Let the Living Lab Live: **Restructure, Survive, Thrive**

Camilla Trudda, Isabella Rose, George Luo, Miranda Wen, Isabella Maria Rangel

Executive summary

Sustainable Smart Campus as a Living Lab

Situation: Funding for the Living Lab is **set to expire in 2022**, and President Wei Shyy is retiring

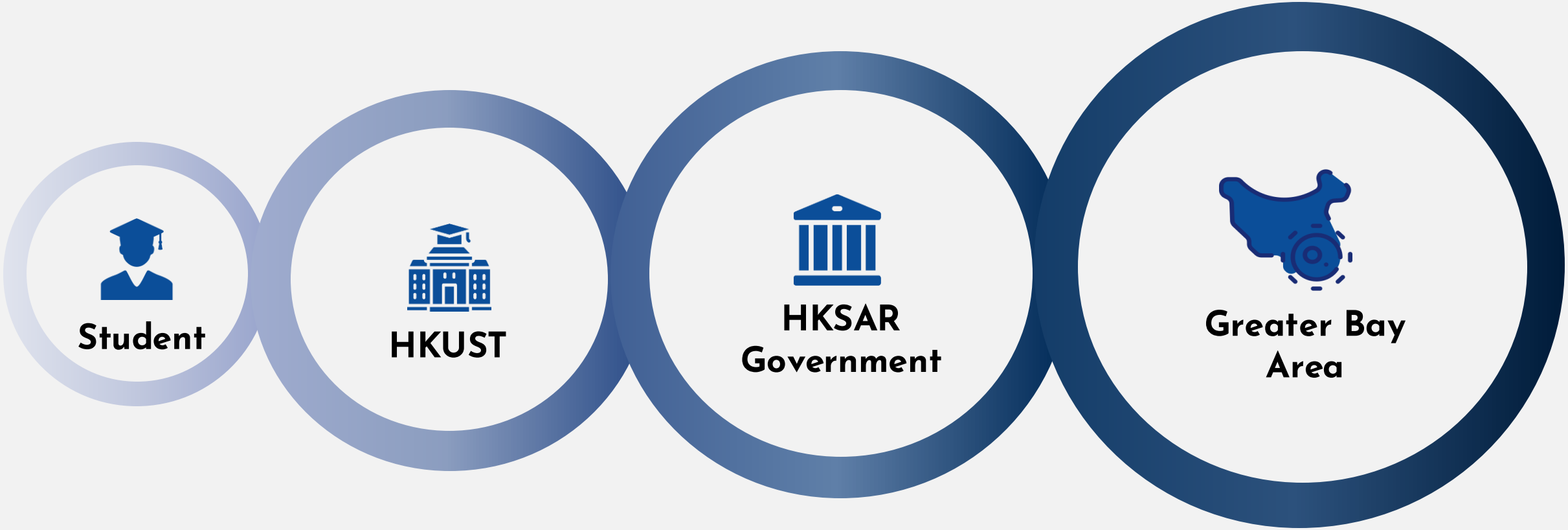
Question: How can the Living Lab obtain funding to survive and restructure our long-term vision to thrive?

Solution: **Restructure** the project scope, **Survive** with university and private sector funding, and **Thrive** with government and user group funding

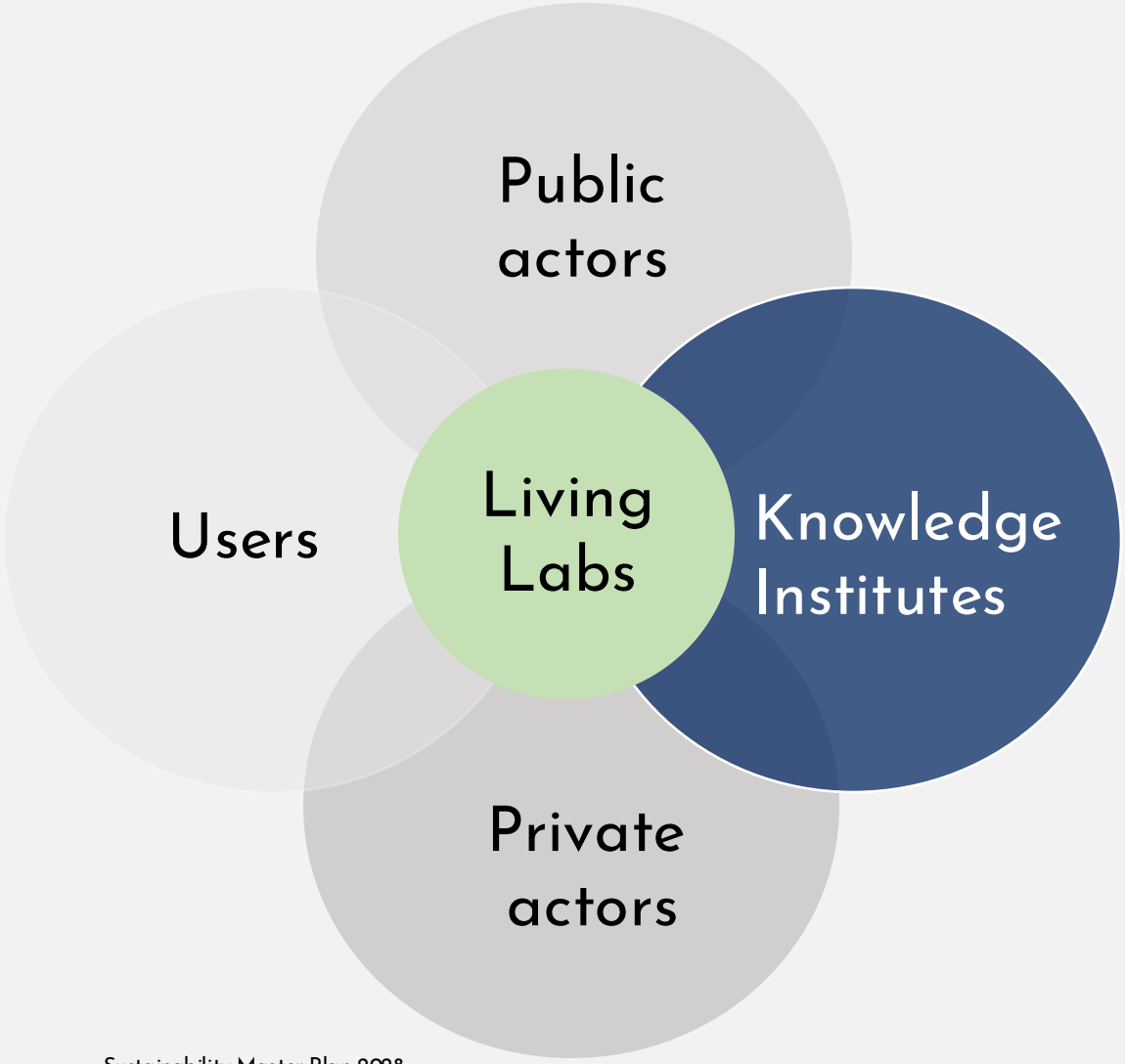
Impact:

- **46** new projects
- **$17.2M** from HKUST over 5 years
- **$40M** total funding over 5 years

Living Lab accelerates sustainability at all scales from student to GBA



The current funding structure and funding history of Living Lab



HK $ 50 Million

100 % from President Shyy

Partial grants	Full grants
4 projects	26 projects
$ 25,000	$ 800,000

Started since 2018

Source: Sustainability Master Plan 2028

Situation Analysis

Securing Funding for the Sustainability and Growth of Living Labs Amid Existential Challenges

Immediate Crisis

Inadequate Funding

President Shyy will retire and his funding is about to expire

$ 2.6 Million

Survive

Long-term Problem

Funder Diversification

Solely relying on the university/ personal budget is not sustainable

$ 40 Million

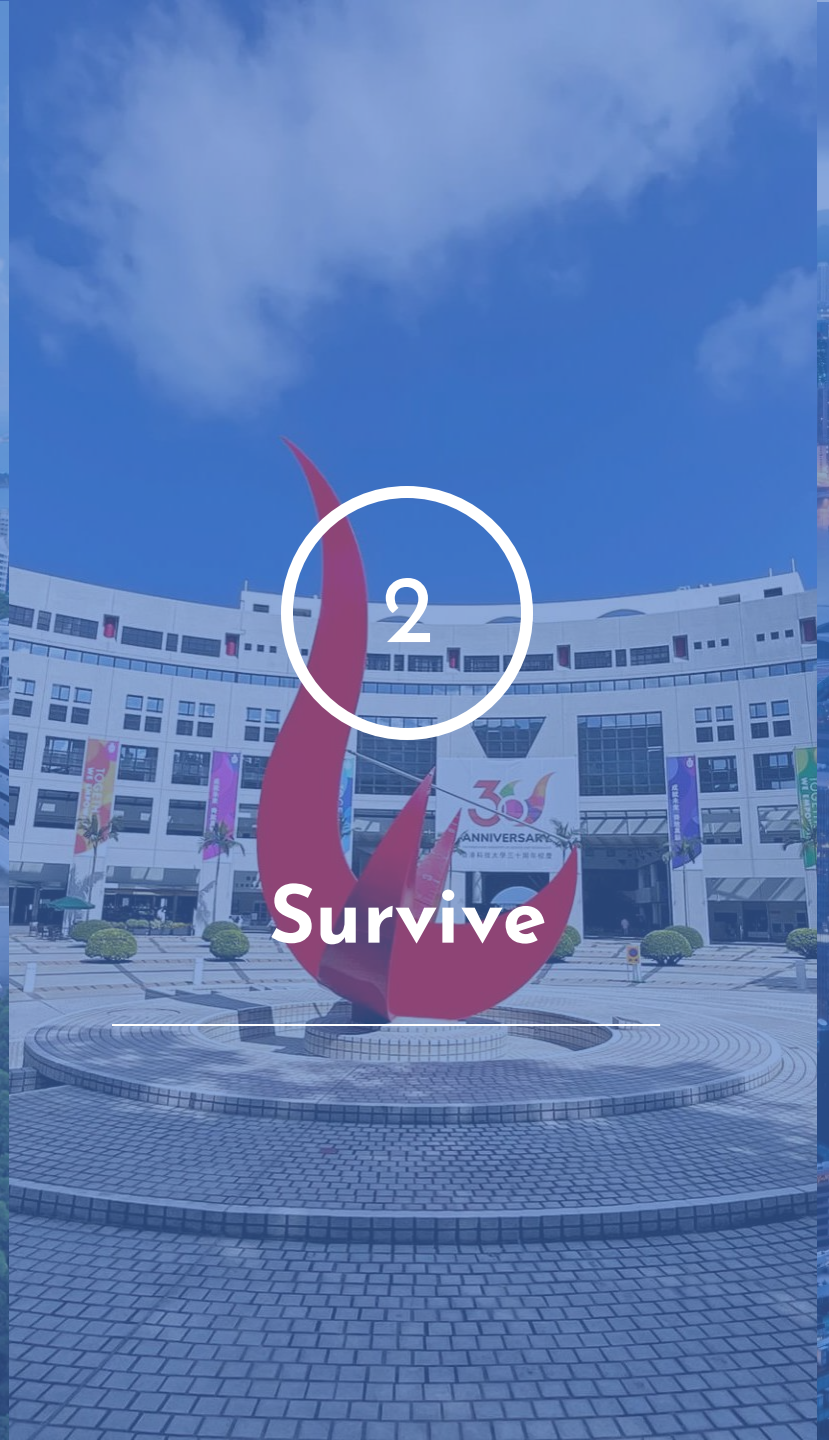
Thrive

Overcoming the ambiguous purpose and inconsistency

Source: HKUST Business Schoolx

1

Restructure



2

Survive

3

Thrive

The current vision is too broad and difficult to measure

Sustainability/ Net Zero Vision

creating the conditions for people to thrive, over time, and within planetary boundaries

