The Tunisian innovation system and the concept of Solution Labs – First insights from the SolLabTUN project

Working Paper developed as part of the project "Solution Labs Tunisia"

funded by the German Federal Ministry of Education and Research (BMBF),
grant numbers 01DH20028A and 01DH20028B

Cyrine Tangour, Andrea Zenker, Emmanuel Muller, Nizar Abdelkafi

Leipzig, Karlsruhe, Kehl, Milan

Februar 2025

Publishing Notes

The Tunisian innovation system and the concept of Solution Labs – First insights from the SolLabTUN project

Project: Solution Labs Tunisia

Websites: https://www.isi.fraunhofer.de/de/competence-center/politik-gesellschaft/projekte/sollab-tun_od.html

https://www.imw.fraunhofer.de/de/forschung/unternehmensentwicklung/digital-health/projekte/SolLab-Tun.html

https://www.hs-kehl.de/sollab-tun/

Funding Body: Federal Ministry of Education and Research (BMBF), supported by project management agency Projektträger Jülich, grants no. 01DH20028A und 01DH20028B

Authors and responsible for content

Dr. Cyrine Tangour, Fraunhofer Center for International Management and Knowledge Economy IMW, cyrine.tangour@imw.fraunhofer.de

Dr. Andrea Zenker, Fraunhofer Institute for Systems and Innovation Research ISI, andrea.zenker@isi.fraunhofer.de

Prof. Dr. Emmanuel Muller, University of Applied Sciences Kehl, muller@hs-kehl.de

Prof. Dr. Nizar Abdelkafi, Politecnico di Milano School of Management, previously Fraunhofer Center for International Management and Knowledge Economy IMW, nizar.abdelkafi@polimi.it

Picture credits

Cover page: ©shutterstock.com/Rawpixel.com

Recommended citation

Tangour, C.; Zenker, A.; Muller, E.; Abdelkafi, N. (2025): The Tunisian innovation system and the concept of Solution Labs – First insights from the SolLabTUN project. Leipzig, Karlsruhe, Kehl, Milan: Fraunhofer ISI.

Published

February 2025

Acknowledgement

We extend our sincere gratitude to the German Federal Ministry of Education and Research (BMBF) for their financial support and to Projektträger Jülich for their administrative guidance throughout the project. We also deeply appreciate the dedication and contributions of our Tunisian colleagues and partners, whose willingness to experiment and co-develop the "SolLabTUN" approach has been instrumental in advancing this innovative initiative.

Contents

1 Abstract

This paper presents insights from the initial phase of the three-year Tunisian-German research project "Solution Labs Tunisia" (SolLabTUN), conducted between 2021 and 2024 and funded by the German Federal Ministry of Education and Research (BMBF). The project aims to strengthen Tunisia's innovation system by fostering collaboration between academia, industry, and public institutions through a tailored workshop format called Solution Labs.

The National Innovation System (NIS) framework, including models like the Quadruple Helix, highlights the importance of interconnected elements such as research, funding, infrastructure, and favorable conditions, as well as collaboration between academia, industry, government, and civil society to drive innovation in a rapidly evolving global landscape. Tunisia's innovation system is hindered by several challenges, including fragmented governance, limited funding, unequal access to innovation, and a lack of collaboration between academia and industry, which collectively impede the translation of scientific knowledge into market-ready innovations and economic growth. The project team defined the SolLabTUN project to promote the emergence of a new market-driven format that strengthens the link between business, science, and higher education.

The results of this paper are built upon the findings of a one-year preparatory project conducted in 2018/19 and a kick-off workshop held at the outset of this project. The key findings of this paper highlight the opportunities and challenges of designing and piloting Solution Labs in Tunisia, which are central to the project's core objective of developing and conducting five such labs in the strategic regions of Tunis and Sfax.

In summary, the Solution Labs initiative in Tunisia is a multi-day, cross-organizational, and intercultural event where young talents, supported by scientific experts, work on real-world challenges presented by Tunisian companies. These interdisciplinary teams collaborate in a creative environment to develop innovative concepts aiming to bridge the gap between academia, higher education, and business. By fostering collaboration among diverse stakeholders, the initiative promotes market-driven innovations and strengthens the relationship between academia and industry, ultimately contributing to a more integrated innovation ecosystem.

