancy and Innovation in Chinese Cities"

- Help 30+ startups to launch pilots in 8+ cities
- Develop a leading, comprehensive platform for building urban innovation ecosystems

- China Urban Research Seminar
- Digital City Workshop
- China Connector: Urbanization, Technology and the Innovation Market
- Economic Analysis of Urban Development and the Environment
- Green Urbanization

- Improve urban innovation ecosystem, establish partnership with Chinese municipal government, and cooperate with more Chinese colleges to further scale up FCIC's model in China.
- Organize real estate event, Forum on Future Chinese Cities (MIT)
- Host the 2020 Annual Meeting of The Chinese Economists Society (Boston, USA)

ADVISORY BOARD



Richard Lester
Co-Chair
Associated Provost MIT



Bin Yang
Co-Chair
Provost and Vice President, Tsinghua University



Changfeng Ling
Vice Chair
China CEO of HongKong Land



Gang Chen
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Member of National Academy of Engineering



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Joe Kwok
Chief Executive of China Property, Nan Fung International Holdings Ltd.



Hashim Sarkis
Lianne Winter Professor of Architecture and Planning, Dean of MIT School Architecture and Planning



Lanzhen Li
President of Tianyi Group



Bin Liu
Global Partner,
Co-President of Fosun Property



Yanwei Ma
President of Chengyu Group



Sandy Pentland
Professor of Media Arts and Sciences
Media Lab Entrepreneurship Program
Director



Jian Zhang
CEO, Co-founder, Nashwork



Michelle Xiao
General Manager of Office Marketing Department, South China Region, China Resource Land



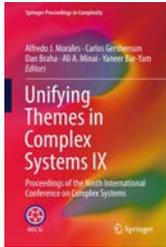
Alan Yan
Chairman of Zall Group Ltd.



Marjorie Yang
Chairman of Esquel Group

1 RESEARCH

2017-2018 Publication



Proceedings of International Conference in Complex Systems (ICCS) 2018

“The Principle of Relatedness”

Cesar A. Hidalgo, Pierre-Alexandre Balland, Ron Boschma, Mercedes Delgado, Maryann Feldman, Koen Frenken, Edward Glaeser, Canfei He, Dieter F. Kogler, Andrea Morrison, Frank Neffke, David Rigby, Scott Stern, Siqi Zheng, and Shengjun Zhu.



Habitat International 2018

“Small property rights housing in Chinese cities: Its role and the uniqueness of dwellers”

Haijing Liu, Yichun Dai, Siqi Zheng.



Transportation Research Part D: Transport and Environment

“The effect of a new subway line on local air quality: A case study in Changsha”

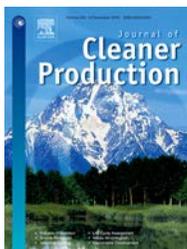
Siqi Zheng, Xiaonan Zhang, Weizeng Sun and Jianghao Wang

“Does Subway Proximity Discourage Automobility? Evidence from Beijing”

Yingjie Zhang, Siqi Zheng, Cong Sun and Rui Wang.

“Congestion and Pollution Consequences of Driving-to-School Trips: A Case Study in Beijing”

Ming Lu, Cong Sun and Siqi Zheng.



Journal of Cleaner Production 2018

“Environmental ideology and household

“Energy Conservation in Beijing”

Weizeng Sun, Xiaonan Zhang, Hao Li, Jing Wu and Siqi Zheng



Journal of Real Estate Finance and Economics 2018

“House Age, Price and Rent: Implications from Land-Structure Decomposition”

Yangfei Xu, Qinghua Zhang, Siqi Zheng and Guozhong Zhu



Journal of Urban Economics 2017

“The Birth of Edge Cities in China: Measuring the Effects of Industrial Parks Policy”

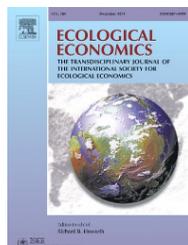
Siqi Zheng, Weizeng Sun, Jianfeng Wu and Matthew E. Kahn.



Journal of Economic Perspective 2017

“A New Era of Pollution Progress in Urban China?”

Siqi Zheng and Matthew E. Kahn



Ecological Economics 2017

“Self-Protection Investment Exacerbates Air Pollution Exposure Inequality in Urban China”

Matthew E. Kahn, Cong Sun and Siqi Zheng



Journal of Regional Science 2017

“Local Public Service Provision and Spatial Inequality in Chinese Cities: The Role of Residential Income Sorting and Land-Use Conditions”

Weizeng Sun, Yuming Fu and Siqi Zheng

Place-based investment and urban vibrancy

The study focuses on place-based policies and governmental initiatives to promote new city development, and its mechanisms, efficiency, and sustainability. This study summarizes new city development in China and other countries, and discusses the general patterns and mechanisms of the growth of new cities. The research team is carrying out investigations into new city cases around the globe. The research also provides a theoretical basis for future new city development practices. It builds upon theories of placed-based policy, and focuses on the selection of new city location and industry type. It also examines regional and urban transport infrastructure to assess the interaction between determinants of local urban vibrancy. The research findings have been published in renowned peer-reviewed journals: the Journal of Urban Economics, the Journal of Regional Science, and others. The research has also been presented at the National Bureau of Economic Research (NBER) Summer Institute and the Asian Real Estate Society (AsRES) Annual Conference. Some findings have been included in a 2018 energy study on urban development in China, conducted jointly by the World Bank and the Development Research Center of the State Council.

New city location selection model

The project focuses on exploring the general patterns and localization (heterogeneity) of new city development around the globe. The study also investigates the economic mechanisms of location choice and includes timing analyses of Chinese new city development based on location choice, development timing, and coordination. The theoretical model used in these analyses was developed by the CFC Lab. Based on the theoretical model and the new city construction database, the study uses machine learning and artificial intelligence to identify the factors that affect the location and construction timing of new cities.

New city industry choice model

The project uses a multidisciplinary approach of regional economics, economic geography, statistics, complex networks, big data analysis, artificial intelligence, and machine learning to construct inter-industry relatedness networks in China (Fig. 1). This study uses detailed information on approximately 2 million large-scale industrial companies from the past 15 years. The study also considers industry-specific characteristics and external environmental factors such as subsidies and other government policies to identify the determinants of industry development. The results demonstrate that the government's selection of a priority industry is a function of both economic and political factors.

Urban vibrancy dynamics model

The research team uses data from mobile terminals, social media, street maps, urban transportation, nighttime lighting, remote sensing, and environmental quality measurements to build urban vibrancy metrics at different scales. The study examines the exogenous and endogenous factors influencing urban vitality and investigates the relationship between urban vitality and real estate value fluctuations. The research provides theoretical guidance for real estate developers involved in new city construction and development. The research team built the urban social network in China, and has developed metrics of urban vibrancy.

Inadequate urban vitality has become a serious constraint to the sustainable development of these new cities and their corresponding main cities. Appropriate new city development site selection and industrial choice are important prerequisites for ensuring the vitality of the new city. The CFC Lab is striving to extend its new city research theoretical models and analysis methods to large-scale urban renewal projects. Using the new city development location selection model, the industry selection model, and the urban vibrancy dynamics model, the study examines various factors affecting the regional vibrancy and the dynamic interactions between them.

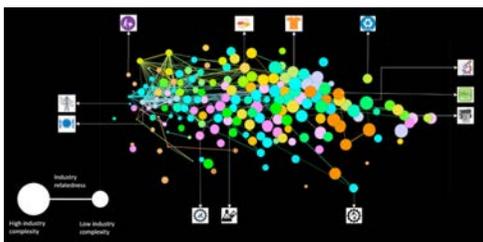
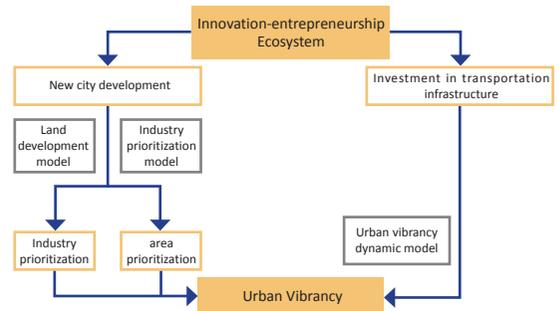


Fig. 1 Industrial relatedness (density)

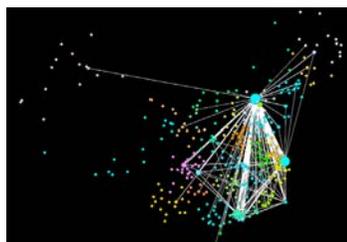


Fig. 2 China Urban Social Network



Planned new city (Zhngdong New District)

Economic geography of innovation and entrepreneurship

The CFC Lab Research team constructs quantitative analysis model of innovation and entrepreneurship vibrancy based on the latest economic geography research on innovation and entrepreneurship. The model can effectively predict the spatiotemporal evolution of innovative and entrepreneurial activities. Factors including policy guidance, industrial clusters, human capital, venture capital, geographic location, urban quality of life, consumption vitality, accessibility via transportation networks, and affordable housing have substantial impact on the spatial distribution of innovation-driven entrepreneurial activities, and clusters. The study provides a theoretical basis for the location selection for start-ups, innovation spaces, VC investment decisions, and urban innovation-entrepreneurship vibrancy regeneration strategies. Research findings on this topic have been featured at EmTech Hong Kong, the MIT World Real Estate Forum, and the North American Regional Economics Annual Meeting.

