

**Korea's only innovative growth engine
for the environmental industry!**

ICT Convergence Environmental Technology Commercialization Mecca

Incheon Innovation Cluster and Collaboration

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Professor, Department of Environmental Engineering, Incheon
National University**



General concept of R&BD

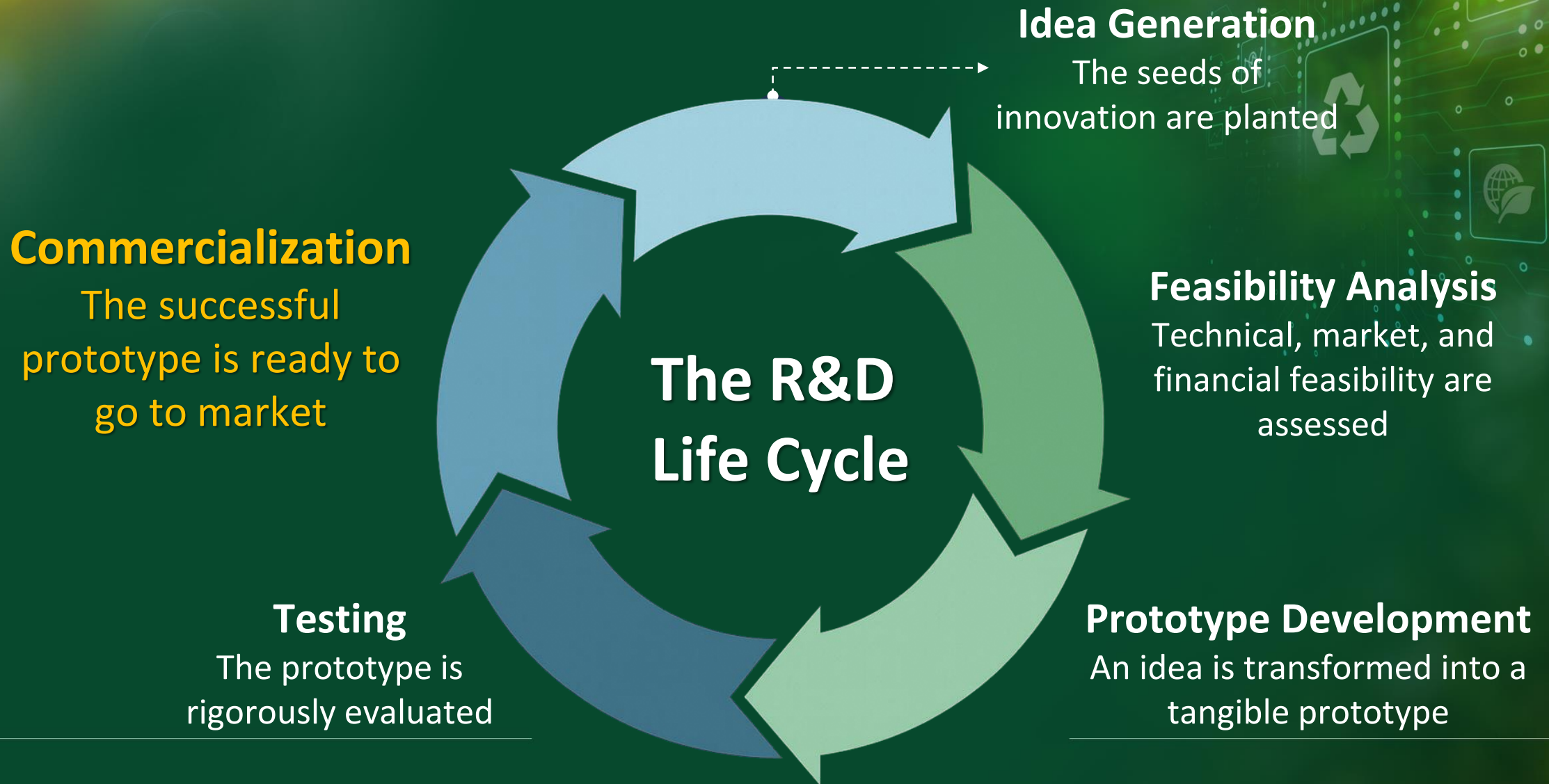
- ❖ *Research & business development*
- ❖ *Review of triple helix model*
- ❖ *Incheon innovation cluster*
- ❖ *Korea – Central Asia Science & Technology Center*
- ❖ *INU – KOICA Climate / Environment Training Program*
- ❖ *Lesson for environmental R&BD*