The project faces several key risks, including the experimental nature of the concept in the Tunisian context, the challenge of identifying appropriate innovation challenges, attracting, and retaining creative young professionals, and ensuring coaching quality. To mitigate these risks, the project foresees continuous improvement strategies, including pairing coaches with diverse backgrounds, gradually transferring process ownership to a Tunisian team, and conducting regular assessments.

In conclusion, the implementation of Solution Labs in Tunisia represents a strategic approach to contribute to improving Tunisia’s NIS by focusing on practical, collaborative problem-solving between academia and industry. This initiative has the potential to catalyze broader improvements in the innovation ecosystem, ultimately contributing to increased innovation potentials.

In the medium to long term, this should contribute to improved innovation capacities, to the creation of employment options, especially for highly qualified persons, and ultimately to improving the standard of living in Tunisia.

2 Introduction

Innovation is a complex, dynamic process that involves the interaction of various actors and activities, rather than a linear flow of knowledge or technology. This perspective has evolved from earlier models of "technology push" and "market pull" to a more interactive and systemic understanding of innovation.[1] The innovation process can thus be considered as a multifaceted endeavor that relies on various interconnected elements to thrive.

As outlined by Lundvall et al. (2009)[2], a national innovation system (NIS) encompasses "an open, evolving and complex system that encompasses relationships within and between organizations, institutions and socio-economic structures which determine the rate and direction of innovation and competence-building emanating from processes of science-based and experience-based learning".[3] This system benefits from or even requires several key components, including research and development activities, diverse competencies and expertise, adequate funding, performant infrastructure, and favorable framework conditions.

Figure 1 illustrates a schematic representation of an innovation system, emphasizing the various components – such as science and research, the business sector, education and qualification, innovation funding, policy support, and related infrastructure – their role for innovation and their interconnections.

These elements are not isolated but interact within a broader ecosystem of stakeholders. The Triple Helix model, introduced by Etzkowitz and Leydesdorff in the 1990s,[4] provides a framework for understanding these interactions, focusing on the relationships between academia, industry, and government. This model emphasizes the importance of collaboration and knowledge flows between these three key sectors in driving innovation. Building upon the Triple Helix, the Quadruple Helix model[5] expands this framework to include a fourth stakeholder: civil society or the public. This addition recognizes the growing role of users, citizens, and communities in the innovation process, particularly in the context of sustainable and responsible innovation. The Quadruple Helix model acknowledges that innovation increasingly occurs in a societal context where public engagement and user-driven innovation play crucial roles in shaping technological development and its impacts.[6]

By considering these diverse stakeholders and their interactions, we can better understand the complex dynamics that drive innovation in modern knowledge-based societies. This holistic approach highlights the need for coordinated efforts across sectors to create an environment conducive to innovation, leveraging the strengths of each stakeholder while addressing the challenges of an increasingly interconnected and rapidly evolving global innovation landscape. More specifically, this perspective emphasizes the need for innovating businesses to cooperate with external partners and jointly develop successful innovations.

---

[1] Cf. Midgley, G.; Lindhult, E. (2021): A systems perspective on systemic innovation. In: *Syst Res Behav Sci* 38 (5), S. 635–670. DOI: 10.1002/sres.2819.

[2] Lundvall, B.-A.; Joseph, K. J.; Chaminade, C.; Vang, J. (Hg.) (2009): Handbook of Innovation Systems and Developing Countries. Edward Elgar Publishing (12943), chapter 1, https://ideas.repec.org/b/elg/eebook/12943.html.