The Urban Innovation-entrepreneurship Ecosystem

The Lab's database covers about 400,000 start-ups across different sectors, 20,000 investment companies and 6,000 innovation spaces in 360 prefecture-level and county-level cities in China. It integrates analysis of policy guidance, industrial clustering, human capital, venture capital, geographic location, urban quality of life, consumer demand, transportation network accessibility, and housing affordability in the innovation-entrepreneurship ecosystem. The research team estimates the parameters in the model and continuously calibrates the model to make it reflect the rapid changes in innovative and entrepreneurial activities as well as the evolution of business clusters. Based on the innovation-entrepreneurship vibrancy model, the research team measures innovation-entrepreneurship vibrancy at the level of cities and urban agglomerations and studies the role of human capital spillover effects and market integration in a system of cities. The results provide theoretical insights into strategic plans and industry development.

This research explores the formation of effective regional innovation and entrepreneurship ecosystems, in order to stimulate the vibrancy of regional innovation-entrepreneurship.



Startup and innovation space location model

The research team analyzes the location choices of startups and innovation spaces for various components of the innovation-entrepreneurship ecosystem. Based on the estimated location choice preference, the team constructs innovation-entrepreneurship indices across and within cities, which provide guidance for site selection by startups and innovation spaces, VC investment decisions, and cost-benefit analysis of real estate developers (Figure 6; taking Beijing as an example). Based on the startup and innovation space location model, the research team has explored the supply of low-cost housing and consumer vibrancy in the innovation-entrepreneurial ecosystem. By expanding and improving the metrics' spatial resolution, the team has managed to increase the predictive power of the machine learning model to forecast the innovation-entrepreneurship dynamics and effectively identify spatiotemporal patterns.

Urban networks and innovation-entrepreneurship activities

The project focuses on the impact that urban networks have on the capacity and value of urban innovation and entrepreneurship. The research team employs rigorous econometric models to conduct industry heterogeneity analyses across sectors and development stages to examine the driving factors of key players' decision-making in the innovation-entrepreneurship ecosystem. The study uses natural language processing of policy document texts to effectively quantify innovation-entrepreneurship policies. The estimation and analysis results of the model provide important theoretical support for the effective integration of beneficial factors and policies, thus further promoting local innovation-entrepreneurship growth.

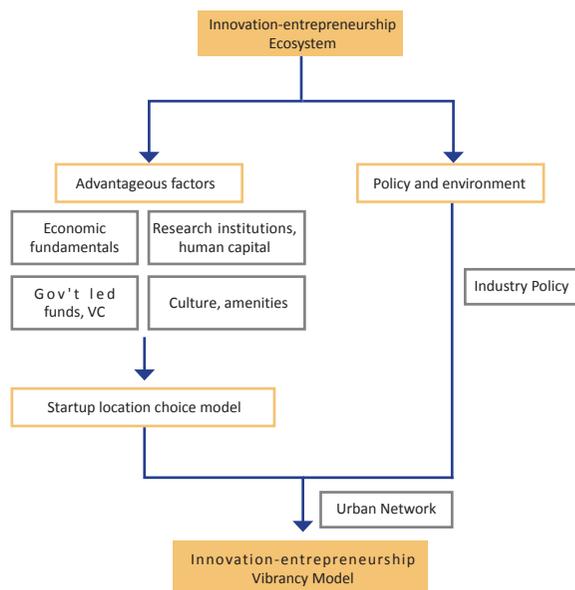


Fig. 3 Economic Geographies of Entrepreneurship and Innovation

Urban growth and the environment

After more than 30 years of rapid industrial growth, China is undergoing massive green urbanization. Under the framework of "supply and demand with government intervention", the CFC Lab research team studies the microeconomic mechanisms to understand the relationship between urban economic development and environmental pollution. The study discusses the motives and behaviors of players (including enterprises, consumers, and government) and interprets the green city's rise and transformation. Professor Siqi Zheng and Professor Matthew Kahn's book "Blue Skies over Beijing: Economic Growth and the Environment in China", published by Princeton University Press (Chinese version 《中国绿色城市的崛起：经济增长与环境如何共赢》), has gained worldwide attention in academia and among policymakers. Professor Zheng, as the principal investigator of the project "China's Green Urbanization" at the China Council for International Cooperation on Environment and Development, has been published extensively in prestigious international journals such as the Journal of Economic Perspective, Ecological Economics, and Transportation Research Part D. She delivered keynote speeches on this topic at the Heartland Environmental and Resource Economics Annual Meeting and the American Economic Association Annual Meeting. In 2018, Professor Zheng's paper was awarded "best paper" at the China City 100 Forum.

Microeconomic level

Most of the empirical research of the CFC Lab team uses the revealed preferences of consumers to identify Chinese urban residents' desires and needs for green development. The Lab's research shows that urban residents are accepting of higher living expenses for cities or regions with relatively better environments, and are willing to pay higher prices for green buildings. The results show that air quality has an important impact on urban housing prices, which reflects a public need for environmental quality. Local housing prices rise by 0.76% for every 10% reduction in air pollution. This study, from both within-city and cross-city perspectives, demonstrates that environmental pollution has a significant effect on housing prices. The CFC Lab team is constructing a structural vector autoregressive model to further study the dynamic impact of mood and environmental pollution on the housing market.

Government level

The Lab's empirical research shows that the environmental quality of cities has an important impact on the promotion of government officials. The incentive mechanism of local governments comes from two levels, one is the central government and the other is the urban residents. Empirical research at the CFC Lab shows that in recent years, the career advancement paths of local governments have shifted from a GDP-oriented one to a more comprehensive assessment system, in which urban environmental quality is given a much larger weight. The social costs brought about by environmental pollution, such as the depreciation of land prices, also put pressure on the government from the economic side. On the other hand, with the increase in income levels and living standards, urban residents' needs for environmental quality are gradually increasing. In the meanwhile, local governments are in a critical period of economic transformation and industrial development. Attracting talents has become a top priority. Among them, environmental quality, public services, and other public resources are playing important roles in attracting high-tech talents. From this perspective, urban residents' desire for the blue sky has also become the driving force of governmental reforms in all dimensions. In this two-way incentive mechanism, local governments have increased their efforts in environmental governance, which has steadily improved the environmental quality of Chinese cities (Figure 8).

From the experience of developed countries, government regulation and investment guidance play decisive roles in the governance of environmental issues. As the government and people pay more attention to environmental issues, a China's environmental status moving in a positive direction? The CFC Lab team uses the environmental Kuznets curve (Figure 9) as the theoretical framework to search for an answer to this question. The environmental Kuznets curve considers that there is an inverted U-shaped relationship between economic development and the environment. In the initial stage of development, economic growth is accompanied by environmental degradation, but when the economy grows to a certain stage, the environmental quality gradually rises as the income level increases. For Chinese cities, this turning point occurred at a per capita GDP of around \$13,000. The CFC team estimates the environmental Kuznets curve for 85 cities in China and conclude that China's environmental conditions are gradually improving.

For example, By 2012, about 33 cities across the country have reached this turning point. Our empirical research supports the use of the environmental Kuznets curve to study the relationship between economic development and the environment in Chinese cities. At the same time, the data from the National Environmental Protection Agency also show that air pollution problems in many coastal cities have gradually eased in recent years. Urban residents' demand for risk reduction, health, and quality of life is also rising (Figure 10).