- ☑ Project Champion
- ☑ Visibility and Educational Potential
- ☑ Stage of Development
- ☑ Value for Money
- ☑ Sustainable and Smart

Source: Case materials

SSC needs a clear purpose and specific rubric categories with KPIs

New Vision

All four stakeholders will leverage HKUST as a lab for sustainability innovation on campus and in the Greater Bay Area

- **2 large-scope projects** ($800,000 max)
- **2 medium-scope projects** ($400,000 max)
- **2 small-scope projects** ($100,000 max)

Energy and GHG	energy footprint, GHG emissions
Water	water sources, consumption levels
Waste to the Landfill	waste produced, percent recycled
Landscape and Biodiversity	soil composition, biodiversity zones
Community Well-Being	staff & student surveys, nutrition
Miscellaneous	Encourage outside-the box thinking; case-by-case KPIs

Source: Progress and Performance | HKUST Sustainability

Survive with Immediate Funding: HKUST and the Private Sector

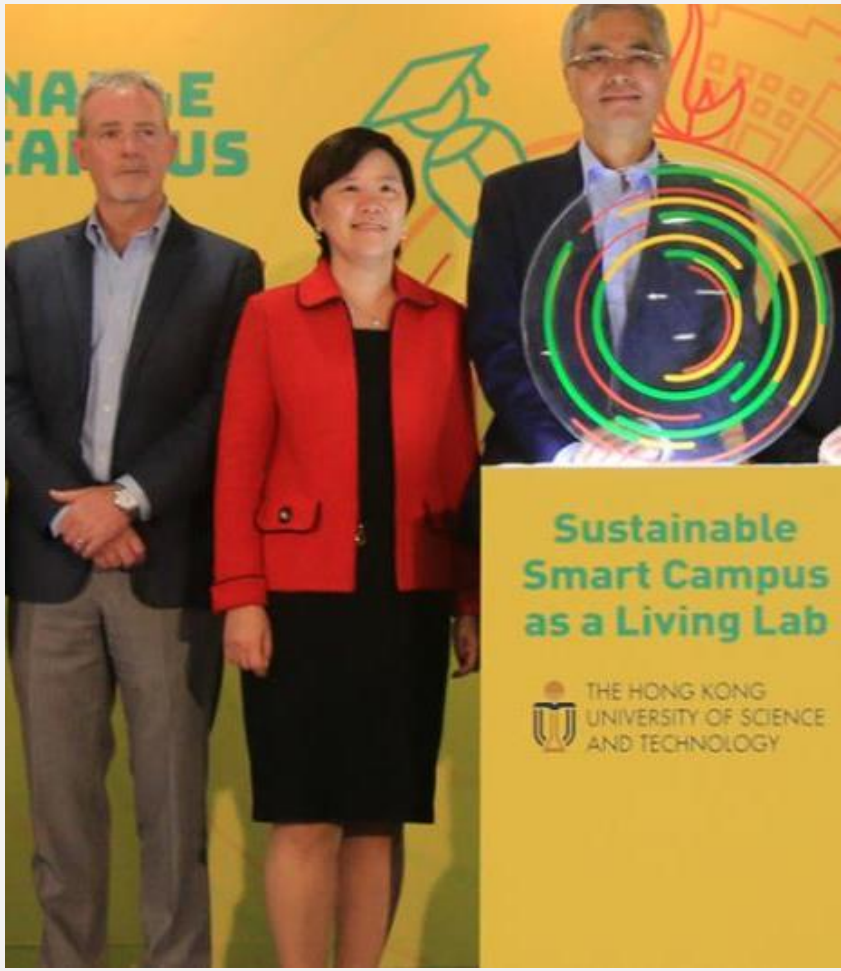
Nancy Ip's new administration is a key to immediate funding

Passing the Torch

President Wei Shyy
$50 million
over 4 years

President Nancy Ip
$17.2 million
over 5 years

New Administration Priorities	Encourage Research & Innovation	Support Sustainability & Social Impact
SSC Alignment with HKUST	Greater Bay Area Vision	Master Plan Rubric Categories



Source: HKUST Drupal Platform Demonstration Website, hkust.edu.hk

Partner with Entrepreneurship Center

Direct Projects Towards Alternate Funding Opportunities

"The Able Company" - bread waste recycling from bakeries into pale ale
"Planeteers" - vegan and biodegradable cutlery to eliminate waste from plastic utensils

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Existing VC Partnerships with Entrepreneurship Center

GOBI PARTNERS
GREATER BAY AREA

SPARK VENTURES

ALPHATRIO

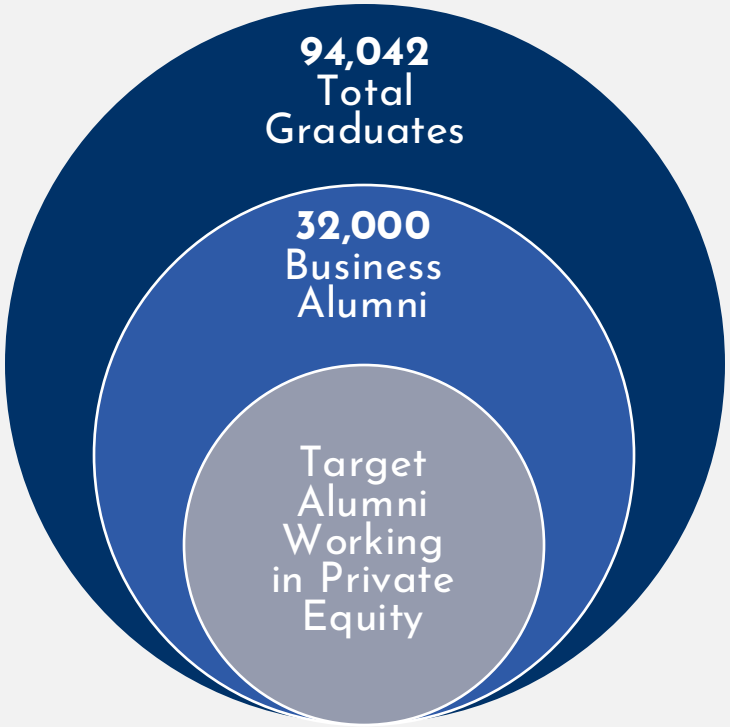
科控資本 COCOON IGNITE VENTURES

HONG KONG

Source: https://hkust.edu.hk/news/entrepreneurship/hkust-sino-one-million-dollar-entrepreneurship-competition-2021-spotlights
https://ec.hkust.edu.hk/one-million/home

Leverage Strong Alumni Network for Funding

Reach out to HKUST Alumni Association



Alvin Lam
Managing Partner, T12M

VC and Angel Investments

Focus on Information Technology and Artificial Intelligence

Yuze Han
Founder, NewMargin Ventures

Focus on green, low carbon sectors: new energy, materials, medical, and advanced manufacturing

Source: bm.hkust.edu.hk, alum.hkust.edu.hk

Create Competition for Existing Projects to Access VC Funding

Partner with Entrepreneurship Center
for expertise in competition organization and fundraising

Who can participate?
All Projects within the Living Lab

Structure:
Pitch competition to VC partners to determine who wins a pre-set prize

Concern

- Engineering and researchers may not want to enter a competition, which involves business skills

Goal

- Create route for **funding without discouraging** STEM-focused students, who lack "pitching" skills

Solution

- Create **partnership** with business students who have **experience** with presentations

Source: eller.arizona.edu

Thrive with Alternative Funding: Government and User Groups

Hong Kong government is looking to fund sustainability in the long term

Pilot Green and Sustainable Finance Capacity Building Support Scheme
$200 million investment by HK government for students

Partnership Research Program (PRP)
Supports research and development for "local public research institutes in collaboration with companies."

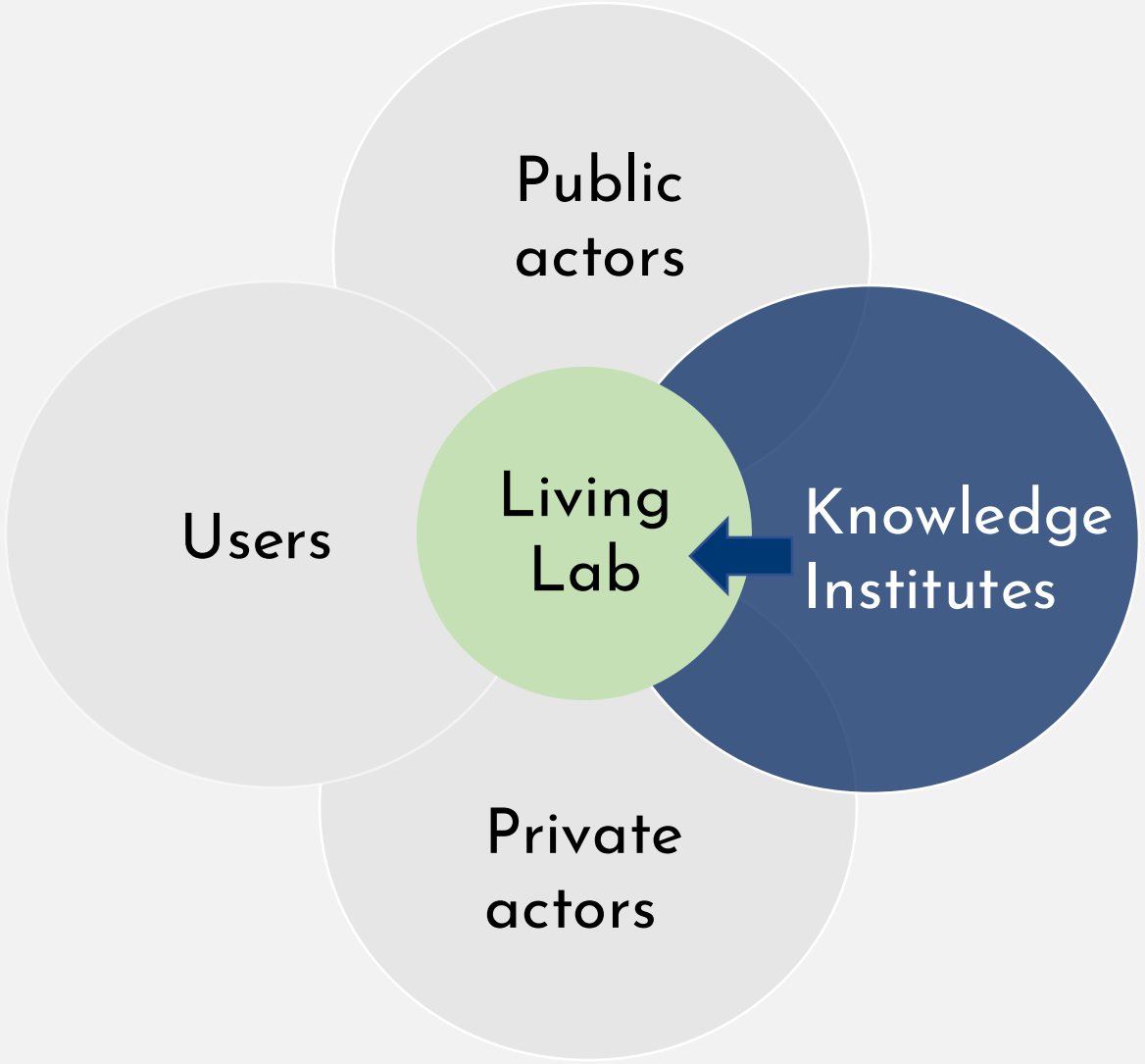
Source: www.itf.gov.hk/, www.hkma.gov.hk, www.info.gov.hk

Capitalize on mature projects through a pay-by-use system

- Staying smart by taking a nap
- Students limited to one 20-minute nap per day due to high demand
- 70% of Hong Kong students experience sleep deprivation
- 55 HKD / hour