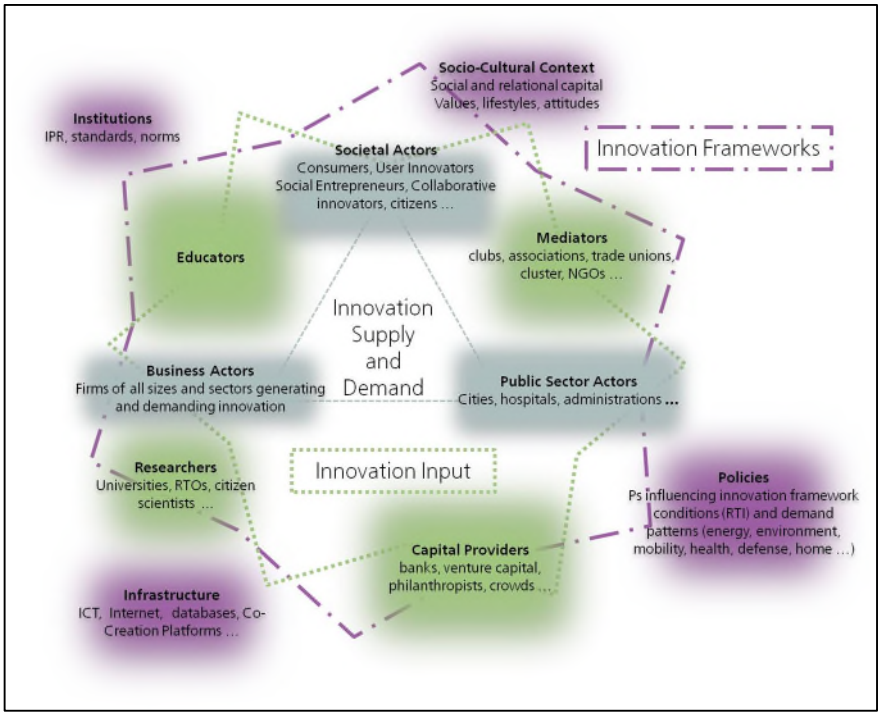
[3] Cf. also https://opus.bibliothek.uni-augsburg.de/opus4/frontdoor/deliver/index/docId/85408/file/85408.pdf.

[4] Cf. Etzkowitz, H.; Leydesdorff, L. (1995): The Triple Helix - University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. In: *EASST review* 14 (1), 14–19, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2480085.

[5] Cf. Carayannis, E. G.; Campbell, D.F.J. (2009): 'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem. In: *IJTM* 46 (3/4), Artikel 23374, S. 201. DOI: 10.1504/IJTM.2009.023374.

[6] Cf. also Cai, Y.; Amaral, M. (2021): The Triple Helix Model and the Future of Innovation: A Reflection on the Triple Helix Research Agenda. In: *Brill*, https://brill.com/view/journals/thj/8/2/article-p217_1.xml.

Figure 1: Schematic presentation of an innovation system



Source: Warnke, P.; Koschatzky, K.; Dönitz, E.; Zenker, A.; Stahlecker, T.; Som, O.; Cuhls, K.; Güth, S. (2016): Opening up the innovation system framework towards new actors and institutions. Fraunhofer ISI Discussion Papers Innovation Systems and Policy Analysis No. 49. Karlsruhe: Fraunhofer ISI.

In the context of Tunisia, a well-performing National Innovation System (NIS) is crucial for several key objectives. Firstly, it is essential for bringing science into practice to drive innovation and solve real-world problems. Secondly, it aims to increase employment opportunities for the younger generation. Lastly, it supports economic growth and improves overall living conditions, enhancing social wellbeing. Despite having well-established research infrastructures, Tunisia faces significant challenges in translating scientific knowledge into market-driven innovations. This is partly due to difficulties in fostering collaboration between public academic research and the private business sector.

To contribute to mitigate some of these challenges, a German-Tunisian team of researchers has conceived the SolLabTUN project. More specifically, the SolLabTUN project is designed to bridge the gap between science, business, and education by promoting the emergence of innovative, market-driven solutions through a format called Solution Labs. In this format, young talented people work together to find creative solutions to real-world challenges presented by Tunisian clients.

This approach not only fosters team building and networking but also encourages the development of new knowledge and innovative solutions. This paper explores the motivations, opportunities, and challenges that shaped the concept and design of Solution Labs in Tunisia. It delves into the factors that drove the development of this innovative approach and examines the opportunities and challenges that might be encountered during its implementation.

This working paper focuses on specifically addressing three key questions:

- What are the primary barriers hindering effective collaboration between academia and industry in Tunisia?
- How can Solution Labs facilitate stronger connections between science and industry, and what benefits can this format bring to improving their relationship within the innovation ecosystem?

- What strategies can be employed to ensure that Solution Labs are effectively integrated and accepted within both academic and business environments in Tunisia?