Green City research frame

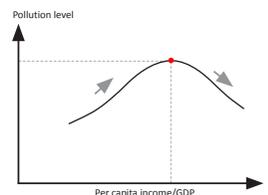
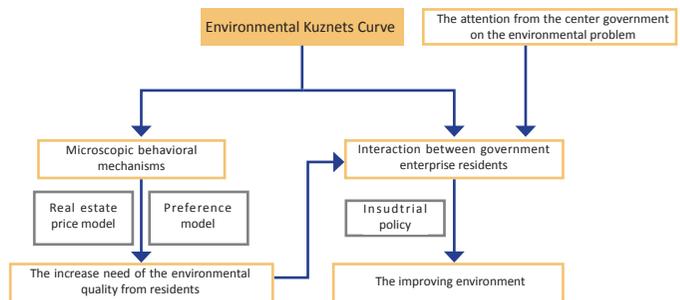


Fig. 4 Environmental Kuznets

Professor Siqi Zheng and Professor Matthew Kahn's book "Blue Skies over Beijing: Economic Growth and the Environment in China", published by Princeton University Press

China Urban Database

Geospatial big data not only provide detailed and real-time information for urban studies, but also help bridge differences in urban data quality between regions. At the same time, the emergence of big data has been accompanied by a revolution in research methods. For example, data mining and machine learning in computer science and econometric methods are widely used in urban research, and they play a role in different types of research problems such as description, interpretation, and prediction. The CFC Lab research team built on MIT's advantages in technology, combining those technological resources with China's rich urban big data resources to build a comprehensive database for measuring urban development. The database is divided into four dimensions, and each dimension is combined with different data to further develop indicators.

Urban vibrancy data sets and indicators

The database measures the intensity of urban vibrancy at different spatial scales, and the factors that influence urban vibrancy. The team is building a dynamic model for quantifying urban vibrancy based on the database.

- Mobile phone data
- Point of interests
- Social media
- Nightlight
- Remote sensing
- Census



Urban living quality data sets and indicator

By assessing the impact of air quality on residents' emotions and daily activities, we can better measure the impact of environmental pollution on urban life. A database of urban public service facilities can be used to study the coupling relationship between urban public services and population distribution, in order to help discover the spatial region of "mismatch", thereby optimizing the spatial configuration of urban service facilities.

- Air quality
- water quality
- Amenities
- Sentiment index



- Industrial parks & new town
- Urban renewal
- Transportation:
 - High-speed rail
 - Subway
 - Highway
 - Flights



China Urban Database



- Publications & patents
- New firms & startups
- Innovation space
 - Accelerator
 - Incubator
 - Co-working space

Location-based policy and investment data sets and indicator

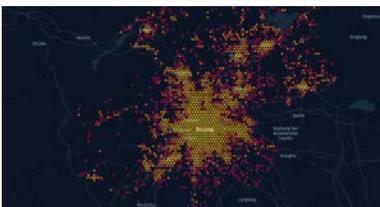
The research team built databases for industrial parks, new city development, and urban renewal, and collected and compiled databases for national industrial and commercial enterprises and transportation networks (including inter-city aviation, high-speed rail, and highway networks; as well as subway and road networks inside cities). The database has extensive time series data and spans multiple spatial scale; further, it can be combined with machine learning, time series analyses and other methods to comprehensively assess regional development. Specifically, the team used these data to analyze the development models of major new cities in China and around the world for the past decades. Based on this work, they developed two data-driven models: a new city development location choice model and an industry selection model.

Innovation and entrepreneurship data set and indicator

In order to measure the potential of urban innovation and entrepreneurship, the team built a database of multiple dimensions. The data covers nearly 400,000 start-ups, 20,000 investment companies and 6,000 innovation spaces nationwide, assessing the original data to support the team's innovative entrepreneurial vitality model.

Research team aims to build a world new city development case database covering typical new city cases and data developed by major countries in different socio-economic and urbanization stages.

It analyzes the development landscape and key mechanisms of major new cities around the world in the past two decades, and explores the generalization and localization developing path from the new urban development. On the basis of solid academic research, we will better transfer the "Chinese experience" of China's new city development to the international academia, industry and policy makers.



Beijing Dining



Beijing Commuting



China migrating path and intensity

Invited Conference Talk

June 30-July 1, 2018

“Prioritizing Industries for Industrial Parks and Its Impacts on Industrial Development of Chinese Cities”, Symposium on “Urban Vibrancy”, International Association for China Planning, Xi’an, China.



July 26-27, 2018

“The Revealed Preference of the Chinese Communist Party Leadership: Investing in Local Economic Development versus Rewarding Social Connections”, NBER Summer Institute – Urban Economics, Cambridge, Massachusetts.



June 23, 2018

“The Role of Human Capital in Shaping the Economic Geography of Entrepreneurship in China: Perspectives from Urban Agglomeration Integration”, Symposium on “Mega urban agglomeration in the sustainable transformation era: typologies, process and governance”, City University of Hong Kong.



June 9, 2018

“Industrial Parks in China: Growth Engine and Misallocation Cost”, keynote speech, Regional, Urban and Spatial Economic International Conference, Changsha, China.



April 26-28, 2018

“Does Clean Air Increase the Demand for the Consumer City? Evidence from Beijing”, Symposium on “Endogenous Amenities and Cities”, Florida State University.

April 13, 2018

“How Does Home Purchase Restriction Affect Job Search of Elite Graduate Students in China?”, Greater Boston Area Urban and Real Estate Economics Seminar.

2 Future City Innovation Connector



Vision

MIT and Tsinghua University jointly launched the Future City Innovation Connector (FCIC). FCIC aims to connect urban innovators with policy makers and industry leaders; to connect its innovation with application test sites.

Goals



Urban Problems



Responsive urban management



Mobility



Culture and entertainment



Life and health



Energy and environment

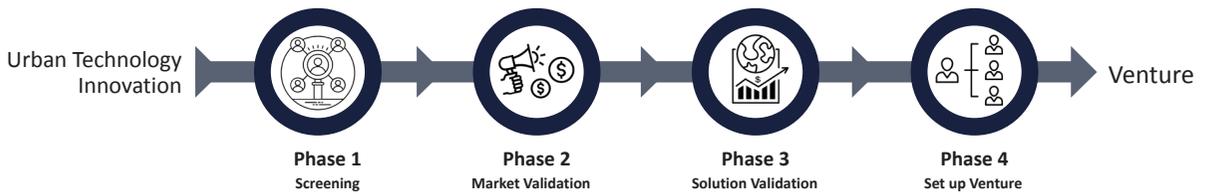


Smart retail and office

Strategic Partners



Value Creation



FCIC Workshop

FCIC course for urban innovation startup teams entering the Chinese market is a specialized entrepreneurship courses. The multidimensional complexity of urban issues requires interdisciplinary collaborations in solving tough urban challenges. The course is structured to guide startups from innovation to impact: problem validation; customer validation and solution validation.

Pilot Connector

The consortium model has created a path from technological innovation to market adoption. The cooperation of FCIC with industry, academic institutions, and research is a completed industry-academia-research mechanism of "selection-orientation-connection", which can promote transformative technological achievements. The Consortium members are playing the role of innovation champions for new products and services through this process. They help realize scalable urban impact, and leverage their leadership and influence in urban development to support cutting-edge technology and talent, and create an ecological environment for the FCIC startup team that is beneficial to urban innovation.

Connecting the application scenarios and the Consortium member's challenges:

We identify the challenges faced by our Consortium members, and explore potential pilot sites in 30 different cities across the country for startups. FCIC builds connections between the startup teams and application scenarios, arranges communications between startup teams and industry advisors, and helps them form preliminary collaborative agreements with partners for pilot projects. In July, the FCIC China trip took teams to Beijing, Hangzhou, Wuhan, and Shenzhen for demo days. The member companies sponsored these events, and the teams developed close communications with local governments and partners. The teams later confirmed new project launches and collaboration agreements, and began pilot launch projects.

Connecting with local technical teams, investments, and ecologies:

Cutting-edge creative ideas must be screened, enter the market, become a company guided by the market and financing tools, and finally achieve growth. In addition to the application scenarios, the financing and local team are also essential elements for the startup teams to launch in China. In 2018, FCIC worked with the Institute of Geographical Resources and Environment (CAS) of the Chinese Academy of Sciences and the Beijing Leping Foundation to establish strategic cooperation, and further solidify and improve the China launch mechanism of FCIC.

