Accelerating University Technology to the Market: Technology Entrepreneurship Education and University Proof-of-Concept (PoC) Program
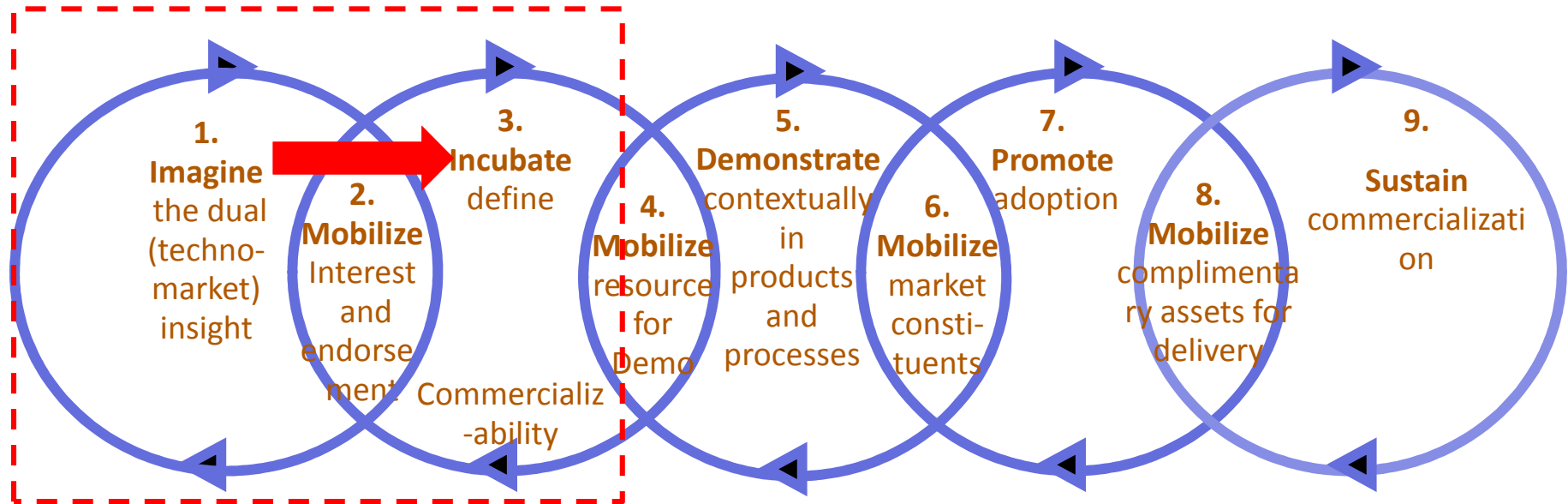
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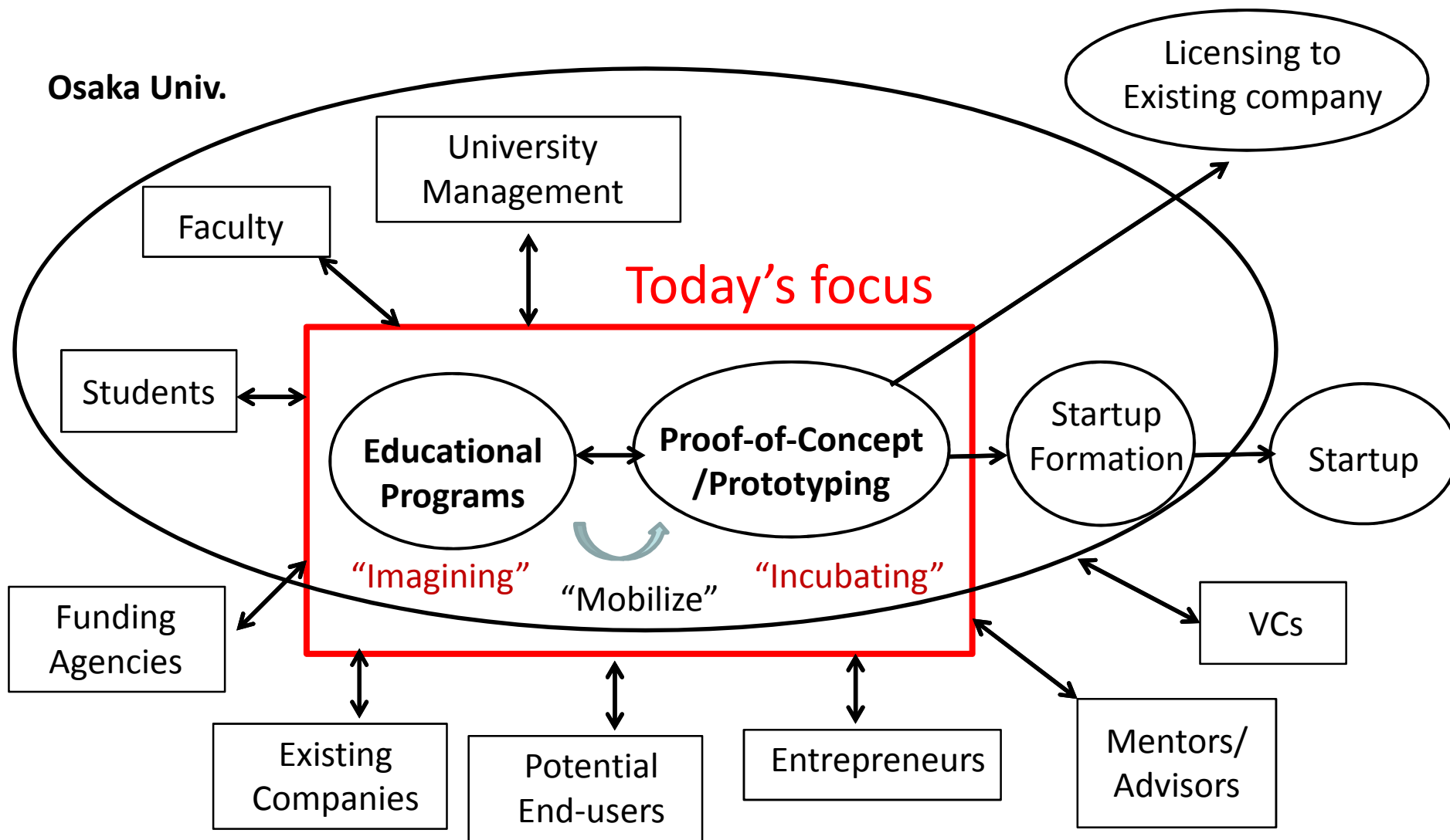
Office for Industry-University Co-Creation

