

Han-Teng Liao

Socio-Technical System Architect and Researcher (former Associate Professor and Vice Dean)

Taipei and Penang

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Drives global value chain transitions through data-driven innovations, focusing on engineering safe and sustainable systems that span the industrial lifecycles: from the AI and semiconductor nexus, back to upstream petro-chemical inputs, and forward to downstream digital economies.

Professional Service

Peer Reviewers

Editorial

Completed 25+ reviews (mostly Q1 and Q2 journals), esp. on AI and Industry 5.0.

2021 — Present

- **Scientific Reports** (Q1:2) **Financial Innovation** (Q1:3); **Nature Humanities and Social Sciences Communications** (Q1:1)
- **Politics and Governance** (Q2:1), **Frontiers in Public Health** (Q1:1); **Journal of Clinical Epidemiology** (Q1:1)
- **Heliyon** (Q1:2); **Cogent Economics & Finance** (Q1:1); **Applied Economics Letters** (Q3:1); **Future Internet** (Q2:1)
- **Journal of Open Innovation: Technology, Market & Complexity** (2); **Discover Artificial Intelligence** (1)
- **Sustainability** (Q2:4); **Environment Systems and Decisions** (1); **Cogent Education** (Q2:1); **Discover Education** (1)

Technical Committee Member

Technical

Joint IEEE Systems Engineering/TEMS TC on Carbon Neutrality

2026 — Present

- Explore active research and strategies to promote carbon neutrality best practices, driving consortium actions with bodies like **SiNANO** and orchestrating strategic liaisons across IEEE Technical Committees and international organizations.

Program Committee / Technical Reviewer

Technical

ACM/AAAI Conference on Artificial Intelligence, Ethics, and Society (AIES)

2026 — Present

- Serving as an invited technical program committee member and peer reviewer evaluating technical manuscripts on AI governance, ethics, and socio-technical alignment frameworks.

Expert Contributor, International Telecommunication Union

ITU

ITU-T Focus Group on AI for Agriculture (FG-AI4A)

2023 - 2024

- Authored technical input document b-FG-AI4A-I-132 on linking carbon accounting data with agricultural business.
- Successfully integrated the framework into ITU-T Y.Suppl.83 (07/2024) under Section 7.2.7 (TG-Digital Agri-Finance).
- Translates 'Carbon Information Chains' regional best practices into international standard reference.

Student Branch Development & Launch

Guangzhou, China

IEEE Technology and Engineering Management Society (TEMS)

2019 - 2023

- Orchestrated and managed the establishment of the IEEE TEMS Student Branch during tenure as Center Director.

Program Committee Chair (MSIED)

Guangzhou, China

Management Science Informatization and Economic Innovation Development Conference

December 18-20, 2020

Conference Special Session Chair

Guangzhou, China

World Eco-Design Conference (WEDC) 2019

2019

- Chaired the session on **Internet Eco-Design: Sustainable Development Innovation Design and Internet Eco-systems** (第二届世界生态设计大会-互联网生态设计: 可持续发展创新设计与互联网生态).

Program Committee Member

Yogyakarta, Indonesia

14th International Conference of IFIP Working Group 9.4

2017

Invited Expert

United Nations ESCAP

Expert Meeting on Big Data and the 2030 Agenda for Sustainable Development

2015

- Provided expert insights on leveraging big data to advance the UN 2030 Sustainable Development Goals (SDGs).

Visiting Expert

Leiden University, Netherlands

ERC Project "Authoritarianism 2.0"

2014

- Invited by Professor Daniela Stockmann to advise the European Research Council (ERC) project team on digital methods.

Conference Organizer

Washington DC, US

Chinese Internet Research Conference (CIRC 2011)

2011

- Co-organized the conference theme "Chinese Factors in Internet Development: Global Public Goods, National Policies, and Private Interests."

Education

DPhil (Ph.D.) in Information, Communication, and Social Sciences

University of Oxford

Oxford, United Kingdom

10/2007 - 10/2014

- Oxford Internet Institute and Keble College.

M.Sc. in Computer Science and Information Engineering

National Taiwan University

Taipei, Taiwan

01/08/2000 - 01/06/2004

M.S.S. (Master of Social Science) in Journalism

National Taiwan University

Taipei, Taiwan

01/08/2000 - 01/06/2004

B.Sc. in Electrical Engineering

National Taiwan University

Taipei, Taiwan

01/10/1994 - 01/06/2000

- Three-semester exchange (including intensive summer) at the University of British Columbia.