Industry advisors

Bin Tang	Global Partner of Fosun Group
Guochen Zhai	Executive General Manager of Investment in Fosun Property Holdings
Xin Xu	Managing Director of Fosun Capital
Qing Maio	Deputy Director of Industrial Innovation Working Group, South China Region, China Resources Land
Xianzhao Yang	Deputy General Manager, Office Marketing Department, South China Region, China Resources Land
Dongshu Shen	CEO of Leping Foundation
Jian Zhang	Founder and CEO of Nashwork
Joe Kwok	President of Nan Fung Group China
Thomas Tam	Managing Director, Nan Fung Group Dawan Asset Management Co., Ltd.
Bo Lin	General Manager of Tusincere Hangzhou Company
Jing Yang	Director of Industrial Investment, Tusincere Group
Jian Luo	Director of Industry Investment Promotion, Tusincere Group Chongqing Company
Xiaodong Wang	Co-founder and Deputy General Manager of Tongchuang Group
Peng Zhou	Vice President of Tianyi Group
Changfeng Ling	President of Hong Kong Land China
Li Fang	Vice-President of Wuhan Zall Cultural Tourism Group
Yutao Peng	Marketing Director, Changjiang Youth City Development (Wuhan)

Academic advisors

Yulin Chen, Associate Professor, School of Architecture, Tsinghua University
 Zhiyong Fu, Professor, Academy of Fine Arts, Tsinghua University
 Yizhen Han, Dean, Data Research Institute, Tsinghua University
 Weixin Huang, Associate Professor, School of Architecture, Tsinghua University
 Xi Lu, Professor, School of Environment, Tsinghua University
 Changshui Zhang, Professor, Department of Automation, Tsinghua University
 Chenghu Zhou, Academician of the Chinese Academy of Sciences
 Lu Zheng, Associate Professor, Department of Sociology, Tsinghua University

Workshop guest speakers

Liqiao Guo, Director of Science and Technology Department, Ministry of Housing and Urban-Rural Development
 Xianqin Jin, Dean of the Institute of Technology Transfer, Tsinghua University
 Hanyi Shao, Executive Creative Director of Frog, the world's top technology product design and strategy company
 Chao Wang, General Manager, Tencent Planning and Design Department
 Ethan Li, Chief of Staff to the President, Alibaba
 Steven Chen, Regional Operations Manager, Uber; Marketing Manager, Amazon
 John Grants, Senior Lecturer in Global Economics and Management, MIT Sloan School of Management
 James Shen, Leping Fellow and co-founder of Plug-In house



Highlight of FCIC 2018 Cohort

Only in its inaugural year, the MIT-Tsinghua Future City Innovation Connector's (FCIC) distinct value and affordance for the MIT entrepreneurial ecosystem are already readily evident. FCIC's core strength draws from China's unique attributes. Due to China's vast scale and exponential transformation, access to China comes with it a plethora of application scenarios and consequently more options for strategies to market. Even with the wide purview of its cohort, FCIC has facilitated helpful connections and potential pilot opportunities for each of its participating startups. 7 out of 16 teams have signed agreements with member companies for pilot projects, and will launch pilot projects in Beijing, Guangzhou, Chongqing, Wuhan, Hangzhou, Shanghai and Shenzhen.

Beijing Demo Day

Yang Bin, Vice President of Tsinghua University, attended the event and delivered a speech. He expressed gratitude to the government, companies and individuals who have supported the FCIC over the past year. FCIC has established extensive partnerships with Chinese cities and industries. This workshop will further promote the experimental results of the two universities in many Chinese cities.



Hangzhou Demo Day



Shenzhen Demo Day



Wuhan Demo Day



At the Demo event hosted by Tusincere in Hangzhou in July, the startup teams communicated with experts from China Smart City Forum, Alibaba City Brain about future city planning strategy and technology applications. And after the project events, over 100 entrepreneurs conducted in-depth conversations and discussions with the startup teams.

At the Demo event hosted by Zall Holdings in Wuhan, executives from Wuhan Municipal Government Department attended the event, and 35 privately-owned enterprise leaders and practitioners participated in pilot communications with the teams. Zhi Yan, chairman of Zall Holdings said, "Wuhan has always been a city that focuses on business model innovation. We hope that by introducing world-class innovation in technology, Wuhan will move faster in both business and technology innovation."

The Demo event hosted by China Resources Land in Shenzhen, attracted more than 200 leaders and practitioners from think tank, investment community, and government departments in the Pearl River Delta region.



Responsive urban management



Biobot Analytic

Urban problems

Biobot Analytics develops cutting-edge technology to transform sewers into public health observatories. Wastewater contains valuable information about the health of communities. We collect it. We analyze it. We tell you how to leverage it to make your city better. Biobot's first product is to measure opioids and other drug metabolites in sewage to estimate consumption in cities. With this data, those working on harm reduction can assess the scope of the epidemic, allocate resources, and gauge the effectiveness of programming over time. Biobot is founded by Dr. Mariana Matus from the Department of Bioengineering at MIT, Dr. Eric Alm from the Department of Bioengineering at MIT, and Newsha Ghaeli, a scientist from the MIT School of Architecture and Urban Planning. Before coming to China, Biobot Analytics had gone through four years of in-depth research and studies.

Launching in China

The team Biobot is working with Guangzhou Imapcloud in: technology product integration, and market development. Through early communication with the Guangzhou Municipal Government, the District Government and the Water Department, all parties plan to carry out technology cooperation and pilot testing to solve the problems in urban industrial sewage discharge in Guangzhou, as well as management difficulties in the indiscriminate discharge of residential sewage. In the early phase of the plan, Biobot will first make training data for urban industrial and residential sewage subdivision types, and establish sewage fingerprints for industrial enterprises and residential areas. In the medium term, the team will trace the source of pollution through sewage analysis. This will help the government produce real-time analyses of sewage and trace pollution sources in real time, which will reduce management difficulties and cost. The Guangdong Academy of Sciences has invested \$500,000 in early research funding to support the pilot project.

Knowledge exchange

In June, Guangdong Academy of Sciences and the CFC Lab co-organized a Seminar on wastewater treatment and the process of building a smart city. Biobot team, Guangzhou district government, research institutions, universities and Nan Fung Group (CFC Lab consortium member), attended the seminar. Dr. Eric Alm, professor at the Department of Bioengineering at MIT, explained the practical application of his research field in international pollution control and urban population health big data acquisition. Through a series of case studies, the audience was informed of the relationship between biological research and urban development and came to understand how scientific research developed into innovative applications. Dr. Mariana Matus, founder of Biobot Analytics, introduced the technical characteristics and practical application cases of the Biobot team, and also led great discussions with relevant field experts and scholars presented at the seminar. More than 20 media members reported on this event in Guangzhou.



Energy and environment



VThree.AI

Urban problems

The main problem of building energy savings is that the data of internal power terminals are not fully utilized, and the energy saving focus is hardware, which involves high initial costs such as installation and investment. Vthree aims to use artificial intelligence research from MIT AI and building technology labs to improve energy savings in buildings.

Launching in China

Transforming from core technology, to business solution, to final service and product requires adaptability to the market. Vthree has conducted a continuous iteration after joining FCIC. They found the key challenges in energy savings and determined their positioning in the market. They acquired their first batch of customers, who are willing to cooperate on technology and pilot projects. FCIC helped Vthree to grasp every key resource in the process of pilot project cooperation with partners, including finding a communication focus, exploring cooperation modes, drafting business plans, finalizing and signing cooperation agreements, etc. Recently, Vthree has signed a service agreement with Hong Kong Land and Nan Fung Group and is fully deploying the pilot project. It has also reached a test project agreement with China Resources Land and is communicating with the Zall Group about the feasibility of the pilot project. Among these partners, Zall Group, China Resources Land and Nan Fung Group have expressed strong interest in the technology of buildings and construction involving energy-saving technology. At the same time, Vthree is communicating with real estate companies in Guangzhou and Shenzhen about developing greater energy savings, having started cooperation dialogue with more than 10 energy suppliers in Guangdong Province. As the pilot project moves forward, Vthree's business direction has been fully verified in many ways. The core algorithm and software architecture has been tested several times to ensure its stability and usability. FCIC has supported Vthree to build many things from scratch, and to go thorough iteration of their core technology. They have also received angel investment from Baidu.

Knowledge exchange

In the cooperation and communication process with Nan Fung Group, the company expressed strong interest in AI application. In order to help employees strengthen their understanding of AI, Vthree team provided AI workshop to Nan Fung, focusing on the current situation and outlook of AI applications in building and other industries. The team shared AI innovation technology and cutting-edge information with Nan Fung, while explored the cooperation possibilities. This new cooperation model enhanced the efficiency and effectiveness of cooperation between the company and the startup, and it is very helpful in building long-term business relationships.



Culture and entertainment



CitoryTech

Urban problems

The core technology of CitoryTech is to promote interactions between people and space by using location-based service (LBS) plus virtual reality (AR) plus artificial intelligence (AIR), which will provide a rich experience for users.

Launching in China

CitoryTech is officially working on a pilot project with Hong Kong Land-Chongqing Changjiahui project. The Hong Kong Landmark - Changjiahui Projects I and II include various elements such as office buildings, shopping malls and old street renovations. The design concept of the entire project is very new, and they will cooperate with CitoryTech team to introduce photography, aesthetic modification, and other service functions to further enhance the customer experience.