INNOPOLIS

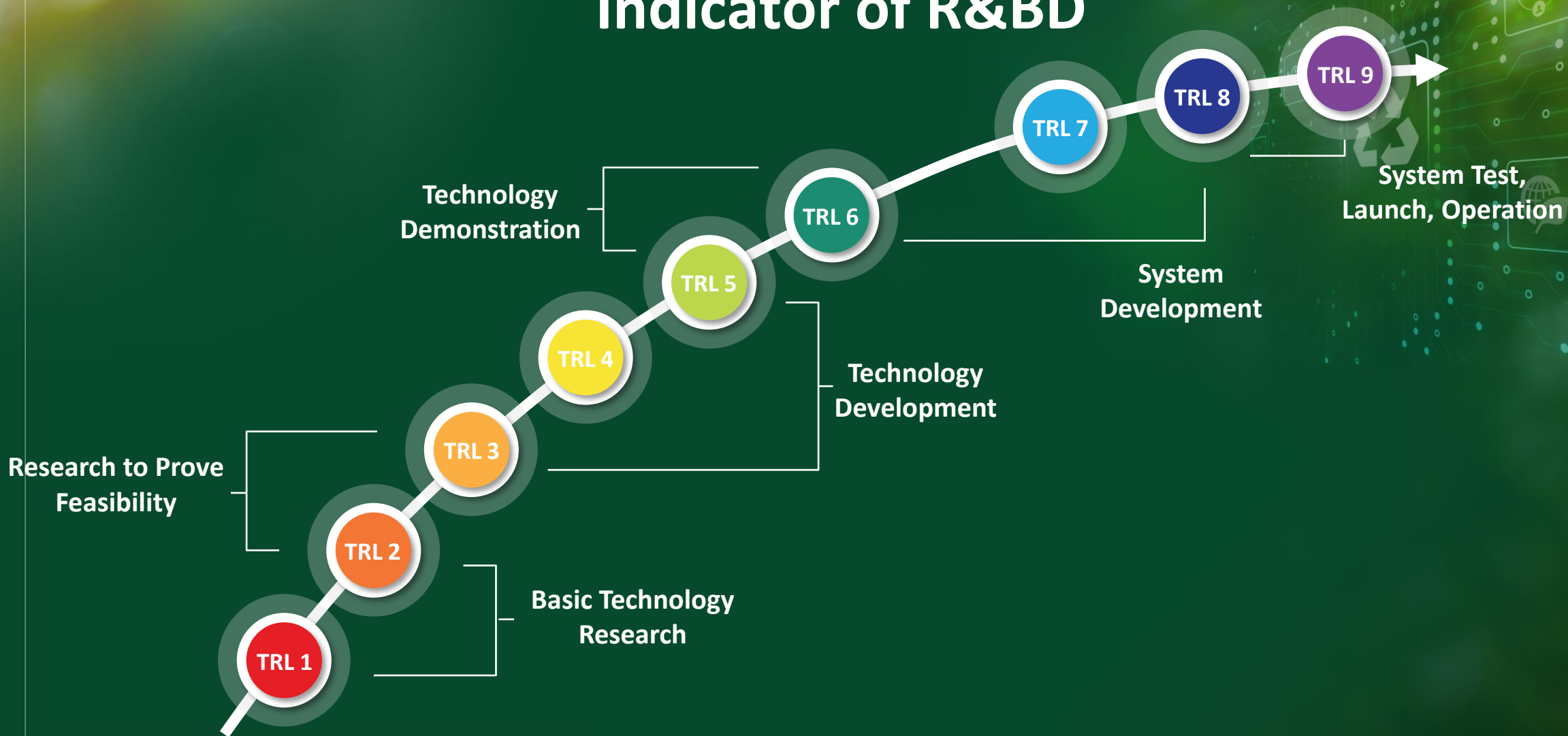
인천강소특구

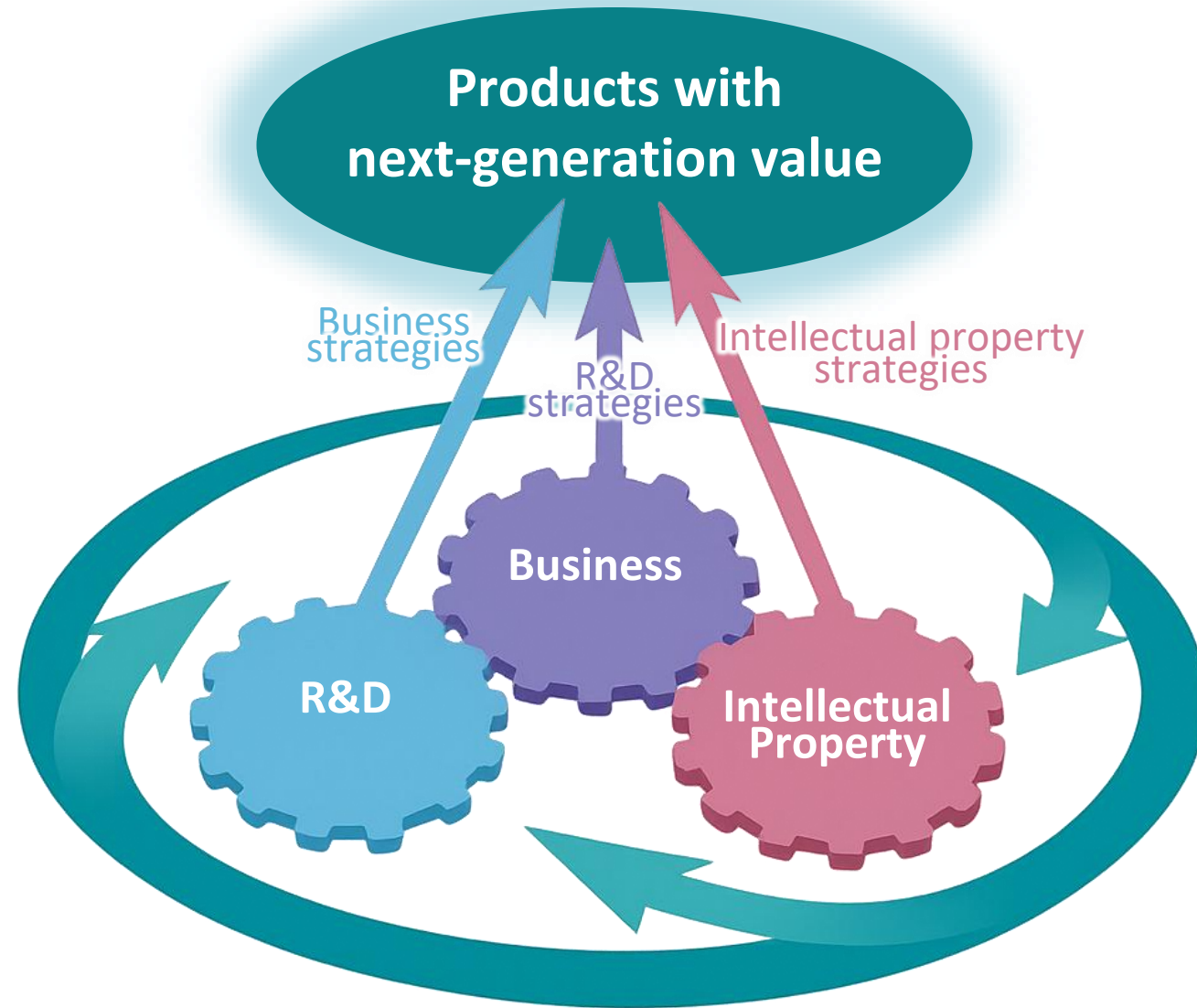


General concept of R&BD

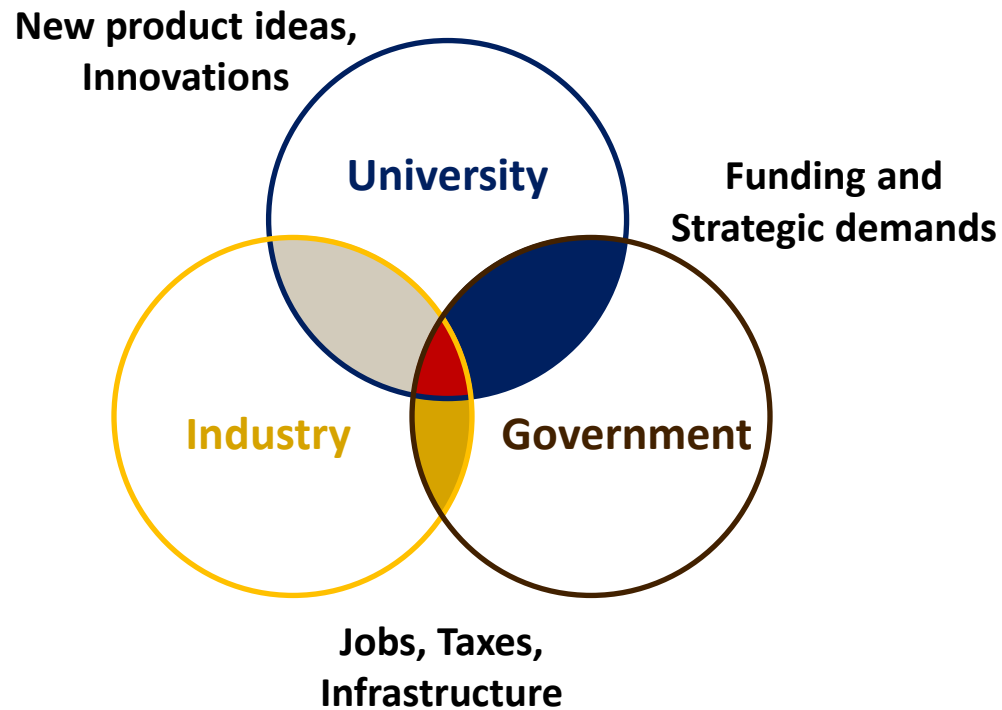


Indicator of R&BD





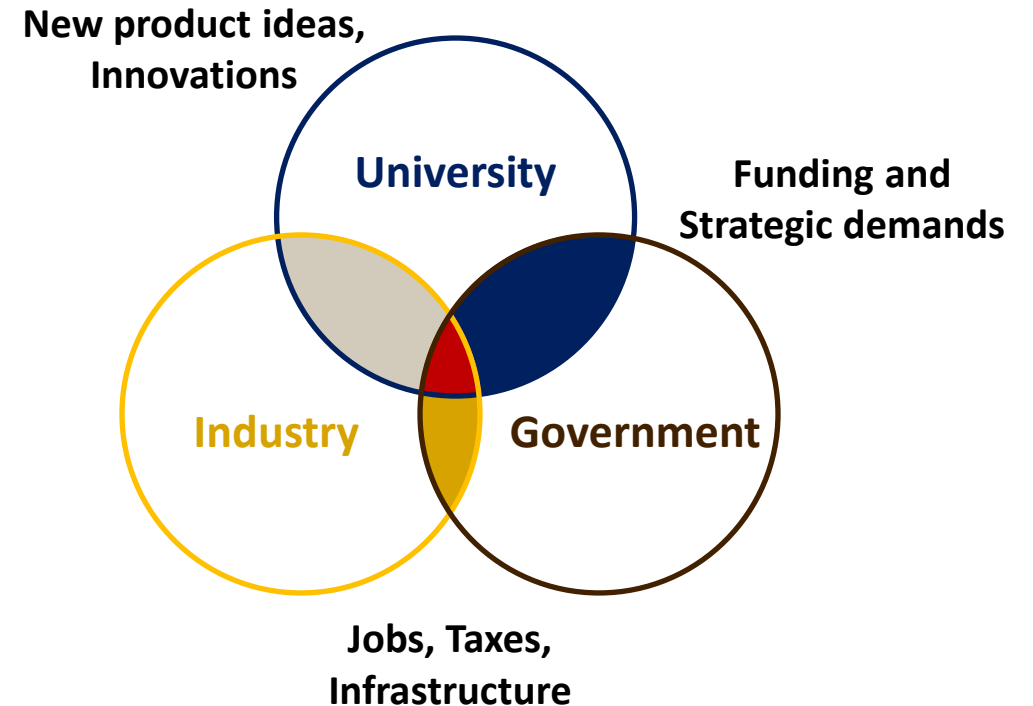
Concept of triple helix model



- Framework developed by Henry Etzkowitz and Loet Leydesdorff (1990s)
- Explains innovation through dynamic interaction of universities, industry, and government
- Emphasizes overlapping relationships and institutional role transformation
- Key driver of innovation in knowledge-based economies
- For example, regional innovation systems (Silicon Valley, science parks)

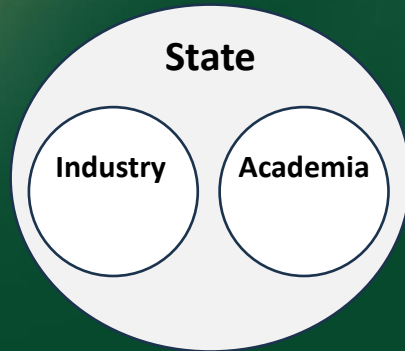
Principal of triple helix model

- **Overlapping spheres:** Create hybrid organizations (research centers, technology parks, public-private partnerships)