Technology commercialization process

1. **Imagine** the dual (techno-market) insight

2. **Mobilize** Interest and endorsement

3. **Incubate** define Commercializ-ability

4. **Mobilize** resource for Demo

5. **Demonstrate** contextually in products and processes

6. **Mobilize** market consti-tuents

7. **Promote** adoption

8. **Mobilize** complimentary assets for delivery

9. **Sustain** commercializati on

- Jolly[1] shows five independent sub-processes and bridges between them for technology commercialization.

- At an early stage, the technology that has been created in the university labs shifts from Imagining to Incubating.

- **Therefore, it is important for universities to accelerate these initial three steps.**

[1]: Jolly, V.K., Commercializing New technologies, Getting from Mind to Market, Harvard Business School Press, p18, 1997.

Innovation ecosystem to accelerate university tech. commercialization

Osaka Univ.

University Management

Faculty

Today's focus

Students

Licensing to Existing company

Educational Programs

Proof-of-Concept /Prototyping

Startup Formation

Startup

"Imagining"

"Mobilize"

"Incubating"

Funding Agencies

VCs

Existing Companies

Potential End-users

Entrepreneurs

Mentors/ Advisors

Ref. Takata (2011) Study of the Process of University Technology Commercialization: The Roles and Effects of Educational Courses

Part I: Proof-of-Concept/Prototyping

Key message:
University Proof-of-Concept/Prototyping programs (i.e. PoC programs) grow university innovation community and accelerate university technology commercialization

University Proof-of-Concept (PoC) program

The PoC Gap extends from **where the government funding of basic research ends** to **where existing companies or investors are willing to accept the risk to commercialize the technology**.

