

STRATEGIC PARTNERSHIP FOR RESEARCH, INNOVATION AND GROWTH PROJECT (SPRING)

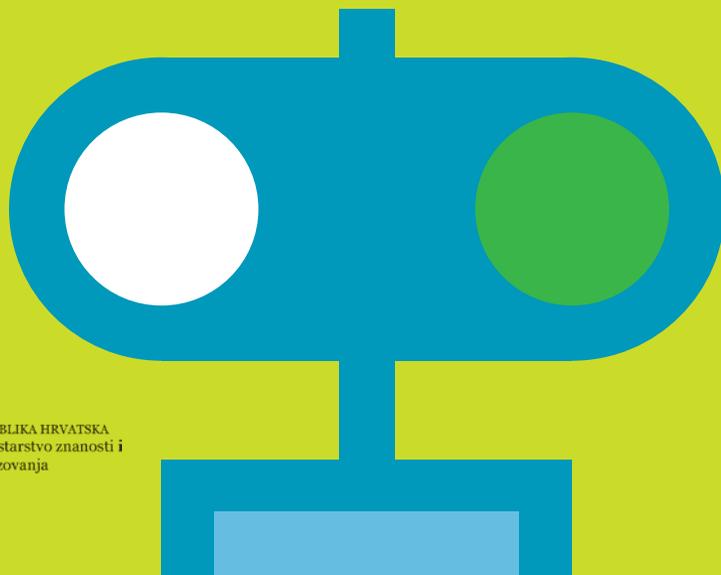
Developing a Functional Technology Transfer Ecosystem



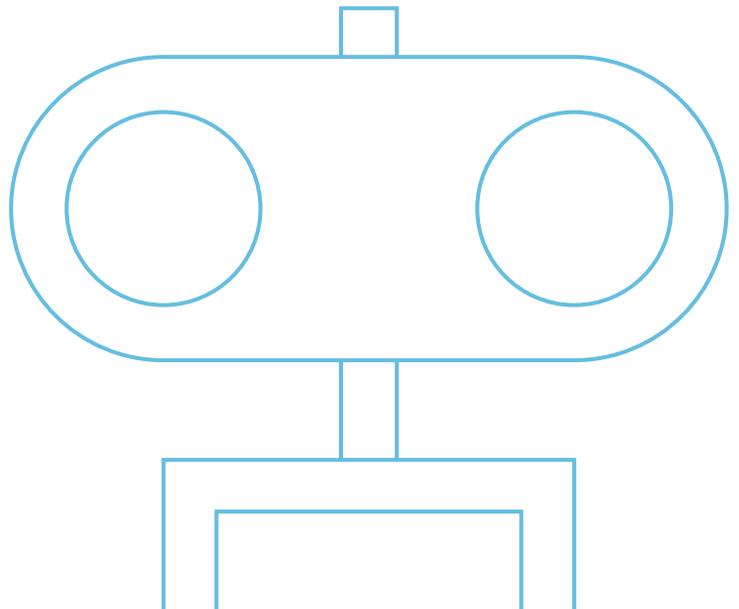
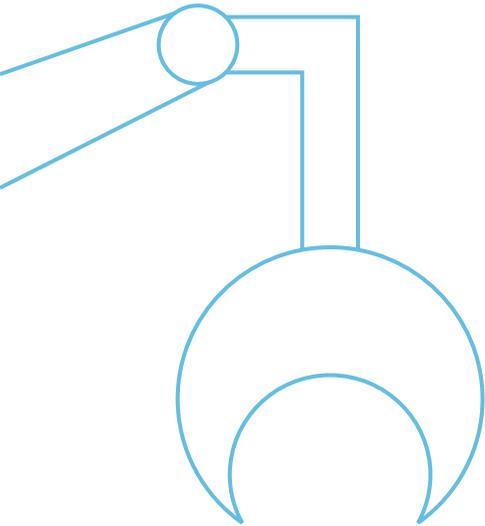
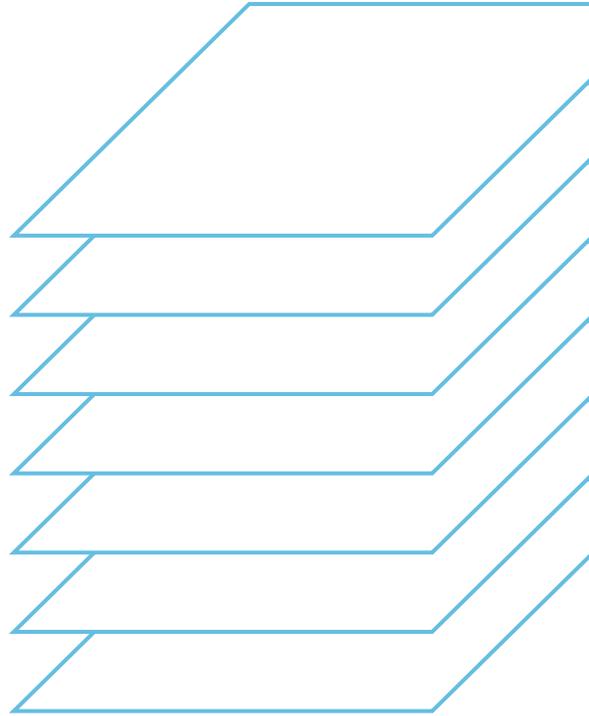
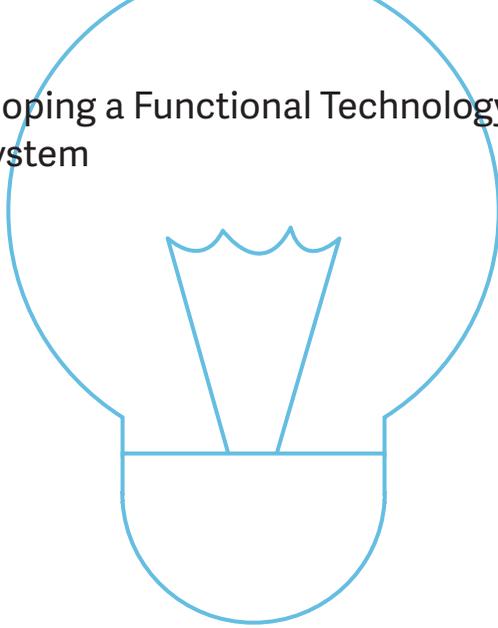
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Developing a Functional Technology Transfer Ecosystem