Roots Studio

Urban problems

Roots Studio seeks to enable indigenous artists to continue their way of life through sustainable income, from wherever they live. Through each license, Roots Studio return 500% more profits to the artist than status quo. Roots Studio also runs surface pattern, technological, and financial literacy workshops with partner communities.

Launching in China

FCIC and the Leping Foundation awarded Roots Studio a pilot grant of 25,000 U.S. dollars. The team has completed the collection and investigation of arts in Yunnan Province and Guizhou Province and established initial cooperation agreements with China's premiere fashion retail brands. Zall Group, Fosun Group and Tianyi Group all expressed their interests in cooperation with Roots Studio's pilot project.



Transportation



Linktravel

Urban problems

Linktravel (Lt) provides green solutions for sensing city and travel services, optimizes urban travel services and provides data support for city operations. Through front-end equipment such as display screens, Linktravel provides commuters with a better travel experience, by giving timely and reliable information on buses and other services. It also provides operators with data support and sensibility based on the "Lt City" artificial intelligence, creating a new generation of people-oriented ground public transport systems.

Launching in China

With the support of Zall Group, Linktravel has reached a cooperation agreement with Wuhan City Investment, for which the team will select two sites for pilot sites in advance. Through electronic ink display technology, Linktravel Provides outdoor interactive information services, sensing urban travel behavior and travel demand through urban capsules, and solves the problems in large-scale electricity deployment and construction by leveraging their advantage: 15w overall power consumption and plug-and-play characteristics. Linktravel provides large support to multi-dimensional city operations. Currently, their product is connecting with Baidu's Apollo autonomous vehicles system in Southeast Asia, and they are also cooperating with the Singapore Land Authority in building and installing the Lt Connect site in the Woodlands area.



3 DIGITAL CITY WORKSHOP

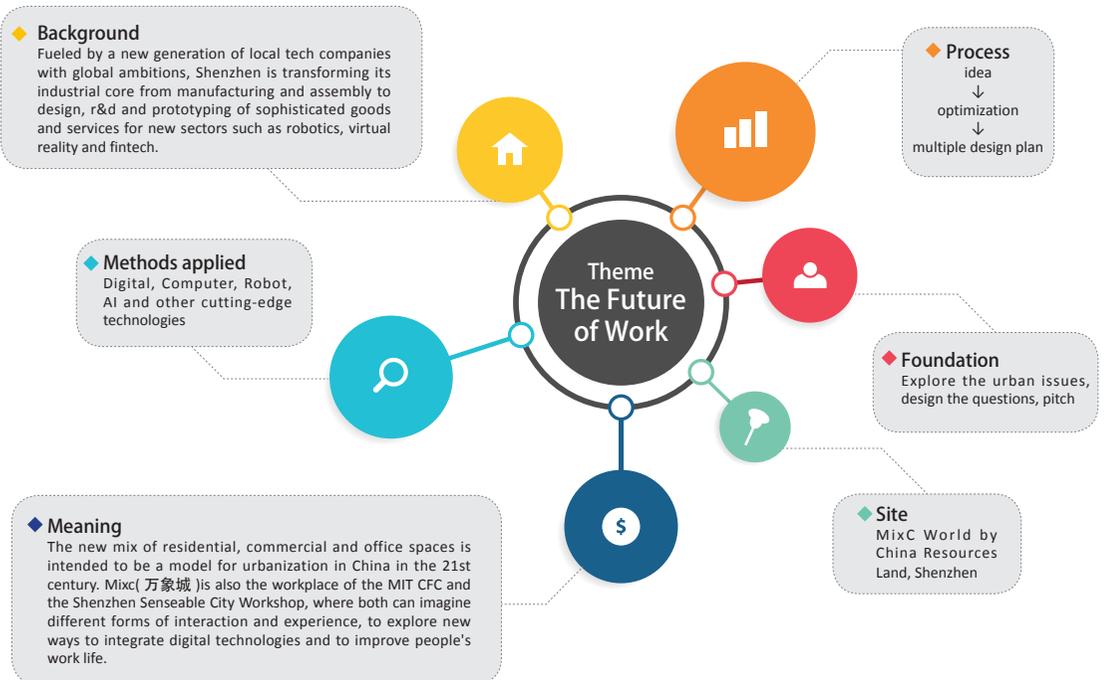
✈ SHENZHEN, CHINA

THE FUTURE of WORK

China Future City Lab in collaboration with Senseable City Lab on Digital City Design workshop. It is focused on the innovative practice of digital revolution in cities. In 2018, the course looked into first time a Chinese city, Shenzhen. Shenzhen is a city where the future of China is taking shape. The city experienced unprecedented growth, when it went from a small market town in the 1970s to a thriving metropolis with over 20 million people today. Over the years, the presence of the technology sector has been a defining factor for the city and its environs. It envision different forms of interactions and experiences that seek to explore new ways in which people's work days can be improved by blending digital technologies into their daily activities. The project's "Shenzhen Senseable City Guide-The Future of Work" was published in August of 2018.



Publication from the digital city workshop



Developing the next generation of social work tools that trigger greater dynamics of collaboration and personal productivity

1. Mediable

Project seeks to foster new social interactions and conversations in meeting rooms, by creating an interactive meeting room table that uses artificial intelligence to mediate work meetings and ideation sessions.



2. Mind Leap

Create a next generation whiteboard that provides simple ideation tools and records multi users ideation sessions across time and space in order to foster shared creativity in the meeting room, across the MixC World development and ultimately across China.



Blending digital technologies to create new experiences that foster both productivity and health

3. Monospace

Create a personal zone of calm reflection that allows for individual productivity to thrive by shielding workers from the chaotic, daily distractions that disturb our concentration and affect our mental health.



4. Hydro Station

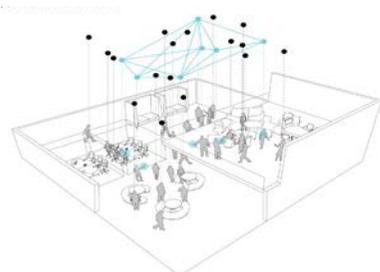
A digitized water fountain become both a social space as well as a health monitoring system where better habits that could improve the well being of workers at both personal and collective levels.



Fostering new social experiences that encourage connections

5. Ping

Envisions a system that choreographs social serendipity in space and time and invites people to meet and socialize through the use of a geo located personal device linked to a social knowledge system.



6. RUNcierge

Use augmented reality technology to digitize personal avatars powered by A.I. that guide users, and specially new migrant workers to a wide variety of new social encounters while inviting them to discover all that the City of Shenzhen and MixC World have to offer.



7. Food Mate

Focuses on the strong and deeply rooted food culture of China to activate public spaces within MixC World by deploying a fleet of autonomous food carts that allow for Shenzhen workers to share a meal together and possibly collaborate in the next great idea that will continue to push Shenzhen towards becoming a global node of innovation.



1. Foodmate

By Juncheng Yang

Project Description

Strategy

The proposal aims to reinvent an optimized dining experience through an innovative food delivery system. The system consists of two components – a digital platform and a fleet of autonomous food delivery carts. The digital platform aims to streamline the process of choosing dining mates and the process of deciding food choices. The autonomous food delivery carts help to decide dining locations and provide pre-emptive food delivery services.

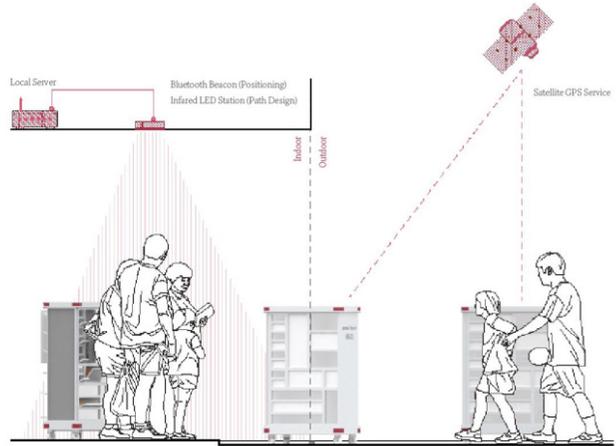
A smart self-driving system that promotes dining-working opportunities in fast-paced work environment.

Personal Interactions

Digital Platform

The primary function of the digital platform (smartphone-based and PC-based) is to take advantage of users' existing social networks. The platform may incorporate data from other popular social networks in China, such as WeChat, QQ, and Weibo. With the Food Mate app, users could invite friends and colleagues to dine together.

Second, the digital platform aims to understand food preferences by collecting data via several means. First, the digital platform may seek to use the data from the existing food delivery apps; Second, the platform could accumulate the data and understand the preferences iteratively. Later, through documenting the actual food choices, the platform may learn to refine the recommendations on food choices. Through multiple rounds of iterative processes, the platform may make an increasingly precise "guess" on food preferences.