GAP

Technology risk

Technology development plan

Industry & market relationship

IP plan

Commercialization team

Commercialization

Market risk

$$

Where the government funding of basic research ends

Where existing companies or investors are willing to accept the risk to commercialize the technology
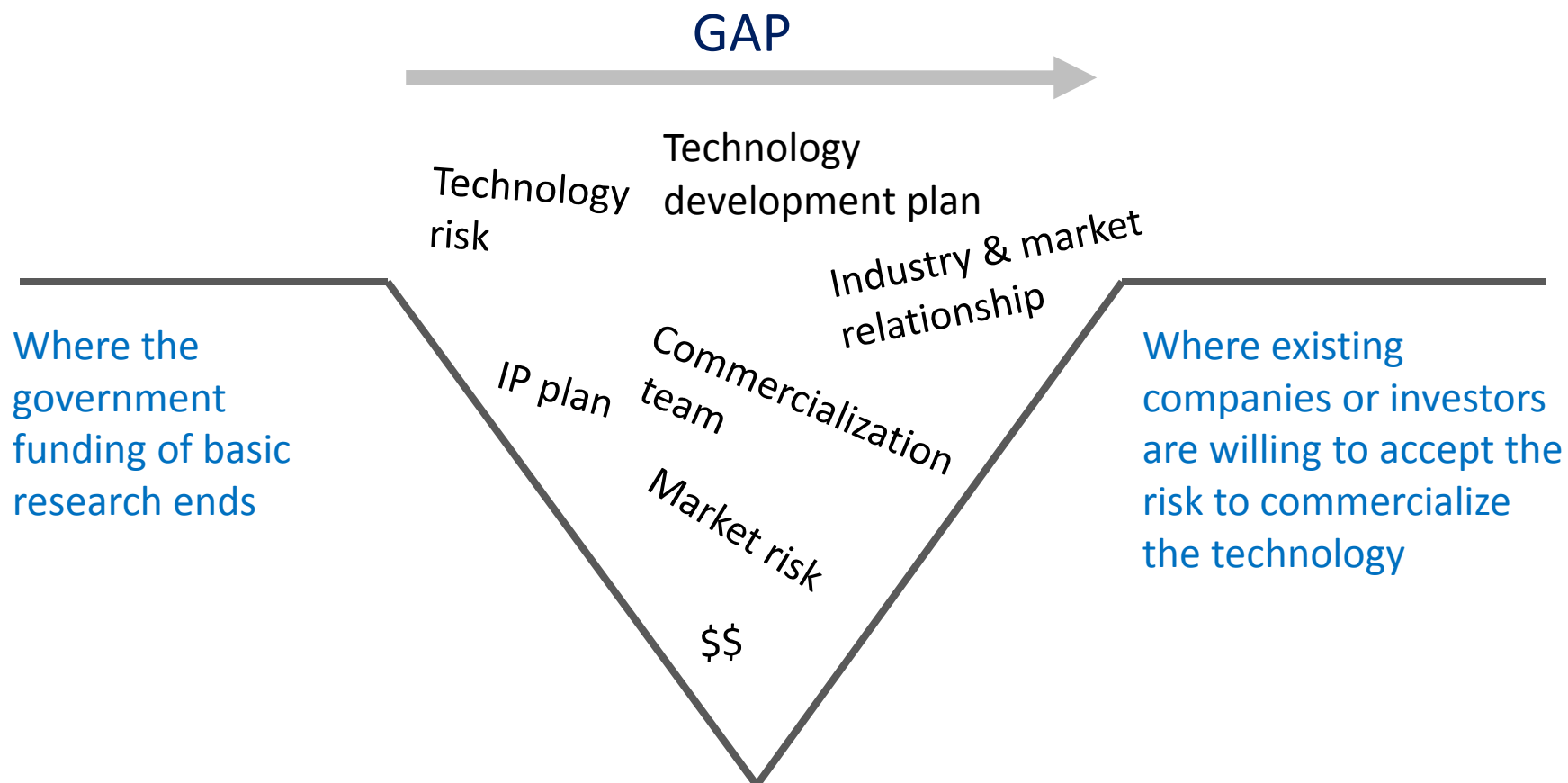
Overview of Osaka University PoC program

- Managed by Osaka University Office for Industry-University Co-creation

- Target research field: All field

- Fund source(s):
  - Government: Multiple sources
  - University: 10% overhead of joint research fee obtained from industry

- Fund size: ca. 25-50K US$/project (Total: ca. 400K US$)

- Sustainability: Negotiation with each source every year

- Expected financial return: No

Process of PoC program

| Promotion | Intake | Evaluation | Decision | Oversight (PoC project) |

25-50K US$/project

PoC program is not only about the money.