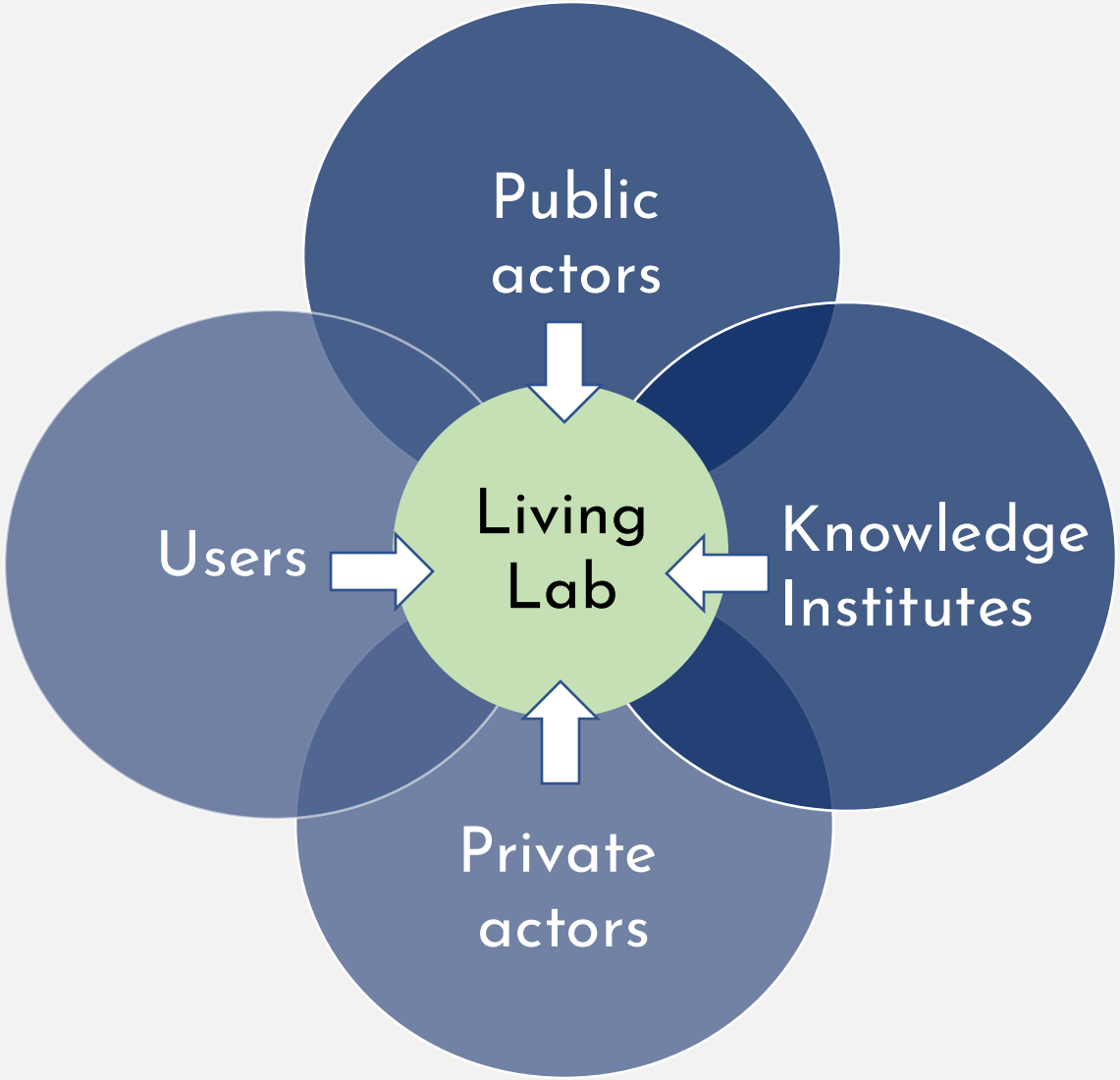
Source: www.researchgate.net

Right now, only one stakeholder is funding the Living Lab



Source: Living Lab Case

With our funding implementation, we will see 4 stakeholder synergy



Source: Living Lab Case

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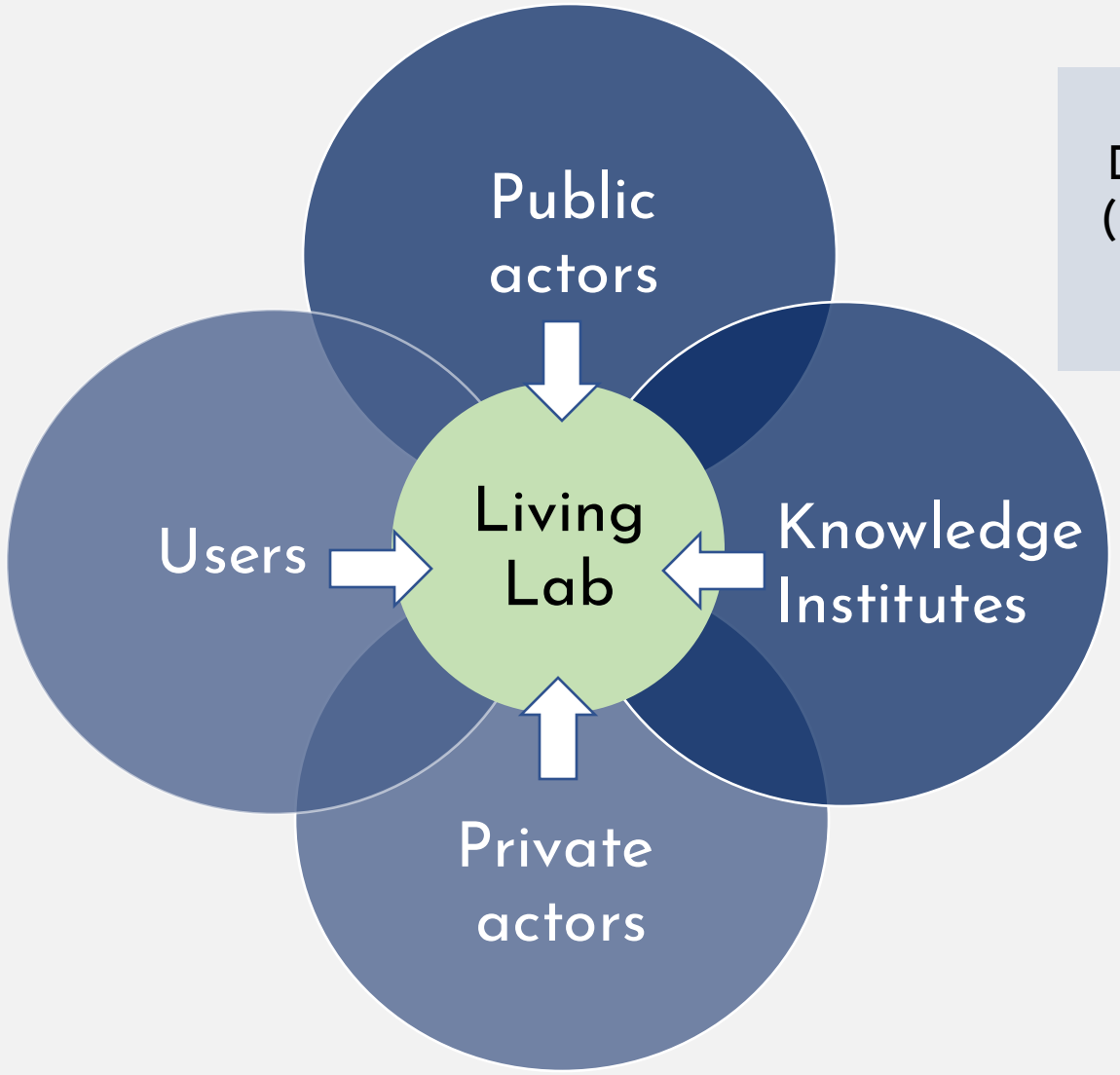
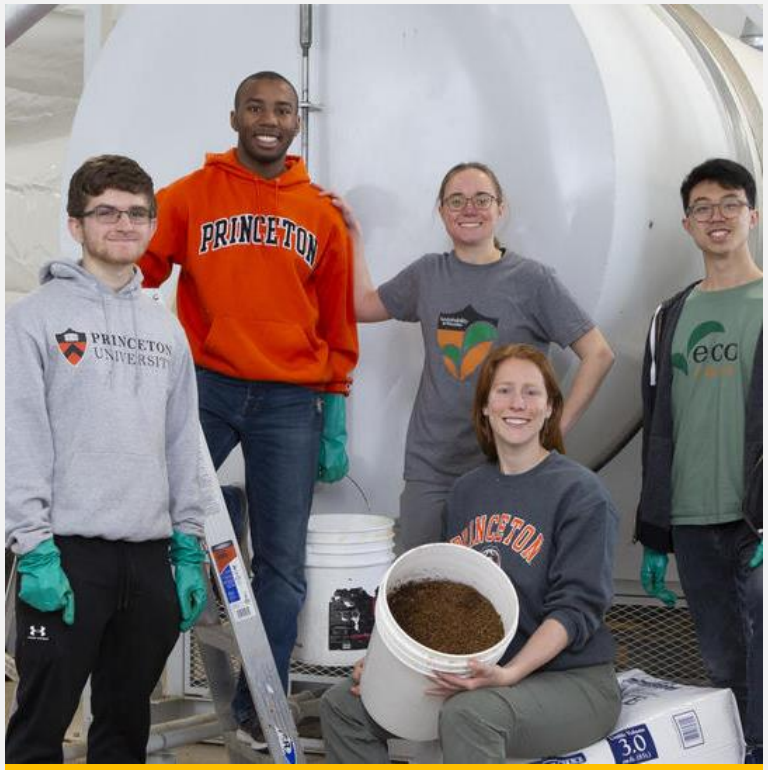


Direct stake (entire living lab)

Indirect stake (individual projects)

Source: Living Lab Case

Case Study: Princeton University Campus as Lab (CAL)



Sustainable Composting Research at Princeton (S.C.R.A.P.) Lab

Student and faculty use campus to advance sustainability on campus, broader community, and around the world.

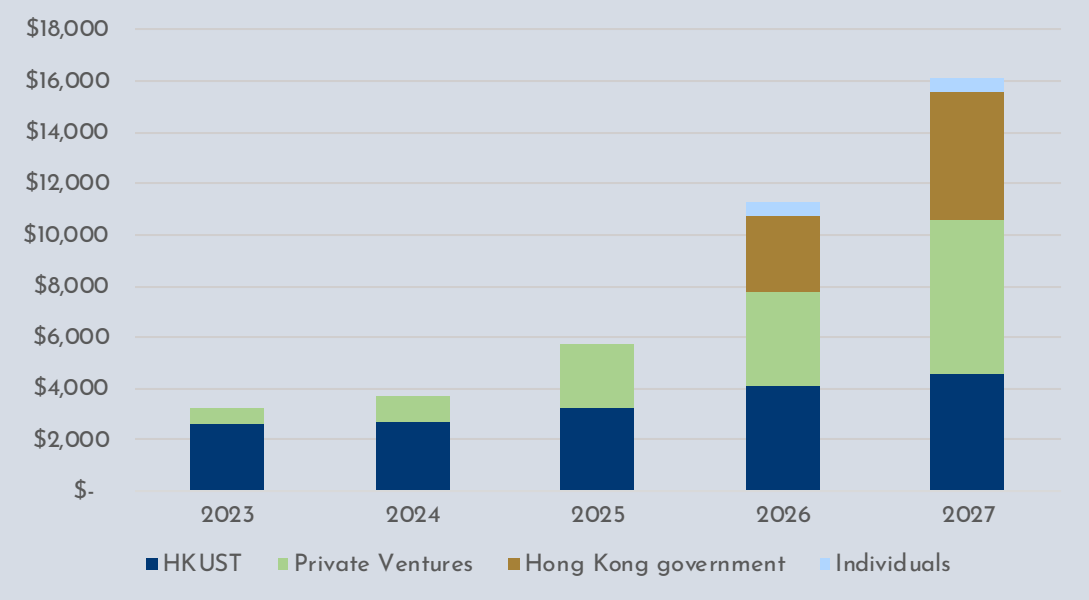
High Meadows Foundation Fund: $10,000/project, 11 projects in 2019