Bachelor of Arts in Foreign Languages and Literatures

National Taiwan University

Taipei, Taiwan

01/08/1995 - 01/06/2000

Work Experience

Project Founder

Penang & Taipei

scvcs.footprints.cv - SSbD Chips Value Chain Services | GBS.today

01/01/2026 - Current

- **Regenerative Socio-Technical Roadmapping and Accounting:** Initiated the SCVCS initiative by establishing a conceptual “Atoms-to-Law” framework, translating complex global semiconductor workflows along the EU-Penang-Hsinchu corridor into an actionable roadmap for smart sustainable manufacturing.
- **Automated Infrastructure Development:** Spearheaded the ongoing architectural design of three core pillars—RealSoS, GuardSoS, and AuditSoS—integrating Trusted Execution Environments (TEEs) and International Data Space connections to automate inline compliance via **professional proxy agents** (GDPR, CSDDD, CBAM) while protecting factory yield telemetry.
- **Consortium Building for EU Funding:** Actively orchestrating international outreach to secure 2–3 EU/UK research partners in SSbD, virtual metrology and FinTech/RegTech, alongside ASEAN packaging hubs and **GBS 5.0 networks**, to co-design pilot deployments for upcoming collaborative funding tracks.

Data Scientist and CEO

Guangzhou, China

Oxford Roadmapping

01/01/2023 - 2025

- **Ecosystem Innovation Visualization:** Designed and deployed specialized visualization prototypes—including **visNetZero** (decarbonization pathways), **visCEADs** (carbon emission datasets), and **NetBib** (bibliometric networks)—to align industrial capabilities with SDG targets and operationalize ITU Digital Innovation Toolkits.
- **Co-Principal 2022ZDJS121 “Roadmapping for Precision-Decarbonization”:** Served as Co-Principal Researcher, Lead Data Scientist, and Corresponding Author for the “Roadmapping for Precision-Decarbonization” project, integrating qualitative policy analysis with quantitative precision analytics.
- **Data Science for Strategic Roadmapping:** Orchestrate workflows transforming raw scientometric, bibliometric, and patent data into strategic narratives to guide regional industrial policies, such as the EU Safe and Sustainable by Design (SSbD) framework and ASEAN Digital Economy Framework Agreement (DEFA).
- **High-Impact Bibliometric Publications:** Authored 4 SCIE/ESCI-indexed (Q2) peer-reviewed articles de-risking green digital infrastructure investments, establishing frameworks for: **Digital Transformation & Business Ecosystems, Partner Maps for ESG Capability Building, ITU-Standard Smart Digital Platforms for Carbon Neutral Management, and Supply Chain Resilience & Human Rights Knowledge Mapping.**
- **Full-Stack De-toxification & SSbD:** Applied the Safe and Sustainable by Design (SSbD) framework

Director, Higher Education Impact Assessment Center

Guangzhou, China

Nanfeng College of Sun Yat-Sen University

12/2019 — 01/2023

- **Strategic Institutional Growth:** Founded and led a university-wide research center to optimize institutional impact and rankings (QS/THE), resulting in the center producing the highest volume of indexed research output in the institution.
- **Data-Driven Quality Assurance:** Architected performance visualization systems to monitor Outcome-Based Education (OBE) metrics, advocating international standards such as the Washington Accord (IIEET).
- **Interdisciplinary AI Integration:** Orchestrated cross-departmental research projects (Engineering, Management, Accounting, and Humanities) focused on AI-SDG EcoInnovations and green digital transformation.
- **Research Orchestration:** Managed a research portfolio (e.g., 2019GXJK186) exceeding 200,000+ RMB, initiating multi-disciplinary reporting for UN Academic Impact, alongside the launch and development of the IEEE TEMS Student Branch.