2. The Hydro Station

By Yuehan Wang

Project Description

The solution here is to take people's water drinking behavior as the incentive to guide them into the pantry and use the Hydro Station to conduct a comprehensive suite of health monitoring, analyze the collected information, and provide feedback to alarm people about physical and mental health issues in an early stage and help them establish a healthier living habit in the workplace. The Hydro Station will not only give feedback to the individual user, and also aggregate data on a system level to provide feedback to the larger building complex.

Office Placemaking

Across MixC World

With one Hydro Station installed in each pantry, there will be 120 stations in one office buildings, and 600 in all buildings of the site. This scale could generate a large database to support collective analysis and compare the situations across floors and across buildings. The feedback would be given to CRL property management and health program as basis for intervention and organizing group activities.

Across CR Land Properties

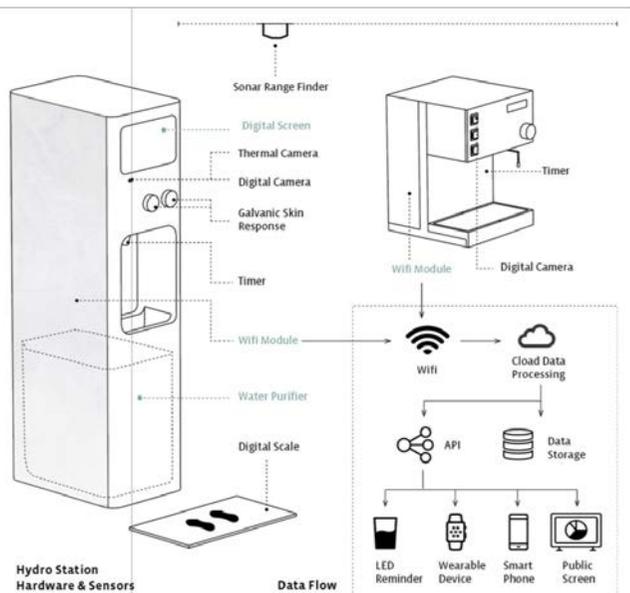
CR Land has properties in 55 cities across China, which gives the Hydro Station system full potential to be scaled up to a national level. There will be around 6000 in Shenzhen, and approximately 60000 in China, collecting information on liquid drinking, and stress level. The data will facilitate considerable amounts of research projects on office health issues.

Technology Description

- Hardware and Sensors
- At the work spot
- Data Processing and Storage
- Real-name Data
- Anonymous Data

Urban Interactions

The Hydro Station generates a rich data pool that can power a range of analysis and functions on a collective level. In terms of enhancing urban interactions, there are three major aspects that operates with different combinations of data and on different scales.



4 PARTNERS & TEAM

Consortium Member



Our Team

Siqi Zheng / Faculty Director

Angie Jo / MCP

Zhengzhen Tan / Executive Director

Tianyi Fan / MSRED

Andrew Ortendahl / Program Assistant

Yichun Fan / MCP

Jingjing Yao / Program Head

Binzhe Wang / DUSP Ph.D.

Haijing Liu / Research Fellow

James Shen / Leping fellow

Rui Du / Post Doc Associate

Jianghao Wang / Visiting Scholar (CAS)

Yingcheng Li / Post Doc Associate

Yiran Wang / Project Mananger (CAS)

Zhaoyingzi Dong / Visiting phd Student

Xi Qiu / MIT DUSP PhD candidate

Lei Dong / Post Doc Associate

Jamie Wong / MIT PhD student

Ruiqi Zhang (China) / China Operation Head

Juan Palacios / Visiting PhD student

Shaojian Wang / Visiting scholar

5 KEY ENGAGEMENT EVENTS



November 2017

China Future City Lab Launch

It looks to advance city life in China through an ambitious range of research and innovation practice. Eight Chinese enterprises joins the CFC Lab consortium. Executives from the group of founding partners gave remarks at th launch event on Nov 17th in MIT's Samberg Conference Center. The Consortium aims to promote a new industrial-academic-city engagement model for Chinese urban research and city innovation.



Early March

CFC Lab and MIT's Senseable City Lab collaborated on the Digital Cities Workshop, focusing on the innovative practice of digital revolution in cities. This year's topic is "The Future of Work". The workshop sought to explore innovative, digitized work environment in the cutting-edge MixC World development, of China Resources Land.

April

Topchain Group and Nan Fung Group China joined CFC Lab's Consortium.

January 6th

Consortium members co-creation workshop where challenges, new practical applications, urban test sites of different type and scales in more than 30 cities across China for emerging technologies were discussed.

Late March

MIT-THU Future City Innovation Connector (FCIC) announced its inaugural 2018 Cohort of startups: 16 urban innovation teams from MIT and Tsinghua University.

May 21/22

Industry Partner Annual Forum

On 21st, 25 Consortium representatives engaged in conversations with the 2018 FCIC startup teams. On the 22nd, 2018 World Real Estate Forum convened leaders of real estate industry, academic elites, and prominent entrepreneurs from around the globe, for a profound discussion about the future of real estate. The forum inspired industry leaders from 25 countries to engage in a comprehensive and informative dialogue. The CFC Lab presented its latest research and interacted with innovation leaders in the Chinese real estate industry.





July

FCIC China Venture Workshop

FCIC 2018 cohort showcased their urban innovations in Beijing, Hangzhou, Wuhan and Shenzhen. 7 out of 16 teams signed agreement on pilots with industry partners in Beijing, Guangzhou, Chongqing, Wuhan, Hangzhou, Shanghai, and Shenzhen.



September

MIT-THU Future City Innovation Connector was invited to participate in Beijing Design Week, in the exhibition of historical Fayuan Temple.



July 8 to 10, 2019

2019 Annual Forum of Asian Real Estate Society

"the Future of Cities, the Future of Real Estate" will be held in Shenzhen. Organized by CFC Lab, the Forum will gather the global experts and scholars in urban development and real estate research, as well as industrial elites.

November 12

China New City Forum

China New City Forum, jointly hosted by MIT-CFC Lab and CIDP (China Institute for Development Planning at Tsinghua University), as a side event of MIT's China Summit. Leaders from industry, academic, and government meet to discuss the development of new planned cities in China, economic growth models and new city development's impact for the global emerging economies.



August

"Shenzhen Senseable City Guides-The Future of Work" was published.



November 13th

MIT China Summit

The MIT China Summit will explore possibilities for MIT-China collaboration in applying science and technology to help solve great global challenges and the role of research and education in shaping tomorrow's world. The Summit will also highlight the importance of U.S.-Chinese collaborations in the effort to solve the complex challenges the world faces today. Prof. Siqi Zheng, Faculty Director of MIT-CFC Lab, will deliver a speech.



CHINA SUMMIT
GLOBAL MIT
麻省理工学院中国峰会

6 2018 FCIC COHORT

Multimer

Better decision based on human signals

Team Member: Arlene Ducao, Ilias Koen, Yapha Berry, Jordi Frank, Zhiqi Guo, Taylor Nakagawa
<http://www.multimer.com/>



Problem

We are all deeply affected by the spaces in which we live and work. However, there are few tools that effectively capture how spatial environments affect these outcomes. Over the past few decades, governments, institutions, and businesses have become increasingly focused on how spaces directly impact human "health" outcomes such as safety, creativity, and productivity.

Product

Multimer provides businesses, governments, and organizations with a data-driven understanding of how humans experience spatial environments by quantifying and mapping human sentiment. It develops advanced technologies that measure in-situ biometric data to help architects, urban planners, and design professionals make better design interventions.

Application

With this information, a city planner is able to integrate sentiment data with existing health data determine how to allocate bike lanes, trees, or hospitals in "unhealthy" neighborhoods, while an architect designing a hospital might use Multimer's technology to understand how design factors into recovery and emotions. Multimer is one of the few companies that integrates brainwave data in a consumer-friendly and research-oriented manner outside of the lab.

Vthree.AI

Empowering the future of smart energy-saving cities

Team Member: Andrew Chen, Elvis Zhang, Mingwen Liu, Mike Deng
<http://vthree.ai/>



Problem

Cities around the globe consume more than 75% of total energy and produce more green-house gas emissions than ever. We see potential for optimization in the lighting and heating, ventilation and air conditioning (HVAC) systems in residential buildings. In a European Union research project, it was demonstrated that with intelligent energy management system, the buildings reduced energy consumption by 18.4%.

Product

Vthree.AI has developed state-of-art smart non-intrusive monitoring technology to process time series data recorded by smart meters, which can provide appliance level detailed energy consumption analysis. With this technology, we can also realize instant detection of malfunctioning appliances, and protect end users from potential safety concerns.