Technology Transfer Offices

Central TTO

- ▶ For one public research organization with administrators at each faculty/ department
- ▶ Central policy, rules and processes
- ▶ Must be service-oriented

Advantages

- ▶ Effective thanks to sharing resources, easier to communicate with industry

Disadvantages

- ▶ Experts do not have a close relationship with researchers—only general knowledge about expertise and intellectual property portfolio

Smaller TTO office at each faculty/department

- ▶ Must have at least one central administrator if public research organization is one legal entity

Advantages

- ▶ More flexible and closer to researchers; easier to communicate the strategy and rules

Disadvantages

- ▶ Cooperation among public research organizations is fragmented, and multidisciplinary projects are difficult to organize;
- ▶ Usually do not have enough resources to offer high quality services

The way **Technology Transfer Offices** function must align with the overall ambition and available resources for technology and knowledge transfer. To align the expectations of all stakeholders and keep them motivated, the management of public research organizations must set clear goals for technology and knowledge transfer.

Regional TTO

- ▶ Might be a suitable model when technology and knowledge transfer opportunities are scarce or when the resources at individual public research organizations are limited
- ▶ Must very clearly communicate the expectations and clarify roles of all parties involved
- ▶ Must have a scout or at least administrator at each public research organization

Advantages

- ▶ Business experts available, intellectual property and expertise portfolio can be more effectively communicated towards industry

Disadvantages

- ▶ Experts do not know the researchers, difficult to map all the intellectual property and expertise

TTO as a Special Purpose Vehicle (SPV)

- ▶ The SPV is fully owned by the public research organization
- ▶ Must be service-oriented
- ▶ Must very clearly communicate the expectations with management and must clearly define powers and responsibilities (including key performance indicators) of the SPV management

Advantages

- ▶ The SPV is a business enterprise: negotiating with the private sector can be much faster and simpler