Associate Professor & Vice-Dean, Internet and New Media

Guangzhou, China

Nanfeng College of Sun Yat-Sen University

01/2017 — 01/2021

- **AI Product Management & Curriculum:** Acted as Lead Product Manager for a "Venture-Ready" GitHub portfolio, overseeing the end-to-end lifecycle of 18 core courses designed to scale capacity for AI solution leaders and product managers.
- **Award-Winning “Smart App Design Innovation Research in the Age of New Business, Arts and Engineering Disciplines [2019GXJK186]”:** Architected province-level "First-Class" Capstone courses (APIs, Machine Learning) using GitHub-based workflows and automation to integrate systems thinking and design thinking for the Internet industry.
- **Quality Assurance:** Led the transition to Outcome-Based Education (OBE) aligned with IEET/Washington Accord standards, using AI Product Manager competencies to align with international education standards.
- **Curriculum-as-MVP:** Designed a modular degree program where students developed PRD, MRD, and BRD documentation and functional prototypes, enabling graduates to transition into UX Design, Front-end Dev, and AI leadership roles.
- **Agile Leadership & Pedagogy:** Recruited and mentored a 7-person faculty team using Agile and Scrum methodologies to iterate on educational delivery, resulting in a reflexive pedagogical framework that allowed high-performing students to accelerate their graduation timeline by one full year (three students). One student was admitted to and graduated from the **European Institute of Innovation and Technology (EIT)**.

Research Fellow

Macau, China

United Nations University (UNU) Institute on Computing and Society

01/07/2015 - 01/11/2016

Yahoo! Fellow, Institute for the Study of Diplomacy

Washington DC, United States

Georgetown University

01/08/2010 - 01/07/2011

Doctoral Research Fellow

Taipei, Taiwan

Institute of Sociology, Academia Sinica

01/08/2009 - 01/06/2010

Political Warfare Officer (Mandatory Service)

Taiwan

Taiwan Military

01/11/2005 - 01/12/2006

Project Manager

Taipei, Taiwan

Open Source Software Foundry (OSSF), Institute of Information Science, Academia Sinica

01/10/2004 - 30/11/2005

Action Researcher & Graduate Teaching Assistant

Taipei, Taiwan

Institute of Journalism, National Taiwan University

01/09/2002 - 01/12/2003

Programmer & Independent Developer (Digital Publishing)

Taipei, Taiwan

Yuan-Liou Publishing Co., Ltd.

01/07/2000 - 31/08/2000

Awards

Certificate of Merit

IEEE TEMSMET Conference

Recognized for outstanding academic contributions

2021

- Awarded for CSR (Corporate Social Responsibility) and ESG (Environmental, Social, and Governance) reporting research.

Province-Level ‘First Class’ Course, Guangdong Department of Education

Guangdong

Curriculum Design & Pedagogy Excellence

2020

- Recognized for the development and instruction of the Capstone Project Course: ‘API, Machine Learning and AI’.

Nation-Level First Prize, National College Art & Design Awards

China

Instructional Excellence

2020

- Awarded for Best Teaching for Capstone Project: ‘API, Machine Learning and AI’.

OxTALENT Awards

University of Oxford

Best Interactive Infographics

2014

- Recognized excellence in university teaching using interactive digital content.

Best Student Paper Award, Chinese Internet Research Conference

University of Pennsylvania

Research Excellence

2009

- Awarded for foundational digital community research.

PGP Corporation and Oxford Internet Institute (OII) Scholarship

University of Oxford

Merit-based Doctoral Scholarship

2007

- Value: £12,000 to support DPhil research.

Publications

From Stacks to Circuits: A Regenerative Socio-Technical Roadmap for AI Infrastructure within Planetary Boundaries

ICE IEEE/ITMC, Porto - Portugal

Conference Paper [doi:10.48550/arXiv.2606.10544](https://doi.org/10.48550/arXiv.2606.10544)

22-25 June 2026

- Contributors: **Han-Teng Liao**; Karen Ang
- Challenges Nvidia's "electrons-to-tokens" five-layer scaling trajectories by converting thermodynamic entropy and Scope 3 metrics into dynamic, regeneratively accountable circuits.
- Introduces a Regenerative Socio-Technical (RST) Roadmap to address the hidden environmental, thermal, cognitive and material costs of unconstrained Generative AI scaling.
- (To be) Presented in **Digital Circular Economy** Special Session, providing the conceptual foundation for the **SCVCS** to anchor its **AuditSoS** Pillar through metrology-grounded Digital Product Passports (DPP).

Scoping Review of AI, Metrology, and ESG in the Semiconductor Sector: Implications for Safe and Sustainable by Design (SSbD)

ICE IEEE/ITMC, Porto - Portugal

Conference Paper [doi:10.31235/osf.io/yknwt_v1](https://doi.org/10.31235/osf.io/yknwt_v1)

22-25 June 2026

- Contributors: Karen Ang; **Han-Teng Liao**
- Proposes a novel six-layer System of Systems (SoS) architecture to integrate AI-driven metrology, supply chain ESG metrics, and federated industrial data spaces into an integrated architecture.
- Bridges the gap between precision manufacturing and verifiable environmental sustainability by embedding SSbD as core operational logic for Industry 5.0.
- (To be) Presented in **Technology** Session, providing the conceptual foundation for the **SCVCS** to integrate RealSoS, GuardSoS and AuditSoS Pillars as a System of Systems(SoS).