- **Role transformation:**
 - Universities become entrepreneurial,
 - Industry invests in knowledge,
 - Government fosters innovation networks

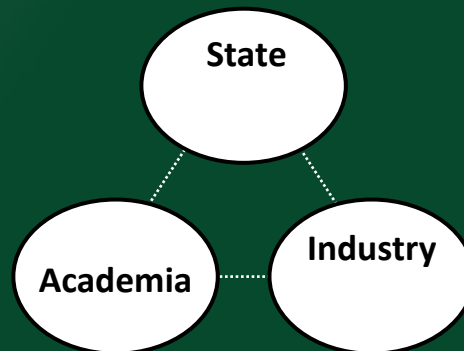


Three triple helix models

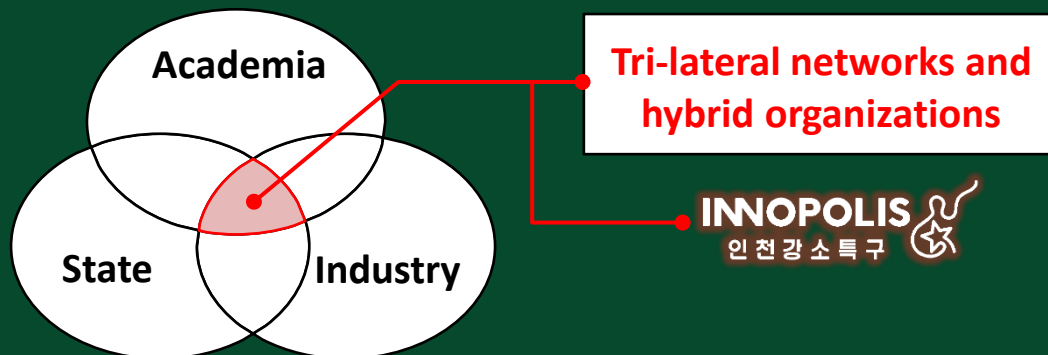
(1) A 'statist' model



(2) A 'laissez-faire' model



(3) The Triple Helix Model

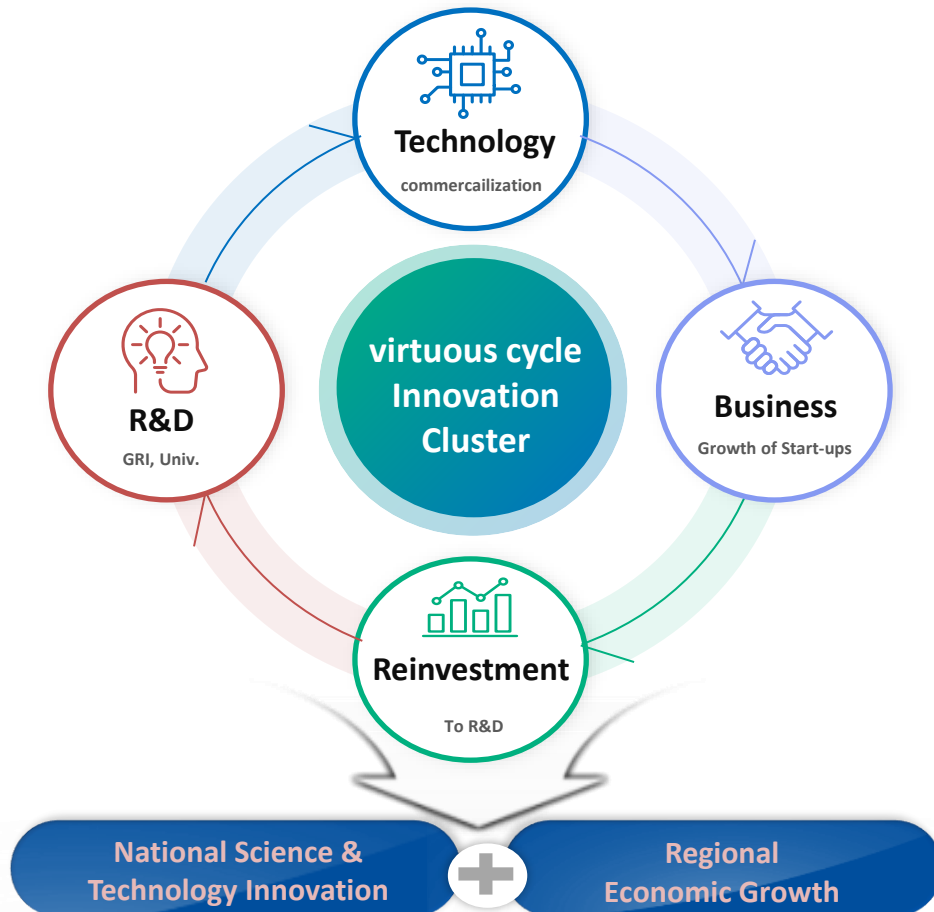


- **Three configurations**
 - **Triple Helix I:** Government-dominated (statist model) - Historical in centralized economies
 - **Triple Helix II:** Separate spheres with limited interaction (laissez-faire) - Traditional Western industrial model
 - **Triple Helix III:** Balanced collaboration with strong linkages (ideal model) - Modern knowledge economy goal / Tri-lateral networks and hybrid organization
- **Temporal pattern**
 - Many regions evolve from I or II toward III