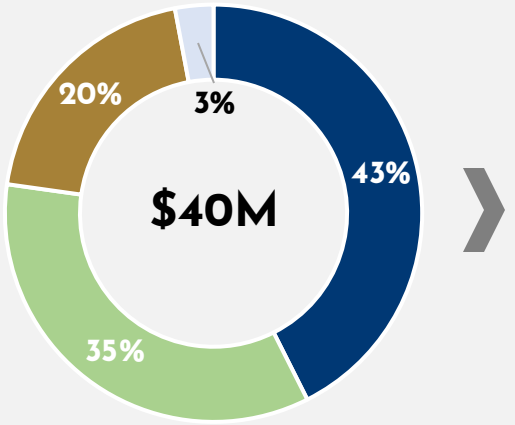
Follows Princeton University Sustainability Action Plan's 7 Overarching Goals

Source: Princeton CAL

Investment

The new funding scheme will involve all four stakeholders within SSC





- HKUST
- Private Ventures
- HKSAR Government
- Individuals

HKUST's contribution

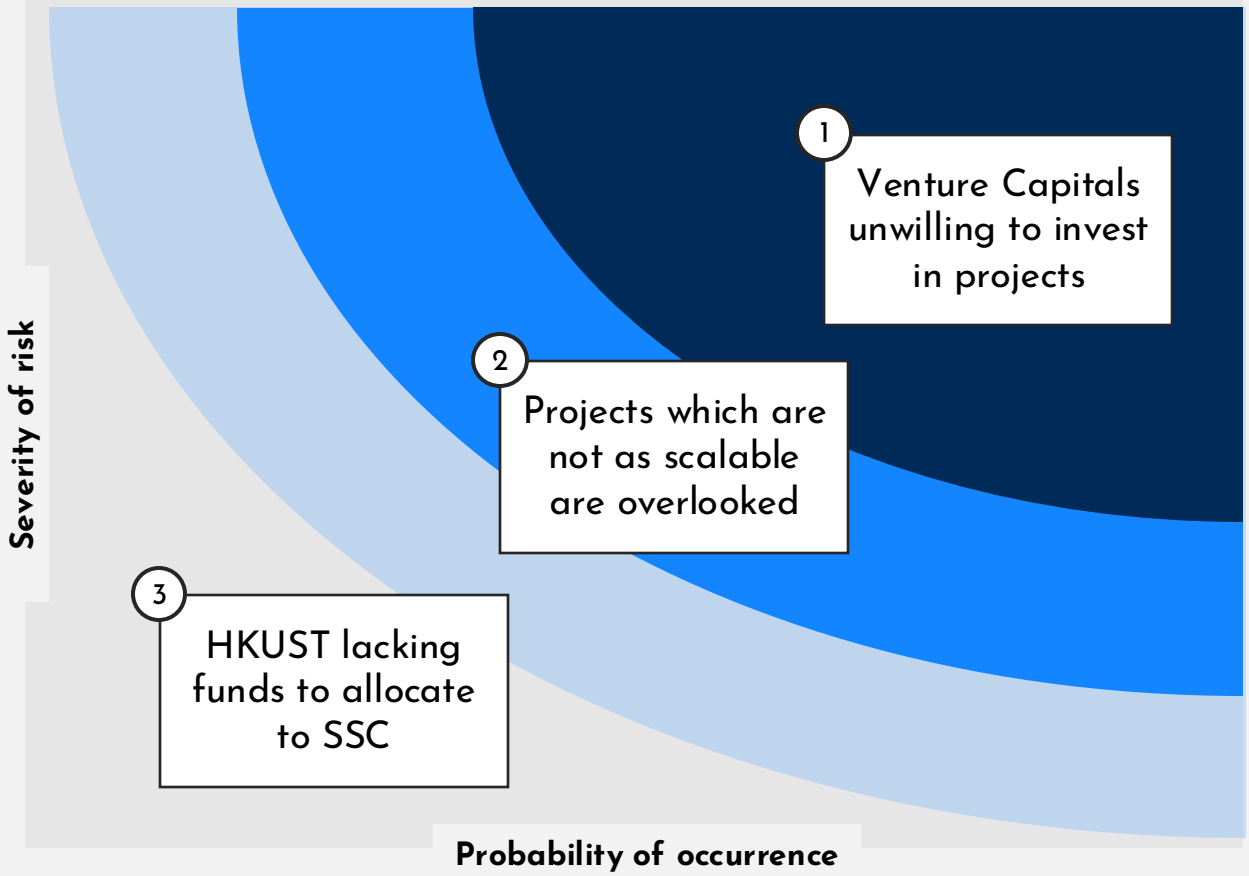
- ✓ HKUST will contribute with **$17.2M over five years**
- ✓ In 2023 HKUST will provide **80% of total investment**
- ✓ **46 new projects** will be granted funds

$40M

Total funds gained over 5 years

Source: HKUST Entrepreneurship Center, Crunchbase, HKUST Entrepreneurship Fund, info.gov.hk, Government Partnership research Programme

SSC should remain adaptable to mitigate risks



1 Venture Capitals

Help projects individually apply to funding schemes and ESG-based start-up competitions.

2 Projects

Modify categories based on Nancy IP and Davis Bookhart's KPIs to include important projects.

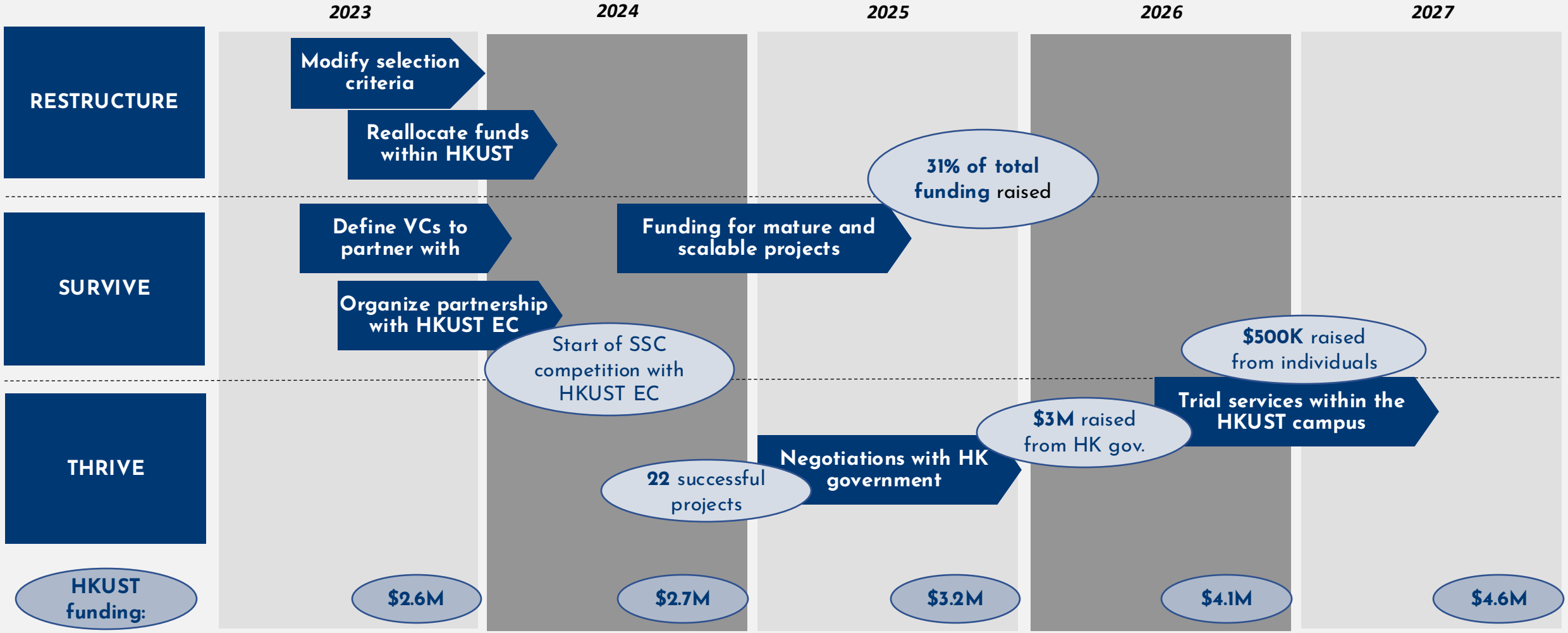
3 HKUST

Diminish the number of projects funded based on HKUST's available budget.

Selected projects should meet specific ESG-based KPIs to be eligible for both VC and HKUST funding

Timeline

HKUST and VCs will be primary investors in the short term



Conclusion

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Appendix

Unified Vision for SSC

SUSTAINABILITY/NET ZERO OFFICE VISION

creating the conditions for people to thrive, over time, and within planetary boundaries

SSC VISION

Knowledge institutions, users, public sector, and private sector stakeholders

will leverage HKUST's unique campus and community

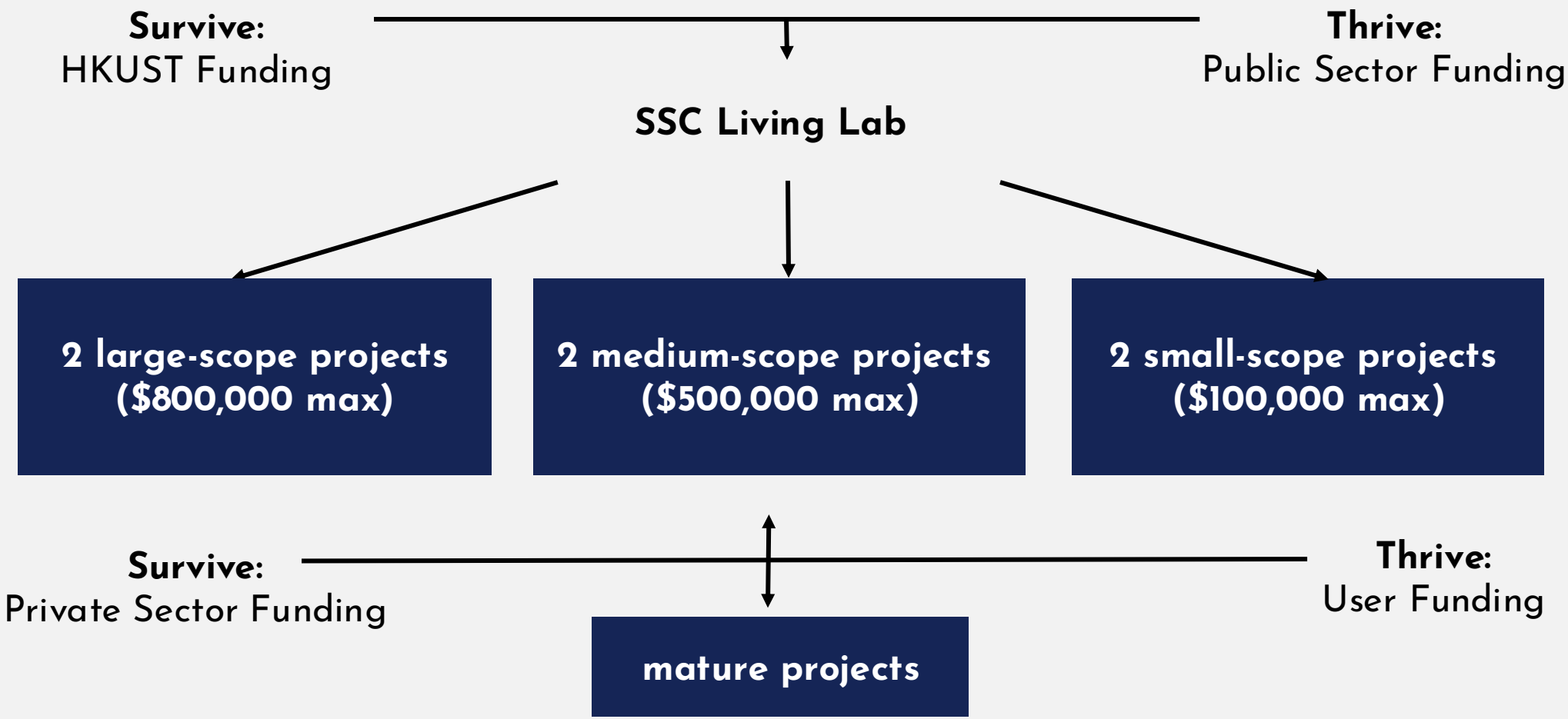
as a lab for experimentation and sustainability innovation

on our campuses and in the Greater Bay Area.