Within this process, there are many complex tasks which TTO should work for university technology commercialization.
The key is to integrate and grow innovation community around university.
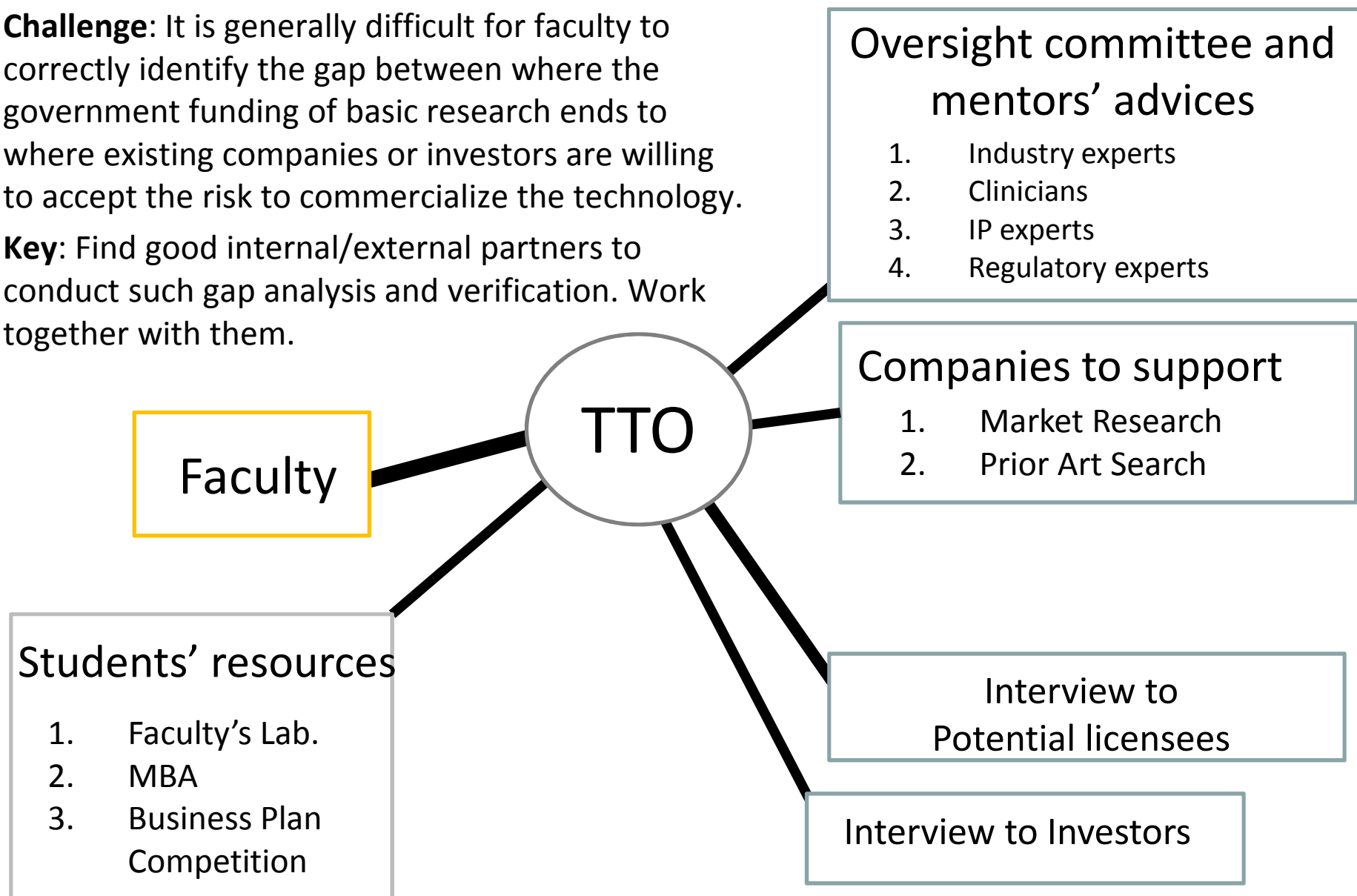
Focusing on four (4) Key Success Factors (KSFs) of PoC Program

KSF1: Gap analysis and verification

Challenge: It is generally difficult for faculty to correctly identify the gap between where the government funding of basic research ends to where existing companies or investors are willing to accept the risk to commercialize the technology.

Key: Find good internal/external partners to conduct such gap analysis and verification. Work together with them.