Advantage

We can deliver world class software technology and optimization results, with a close to zero installation cost and a short calibration period. Our frictionless solution is purely based on existing hardware devices, so there is no need to install a whole suite of smart sensors and devices. Our optimization will be constantly and automatically improved and can be quickly adjusted to serve customers'specific demands.

Constructure

Cast positive influence on society

Team Member: Ningxin Cheng, Chenlu Wang, Juncheng Yang
<https://www.linkedin.com/company/constructurelianji/>



Product

Constructure addresses the poor matching between employers and workers and between workers and workers in the construction industry in Chinese urban contexts. The platform provides a reference of compatibility between worker and worker and between worker and employer. The platform visualizes the network map that collapses and organizes multiple layers of information - past partners or co-workers, work time, location, and other relevant individuals or entities.

Advantage

We provide workers access to a more diverse array of job opportunities and help them overcome the limitations of personal connections. Constructure helps companies improve their hiring efficiency and gain access to desired workers. Constructure has significantly lower transaction costs compared to these traditional job-dealers. We also provide specific information about compatibility and put potential cooperative opportunities into practice.

Vision

Further, the proposal will receive attention from municipal governments. Qingdao city government has provided funding for projects of this nature. On a broader scale, the government also benefits because our platform helps track employment activities across the industry and thus formalizes employment activities in the construction industry.

GAIA-E

Mitigate climate change, eliminate air pollution, eradicate energy and water poverty

Team Member: Carlos Perez Damas, Arlette Reyes, Nan Ma, Burak Gozluklu
<http://www.gaia-e.com>



Problem

Gaia-E was founded by MIT students after winning the NASA Space Race Competition. As a result, we attained licensing rights on a Nasa patent developed in the area of control and tracking tethered UAVs. Our goal is to develop an autonomous kite power system that represents the future of wind energy.

Product

Our system consists of an electrical generator tethered to a controlled semi-rigid airfoil that is driven by wind to spin the generators on the ground. As it removes the need for a tower to access high altitude winds, it requires less than 10% of the material and can significantly reduce the cost per watt while benefiting from a higher capacity factor and power density than state-of-the-art wind turbines.

Vision

We are the only company implementing an AI-based control system that truly maximizes the reliability and power output from the device. Our design can also be scaled from a few kilowatts (KW) to several megawatts (MW) using the same basic product architecture. We have the simplest, most cost effective and reliable architecture under development today. We hope to deploy our technology in China both on land and offshore near coastal cities.

Roots Studio

Digitizes the work and stories of traditional artists

Team Member: Rebecca Hui
<https://www.rootsstudio.co/>



Problem

Roots Studio re-imagines art distribution for low-income artists living in remote places through digitization, eliminating the burden of a costly supply chain through licensing. We enable rural artists to transact with buyers at minimal life disruption by setting up scanners at their location, training them how to digitize their work, and enabling access to high-margin markets.

Product

We install a computer and scanner in villages for artists to post directly to our online repository, ensuring that artists can continue pursuing their current art practice from their village. This design repository is then used to license these designs to create long-term royalty streams for these artists. We also sell print reproductions of their artwork and apply them to new products (stationery, home goods, etc) on our e-commerce website.

Achievement

We have worked across 5 states in India and over 6 villages in 2 years, working with over 1200 artists in India and the Middle East. Over a soft launch period of 6 months we garnered \$90,000 in sales through crowdfunding, e-commerce, and offline sales. We have won funding from or are affiliated with Echoing Green, Girlboss Foundation, MIT IDEAS Challenge, MIT-TATA Center, MIT Legatum Center, MIT100K, Stanford-StartX, Halcyon, Harvard's Dean Challenge, and The Unreasonable Institute.

树融科技 (Shu Rong Technology)

Connecting multiple data sources for better business decisions

Team Member: Zhiyong Wang, Yi Zhu, Xudong Sun



Problem

Nowadays, most commercial real estate enterprises opt for data-driven intelligent systems for precision operations. However, the capacity of data-driven systems is severely limited by insufficient single-source data, fragmentation of market information, and more importantly, the gap between algorithms and real-world business processes. Commercial real estate enterprises need tools that provide not only analytical results but also a combination of multi-source market information that precisely echo their needs.

Product

We provide commercial real estate enterprises with a toolkit for real-time operation evaluation, forecast, and decision assistance built on a multi-source data fusion platform. By utilizing exogenous data and integrating information, the client is provided with a holistic vision of the needs of its customers and the market. We use data fusion technologies, combining our client's database with new data to increase integrity & precision.

Achievement

Currently, Shurong focuses on an urban data and knowledge fusion platform to support not only the intelligent toolkit for commercial real estate enterprises, but also the urban planning and management products for public sectors. Within the last three years, based on our rapidly accumulating database of major Chinese cities, we have provided decision assistant tools, platforms, and consultants to a variety of commercial users and local governments.

Kawsay

Connecting Communities to Infrastructure Services

Team Member: Andrew Brose, Alexander Wiegering
Sofia Garcia, Mario Giampieri
<https://www.kawsay.io/>



Problem

Kawsay is a platform that connects micro infrastructure providers (MIPs) with people in informal communities through multi-scale, multi-source datasets. By collecting, managing, and synthesizing a range of data, Kawsay provides exposure to new markets, an integrated planning strategy, and predictive analytics to improve access to a more dignified life in the city.

Service

Through the combination of data from government agencies, satellites, ground sensors, and field surveys, we can create a comprehensive understanding of current conditions in informal settlements. Through a network of social impact organizations, MIPs, and community leaders, we obtain valuable perspectives and cultivate a sense of trust in our partnership with local communities.

Achievement

Kawsay provides the user with approachable, actionable insights to grow their markets and serve informal communities more effectively, saving time and money on in-house market analysis and data management. An accurate mapping of service consumption and need in urban areas helps better define the status of development and provides a localized measure of quality of life.

CitoryTech

Facilitate exploratory trips and reconnect people with the physical world

Team Member: Liu Liu, Zhoutong Wang, Bolei Zhou, Fan Zhang, Jinxin Shao
<https://www.citorytech.com/>



Problem

Unlike routine excursions, an exploring trip embraces diverse events which may bring unexpected pleasure and excitement. It satisfies the human nature of curiosity and cities provide a promising locale to reinvent this type of leisure. A future city must link people, space and time tightly together. Target-free trips drastically drop when technology severs the bridge between human and physical world is broken.

Product

StreeTalk will facilitate exploratory trips and reconnect people with the physical world. This tool will encourage people to adventure within their limited leisure time. The application expands in two modes: Live Mode, in which people can explore events and Routing Mode which utilize a user's profile to match them with suitable spots. Tours are personalized and optimized for the individual.

Advantage

StreeTalk underlines the spirit of exploration and prepares a dynamic interface for instant trips. Through computer vision and natural language processing, StreeTalk digests tons of images and tour reports and supports a clean recommending system. Not only does it lower the time cost and risks, but also it facilitates informal communication.

AdaViv

Harnessing AI to Unleash Nature's Potential.

Team Member: Juian Ortiz, Ian Seiferling
Thomas Matarazzo, Mohammad Vazifeh
<http://www.adaviv.com/>



Problem

Global concerns over food security and quality have led to a recent increase in controlled urban and indoor agriculture systems (IAg). Climate change, pollution, environmental degradation and agriculture are interconnected and are already negatively affecting crops across China. Such cases underscore the need to develop IAg systems that are sustainable, resilient, adaptive and avoid pesticides.

Product

AdaViv is aiming to fundamentally change the way we grow crops indoors with the aid of sensing and computing technologies. We bridge sensors, actuators, and machine learning to provide greenhouse farmers with hidden knowledge on their crop growth and act on that knowledge to gain higher yields and quality at lower costs. While there has been activity in using technological tools to improve crop production, current solutions available to greenhouses are unable to accurately monitor the health of an individual plant using affordable and customizable sensor packages.

Vision

We are developing a hardware-enabled artificial intelligence solution to improve the resilience and production of our food and medicine growing systems during times of global change and rapid population growth. We aim to develop a product for the China IAg market with a high value proposition to which we can build and iterate on towards reaching other types of urban farming (vertical farms and personal growers) and scale the solution in other cities in China.

Biobot Analytics

Unleashing the potential of our collective biome.

Team Member: Mariana Matus, Newsha Ghaeli
<https://www.biobot.io>



Product

Biobot Analytics has established methods and techniques to measure drug metabolites in sewage to estimate consumption in cities. Our data enables governments to assess the scope of use of various drugs in their communities, decide how to allocate funding and resources to mitigate consumption, and gauge the effectiveness of interventions over time. Our techniques yield unprecedented insight into the health of communities.