Source:

Appendix B

New Funding Sources & Allocation



Source:

Appendix C

HKUST Budget For Bridge Gap Fund 2023

- Each approved project will typically receive funding support of up to HK$ 0.25M for "Seed Project Support Scheme" and up to HK$ 0.5M for "IP Commercialization Scheme".
  - **Seed project support scheme:**
    - Principal Investigator must be full-time faculty members of HKUST (Clear Water Bay) who have not received any funding support from OKT funding program (including but not limited to PCF, BGF, HBJRI, HKJRI & HCIC) and CSSET funding program.
  - **IP Commercialization scheme:**
    - Principal Investigator must be full-time faculty members of HKUST (Clear Water Bay)
    - Projects should have clear background Intellectual Properties (IPs) with invention/software/know-how disclosure submitted to OKT.
- Funding support is to fund eligible activities within the project (refer to Guideline) for up to twelve (12) months (from the project commencement date) with tangible deliverables. Unexpended balance must be returned to HKUST.

Source: HKUST

Appendix D

HKUST Additional Funding For BGF And SSC Initiatives

- Additional funding of up to $0.1M will be offered to awarded BGF projects for demonstrating sustainability contributions through the Sustainable Smart Campus as a Living Lab (SSC) initiative for use in developing highly visible and interactive educational components for the HKUST community, and measured by clear and measurable contributions to the United Nations Sustainable Development Goals (SDGs)
  - **Eligibility criteria:**
    - Projects must be approved by the **Seed Project Support Scheme or the IP Commercialization Scheme** before being eligible for SSC support.
    - Projects should demonstrate their contribution to positive social impact by explaining how the work helps advance one or more of the UN Sustainable Development Goals "Targets and Indicators."
    - Must either:
      - implement their prototype or intervention in a visible location on campus which can be the source of the teaching and learning components
      - install a teaching and learning feature in a visible location on campus that directs attention to the project and its educational features.

Source: HKUST

Appendix E

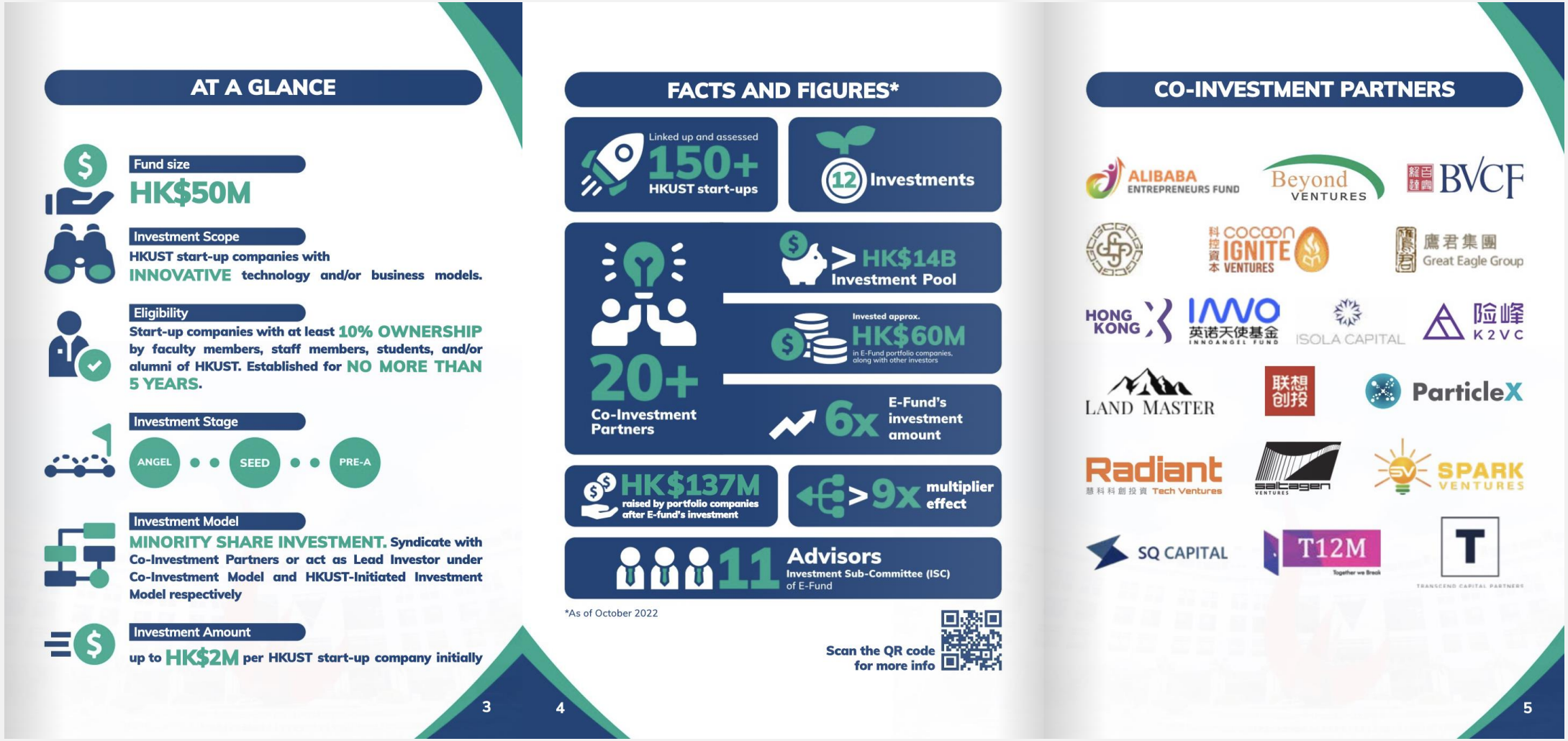
BGF Selection Criteria

- **Potential for Commercialization**
  - Key problem or gap that the proposed technology can solve
  - Market opportunities
  - Target industry players or startup potential
  - Commitment from industry player
- **Technology**
  - Strength of Background IP (patent / patent application, copyrights, software, know-how, database, etc.)
  - Technology and IP development plan
  - Level of innovation and viability of deliverables
  - Possibility to establish the deliverables
- **Project Team**
  - Demonstration of the capability of research and development
  - Adequacy of the team to perform the project

Source: HKUST

Appendix F

HKUST Entrepreneurship Fund (E-Fund)



Source: HKUST Entrepreneurship Fund

Appendix G

HKUST Entrepreneurship Center Accelerator Funds

Name of Accelerator Fund/ Scheme	Supporting Amount /Approved Project	Application Deadline
HKUST Dream Builder Program	up to HKD 100,000	Open all year round
The Lo Kwee Seong Technopreneurship (Tech-Ship) Fund	up to HKD 200,000	27 Feb 2023
Alumni Endowment Fund Student Start-up Grants (AEF)	up to HKD 10,000	Open all year round
Subsidy & Recognition Award for HKUST teams Participating in Entrepreneurship, Innovation & Technopreneurship Competitions/ Programs	Subject to the application	Open all year round
Chan Dang Foundation Social Entrepreneurship Award	up to HKD 60,000	26 Feb 2023

Name of Accelerator Fund/ Scheme	Supporting Amount /Approved Project	Application Deadline
Yeung Wing Yee Entrepreneurs Fund (YWYEF)	up to HKD 200,000	Closed - No longer available
U*STAR Award	up to HKD 50,000	Closed - No longer available
HKUST Entrepreneurship Acceleration Fund (EAF)	up to HKD 15,000	Closed - No longer available
HKUST Entrepreneurship Development Fund (EDF)	up to HKD 20,000	Closed - No longer available

Source: HKUST Entrepreneurship Center

Appendix H

Target Private Ventures Investments

NewMargin Ventures

Series C - Changyang Tech	CN¥150M
Seed Round - Kiddiwinkie Academy	—
Series B - Bugbank	—
Series E - Mafengwo	$250M
Series A - Kuailaicai	$3M
Series A - Shikong Suo	CN¥10M
Series A - Xnw.com	CN¥10M

Gobi Partners

Seed Round - Durioo	MYR12.5M
Series B - Komunal	$8.5M
Seed Round - Wristcheck	$8M
Seed Round - HD	$6M
Seed Round - Future salad	$2.9M
Series A - Great Bay Bio	$15M

Spark Ventures

Seed Round - NeoImmune	CN¥30M
Series A - pickupp	—
Seed Round - pickupp	—
Seed Round - Scintilla Global	—
Series A - Aqumon	—
Series A - Find Solution Ai	$1.7M

Source: Crunchbase

Appendix I

PE Partnership Companies

Alphatrio: Green Tech, Agrifood Tech and Financial inclusion. Focus on social *and environmental impact.*

Gobi Partners, Greater Bay Area: Technology-related equity

SPARK Ventures: Innovative Infrastructure and Enterprise Technology

Cocoon Ignite Ventures: focuses on early-stage startups for sustainability

HKX Technology: Big data, Artificial Intelligence, Robotics, Biotechnology, Medical Science, Medicine, Microelectronics, Materials, Energy

Source: https://e-fund.hkust.edu.hk/partners

Appendix J

Case for Partnerships Between Engineering and Business

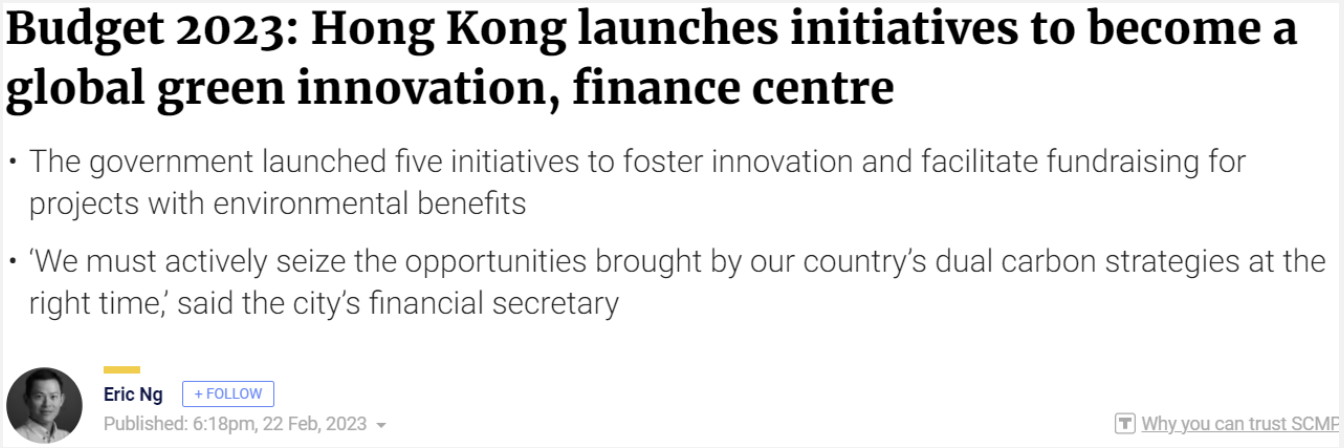
"Engineering and business students have much to learn from each other – and from coursework that covers both fields."