Orchestrating the Twin Transition in Multinational Corporations: Technology Roadmapping for Green and Digital Global Business Services

ICE IEEE/ITMC, Porto - Portugal

Conference Paper [doi:10.31235/osf.io/ktcxd_v1](https://doi.org/10.31235/osf.io/ktcxd_v1)

22-25 June 2026

- Contributors: **Han-Teng Liao**; Karen Ang
- Synthesizes Technology Roadmapping (TRM) and the ITU innovation toolkit to treat Global Business Services (GBS) units as strategic "operational airlocks."
- Establishes a socio-technical framework for multinational corporations to harmonize internal digital agility and AI-native transitions with external sustainability mandates.
- (To be) Presented in **Innovation** Session, providing the conceptual foundation for the **SCVCS** to cross-map carbon border adjustment data aggregation under its **AuditSoS** Pillar for regional GBS 5.0 networks.

Digital transformation and innovation and business ecosystems: A bibliometric analysis for conceptual insights and collaborative practices for ecosystem innovation

International Journal of Innovation Studies

Journal article [doi:10.1016/j.ijis.2024.04.003](https://doi.org/10.1016/j.ijis.2024.04.003)

April 2024

- Contributors: **Han-Teng Liao**; Chung-Lien Pan; Zhiying Wu
- Conducted a PRISMA-compliant bibliometric analysis and science mapping of digital transformation (DT) literature focusing on business and innovation ecosystems to unlock pathways toward UN SDGs.
- Proposed a Green Digital Transformation (GDT) innovation roadmap integrating the Triple Helix model with the "ecosystem economy", establishing how digital systems must map onto natural planetary boundaries.
- Concludes that meaningful GDT requires the eco-design of corporate digital strategies, offering a structured "ecosystem innovation" research agenda that balances industrial digitalization with real-time tracking of environmental resources and ecosystem services.

Smart digital platforms for carbon neutral management and services: Business models based on ITU standards for green digital transformation

Frontiers in Ecology and Evolution

Journal article [doi:10.3389/fevo.2023.1134381](https://doi.org/10.3389/fevo.2023.1134381)

March 2023

- Contributors: **Han-Teng Liao**; Chung-Lien Pan; Yuan Zhang
- Evaluated the architectural gap between ITU green digital transformation standards and China's CPCNMSP policy framework, highlighting the latter's omission of "AI of the environment" (infrastructure footprint tracking).

- Synthesized these global standards into a specialized multi-sided Platform Canvas designed to capture metrics, curation pathways, and currency mechanisms for data-driven decisions.
- Modeled an open-innovation business framework featuring targeted engineering design questions to optimize, substitute, and manage greenhouse gas (GHG) emission data for both producer and consumer participant segments.

Collaborating on ESG consulting, reporting, and communicating education: Using partner maps for capability building design

Frontiers in Environmental Science

Journal article [doi 10.3389/fenvs.2023.1119011](https://doi.org/10.3389/fenvs.2023.1119011)

March 2023

- Contributors: **Han-Teng Liao**; Chung-Lien Pan; Yuan Zhang
- Applied design science and circular economy frameworks to map the specific data and digital skills required for ESG consulting and reporting.
- Establishes a collaborative roadmap for universities and industry to build capability for sustainable innovation across disciplines and sectors.

Knowledge Mapping of Resilience and Human Rights in Supply Chains

Frontiers in Environmental Science

Journal article [doi 10.3389/fenvs.2023.1152345](https://doi.org/10.3389/fenvs.2023.1152345)

April 2023

- Contributors: Chung-Lien Pan; **Han-Teng Liao** (Corresponding Author); Yuan Zhang
- Developed a roadmapping taxonomy to integrate human rights and resilience into supply chain architecture.
- Provides a governance framework for the Twin Transition, offering strategic tools for risk mitigation and value-based alignment in complex, cross-border industrial ecosystems.