Advantage

While there has been activity in using technological tools to improve crop production, current solutions available to greenhouses are unable to accurately monitor the health of an individual plant using affordable and customizable sensor packages. We are developing a hardware-enabled artificial intelligence solution to improve the resilience and production of our food and medicine growing systems during times of global change and rapid population growth.

Achievement

Biobot Analytics is currently working in partnership with the Town of Cary, North Carolina and the City of Cambridge, Massachusetts in order to deploy our drug consumption monitoring program. Our work with the Town of Cary facilitated the city's recognition as a Champion City as a part of the 2018 Bloomberg Mayor's Challenge.

MUYU Technology

Decrease 90% of water waste on hand washing.

Team Member: Dajun Zu, Li Zhang, Xiaotong Zheng
<http://v.qq.com/x/page/y0623z10vc.html>



Product

The intelligent air faucet by using a novel High Efficiency Low-Pressure Atomization Technology (HELAT), changed the traditional water-saving cleaning model. While guarantees excellent cleaning effects, it can achieve an ultra high water-saving rate which is over 90%. The water-saving efficiency is far superior to the existing products. This technology is in the leading position in the industry across the world.

Mechanism

In the traditional cleaning process, less than 5% of the water is used to dissolve stains on hands, while more than 95% of the water can only wash stains away through mechanical function. Based on the common feature that fluid can wash away stains, the intelligent air faucet uses air, which is as clean as water, to play the role of the mechanic function of water. Combined with dissolution effect, it can achieve an ultra high water-saving rate which is over 90% and guarantee the cleaning effects at the same time.

Advantage

The intelligent air faucet can achieve an ultra high water-saving rate of 90%, and speed up the acquisition of intellectual property through continuous technical iterative optimization. Recently, about twenty patent applications have been submitted, including 5 invention patents and 7 utility model patents, which will cover and protect the product and technology of the company.

The intelligent air faucet can save 15 billion tons of water per year, which equivalents to the annual domestic water consumption of 30 million residents. It has considerable benefits especially in urban area.

Galloon

Quench the thirsty world.

Team Member: Kalista Salimova, Cheng Yi



Product

Galloon is providing clean drinking water to those who need it by extracting water from the air and treating the extract to meet safe drinking water standards.

Application

The installations vary in shape and function depending on the location, climate and the budget: from small-scale indoor devices to the large-scale city installations integrated with different infrastructure elements. Real-time tracking system and the built-in sensors: check parameters including water volume produced per day, water and air quality via the App.

Advantage

Galloon has three functions in one body: water generator, air purifier, and dehumidifier.

Zhongyan Parking

Increase the utilization of central city spaces.

Team Member: Guanglei Liu, Xiaoqing Luo, Qi Wang

<http://mp.weixin.qq.com/s/41wYhe9TzI9FoSC9vWE4Q/>



Product

In metropolitan regions of China, parking space is claimed to be a new type of limited resource. Intelligent underground parking system is an effective supplement to those urban area. Our Deep Shaft Parking System for Automobiles requires only 50 m² space on the ground and 30-50 cars can be accommodated in the shaft, 10 times more ground space utilization than normal parking. Intelligent Parking System for Bicycles requires only 6 m² space on the ground and 280 bicycles can be accommodated in the shaft. The mechanical running time is only 8 second for one bicycle. It is best suited for the subway P+R system.

Mechanism

The shaft is all pre-fabricated and assembled on site, and sunk to the ground by a patented technology, result in increased construction speed and safety, best suited for narrow spaces. Zhongyan Parking develops a series of technologies and products to complete the challenge:

1. Deep Shaft Parking System
2. Underpinning Parking Structure under Existing Building
3. Cover-Excavated Underground Parking
4. Underground Parking Combining with Utility tunnel
5. Intelligent Underground Bicycle Parking System

Advantage

The Shaft-like Intelligent Parking system can increase the utilization of central city spaces, improve the traffic conditions and residential environment. The product is standardized and repeatable, thus can be easily applied to different regions.

1. All Pre-fabricated and Assembled on site
2. Patented Self Sinking Technology
3. Special Fire Protection System for Small Underground Space
4. Reliable Water Proofing System
5. High Speed and Intelligent Parking Equipment
6. Unattended Operation and Senseless Payment
7. Mobile Internet Supported Time Sharing

Sponge Public Rest Gardens

Design new public restrooms to make the city more beautiful.

Team Member: Huaiyu Zhou, Zijing Liu, Guoxuan Lin

<http://weixin.qq.com/r/nUgHH8nEbJQTrY189x2P/>



Product

A new urban public toilet applying stormwater management technology, combined with rain gardens, furniture, public facilities, billboards and business services. Rainwater is collected from outside landscapes and bio-retention ponds to reservoirs, then filtered vertically and used to flush toilets. Excess water is stored and used to maintain plant landscapes; Advertising can be set up on the interior and exterior facades to attract investment. The key technologies are rainwater treatment and utilization technologies, landscape design and management.

Principle

Sponge public restgardens collect and purify rainwater at the corresponding low point or the terminal of the watershed, to meet the flushing needs of public toilets. The minimum 60m² sponge public restgarden can basically collect the rainwater from about 1000 square meters' area(20times). The restgarden can provide an advertising platform for advertisers and create convenience for the public with cosmetics and vending machine. The restgarden is designed to achieve a win-win situation for the government, the public, developers, and advertisers.

Advantage

Sponge public restgardens collect rain water to flush toilets. The annual replacement rate of tap water reaches 70%. Maintenance costs of the collecting facilities are dispersed into the daily operation process. Help the developers and government to reach the goal of stormwater runoff control. Make it easier for residents to use public toilets and get cosmetic products. A cleaner and greener public facility; Screens t to attract advertising investment to support the maintenance.

LeanFM

Reinventing Facilities Management with Artificial Intelligence.

Team Member: Xuesong Liu, Burcu Akinci

<http://www.leanfntech.com/>



Product

Developed from the 11 years' research achievements in Carnegie Mellon University, LeanFM offers the first software platform that integrates Artificial Intelligence technologies with Building Information Models (BIM), Building Automation Systems (BAS) and Internet of Things (IoT) to improve the efficiency of operating and maintaining commercial buildings. By providing intelligent information and decision support, LeanFM is able to reduce the utility waste in facilities management and enable smart building management.

Mechanism

LeanFM's intelligent building management platform automatically integrate large volume of heterogeneous building information to provide AI-based information visualization and analytics for commercial building managers. By revolutionarily changing the current reactive maintenance to predictive and data-driven analytics, LeanFM enables facilities managers to efficiently access different types of building information, and be aware of the existing and potential faults and failures in the building assets.

Advantage

It's the first software platform in the world that can automatically integrate and analyze static building design, dynamic IoT data, and unstructured text. With the independently developed 3D visualization engine, LeanFM enables facilities managers to use smartphones and tablets to access and analyze complex building information anywhere, anytime. The case studies completed in 2016 demonstrated that LeanFM is able to save more than 10% of the operation and maintenance cost in commercial buildings.

Linktravel

Feel the City, Intelligent Commuting

Team Member: Kaiping Wang, Shaojun Zhang, Xing Wan, Shuang Dong, Hang Ren, Taoran Tang

<http://www.linktravel.com/>



Product

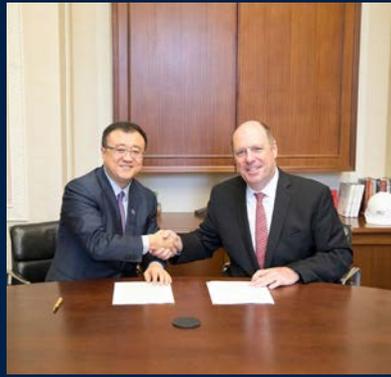
Linktravel (Lt) initiated the concept of smart mobility with Sensing City solution to improve level of service for commuters and provide data support for operators.

Mechanism

It comprises of two major parts. 1. Frontend devices installed at bus stop: "Lt Edge" - the e-paper display panels and "Lt Capsule" - the HD AI-camera and multiple sensors for smart data collection, such as crowd density, traffic flow; "Lt City" is the backend platform for functional management and data analytics.

Advantage

Through fronted devices, AI technologies and data magic, Linktravel provides better travel experience for commuters with timely and reliable bus service information, powerful city sensing platform and data perception over "Lt City" AI, creating a people-centric next generation of ground public transport system.



MIT China Future City Lab
Massachusetts Institute of Technology
105 Massachusetts Ave, Samuel Tak Lee Building, 9-333
Cambridge, MA 02139
cfclab@mit.edu
+1.617.715.2352

CFClab.mit.edu