Disadvantages

- ▶ May be complicated to set up; communication between researchers and SPV as external body may be problematic

Technology and Know Process Step by Step

There are five basic stages of technology and knowledge transfer:

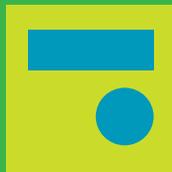
1

Forming
an idea



2

From idea
toward
a product



3

Technology and knowledge
transfer and
commercialization models

CONTRACTUAL
RESEARCH



COLLABORATIVE
RESEARCH



ledge Transfer

IP LICENSING



SPIN-OUT
COMPANIES
CREATION



4

Aftercare
and controlling



5

IP portfolio
management



Forming an idea



Research design

- ▶ The public research organization must understand how to design research with application potential. The research design should start with a review of the state-of-the-art.
- ▶ The research design might also reflect local specialization—such as smart specialization—to have a better chance to succeed.
- ▶ Applied research design is a continuous process—the design should be adapted based on new findings and market research.
- ▶ Commercialization is often most successful when the project is designed based on a concrete need of an industrial partner.
- ▶ The challenges of proper research design—including the definition of the research question or problem—must not be underestimated, even during contractual or collaborative research.

Internal communication

- ▶ Communicating technology and knowledge transfer rules to all researchers within each organization is crucial.
- ▶ TTOs may organize regular meetings with researchers interested in technology and knowledge transfer.
- ▶ TTOs may consider employing a communication manager who would be responsible for all communication channels.
- ▶ Internal communication is critical during collaboration and contractual research. The research progress must be monitored internally and communicated regularly with partners.

Popularization and further education

- ▶ TTOs should disseminate best practice examples and success stories to boost researcher motivation to engage in technology and knowledge transfer activities.
- ▶ Basic technology and knowledge transfer rules, such as patenting principles, should be part of students' curricula.
- ▶ There are other ways to popularize technology and knowledge transfer. TTOs may organize hackathons, info days for companies (partners), specialized seminars where companies present their business, etc.

Monitoring capacities and projects

- ▶ All internal experts (researchers) and other capacities must be monitored. The TTO must have a good database of internal scientific capacities.
- ▶ A TTO should have an internal database of researchers.
- ▶ If there are active commercialization projects, there should be internal evidence specifying the current phase each project is in and the further steps planned.
- ▶ Regular internal meetings with the most promising research teams should be organized.

From idea toward a product

When researchers bring a new idea that is well-designed and potentially solves an important societal problem, the road to a product is very long. **TTOs must help researchers understand this challenge and deal with it.**

Ownership—invention and its protection

- ▶ Employees in Croatia must report all inventions to their employers.
- ▶ If public research organization management decides not to proceed with protecting and commercializing an invention, the ownership rights may be transferred to the inventors.
- ▶ The intellectual property rights (IPR) must be fully in line with legislation, especially in the case of spin-off companies that have the ambition to attract angel or venture capital.
- ▶ A TTO must closely monitor ownership and address all legal aspects before negotiating with industrial partners.
- ▶ If the intellectual property (IP) is co-owned, a contract must accompany the co-ownership. IP ownership is highly relevant even in the case of contractual and collaborative research.

Validation (technical, legal, business)

- ▶ The research team usually validates the technical quality, but the TTO should be able to help methodologically.
- ▶ Validation of legal quality demonstrates that the project or invention has a unique protectable feature (patentability), or at least it does not conflict with other solutions (freedom to operate or FTO).
- ▶ Business validation should be done during the research, not after the research is completed, because it often brings important insights from the market, and the research team can adjust accordingly.
- ▶ The TTO should be able to help the researcher with business validation, at least with a basic analysis.
- ▶ The TTO might organize external experts into a Commercialization Committee to validate the business potential of ideas or technologies.

Commercialization agreement

- ▶ Commercialization needs to be transparent for each party involved; thus, the TTO should have a written agreement between all parties.
- ▶ The commercialization agreement should also specify how the potential revenues will be distributed.
- ▶ The commercialization agreement should specify milestones to keep the TTO and the researcher committed: filing the patent application; undertaking a valuation; detailed market analysis; starting negotiations with the first potential client; preparing the first draft of a license agreement or termsheet.