The development of a Solution Lab approach customized to the Tunisian context is built on two cornerstone elements: a preparatory project and a kick-off workshop.

The preparatory project, funded by the BMBF under grant number 01DH18022, was conducted over a year in 2018/19. This phase involved a comprehensive investigation into the potential transferability of the Solution Lab approach to Tunisia. The project team engaged in literature reviews and meetings with key stakeholders from Tunisia's National Innovation System (NIS) in the two strategic regions of Tunis and Sfax. The team met with representatives from the government, government agencies, innovation supporting structures (such as technoparks and accelerators), eight universities, eight companies, and civil society organizations. This preparatory phase allowed to refine the basic concept, adapt the methodology to Tunisia's context, and establish strong partnerships with solution-seeking companies, universities, research centers, and intermediaries. These collaborators enriched the project with their expertise, networks, facilities, and experience, ensuring a solid foundation for implementing Solution Labs in Tunisia.

The subsequent implementation-oriented Solution Lab project began with a kick-off workshop held on November 18, 2021. Due to the COVID-19 pandemic, the event was conducted virtually, in contrast to the original plan of a face-to-face workshop. The workshop brought together Tunisian and European experts, along with associated project partners. Participants included representatives from:

- Two Tunisian public organizations: National Agency for the Promotion of Research (ANPR), and Sfax Business Center.
- Four Tunisian higher education institutions: Ecole Nationale d'Ingénieurs de Sfax (ENIS), Ecole Supérieure des Communications de Tunis (SUP'COM), Institut Supérieur de Gestion Industrielle de Sfax (ISGIS), and Ecole Nationale d'Electronique et des Télécommunications de Sfax (ENET'COM).
- Five Tunisian and five European companies
- One European Technology Transfer Organization, Steinbeis Europe.

The SolLabTUN project is funded by the BMBF and executed by two Fraunhofer institutes (the Institute for Systems and Innovation Research ISI and the Center for International Management and Knowledge Economy IMW), the University of Applied Sciences Kehl, and the National Engineering School of Tunis (ENIT) and further associated Tunisian partners.

This collaboration reflects a broader effort to address the challenges in Tunisia's innovation system. By leveraging international partnerships and expertise, initiatives like SolLabTUN aim to enhance innovation capacities and promote economic growth in Tunisia.

This paper is structured to provide a comprehensive overview of the Tunisian innovation system and the implementation of Solution Labs within it. The discussion begins with an examination of the Tunisian innovation system, highlighting both the opportunities and challenges it faces (Section 3). Following this, the paper explores the potential and opportunities offered by Solution Labs in Tunisia, detailing how this initiative can address existing gaps in the innovation system (Section 4). It then delves into the potential challenges that Solution Labs might encounter in the Tunisian context, providing insights into the obstacles that need to be overcome for successful implementation (Section 5). Finally, the paper concludes by summarizing the key findings and implications for enhancing innovation capabilities in Tunisia (Section 6).

3 The Tunisian innovation system: Opportunities and challenges

Tunisia's national innovation system (NIS) is characterized by the presence of basic elements necessary for innovation, although the interconnections between these components are not fully operational.

Key organizations within the Tunisian NIS include 13 public universities, 39 national research centers, the Agency for the Promotion of Industry and Innovation (APII), and the National Agency for Scientific Research Promotion (ANPR). Technoparks also have a high significance in Tunisia's innovation system. These entities play crucial roles in promoting innovation, supporting startups, and funding research projects. Another strength of Tunisia's innovation system lies in its ability to generate high-quality scientific knowledge in academia, offering potential for innovation. The country has achieved notable success in scientific production, ranking 12th globally in terms of scientific publications relative to GDP, with a substantial rate of international co-publications reaching 58%. Tunisia has a high institutional density in higher education and scientific research, with about 18 higher education and scientific research institutions per million inhabitants. This has led to a well-educated workforce, with more than 40% of the population having completed at least intermediate or advanced education.[7]

Furthermore, a burgeoning startup ecosystem has emerged, supported by infrastructures like incubators and accelerators, such as Flat6Labs, Google for Startups Accelerator. These provide essential resources such as funding, mentorship, and networking opportunities. The startup ecosystem in Tunisia is characterized by its fast growth and the presence of highly motivated, educated talents. Initiatives like the Startup Act of Tunisia and programs such as Anava Seed Fund further support this ecosystem by providing legal frameworks and investment opportunities. These developments not only foster entrepreneurship but also contribute to economic growth across various sectors.[8]