Source: https://eller.arizona.edu/news/2023/01/new-entrepreneurial-initiative-connects-engineering-business-students

Appendix K

Hong Kong Cares About Sustainability

Hong Kong set 2025 Target for Carbon Neutrality



Budget 2023: Hong Kong launches initiatives to become a global green innovation, finance centre

- The government launched five initiatives to foster innovation and facilitate fundraising for projects with environmental benefits
- 'We must actively seize the opportunities brought by our country's dual carbon strategies at the right time,' said the city's financial secretary

Eric Ng + FOLLOW
Published: 6:18pm, 22 Feb, 2023
Why you can trust SCMP

In 2021, Legislative Council passed the municipal solid waste-charging bill
Addressing waste issue where only 29 percent of people recycle

Source: https://www.scmp.com/business/china-business/article/3211122/budget-2023-hong-kong-launches-initiatives-become-global-green-innovation-finance-centre
https://www.scmp.com/comment/letters/article/3147008/how-hong-kong-can-get-most-out-its-waste-charging-scheme

Appendix: Pricing of Nap Pods

Going Price for Airport "NapCabs" is 10-15 USD per hour. (Conversion: 78-117 *HKD per hour)*

Student discount of 30%

55-82 HKD per hour

Start at 55 HKD per hour to gauge success of new pricing structure

IMPACT example: average cost of nap pod is 78,491HKD. If students use a nap pod for 5 days a week for 5 hours per day, the nap pod will be paid off in 57 weeks.

Source: https://www.purevpn.com/blog/airport-sleeping-pods/#:~:text=NapCabs%20average%20price%20ranges%20from,10%2D15%20USD%20per%20hour.
https://www.physicianstweekly.com/how-much-would-you-pay-for-a-nap/#:~:text=The%20cost%20of%20one%20sleep,high%20schools%20in%20the%20US.

Appendix M

ESG KPIs examples based on new metrics

Energy and GHG

-8% KhW

Electricity

Water

100 L

Water saved on campus

Waste to landfill

+700%

Recyclables (tons)

Landscape and biodiversity

-30%

Greenhouse gas (ton CO2-e)

Community well-being

-10%

Food waste recycling (tons)

Miscellaneous

N/A

Source: Impacts | Sustainable Smart Campus as a Living Lab (hkust.edu.hk),

Appendix N

Investment and project amount in detail

Investment amount (in thousand HKD)

	2023	2024	2025	2026	2027	Total %
HKUST	$ 2.600	$ 2.700	$ 3.200	$ 4.100	$ 4.600	43%
Private Ventures	$ 650	$ 1.000	$ 2.500	$ 3.650	$ 6.000	35%
Hong Kong government	$ -	$ -	$ -	$ 3.000	$ 5.000	20%
Individuals	$ -	$ -	$ -	$ 500	$ 500	3%
Total	$ 3.250	$ 3.700	$ 5.700	$ 11.250	$ 16.100	100%
Total %	8%	9%	14%	28%	40%	$ 40.000

Projects funded

	2023	2024	2025	2026	2027	Total
Large	2	2	2	3	3	12
Medium	2	2	3	3	4	14
Small	2	3	4	5	6	20
	6	7	9	11	13	46

Projects funded (thousand HKD)

	2023	2024	2025	2026	2027	Total
Large	$ 1.600,00	$ 1.600,00	$ 1.600,00	$ 2.400,00	$ 2.400,00	$ 9.600,00
Medium	$ 800,00	$ 800,00	$ 1.200,00	$ 1.200,00	$ 1.600,00	$ 5.600,00
Small	$ 200,00	$ 300,00	$ 400,00	$ 500,00	$ 600,00	$ 2.000,00
	$ 2.600,00	$ 2.700,00	$ 3.200,00	$ 4.100,00	$ 4.600,00	$ 17.200,00

Funding	
$ 800,00	large projects
$ 400,00	medium projects
$ 100,00	small projects

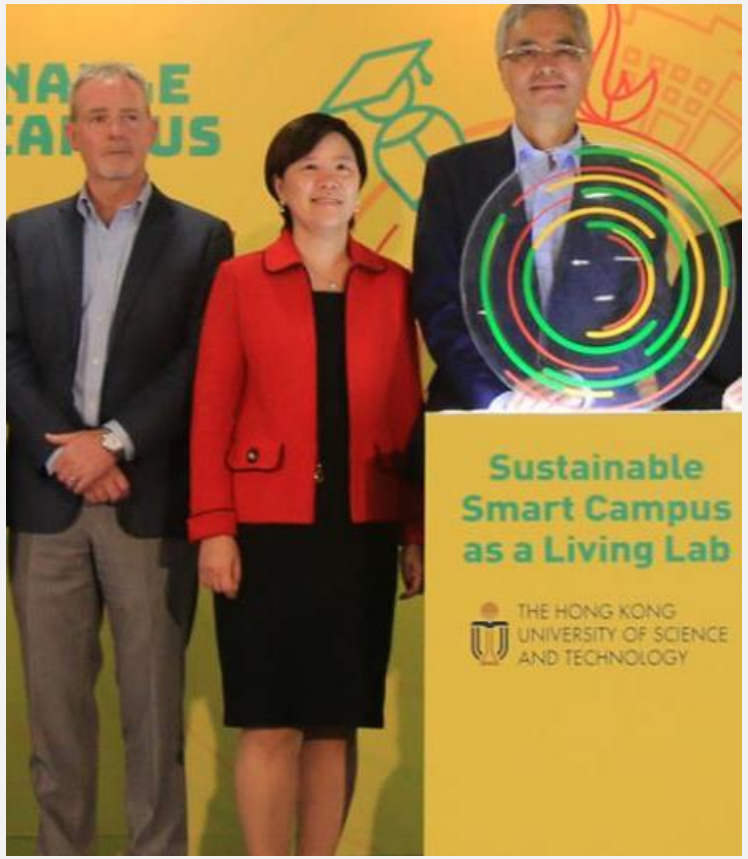
Source:

Appendix O

Passing the Torch: Requesting Funding from the New Administration

HKUST is more than just a place to work and study. It is a **thriving community, a hub of ingenuity, and a home** that builds long-term partnerships. I will dedicate myself to ensure that **the flame of innovation** will continue to burn bright.

- President Nancy Ip, 2022



Universities are **microcosms of society**. HKUST has been fully engaged in encompassing business management, policy as well as science and technologies to **make our campus smarter and more sustainable**, and with this endeavor to help advise society's transition to **a future that is greener, more livable, and human centric.**

- President Wei Shyy, 2018

Source: HKUST Drupal Platform Demonstration Website, hkust.edu.hk

Appendix P

Nancy Ip's Bio

About

- Appointed **first female president of HKUST president in October 2022**
- Morningside Professor of Life Science at HKUST

Background

- PhD in pharmacology at Harvard University
- Senior Staff Scientist at Regeneron Pharmaceuticals in New York
- Head of Department of Biochemistry, HKUST
- Dean of Science, HKUST
- **Vice-President for Research and Development from 2016 - 2022**

Accomplishments

- Extensive **research contributions in Alzheimer's disease** and molecular mechanisms underlying brain development and synaptic plasticity
- Serves on the Advisory Committee on Innovation and Technology to the HKSAR Government and supports **government partnerships and research funding policies**

Sources: (1), (2),

Source:

Appendix Q

Nancy Ip's Goals

1) Social Impact and Sustainability Research
"Nurturing a solution-focused mindset, we will **develop technologies and implement novel concepts** to help address **pressing global issues, such as aging populations, pandemics and the climate crisis**. It is also of paramount importance that we continue to innovate, internationalize, and further integrate **our University community**."

2) Synergy with the HKUST Guangzhou Campus and the Greater Bay Area
"The faculty, staff, and students of the **two campuses** will work together to create a new chapter of HKUST, and make greater contribution to our country and the **Greater Bay Area (GBA)** in terms of education, scientific research and knowledge transfer."

Source:

Appendix R

Nancy Ip's Recent Activities as President

HKUST and the Institute of Sustainability and Technology sign a Memorandum of Understanding, November 2022

"Through our core missions in research, teaching, and innovation, we are grooming the next generation into responsible professionals and leaders, and contributing to solving pressing environmental and social issues." (source)

New HKUST President Prof. Nancy IP Responds to Policy Address, October 2022

"HKUST emphasizes both basic and applied science, and has always been dedicated to the transformation of research findings to applicable solutions. We will also encourage our students and faculty to actively participate in the Research, Academic and Industry Sectors One-plus Scheme."

HKUST2.0 to Drive Complementary and Collaborative Development of Its Hong Kong and Guangzhou Campuses, August 2022

Once our new campus in Guangzhou opens in September, we will have expanded capabilities and resources, and wider expertise, all of which will be available to our members on both campuses.

Source:

Appendix S

Hong Kong government is looking to fund sustainability in the long term

Pilot Green and Sustainable Finance Capacity Building Support Scheme
Launched by Green and Sustainable Finance Cross-Agency Steering Group
$200 million investment by HK government for students

Partnership Research Program (PRP)
Launched by Innovation and Technology Fund - Innovation and Technology Commission
Supports research and development for "local public research institutes in collaboration with companies."

Source: www.itf.gov.hk, https://www.hkma.gov.hk/eng/news-and-media/press-releases/2022/12/20221213-5/
https://www.info.gov.hk/gia/general/202211/30/P2022113000390p.htm#:~:text=(2)%20The%20Government%20is%20committed,the%20training%20and%20acquisition%20of

Appendix T

Appendix: Financing from User Groups - Crowdfunding

Groups: campus staff, students, and Hong Kong community

"How crowdfunding can allow Hong Kong's youth to thrive in their own city" by Christopher Tang "Instead of moving elsewhere in the Greater Bay Area or leaving China, entrepreneurial youth should consider starting an innovative business in Hong Kong by raising funds from the public "
https://www.scmp.com/comment/opinion/article/3145114/how-crowdfunding-can-allow-hong-kongs-youth-thrive-their-own-city

Platforms: Kickstarter, Indiegogo

Other Ideas for crowdfunding:

- rewards-based crowdfunding campaign: early-bird discounts to get pledges from backer

Source:

Appendix U

Current approach to measuring impact

- Uncategorized
- Not cohesive
- Data without storytelling

Source: Impacts | Sustainable Smart Campus as a Living Lab (hkust.edu.hk)

Appendix V

Case Study #1: Princeton University

Mission: The CAL program works actively with student and faculty researchers in using Princeton's campus for sustainability research and experiential learning. Explorations into the physical, operational, behavioral, and cultural dimensions of Princeton can generate new knowledge to advance sustainability on campus, in our broader community, and around the world.