Valuation

- ▶ TTOs must be able to help researchers value their projects or have external partners to do so. A TTO may have templates and guides for researchers to perform a basic valuation themselves. There are several ways to arrive at an estimate: cost-based valuation, analogy valuation, or market-based valuation. The choice of a specific method is very individual and depends on available data.
- ▶ An external party should perform valuation in spin-offs to manage conflicts of interest. The valuation and cost-benefit analysis (CBA) significantly help during negotiations with industrial partners.

Intellectual Property Protection

- ▶ The TTO should prepare a cost-benefit analysis to identify which ideas are worth protecting with a patent.
- ▶ Not all ideas are suitable for patent protection, but other forms of IP may be applicable. The TTO and the researcher must understand the differences between patents, utility models, design patents, trademarks, and know-how.
- ▶ The TTO must always consider the quality of the patent attorney.
- ▶ In cases where the public research organization decides the idea is not worth commercializing, the researcher should be able to proceed with the commercialization if they still believe it can be successful.
- ▶ In the case of IP co-ownership with an industrial partner, the roles during the IP protection process must be agreed upon, including the patent attorney selection, patent quality assessment (FTO, patentability, enforceability), financing, etc.

Commercialization models

There are many types of technology and knowledge transfer and commercialization. Each case is suitable for a different type. At the beginning of commercialization, the TTO must understand the specifics of dealing with the private sector in contrast to academic processes. **It is crucial to react quickly, flexibly, and transparently.**

Contractual research

- ▶ The TTO should map the public research organization's internal expertise and capacities to match them with opportunities for contractual research. Contractual research is often a first step toward more complex partnerships. The public research organization's internal expertise should be well mapped.
- ▶ Marketing of expertise and specialized equipment is useful if the demand is not very strong yet, especially when there are not many success stories yet.
- ▶ Before any contractual research, the TTO must consider potential future IPR. The TTO should include license clauses in each contractual research project, no matter how unlikely it is that any IP will emerge.
- ▶ In each research contract, the TTO must have a pricing calculation.

¹ Foreground IP refers to intellectual property developed after the license agreement is signed (either by the licensor or licensee). Contrast with background IP, which refers to intellectual property entering a license agreement (i.e., intellectual property developed before the license agreement is signed) or intellectual property a partner is bringing to a cooperation.

Collaborative research

- ▶ Collaborative research is a complex collaboration between a public research organization and an industrial partner. The TTO should sign a collaborative research agreement.
- ▶ The TTO must go into detail (as required by EU legislation) when they choose a specific collaborative research type:
 - ▶ Fully covered by public sources (fully state-funded research): the public research organization will own IPR arising from the research.
 - ▶ Fully covered by industrial partner: the industrial partner is entitled (according to law) to an exclusive license or non-exclusive royalty-free license of the foreground IP¹ arising from the collaborative research.
 - ▶ Partly covered by industrial partner: the terms of IP ownership are agreed upon among the parties, and it is especially important that the TTO sign a collaborative research agreement before the project starts.

IP licensing

- ▶ A TTO may prepare some typical licenses as templates, although each license is different, and preparing templates is difficult.
- ▶ The TTO must define the object of a license agreement well.
- ▶ It is important to distinguish between exclusive and non-exclusive licenses.
- ▶ The pricing (license fees and their distribution in time) must reflect other license terms.
- ▶ If there are royalties, they must be precisely defined.
- ▶ Each license must have a duration and specific terms regarding premature termination.
- ▶ The license agreement must specify what happens when the licensor or licensee improves the object of the agreement.
- ▶ For both exclusive and non-exclusive license agreements, the TTO should include a free license for the public research organization for academic and teaching purposes.
- ▶ The license agreement is rarely easily transferable without additional services by the licensor.
- ▶ There are several challenges when preparing a license agreement. Addressing these challenges is crucial in the contracting process.
 - ▶ What is being licensed?
 - ▶ Is the contract fair (win-win)?
 - ▶ How is the future improvement clause dealt with?
 - ▶ How much will the licensee pay, and how was it calculated?
 - ▶ Is the contract too complicated?