However, the high-quality scientific knowledge generated in Tunisia's academic institutions barely transcends the boundaries of academia, with only a small fraction being translated into market-ready innovations that benefit both the business world and society. Tunisia's NIS faces several challenges that hinder its full potential, including:

1. Fragmentation of public policy and governance: A clear strategic direction is lacking, particularly in aligning scientific research with industrial needs. Moreover, responsibilities are distributed across various ministries, which complicates coordinated innovation efforts. Formal and informal institutional constraints, such as regulatory barriers and bureaucratic hurdles, impede innovation efforts. These constraints often lead to imitative rather than innovative behaviors among firms.
2. Limited funding capacities and use of intellectual property mechanisms: Tunisia struggles to fund research and development. Researchers lack funding and incentives for commercializing research results or protecting intellectual property through patenting. This limits the ability of firms to access necessary resources. Companies also face difficulties in accessing relevant research and scientific partners. In addition, there is also a need for greater awareness among Tunisian companies about the importance of innovation. Since most Tunisian firms are small

[7] Cf. Chaâbouni, R.; Cogneau, S.; Guibert, J. C. (2021): Technology Transfer in Tunisia 2019 - 2020. Publications Office of the European Union. European Commission (ed.), https://publications.jrc.ec.europa.eu/repository/handle/JRC125744. See also https://www.euraxess.tn/tunisia/research-tunisia.

[8] Cf. https://xplore.unternehmertum.de/start-up-ecosystem-in-tunisia.

and medium enterprises (SMEs), they are often not aware of available external knowledge, rarely use external patented knowledge through licenses and have limited patent activity themselves. This reflects a broader challenge in translating research into market-ready innovations.

3. Lacking inclusive innovation: Innovation does not equally benefit all segments of society. Socio-economic disparities within the country lead to unequal access to new developments, exacerbating socio-economic inequalities. Regional disparities in access to innovation resources and opportunities further exacerbate socio-economic inequalities, hindering equitable economic growth.
4. Limited collaboration between academia and industry: Despite existing structures and programs within Tunisia's NIS, there are significant barriers to effective collaboration between public academic research and the private business sector. This is due to differences in incentives, motivations, and communication patterns between scientists and businesspeople. While businesses aim to commercialize products, researchers focus on publication and teaching, leading to a lack of application-oriented research and limited knowledge flows between academia and industry. From a business perspective, public research often lacks practical application, while the research system does not prioritize producing commercially viable knowledge. Different communication patterns between academia and industry also impede knowledge flows, leading to underutilization of valuable research outputs. This mismatch hinders effective collaboration. Furthermore, existing partnerships often rely on individual efforts, such as those by lab directors, rather than systematic institutional collaborations. Improving these interrelations can have positive effects, such as better aligning scientific research with industrial needs and enhancing market activities through shared knowledge and expertise.

A range of instruments to address these challenges and to enhance innovation activities can be applied. These include aligning priorities on the strategic level, and instruments such as financial incentives, legal frameworks and public programs for collaborative research. Financial incentives, such as spinout equity, motivate researchers to engage in technology commercialization WIPO 2024a, and tax credits provide significant support by subsidizing R&D costs.[9] Developing legal frameworks, such as for the intellectual property protection, and aligning strategic priorities is crucial to ensuring the greatest potential impact of innovation.[10] Finally, public programs that support collaborative research activities between academia, industry, and government play a vital role in fostering innovation. These programs can include funding for joint research projects, technology transfer initiatives, and entrepreneurship support. By promoting collaboration, these programs help bridge the gap between research and commercial application, driving innovation and competitiveness.[11]

Based on the literature and results of the kick-off workshop, it is evident that Tunisia has already implemented a range of instruments aimed at enhancing its innovation capabilities. On the one hand, the government has focused on improving research and development, valorizing research, and establishing innovation-supporting structures like technopoles. These technopoles foster collaboration between academia, industry, and government, aligning with the Triple Helix model of

[9] Cf. WIPO (2024): Incentives in Technology Transfer. A Guide to Encourage, Recognize and Reward Researchers and Professionals. Geneva, https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=31521181. The French *Crédit Impôt Recherche* (CIR) introduced in the 1980s, https://www.economie.gouv.fr/entreprises/credit-impot-recherche and https://www.tresor.economie.gouv.fr/Articles/2021/09/20/evaluation-de-la-reforme-du-credit-impot-recherche-de-2008 (including results of evaluation exercises). The German *Forschungszulage* was introduced in 2020, see https://www.forschungszulage.de/.