Oversight committee and mentors' advices

1. Industry experts
2. Clinicians
3. IP experts
4. Regulatory experts

Companies to support

1. Market Research
2. Prior Art Search

TTO

Faculty

Students' resources

1. Faculty's Lab.
2. MBA
3. Business Plan Competition

Interview to Potential licensees

Interview to Investors

PoC experiment to reduce the technology risk

In many cases, based on the gap analysis and verification,

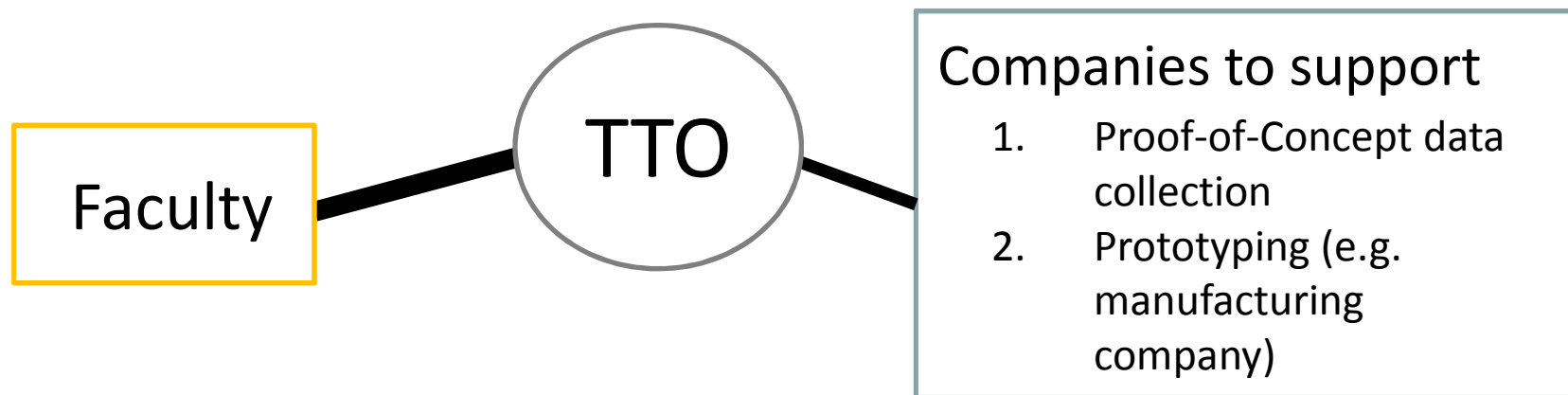**PoC experiment to reduce the technology risk is needed.**

e.g.

- Scale up experiment
- Undertake testing of a technology or material to obtain data on performance
- Develop a more user-friendly software interface
- Send a material out to independent third party for testing under industrial conditions
- Conduct *in vivo* or animal testing of a new compound

KSF2: Outsource

Challenge: Faculty is generally not interested in the data collection or prototyping which are <u>NOT</u> lead to the publication of academic papers.
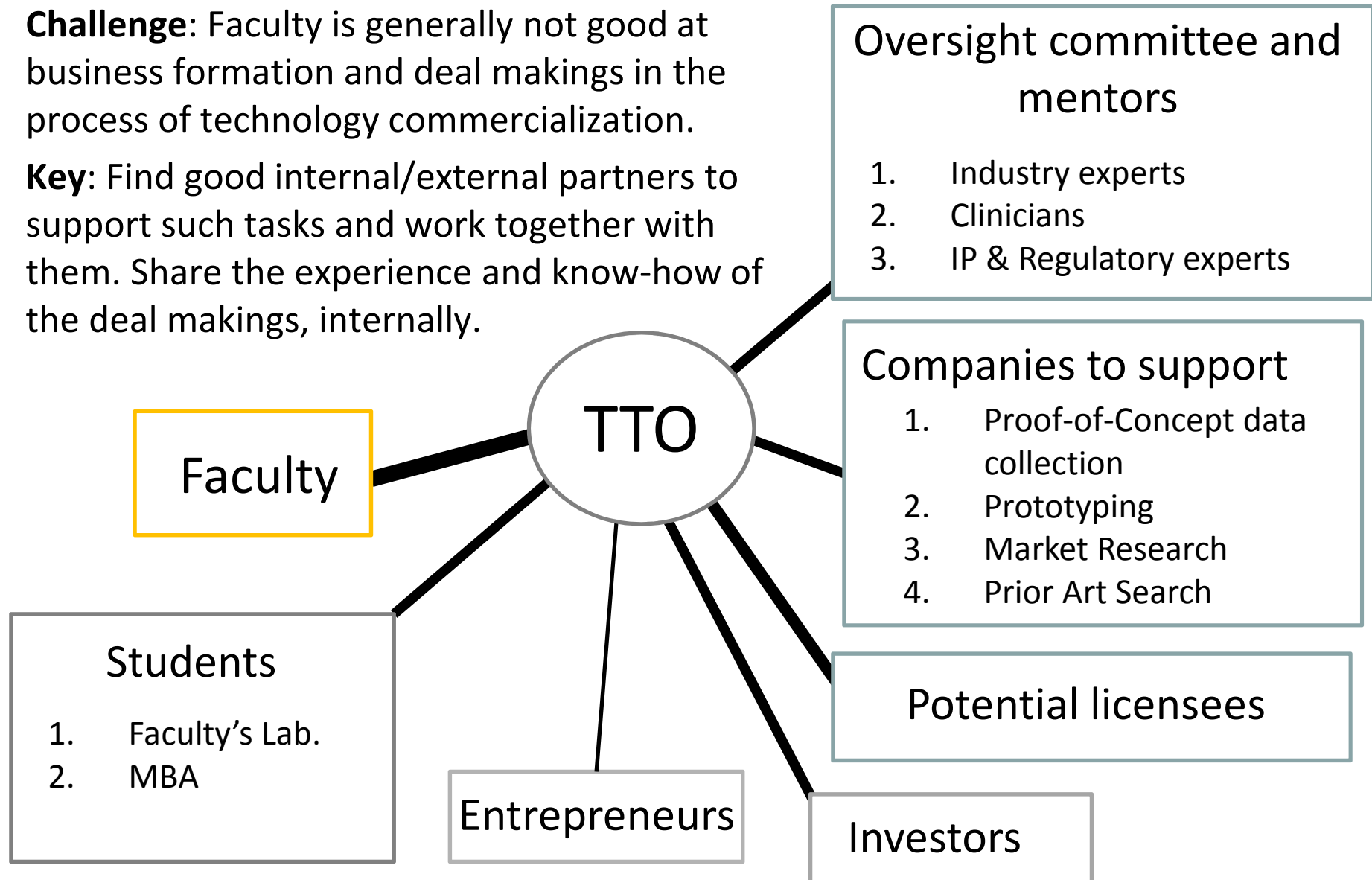
Key: Find good internal/external partners to support such PoC data collection and prototyping. Work together with them.