Spin-out company creation

- ▶ Some ideas have wider market potential and can be commercialized as a spin-out—a newly created company—which can have several forms.
- ▶ The commercialization, specifically the spinning off, can be supported by a specific SPV spin-off—a company 100% owned by the public research organization.
- ▶ The spin-off's founders—researchers—are usually technical experts and often lack business skills, which must be complemented.
- ▶ The TTO or the SPV must be linked to an angel and venture capital ecosystem to support spin-off creation.
- ▶ Similar to licensing, the spin-off should start with a termsheet, defining all stakeholders' roles, the general strategy of the spin-off, and the monetization strategy.
- ▶ If the spin-off has exit potential, the TTO should consider introducing a success fee for the public research organization related to the exit.
- ▶ Founders are advised to have a shareholders' agreement. The founder of the spin-off may often have a clash of interests with their work at the public research organization. TTOs must address this transparently and fully.
- ▶ If the public research organization is successful in creating a spin-off, the TTO must be able to manage its portfolio (or equity) well.

Aftercare and controlling

- ▶ For sustainable and successful tech transfer, the cooperation does not end with the contract signed or the project termination.
- ▶ To have a good long-term relationship with all partners, TTOs should have a customer relationship management (CRM) tool.
- ▶ The TTO may attract new partners and keep the existing partners engaged through social events and similar activities. For example, “speed dating” events, where researchers and the business community can network and share their ideas on specific topics, can be a very successful model.
- ▶ TTOs may also prepare a long-term partnership program with defined rules, access to students, access to research, etc.
- ▶ So-called “university labs” are another example of how TTOs may effectively engage with industrial partners. This concept offers companies a virtual space at a public research organization where they can present their challenges.

IP portfolio management

- ▶ Besides digital evidence of researchers, expertise, equipment, and commercialization projects, a TTO should have evidence of a general intellectual property portfolio.
- ▶ TTOs should reassess their patent lifecycle costs yearly.

Technology and knowledge transfer financing models

TTOs can be set up either to predominantly create income for their institutions or to provide a service infrastructure for institutional staff in the field of technology transfer. In both cases, the TTOs are originally funded by public research organization resources. When a TTO aims to finance its operation partly from revenues from technology and knowledge transfer, the TTO must prepare suitable financial processes in the institution.



Public funding

- ▶ Some activities are difficult to finance internally or commercially, especially in less mature ecosystems. These include especially proof-of-concept projects, IP protection, and valuation. Usually, these types of activities are subsidized at the national level. There are also international public funding opportunities, such as through Horizon Europe.



Funding from industry

- ▶ When there is not enough institutional funding, a TTO should put more effort into partnerships with the private sector.
- ▶ A TTO may also consider introducing a sponsorship program. A TTO can prepare benefits for private companies (such as access to students, university labs, public relations and promotion, etc.) in exchange for small recurrent fees.
- ▶ When there is an excellent research group, there might be a possibility to have a direct sponsorship from industry.



Angel and VC funding

- ▶ TTOs may partner with business angels and venture capital funds, which can invest the capital necessary for spin-out creation. Moreover, from a long-term perspective, business angels and venture capital funds can significantly increase the success rate of spin-outs.
- ▶ A TTO should have a portfolio of available technologies suitable for spinning out.
- ▶ TTOs must ensure that all internal processes (including legal obligations) are followed because investors perform rigorous due diligence, and every shortcoming is revealed sooner or later.
- ▶ TTOs may gather feedback on technologies (potential spin-outs) from external partners, such as from a commercialization committee.
- ▶ If spin-out creation is one of the main goals within a TTO's technology and knowledge transfer strategy, the TTO should consider becoming a member of some international business angel or venture capital networks.