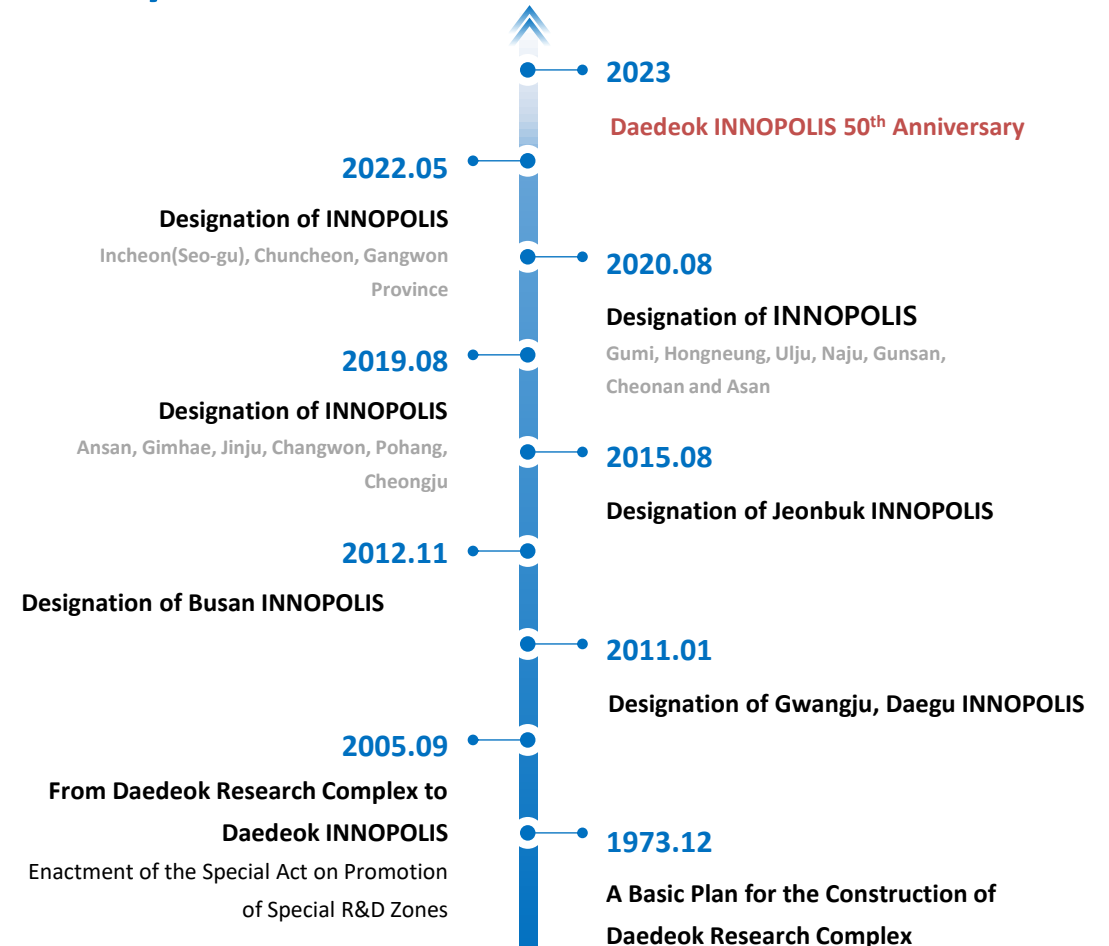
Overview of INNOPOLIS

Major Missions

Make the innovation eco-system in INNOPOLIS
Facilitate technology commercialization to drive innovation and growth



Major History



Designation of INNOPOLIS



- ◆ Designated in 2019
- ◆ Designated in 2020
- ◆ Designated in 2022

Designated in 2019

Category	Space	Specialized areas
Ansan	1.73km ²	ICT components & materials
Gimhae	1.13km ²	Biomedical · medical devices
Jinju	2.17km ²	Aerospace components · materials
Changwon	0.65km ²	Intelligent electronics-based machinery convergence
Pohang	2.72km ²	New high-tech materials
Cheongju	2.20km ²	Smart IT components · systems

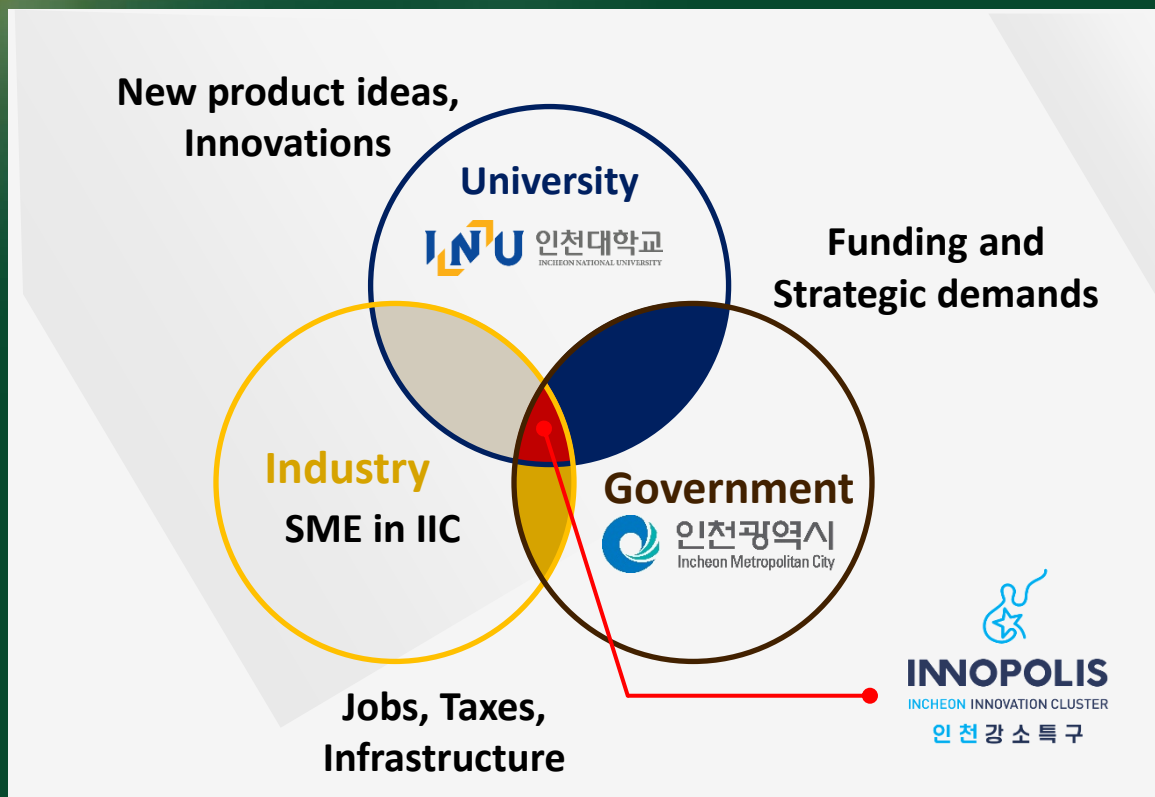
Designated in 2020

Category	Space	Specialized areas
Gumi	2.57km ²	Smart manufacturing systems
Hongneung	1.36km ²	Digital healthcare
Ulju	3.01km ²	Futuristic cells
Naju	1.69km ²	Intelligent solar light · energy storage
Gunsan	2.70km ²	Eco-friendly EV components and materials
Cheonan · Asan	1.32km ²	Next-generation automobile components