Stakeholders: Students, Faculty

- Students: developing new ideas and piloting innovative solutions that advance the University's Sustainability Action Plan
  - Research questions provided to answer: https://sustain.princeton.edu/campus-lab/research-questions
- Faculty: independent project advisors to students researching sustainability-related topics _ deepen student excitement in sustainability
  - Projects may include papers or internships that incorporate sustainability data in teaching and learning.
  - Integrating your research with the CAL Program to demonstrate or showcase applications that go 'beyond academia' and have practical outcomes (real world examples and campus site visits to use in your courses or modules)

Financing: High Meadows Foundation Sustainability Fund

- requests proposals that support the implementation of Princeton's Sustainability Action Plan
- no funding request exceed $10,000 (~ 78,500 HKD)

Requirements: Princeton University's Sustainability Action Plan

- Reduce Greenhouse Gas Emissions to Net Zero
- Reduce Water Usage
- Increase Area Under Enhanced Stormwater Management
- Design and Develop Responsibly
- Cultivate Healthy and Resilient Habitats
- Increase Commuters Using Alternatives to Single-Occupancy Vehicles
- Reduce Waste and Expand Sustainable Purchasing

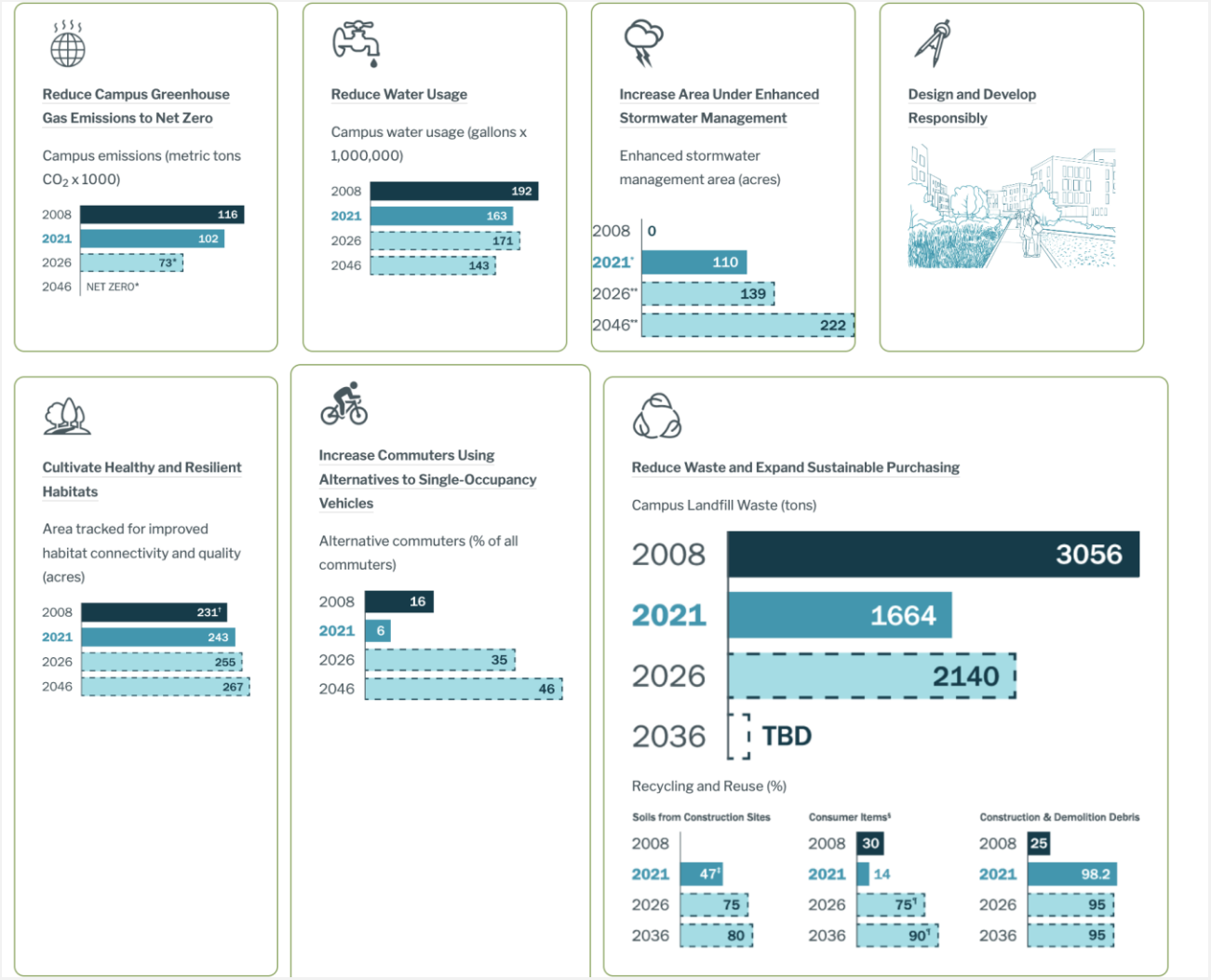
•Notable projects:

- Butler Green Roof
- Princeton Vertical Farming Project
- School Bus Tiny Home

Source: https://sustain.princeton.edu/campus-lab

Appendix W

Princeton University's CAL 7 Action Areas based on University Sustainability Action Plan



Source: Sustainability Action Plan

Appendix X

Princeton University's High Meadows Foundation Fund Recipients 2019

High Meadows Foundation Fund Recipients

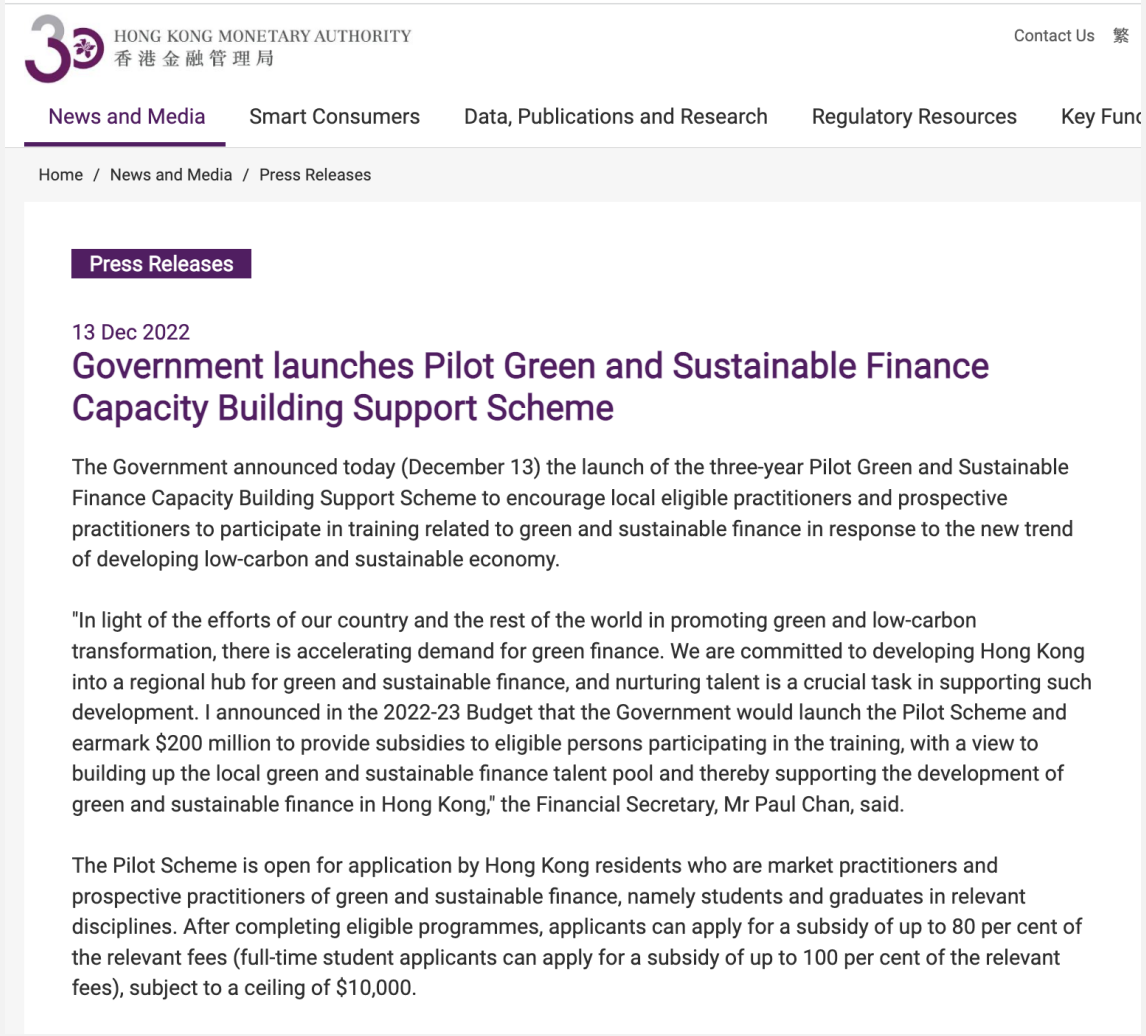
This is the complete list of High Meadows Foundation Fund recipients from 2008 to present. For more information about the **High Meadows Foundation** or to apply for a High Meadows grant please visit the **High Meadows Foundation Sustainability Fund** page.

Project Lead(s)	Proposal Title	Funding Year(s)
Kiley Coates '20	Compost Chemistry: Utilizing Food Waste as a Soil Amendment	2019
Connor Matthews '20	Waste to Work Powering Cold Storage Systems Using Biomass and Solar Power	2019
Nicholas Callegari '20	Princeton X Hendo Senior Project	2019
Dorit Aviv GS	Humidity harvesting for evaporative cooling on Princeton Campus	2019
Urvashi Uberoy '20 and Khyati Agrawal '20	Press to Dress	2019
Xiili Bassett GS	Fungal Bioreactors	2019
Sandra Moskovitz	McGraw Center Sustainable Events Project	2019
Grey Wartinger	Structural Felt	2019
Alex Ju '20	Formula Princeton Racing Electric	2019
Claire Wayner '22	GreenAllies Conference 2019	2019
Rawlison Zhang '20	Princeton Smart Glass	2019

Source: High Meadows Sustainability Fund

Appendix Y

Hong Kong Government Strong Support for Living Lab Concept



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Press Releases

13 Dec 2022

Government launches Pilot Green and Sustainable Finance Capacity Building Support Scheme

The Government announced today (December 13) the launch of the three-year Pilot Green and Sustainable Finance Capacity Building Support Scheme to encourage local eligible practitioners and prospective practitioners to participate in training related to green and sustainable finance in response to the new trend of developing low-carbon and sustainable economy.

"In light of the efforts of our country and the rest of the world in promoting green and low-carbon transformation, there is accelerating demand for green finance. We are committed to developing Hong Kong into a regional hub for green and sustainable finance, and nurturing talent is a crucial task in supporting such development. I announced in the 2022-23 Budget that the Government would launch the Pilot Scheme and earmark $200 million to provide subsidies to eligible persons participating in the training, with a view to building up the local green and sustainable finance talent pool and thereby supporting the development of green and sustainable finance in Hong Kong," the Financial Secretary, Mr Paul Chan, said.

The Pilot Scheme is open for application by Hong Kong residents who are market practitioners and prospective practitioners of green and sustainable finance, namely students and graduates in relevant disciplines. After completing eligible programmes, applicants can apply for a subsidy of up to 80 per cent of the relevant fees (full-time student applicants can apply for a subsidy of up to 100 per cent of the relevant fees), subject to a ceiling of $10,000.

Source: https://www.hkma.gov.hk/eng/news-and-media/press-releases/2022/12/20221213-5/

Appendix Z

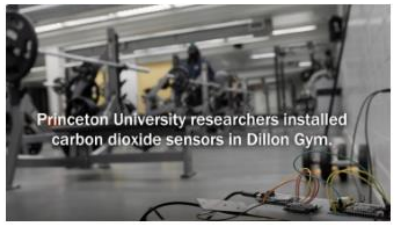
Princeton Campus as Lab Projects

Butler Green Roof

HMEI conducted research on energy and stormwater-related performance factors of the Butler College green roofs from installation 2009 through 2014.

Princeton Vertical Farming Project

The PVFP used a hydroponic and artificial lighting growing system to investigate the viability of feeding a rapidly growing world population with space-saving methods.



CO2 Sensing Project in Dillon Gym

Researchers are using CO2 sensors in Dillon Gym to examine air circulation quality, which can be helpful in determining the transmission rates of airborne pollutants and illnesses like COVID-19.

School Bus Tiny Home

Students retrofitted an old school bus into a sustainable living space to address cost and energy efficiency concerns within the residential housing sector.

S.C.R.A.P. Lab

In September 2018, the Office of Sustainability launched an on-site food scraps composting demonstration project to support the sustainability goals and research and education missions of Princeton University.