Knowledge Mapping Analysis of Intelligent Ports: Research Facing Global Value Chain Challenges

Systems

Journal article [doi 10.3390/systems11020088](https://doi.org/10.3390/systems11020088)

2023

- Contributors: **Han-Teng Liao**; Tsung-Ming Lo; Chung-Lien Pan
- Utilized scientometrics and science mapping to analyze the digital transformation of intelligent ports within Global Value Chains (GVC).
- Identifies technical and governance bottlenecks in open and collaborative innovation, providing a strategic roadmap for port-city digital integration.

Carbon neutrality policies and technologies: A scientometric analysis of social science disciplines

Frontiers in Environmental Science

Journal article [doi 10.3389/fenvs.2021.761736](https://doi.org/10.3389/fenvs.2021.761736)

October 2021

- Contributors: Yuan Zhang; Chung-Lien Pan; **Han-Teng Liao**
- Conducted a comprehensive science mapping and systematic review of 907 social science articles to delineate disciplinary boundaries and collaborative frameworks for net-zero pathways. - Highlighted the critical intersection where green digital transformation and datafied environmental indicators must guide human production and consumption patterns.

A Literature Review of Museum and Heritage on Digitization, Digitalization, and Digital Transformation

International Conference on Humanities and Social Science Research (ICHSSR 2020)

Conference paper [doi 10.2991/assehr.k.200428.101](https://doi.org/10.2991/assehr.k.200428.101)

May 2020

- Contributors: **Han-Teng Liao**; Man Zhao; Si-Pan Sun
- Executed a scientometric analysis of 1,107 Web of Science articles using VOSviewer and custom Python scripts to categorize distinct layers of socio-technical transitions. - Mapped the shift in cultural institution research fronts from technology-centric concerns to people-centric concerns (digital literacy, organizational adaptation).

Conflict and consensus in the Chinese version of Wikipedia

IEEE Technology and Society Magazine

Journal article [doi 10.1109/MTS.2009.932799](https://doi.org/10.1109/MTS.2009.932799)

June 2009

- Contributors: **Han-Teng Liao**
- Investigated the socio-technical architectures, editorial policy alignments, and hyperlinked structures used to govern consensus in high-conflict, cross-border digital environments. - Analyzed how political and cultural cybernetics operate when collaborative web spaces cross sensitive jurisdictional and ideological boundaries.

More publications and citation indices ...

Academic Profiles

Profile Metrics

Current

- **Digital Portfolios:** Comprehensive tracking and publication records are available via my [ORCID Profile](#) and [Google Scholar Profile](#).
- Includes comprehensive tracking of peer-reviewed articles, conference papers, and citation impact metrics.
- Maintained an accelerating citation trajectory with 800+ total citations (630+ since 2021), achieving an h-index of 16 and an i-index of 24 across leading high-impact sustainability and innovation journals.

Skills

Strategic Architecture & Governance

Integrator of the Socio-Technical: IEEE Systems Council (Social Implications of Technology) and Oxford Internet Institute Multi-disciplinary Training

- AI System & Platform Architecture, ICT System Architecture & Analysis
- Systemic Design Thinking, Software Specification Analysis
- Architecture Generalization, Socio-Technical Systems (STS), **Cyber-Physical Systems (CPS)**, **CPS and Twin Transition**

Intelligence & Foresight (Data Science)

Integrator of Scientometrics/Webometrics and Technology Roadmapping (TRM)

- Strategic Foresight, Knowledge Management, Scenario Planning, Knowledge Graphs
- Scientometrics, Bibliometrics, Webometrics, Science Mapping (Bibliometrix, VOSviewer)

AI, Data Architecture & Automation

Integrator of Open Source/Open Content Ecosystems with Open Science Best Practices

- RAG (Retrieval-Augmented Generation), Harness Engineering, Context Engineering, LLM-Driven Strategic Intelligence, Python (Pandas/NumPy), Semantic Data Modeling, Resource Description Framework (RDF), CMS (Quarto & Obsidian)

Product & Agile Leadership

Integrator of 2017-2023 Undergraduate Program Reform in China for Industry-ready Talents.

- Full-Lifecycle Product Management (MVP to Scale), PRD/MRD/BRD Documentation, UX/UI Design Research, Scrum, Agile Workflows, GitHub-Based Collaborative Engineering

Language Skills

CEFR C2 Certified

High-level cross-lingual communication and global value chain translation capabilities.

- **Chinese:** Native proficiency (Mother tongue).
- **English:** C2 Proficient User (Fluent mastery across Listening, Reading, Speaking, and Writing).