Designated in 2022

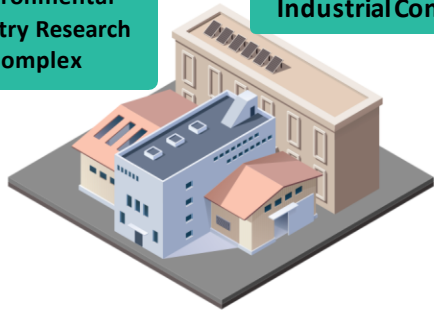
Category	Space	Specialized areas
Incheon	1.49km ²	ICT Convergence Environmental Pollution Treatment and Management
Chun Cheon	0.93km ²	New biopharmaceutical material

Incheon Innovation Cluster

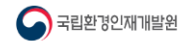
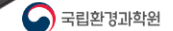


- **University**
 - Incheon National University / Institute of Environmental Convergence Technology
- **Government**
 - Incheon Metropolitan City (including sub districts)
- **Industry**
 - Approximately 180-220's SME
 - Additional 120-150's SME for new industrial zone

Environmental
Industry Research
Complex



Geomdan 2 General
Industrial Complex



「ICT Convergence Environmental Pollution Treatment and Management」



Establishment of an Environmental Industry Infrastructure



Support for fostering and commercialization of global research institutes

Incheon National University



INU "All-in-One" Technology Commercialization Platform



Specialize Graduate School

Incheon Innovation Cluster

Domain Knowledge

- Incheon National University Startup & Venture Green Convergence Cluster, Professional Talent Training Institute (for corporate practitioners)
- Environment-Focused Specialized Graduate School - Entrepreneurship & Venture Track (for full-time graduate students)

Technology Development / Lab Validation

- Research capability, lab-level development, academic outcomes

Productization Stage

- PoC & prototype fabrication, securing R&D funds, securing patents/IP

• Startup & Venture Green Convergence Cluster (Ministry of Environment in-house program)

Commercialization Preparation

- Prototype enhancement, performance testing, design & user feedback

• INU Startup Center

과학기술정보통신부 고시 제2023-24호
인천 서구 강소연구개발특구 지정 고시 일부개정

「연구개발특구의 특성에 관한 특별법」 제4조의2 제2항에 근거하여 인천 서구 강소연구개발특구를 변경하기로 결정함에 따라, 인천 서구 강소연구개발특구 지정 고시 일부를 개정하고, 「연구개발특구의 특성에 관한 특별법」 제4조 제7항 및 같은법 시행령 제6조와 「토지이용규제 기본법」 제8조 및 같은법 시행령 제7조의 규정에 의하여 다음과 같이 고시합니다.

2023년 6월 28일
과학기술정보통신부장관

인천 서구 강소연구개발특구 지정

- 특구의 명칭·위치 및 면적
 - 명 칭 : 인천 서구 강소연구개발특구
 - 위 치 : 인천 서구 오류동 및 경서동, 미추동구 도화동, 연수구 송5동 일원
 - 세부적인 범위는 별첨의 시행도 및 지번·지적 현황에 의함
 - 면 적 : 2.22㎢
 - 기술핵심기관 : 0.73㎢, 배후공간 : 1.49㎢
 - R&D거점지구(인천대학) : 0.73㎢²
 - 기술·인력·자급·환경·융합·혁신지구(인천대학) : 0.7173㎢²
 - 생산거점지구(인천2 일원산업단지) : 0.773㎢²
- 특구 지정 목적
 - 인천 서구의 인천대을 중심으로 ICT 융복합 환경조성 처리 및 관리 등의 R&D역량 강화 및 산·학·연 협력을 통한 기술이전 사업화 활성화

Startup / Market Entry

- Business planning, business-model design, team building, fundraising

• INU Partners – Investment Corporation

Growth & Expansion

- Company incorporation, product launch, marketing, sales & customer acquisition

• Incheon Innovation Cluster Business Association

Scale-up / Global Expansion

- Additional investment, revenue growth, expansion of staff & partnerships

• Department of International Climate Cooperation /
• KOICA Climate Degree Training Project

Specialized Fields

ICT-based technical base for treating and managing environmental pollution and contributing

Measurement and Treatment of Environmental Pollution Monitoring

- ▶ Post-treatment and pre-prevention technology for possible environmental pollution by environmental agents



Major Tech.

- ✓ Advanced water purification treatment
- ✓ Ship air pollution
- ✓ Fine dust control technology

Waste Recycling and Alternative Material Development

- ▶ Waste recycling and energy conversion for carbon neutrality and energy reduction & Development of eco-friendly substitute materials using biomass



Major Tech.

- ✓ Recycling of waste plastic
- ✓ Anaerobic digestion of bioplastic and food waste

AI-based Environmental Management

- ▶ Environmental management through prediction and decision-making applying environmental technology, 4th industrial revolution, digital new dill based AI and IoT



Major Tech.

- ✓ Measurement and analysis of marine environment
- ✓ Environmental information monitoring technology
- ✓ Recyclable resource recovery robots

IICE Cluster Promotion strategy i-ESP* Cluster

* Incheon/Integrated - Environment, Science, InnoPolis

Commercializing technology of ICT convergence environmental pollution treatment and management

Exploring demand of technology and business

Platforming Technology Commercialization

Following Development Support

IICE Cluster Community (Lead by INU)



- Exploring demand of technology (Environ tech Information system)
- Exploring business on tech
- Verifying business value

ICT Convergence E tech

Technology Institution

INU Incheon National University (INU)
(INU Indust univ Cooperation/INU IICE Cluster Team)

Manufacturing (Industrial Complex)

Gumdan1 IC
• Malodor prevent tech

North east National IC
• Wastewater disposal tech

Gyeongseo Casting Complex
• Dust collection tech

Commercializing Technology & Business

Technology Development

INU (ECTI)
한국환경공단
국립환경과학원
국립생물자원관

Research

IH (Manufacturing cluster management)
Cluster resident business tech demand

Original & Applied technology

Exploring and developing start-up

- Incheon Seo gu Keco Infra
- INU Incheon City start up fund
- INU Incheon City start up program