Princeton Wildlife Monitoring Project

Astrophysics Professor Gaspar Bakos monitors and observes wildlife in the area surrounding Princeton.

Source: https://sustain.princeton.edu/campus-lab/cal-research-projects

Appendix AA

Case Study #2: University of Minnesota

Mission: Campus grounds aren't only a backdrop at the University of Minnesota. Our Living Laboratories have transformed otherwise un-programmed areas into spaces for innovation, testing, demonstration, and learning

Stakeholders: Students, Faculty, Public Sector

- Students: Proposals and innovation
- Faculty: Required support / advisor role
- Government: Additional funding and support

Financing: UMN Twin Cities Sustainability Committee + Government Grants

- Institute on the Environment Mini Grants (university): up to $3,000
- The Legislative-Citizen Commission on Minnesota Resources through the Minnesota Legislature (gov.): $70 million available / year
- Mississippi Watershed Management Organization Grants (special purpose local gov.): $5,000, $20,000, $50,000 awards

Requirements: University's Core Mission and Regents policy "Sustainability and Energy Efficiency"

Notable projects:

- "Community Connections" garden
- LOW IMPACT TURF GRASS
- BIOPHILIC NET-POSITIVE DESIGN PROJECT

Source: https://sustainable.umn.edu/living-lab

Appendix BB

Case Study #3: University of British Columbia

Mission: Collaborative framework for researchers, students, operations staff and external partners to leverage the campus to explore, develop and test new ideas, and to share the knowledge gained from these experiences.

Stakeholders: Students, Faculty, Private and Public Sector

- Students: Project leads
- Faculty: Advisors
- Private: Athena Sustainable Materials Institute
- Government: City of Vancouver

Financing: CLL Fund Competition

- Up to $50,000 seed funding
- 4-6 projects for 2022-2023
- $200,000 funding budget (~ 1.6 million HKD)

Requirements: UBC's Strategic Priorities and Climate Action Plan 2030

- Climate Action
- Resilient Systems
- Sustainable Places and Communities
- Health & Wellbeing

•Notable projects:

- Leak detection for UBC buildings using autonomous robots
- MycoToilet: Demonstration of a Mycelium-Based Composting Toilet Sustainable Places & Communities
- Digital Detection Web for On-Campus Insects

Source: https://livinglabs.ubc.ca/

Appendix CC

Successful projects from the Living Lab –Urban Spring Smart Hub

Urban Spring Smart Hub

KATHERINE LAM, MEIKE SAUERWEIN, HUNG LAU

Urban Spring Smart Hub will be plugged into 50 standard mechanical drinking water dispensers to read water consumption & operational data in order to enable efficient drinking water facility management and to demystify water quality to the HKUST community. Through connecting to a cloud database with NB-IoT connectivity, information such as water usage, temperature, and filter capacity are collected for management purposes. With public dashboards displaying the number of bottles saved across campus, users will see their collective environmental footprints regarding single-use plastic bottles and water consumption. It aims to cultivate the Bring Your Own Bottle (BYOB) behavior through multi-level data visualization and innovative user interaction.

Map:

What is the problem this project is trying to address?

Currently, HKUST's water dispenser management is manual and costly. Although HKUST closely monitors drinking water quality with water testing and frequent filter changes, much of our campus managers' effort is not communicated through to users, resulting in a lack of trust in water quality. Moreover, plastic pollution awareness campaigns could have a short-term effect on the behavioral change of BYOB. This project targets to improve operational efficiency and long-term community engagement.

How does this project support our sustainable smart campus as a living lab vision?

By digitizing dispenser management, it provides a smart approach to managing water resources on campus, enabling data-driven facility upgrade and expansion in the future. Plastic and filter wastes could be reduced through dispenser usage maximization and education. The project takes an agile and experimental approach to test the effectiveness of public and personalized data analytics, and reward systems to encourage long-term sustainable habits within the HKUST community. Besides, the team brings passionate students along the solution-building journey through hands-on Sustainability x Tech workshops on environmental awareness and resource management, integrating real-life experiments and education.

What's next?

As the next phase of this project, the team will be testing out different approaches for interventions, with a goal to increase the number of people refilling water from fountains and encourage people to drink more water. The interventions would be focused on improving visibility of the dispensers, users' perception on the hygiene conditions of the dispensers, environmental data visualization & communication, as well as personalized incentive schemes.

Source: https://ssc.hkust.edu.hk/projects/empowering-our-community-for-positive-change/urban-spring-smart-hub

Appendix DD

Successful projects from the Living Lab –Pulse of HKUST

Pulse of HKUST

HUAMIN QU

This project is an online platform which aims to build a smart "3C" campus which can 1) Collect various real time information, 2) Communicate amazing stories of the university and 3) Connect the UST community.It serves as a data-driven platform to palpate the "pulse" of the campus community such as human crowds, facility availability, and events. The platform automatically senses real-time crowds based on Wi-Fi access logs and CCTV videos, and visualizes crowd distribution and movement appealingly. It further applies big data technologies to derive useful information about facility status, and utilizes AI techniques to predict crowds. Finally, it communicates those data to the public on various platforms including large-screen displays, Kiosk machines, and mobile websites.

To visit Real-time data page of Pulse, please check out: http://pulse.hkustvis.org/chartScreen.html

For more information, please visit: https://pulse.ust.hk/

11 SUSTAINABLE CITIES AND COMMUNITIES

What is the problem this project is trying to address?

The absence of good and timely information manifests itself in a variety of inconveniences – unnecessarily waiting in lines, difficulty in scheduling activities, delays in communicating with colleagues, and wasting valuable resources. While this has been a part of our normal routine, new ways to collect and utilize data have the potential to eliminate these inconveniences. This project allows both the campus community and visitors to share the benefits of a smart campus. By analyzing and communicating campus big data, it provides a data-driven solution for smart decision-makings on mobility and facility management. As such, it promotes a better campus experience, quality of life, and a stronger sense of ownership, making HKUST a leader in the open-data movement.

How does this project support our sustainable smart campus as a living lab vision?

The project provides a data-driven, evidence-based solution to promote smarter decision-making on mobility and facility management, which can enable us to use resources more efficiently. As the project allows all USTers to contribute, the learning outcomes will be active.

Progress and achievements

Apr 2019: Our project won the Student Innovation Gold Award, Hong Kong ICT Awards 2019 (By Office of the Government Chief Information Officer), and was exhibited at HKTDC International ICT Expo (Smart City, Smart Living Pavilion). [Feature story by Ta Kung Pao]

Mar 2019: The South China Morning Post wrote a feature story about us, namely, Making long queues a thing of the past is the goal for two computing science master's students at Hong Kong University of Science and Technology.

Feb 2019: Pulse of HKUST was highlighted in the HKUST Sustainable Smart Campus as a Living Lab launching event, and received extensive media coverage including 明報, 東網, 香港新聞網, 信報, 文匯報, 新浪教育, 人民網, 新華網, 香港01, 星島, 東方日報, 中联办, 頭條日報, 香港仔,灼見名家, 香港經濟日報, the Standard, China Daily etc.

Nov 2018: Our project was selected as one of the first seven HKUST Sustainable Smart Campus as a Living Lab initiatives and received a funding of HKD 2,600,000.

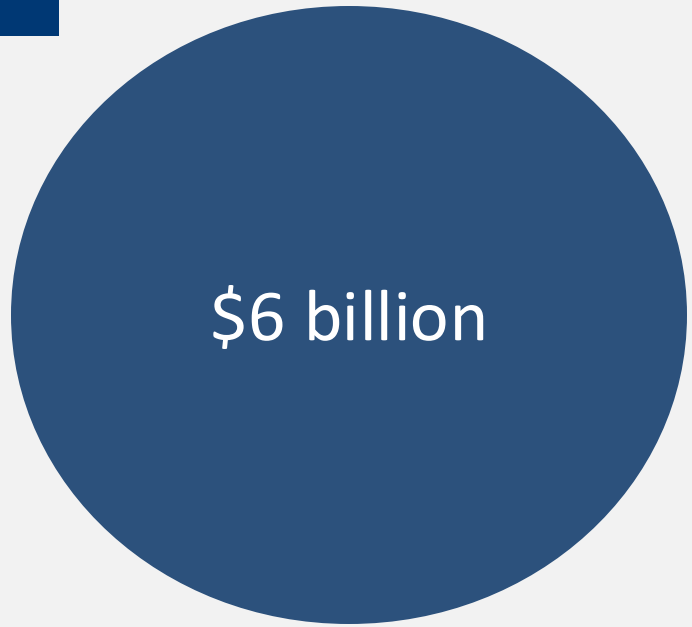
Dec 2018: Our story was available at the School of Engineering yearbook In Focus.

Oct 2018: Mr. Wu presented this work as an extended abstract at the VISComm Workshop, IEEE VIS at Berlin.

Sep 2018: We released our first demo at the Engineering Commons starting at the HKUST Information Day 2018, which visualized the real-time crowdedness such as waiting time at bus stops and available seats at canteens. Our project was also briefly covered by the Sing Pao Daily.

Source: https://ssc.hkust.edu.hk/projects/embracing-digital-resources-for-livability/pulse-of-hkust

HKUST Budget 2023 - 2024



Life & Health Technology Research Institutes

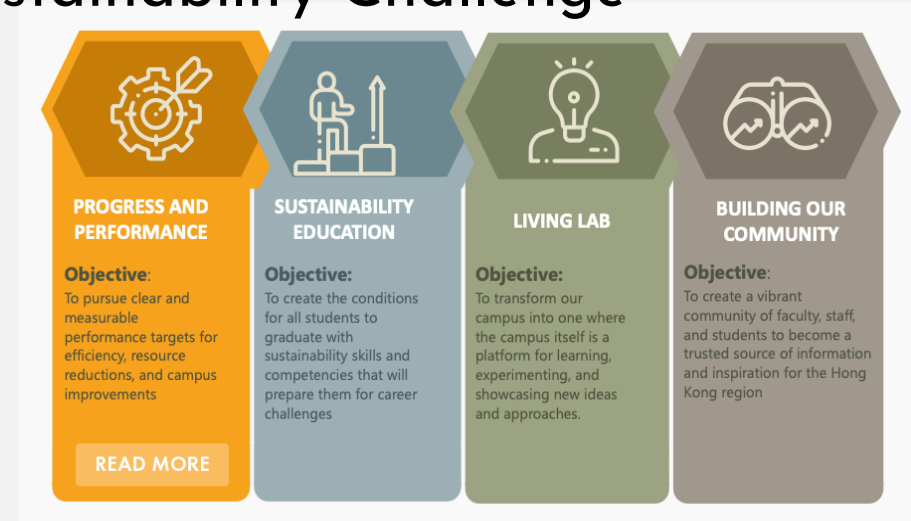
Support for Startups

HKUST appreciates the series of forward-looking measures rolled out in the Budget today, especially those that promote the commercialization of life and health technology research outcomes and basic research on frontier technologies

- President Nancy Ip

Source: HKUST Welcomes The 2023-2024 Budget | The Hong Kong University of Science and Technology

HKUST 2028 Sustainability Challenge



Operations Goal:
Reducing waste to the landfill by 50% and reducing energy consumption by 10% using 2014-15 as the baseline year

Community Goal:
Create an HKUST Sustainability Network to form a core social backbone to support and advance sustainability actions and policies across departments, schools, and the campus.

Demonstration Goal:
Develop visible on-site demonstration projects that contribute to campus sustainability goals while showcasing the work of HKUST researchers as contributors to solving global sustainability challenges.

Education Goal:
Strengthen the administrative and academic connections between the operations and academic sectors of the university to help develop the physical capacity to utilize the campus and grounds as a “living laboratory” for experiential learning in sustainability

SSC is an integral part of achieving these four goals.

Source: HKUST 2028 Sustainability Challenge | HKUST Sustainability

Appendix