Faculty —— TTO ——

Companies to support

1. Proof-of-Concept data collection
2. Prototyping (e.g. manufacturing company)

KSF3: Team formation and deal makings

Challenge: Faculty is generally not good at business formation and deal makings in the process of technology commercialization.

Key: Find good internal/external partners to support such tasks and work together with them. Share the experience and know-how of the deal makings, internally.

Oversight committee and mentors

1. Industry experts
2. Clinicians
3. IP & Regulatory experts

Companies to support

1. Proof-of-Concept data collection
2. Prototyping
3. Market Research
4. Prior Art Search

Faculty

TTO

Students

1. Faculty's Lab.
2. MBA

Entrepreneurs

Potential licensees

Investors

KSF4: TTO should be a facilitator but not be a leader

Challenge: TTO should be trusted but should not be depended by the faculty.

Key: TTO staff should be a facilitator but should not be a leader of the project.

Selection criteria at Osaka Univ.

- Results of interview(s) to potential licensee and/or investors
  - If the specific data collection or prototyping is completed by the end of the fiscal year, can this project be succeeded in e.g.
    - Licensing to the potential licensee(s)?
    - Committed by the investor(s)?

    Large weight

- Market :needs, size, trend, and new vs. existing market.
- Social contribution
- Sustainability of competitive advantage.
- Intellectual property: e.g. freedom to operate.
- Barrier to market entry: e.g. regulatory path and custom.
- Stage of development and technology development plan
- Resource allocation
- Business formation

Based on the gap analysis and verification, the plans were mostly modified from the PI's initial proposal.

Real case study: A new epoxy resin

Technology prior to PoC program

- A principal investigator (PI) at Osaka University – methods to enable chemical powder reaction without solvent (liquid) under a laboratory scale
  → important applications in epoxies

Gap bridging project (ca. 30K US$): Scale-up experiment

- **Gap analysis:** The PI originally planed to use a large-size glass reactor. However, an external judge advised PI's group that the group should negotiate with a company to rent a larger scale chemical reactor to meet industry's needs.
- **Deal making:** TTO staff negotiated with a potential licensee to rent a five litter chemical reactor by free of charge under a joint research agreement.
- **Outsource:** The scale-up experiment itself has no value for publishing academic paper. Therefore, a external technician was hired.

Outcome

- **Deal making:** Potential licensee launched an incubation laboratory inside Osaka University under a joint research agreement
- **Deal Making:** Licensing agreement with the potential licensee

Metrics: Evaluation of PoC program

How do we measure the effectiveness of PoC Program?

- ## Short-term
  - – Have you overcome the four (4) major challenges as shown in slides 8 - 12?
  - – Have you moved the project to bridge the next gap (e.g. to get **follow-on public funding**)?
  - – Have existing companies or investors accepted the risk to commercialize the technology (e.g. to make deals on **joint research/licensing agreement** or to **get an investment**)?