Domestic and global marketing

Support to Enter Domestic & Global Market

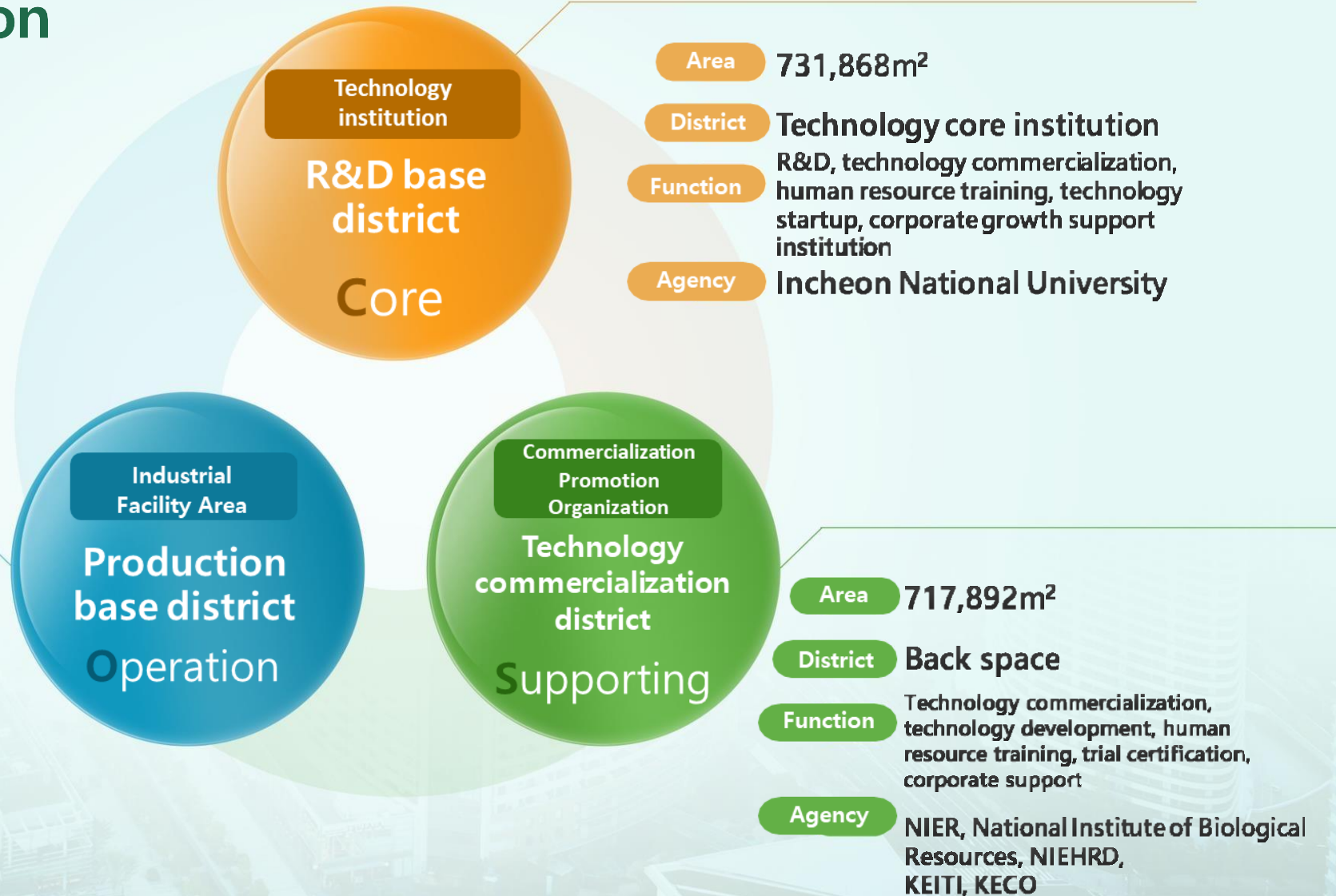
Strategy to marketing → Marketing to Local Government

Global marketing → Global Networking with INU

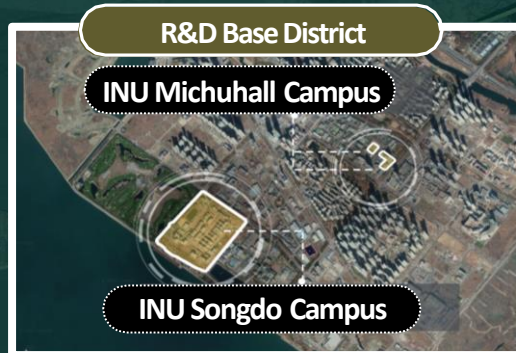
Development direction

COS Strategy

- : Core area
- : Operation area
- : Supporting area



+ Establishing an ICT-Convergence Hub for Environmental Pollution Treatment & Management + Technology Commercialization



Geomdan 2nd General Industrial Complex


Integrated Environmental Research Complex



Environmental Industry Research Complex

Environmental Convergence Industry-Academia Research Center

INU Jemulpo Campus




Specialized in the Environmental Industry



The only participation of central government departments



Participation in Incheon National University, a leading start-up in Korea



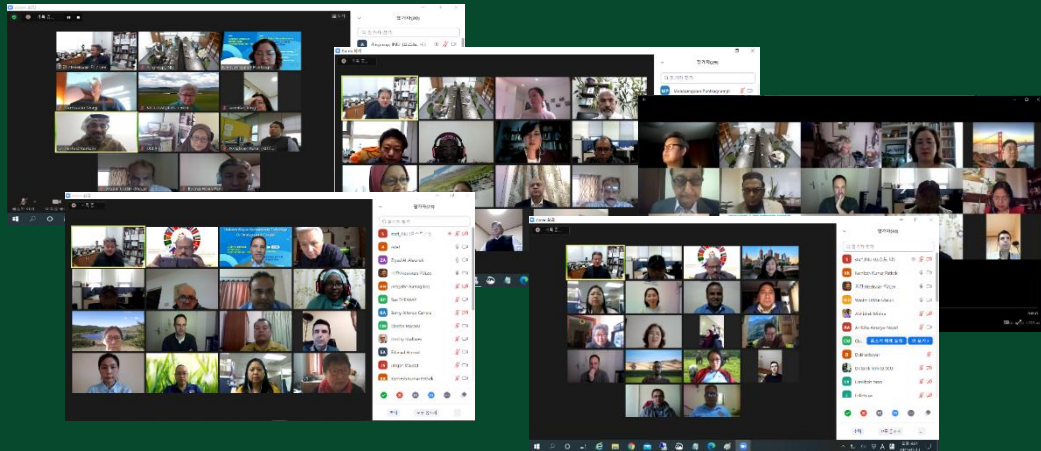
Korea's Largest Environmental Industry Infrastructure Area

Innopolis Innovation Cluster PR video



Link

IIC Confex & I.NERGY Symposium



IIC Confex & I.NERGY Symposium



Korea-Central Asia Science & Technology Center

"Promote Mid-to Long-Term international Cooperation on S&T Development

Establish a sustainable cooperation system linking technology, human resources, and industry via the K-CAST Center

◆ Establish a Sustainable Korea-Central Asia Future Platform through an S&T-Based Dev. Cooperation Model ◆

Networking

Talent Exchange

Tech Coop.

01

Foundation & Outreach

02

Cooperation & Execution

03

Expansion & Sustainability

Initial Structure Formation :
talent discovery, conferences, platform building

1. Establish and Build an Operational Base for the Center (Including Platform)

- Establish branch/cooperation centers in 6 partner countries
- Hold regular ops committee meetings (6)

- Build tech business platform

2. Host annual international conference

- Operate Central Asia special sessions (3)
- Invite 10 outstanding Central Asian researchers

3. Support talent exchange and recruitment activities

- Hold promotion sessions in major cities of partner countries (3)
- Select 10 trainees for KOICA degree programs

Implementation of cooperation projects :
joint research, ODA linkage, tech trend analysis

4. Tech Trends & Domestic Expansion

- Conduct tech trend surveys & publish result-sharing reports (3)
- R&BD surveys at INU & IIC



5. Strengthen Networks for Joint Research & Tech Cooperation

- On/offline joint workshops & forums (4)
- MOUs with research institutes & universities in each country (15)

6. Joint ODA Project Identification & Linkage

- Plan joint research projects (6)
- Identify & propose ODA-linked projects (3)

Settlement Stage :
Demo Cooperation, Platform Use, Sustainability

7. Develop Sustainable Operation Strategies & Foundation

- Implement demonstration projects through tech cooperation (3)

8. Match Korean Tech Companies with Central Asia Tech Needs & Demonstration Cooperation

- Match excellent technologies based on local demand (3)