[10] -Cf. for instance the comparative study of WIPO (2024): Models of Intellectual Property Governance and Administration (WIPO Publication No. 2009EN/24), https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=31521181.

[11] Cf. OECD (2013): Commercialising Public Research. New trends and strategies, https://www.oecd.org/en/publications/commercialising-public-research-new-trends-and-strategies_9789264193321-en.html.

innovation.[12] On the other hand, public programs such as the "Programme de mise à niveau" have modernized the industrial sector and integrated it into global markets. International collaborations with organizations like Expertise France and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH have further enhanced innovation capabilities. Tunisia also offers several research and innovation programs, including MOBIDOC, which supports PhD students working on company-related issues. The Valuation of Research Results (VRR) program, launched in 1992, promotes the commercialization of research results. All these efforts demonstrate Tunisia's commitment to strengthening its innovation ecosystem[13].

Despite Tunisia's progress in enhancing its NIS, there are opportunities for further improvement to unlock its full innovation potential. Experts and the project team have identified several key areas that require attention to continue advancing Tunisia's NIS:

1. Strengthen public-private partnerships: Enhance collaboration between academia, industry, and government to leverage resources and expertise effectively. This includes developing policies that encourage private participation in R&D and strengthening public-private cooperation in research. Also, offering financial incentives for academic-industry interaction can enhance collaboration and knowledge transfer between these sectors, thereby facilitating open innovation approaches.
2. Enhance governance and coordination: Establish a stable institutional framework with clear priorities to promote innovation. This involves refining governance structures to ensure consistent policy implementation and coordination across different sectors.
3. Enhance absorptive capacities of companies: To strengthen absorptive capacities in Tunisia's business sector, companies should focus on investing in employee training, enhancing internal R&D activities, fostering partnerships with academia and research institutions, and building strategic international alliances. These strategies help businesses effectively absorb and apply new knowledge, enhancing innovation and competitiveness.
4. Integrating innovation into education: Embedding innovation into higher education and qualification processes can significantly raise awareness and motivation for innovation activities among students and young professionals. This approach helps cultivate a culture of innovation from an early stage, equipping future leaders with the skills and mindset needed to drive innovation in their careers.
5. Evaluation and learning systems: Implementing flexible "learning systems" to evaluate efforts and adapt strategies based on feedback is essential for continuous improvement.

The SolLabTUN project tackles barriers hindering effective collaboration between academia and industry in Tunisia. It is designed to contribute to the improvement of Tunisia's NIS by strengthening public-private partnerships, while addressing further critical areas, such as integrating innovation into education, and promoting inclusive innovation policies.

[12] Cf. Chaâbouni, R. et al., ibid. See also European Commission (ed.) (2019): Research priorities and private participation in R&D. Horizon 2020 Policy Support Facility - Specific Support to Tunisia, https://projects.research-and-innovation.ec.europa.eu/sites/default/files/rio/report/PSF%2520Tunisia_Final%2520report.pdf.

[13] Cf. https://www.anpr.tn/mobidoc/, https://www.anpr.tn/programmes-nationaux/.

4 Solution Labs: Potentials and opportunities

Solution Labs represent a novel open innovation format, originally developed in Germany's Black Forest region and successfully implemented in several German regions and across the German/French border. Previous events involved binational partnerships, such as those between Germany and Algeria, where participants develop innovative solutions like online platforms and logistics concept. These six-day events bring together companies with specific challenges, young creative talents, and actors from science and innovation-supporting institutions. Participants work in small, transdisciplinary teams to develop innovative solutions, supported by coaches who provide methodological expertise and feedback. This collaborative approach emphasizes creativity and diversity, fostering an environment where diverse perspectives converge to address business challenges.[14]

At their core, these labs utilize three key cornerstones: divergent thinking techniques for idea generation, collaborative approaches to defining and conceptualizing problems, and methods for evaluating and optimizing potential solutions. The process typically unfolds over several phases, beginning with problem definition and discovery, followed by ideation and development, and ideally culminating in approaches for prototyping and testing.