- ## Long-term
  - – Have you built a community to bridge the PoC gap?
  - – Have you formed business and created job?

Evaluation of OU PoC program (FY2011-2015)

- ## Short-term
  - 163 proposals received
  - 63 proposals accepted and hands-on supported
  - 41 Joint research agreements signed
  - 6 Licensing agreements signed
  - 33 follow-on public funding granted
  - 3 startup companies launched and got investment
- ## Long-term
  - Building a community to bridge the Gap:
    - ca. 20 external advisors including industry experts, VCs, IP experts, and regulatory experts.
    - Subscription of Market Research Databank

Part II: Educational Program

Key message:

University-industry collaborative entrepreneurship education programs grow university innovation community and accelerate university technology commercialization

G-TEC: Global Technology Entrepreneurship & Commercialization

- G-TEC provides <u>an inter-disciplinary experiential training course on technology commercialization</u>.

- Operated on a yearly basis since 2011.

- A short-term program that is delivered over the course of 2 weeks (8 hours per day over 10 days).

- Each year, about thirty (30) people participate. <u>Not only university students and lecturers but also corporate practitioners can participate</u>.

- About four to six real technologies being developed at Osaka University were assessed through G-TEC's technology assessment project and venture assessment project each year.

- The results of <u>technology assessment and venture assessment were used for generating strategies for commercialization</u>.

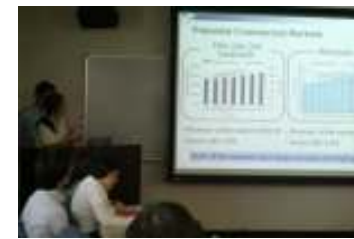Ref. G-TEC Promotion movie, flyer, course program, and an original research article.

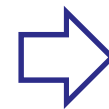# Process of G-TEC

Group works

Group Presentation

Lectures &
Case discussion

Project Based Learning

Project Based Learning

Mentoring Session

Comments from Judges & Students

Example of group work by students
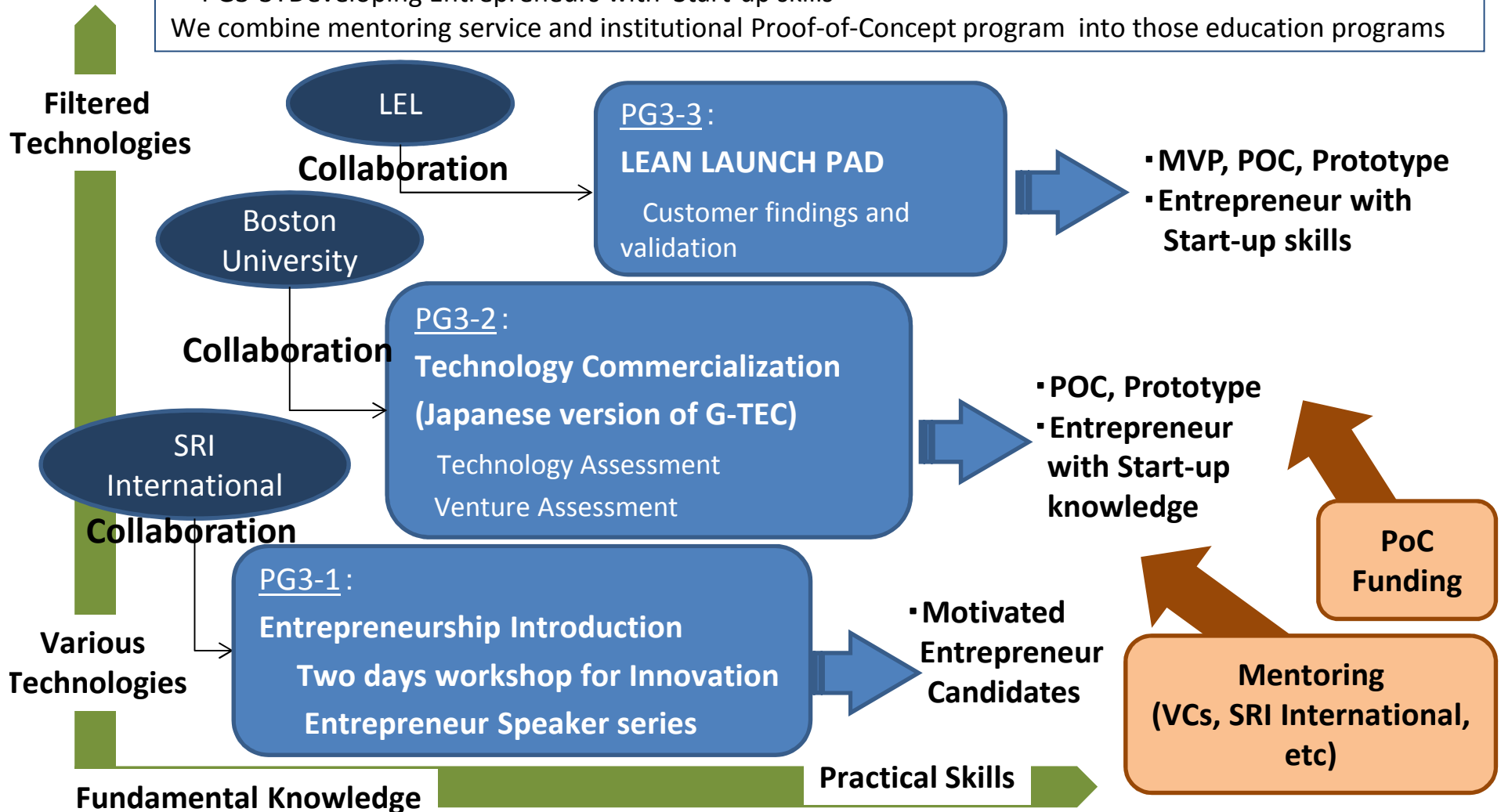
- Assess real technologies being developed at Osaka Univ. or related institutions.
    - Social/market needs
    - Solution and technology features
    - Potential market analysis
    - Competitive analysis
    - Technology development plan
    - IP(Intellectual Property) strategy
    - Product & services
    - Financials
    - Milestones & exit strategy