9. Utilize Tech Business Platform & Support Local Expansion

- Secure partners and participants: sign 20 MOUs

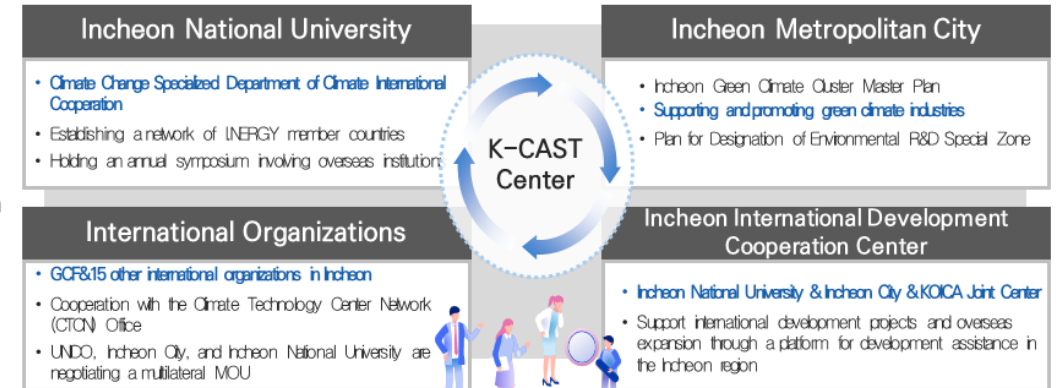
Final Goal

Three Strategic Objectives

Detailed Implementation Objectives

Korea-Central Asia Science & Technology Center

- ▶ The project's principal investigator, Prof. Heekwan Lee, established I.ENERGY in 2011, building a coop. network spanning 30 countries worldwide
- ▶ Sustain active academic & tech exchanges on environment, energy, climate with I.ENERGY and International organizations (KOICA, GCF, CTCN, UNDP, UNIDO).

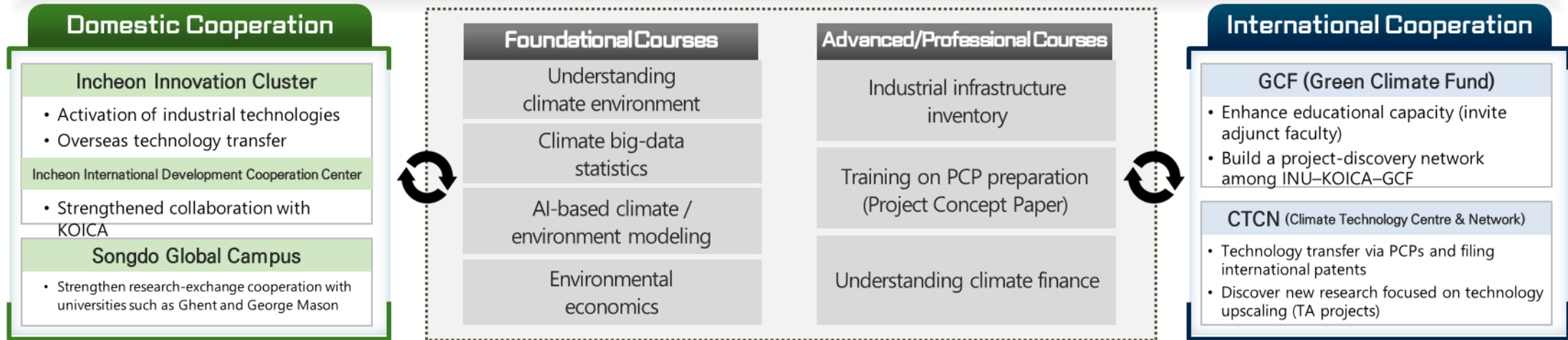
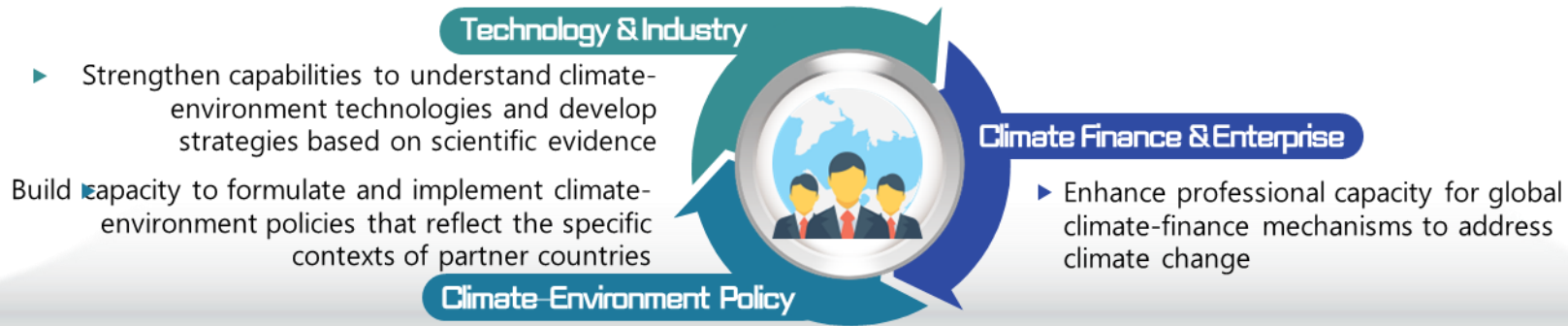


GREEN CLIMATE FUND



INU-KOICA Degree Program

Training Convergence Climate Environment Infrastructure Experts Focused on Partner Countries