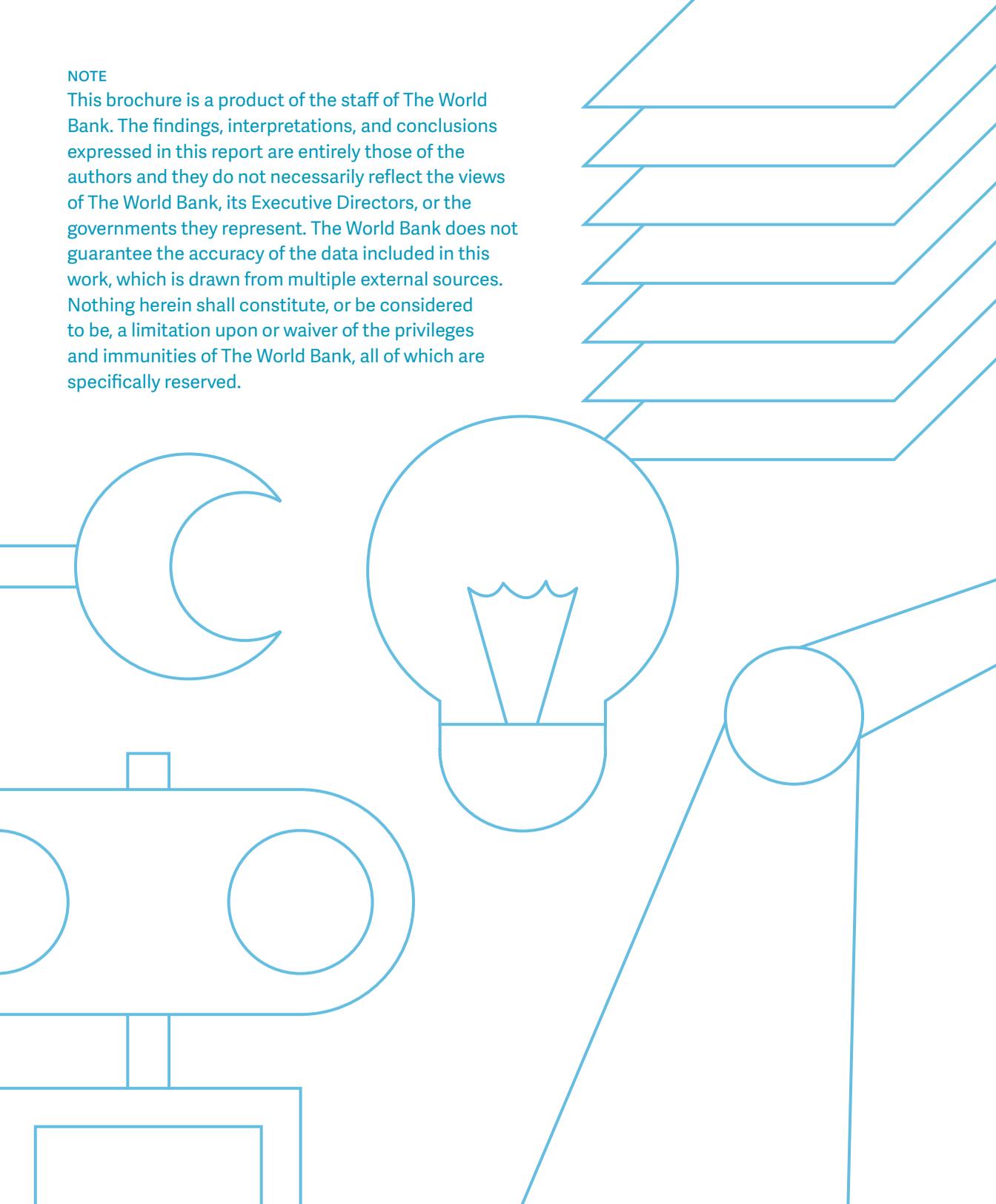


Financing TTOs lean

- ▶ The role of a TTO is very complex, and the administration of the whole agenda is often costly. However, the lean approach may help to balance the performance and costs.
- ▶ Always try to start with small actions and follow up with more ambitious goals.
- ▶ Have excellent evidence of internal research capacities and attract inbound demand.
- ▶ Be ready to do TTO piloting—test what functions well and adjust the TTO agenda accordingly.
- ▶ Outsource the lengthy yet relatively standardized tasks.
- ▶ Validate all technology and knowledge transfer activities and choose to support only the projects with significant business potential—save time for activities on which you can have the biggest impact.
- ▶ Choose the most excellent teams and aim for sponsored research.
- ▶ Connect with other public research organization and pitch your expertise together.
- ▶ Setting up a TTO as a spin-off can help to introduce this business-oriented lean approach.

NOTE

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