Present the business plan to real VCs

Educational effect of G-TEC

- University-side participants
  - Learned reality of developing technology/product in business
  - Got rich insight, even though the assessment was resulted in tragic conclusion , "KILL the project"
  - Understood the importance of humanity, such as in-depth communication, high motivation from industry-side participants
- Industry-side participants
  - Got the theory and framework of tech commercialization
  - Captured panoramic view/whole process of tech venturing process
  - Learned from students' innocent questions and recognized that their cognition was biased
- Role of program facilitators as intermediators
  - Made "infrastructure" and "shared language" of participants
  - Not touched each team's project so much, but gave teams freedom
- Independency and temporality of project
  - Maximized freedom for challenge, under the risk-free condition
  - Activated participants in special occasion of two-week and apart from usual

Related educational programs

■ PG3-1：Developing Motivated Technology Entrepreneurs
■ PG3-2：Developing Entrepreneurs with Start-up knowledge
■ PG3-3：Developing Entrepreneurs with Start-up skills
We combine mentoring service and institutional Proof-of-Concept program into those education programs

Filtered Technologies

LEL

Collaboration

Boston University

Collaboration

SRI International

Collaboration

Various Technologies

PG3-3:
LEAN LAUNCH PAD
Customer findings and validation

・MVP, POC, Prototype
・Entrepreneur with Start-up skills

PG3-2：
Technology Commercialization (Japanese version of G-TEC)
Technology Assessment
Venture Assessment

・POC, Prototype
・Entrepreneur with Start-up knowledge

PG3-1：
Entrepreneurship Introduction
Two days workshop for Innovation
Entrepreneur Speaker series

・Motivated Entrepreneur Candidates

PoC Funding

Mentoring (VCs, SRI International, etc)

Fundamental Knowledge   **Practical Skills**

Evaluation of educational programs (FY2014-2016)

- 33 challenges to business plan competitions → 11 teams have been awarded
- 12 startup preparation projects formed → 4 startups have been launched
- 19 deals (total: ca. 6M US$) have been done.

Filtered Technologies

LEL

Collaboration

Boston University

Collaboration

SRI International

Collaboration

Various Technologies

Fundamental Knowledge

PG3-3 72 participants

LEAN LAUNCH PAD

Customer findings and validation

645 expert/customer interviews

- · MVP, POC, Prototype
- · Entrepreneur with

PG3-2 59 participants

Technology Commercialization (Japanese version of G-TEC)

Technology Assessment

Venture Assessment

- · POC, Prototype
- · Entrepreneur with Start-up knowledge

19 PoC Grants

*10K US$/project

PG3-1 908 participants

Entrepreneurship Introduction

Two days workshop for Innovation

Entrepreneur Speaker series

- · Motivated Entrepreneur Candidates

100 Mentors

etc)

Practical Skills

Thank you for listening.
Questions?

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