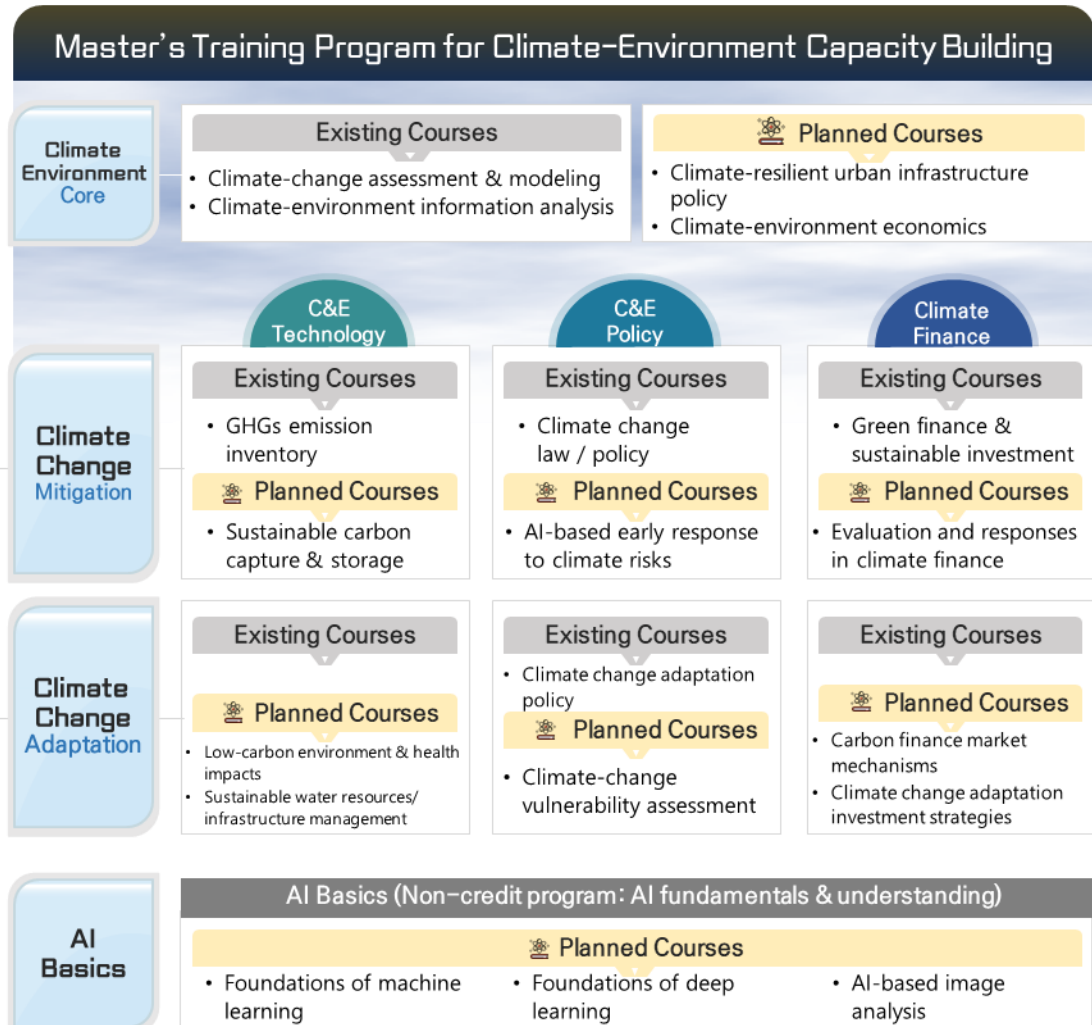


Dissemination of K-Climate & Environment Industrial Technologies

Improvement of Climate-Environment Governance Systems

Linkage with Climate Finance

Operation of Capacity Building Professional Track



Modular Curriculum

- Learner-centered, capacity-building modular program, combining the pillars
(Climate-Environment Technology + Climate-Environment Policy + Climate Finance) with focus areas Climate-change Mitigation and Climate-change Adaptation

Thesis Supervision & Degree Conferment

- One-to-one thesis advising with ad-hoc meetings with the advisor
- Thesis topics selected to align with each participant's country needs in climate change and the environment
- Build research networks that connect advisors and their home institutions
- Degree awarded according to thesis-committee composition and academic regulations.



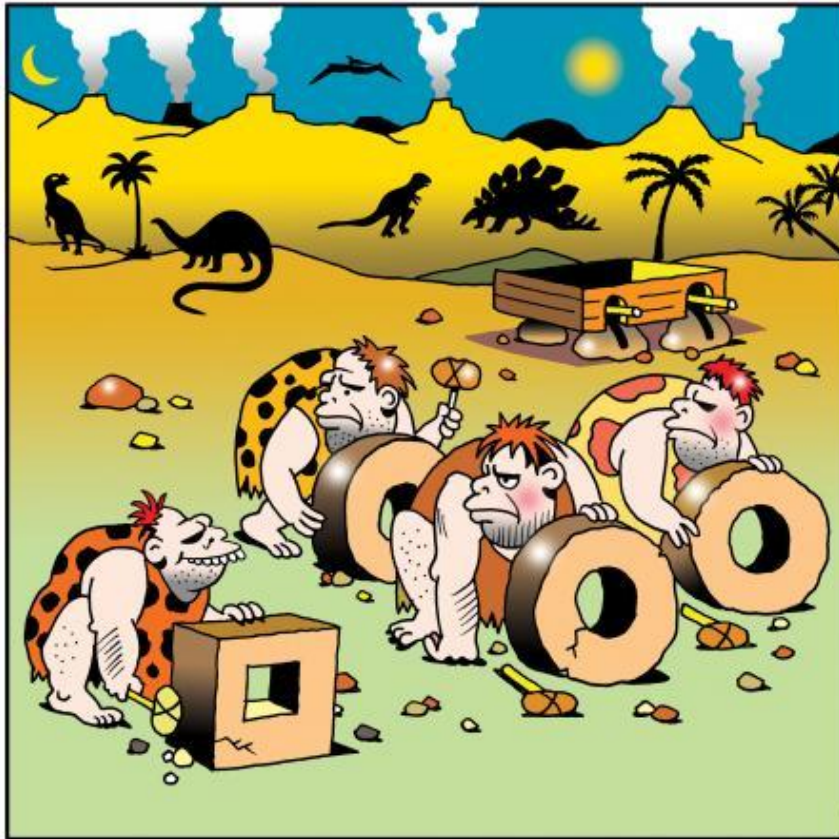
Need to innovate ??

Guilty of "square wheels"
in your business?



"I'm too busy at the moment
to get any other wheels!"

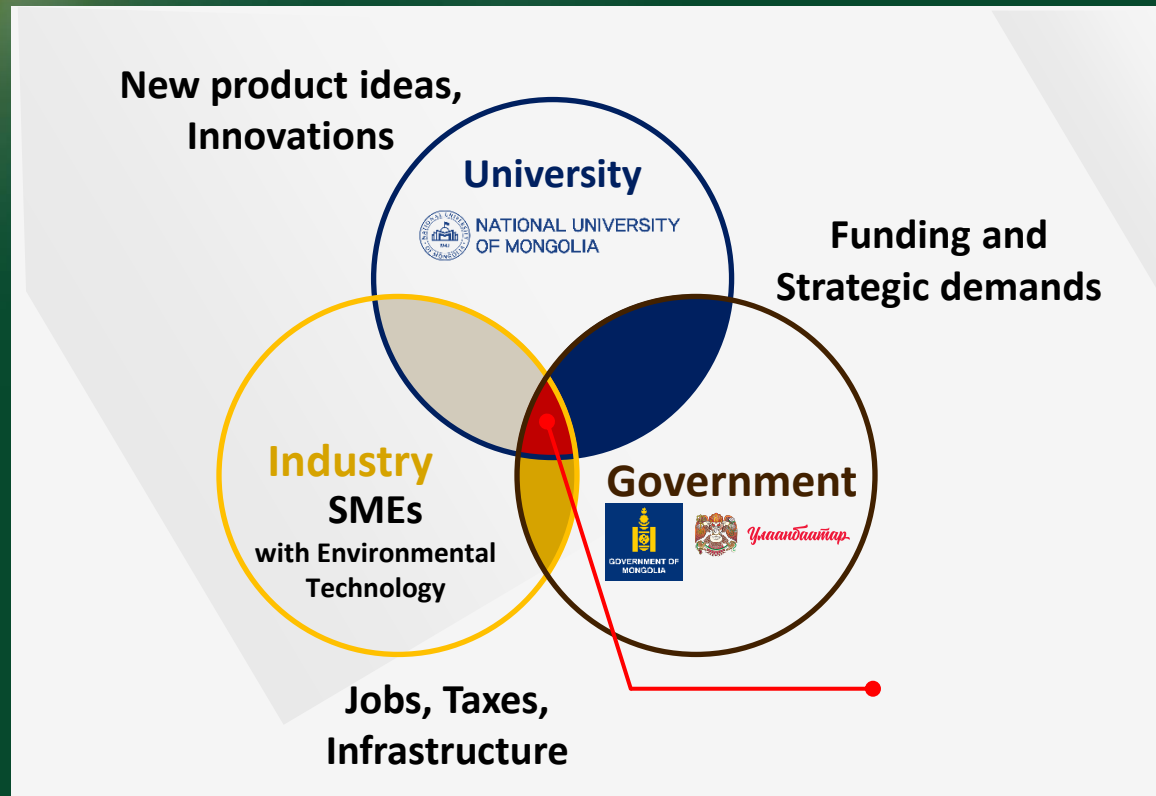
Need a teamwork ??



IIC Collaboration



Mongolia Innovation Cluster



Mongolia Innovation Cluster: Driving Green Economic Growth

Triple Helix Partnership:

- National University of Mongolia
- Government of Mongolia & Ulaanbaatar City
- Environmental Tech SMEs

Key Objectives:

- Accelerate environmental technology R&D and commercialization
- Develop innovative solutions for Mongolia's environmental issues
- Foster technology transfer from university to industry
- Build specialized environmental tech expertise and capacity

Expected Outcome: → Establish Mongolia as a center of excellence in environmental technology innovation



Korea **ICT convergence environmental technology** based Incheon Environment Innovation Cluster will lead ...

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INNOPOLIS⁺
INCHEON SEOGU INNOVATION CLUSTER

INNOPOLIS⁺
INCHEON INNOVATION CLUSTER