A key feature of the Solution Labs is the parallel work of multiple solution-finding teams, each tackling a different innovation challenge and being backed by scientific and methodological coaching. In each Solution Lab, three company challenges are worked on simultaneously, allowing for a comprehensive exploration of various innovation issues. Furthermore, to maintain momentum and facilitate knowledge sharing, the Solution Labs incorporate daily presentations of results. These presentations provide an opportunity for each team to share their progress and insights with the entire group of talents, coaches, and scientific experts. This regular exchange not only allows for cross-fertilization of ideas between teams but also enables participants to benefit from the collective expertise of all involved parties. The daily discussions following these presentations are crucial for refining ideas and approaches. They allow for constructive feedback, critical analysis, and the integration of diverse viewpoints. This format provides rich opportunities for exchanges between team members, fostering a dynamic environment where diverse perspectives converge. The diversity within and across teams is a significant and unique strength of the Solution Labs approach.

Another distinctive feature of Solution Labs is their transdisciplinary nature, which brings together teams composed of individuals from diverse knowledge and technology fields. This broad composition fosters the integration of ideas from different angles, enhancing creativity and leading to more innovative solutions. For example, participants with expertise in technology may collaborate with those with management backgrounds, alongside graduates in social sciences, humanities, and design. This collaborative effort ensures that challenges are addressed from multiple perspectives, incorporating insights that would rarely emerge from a single discipline alone. By working together toward a shared goal, participants engage in "out-of-the-box" thinking, which enriches the solution-finding process.

A final distinctive characteristic of the Solution Lab is that teams, including coaches and talents, work, eat, and live together throughout the event, fostering intense team building, networking effects, and a collaborative environment that enhances creativity and problem-solving.

[14] Cf. https://www.kleinstadtakademie.de/methoden/solution-lab, https://werk-isi.de/.

The SolLabTUN project, supported by the BMBF, aims to adapt this methodology for Tunisia, which encompasses several key benefits:

1. For companies: Solution Labs provide access to innovative ideas and possible solutions developed by interdisciplinary teams of young, highly qualified talents. Companies gain fresh perspectives and creative ideas while receiving support from scientific experts. Moreover, this format serves as an excellent platform for companies to identify and assess potential new talented employees. By observing participants in action, businesses can evaluate their skills, problem-solving and communication abilities, and cultural fit, potentially leading to recruitment opportunities. This can be particularly valuable for Tunisian startups and growing companies looking to build diverse, innovative teams. Also, companies are exposed to new networks and resources, which can be invaluable for future growth and development. Companies have a unique opportunity to learn and adopt new approaches to problem-solving through their regular exchanges with their dedicated teams during the Solution Lab event. This interaction exposes companies firsthand to innovative methodologies and fresh perspectives, potentially transforming their own problem-solving processes.
2. For young talents: The Solution Labs not only provide an opportunity for young talents to gain hands-on experience with real-life challenges but also immerse them in a collaborative and interdisciplinary setting. This dynamic environment allows participants to develop new skills, expand their professional networks, and explore innovative problem-solving methodologies, all while contributing to meaningful outcomes for participating companies. In Tunisia, methodologies, and soft skills, such as those emphasized in Solution Labs, are not typically covered in university curricula. Neither is such intense practical experience with companies commonly integrated into academic programs. Including this in Solution Labs will enhance employment opportunities for young graduates and improve communication between higher education and the private sector.
3. For academia: Solution Labs serve as a strategic catalyst for initiating and strengthening academia-industry linkages by creating intensive, focused partnerships around specific innovation challenges. The week-long collaborative process not only addresses immediate business needs but also lays the groundwork for potential long-term collaborations and research projects that extend beyond the initial Solution Lab event. The project addresses untapped potential in transferring generated knowledge into innovative business models.

By bringing together diverse actors and fostering collaboration, the SolLabTUN project envisions creating a dynamic platform for innovation that benefits all stakeholders involved. Through this approach, Solution Labs in Tunisia aim to leverage collaborations between public research, higher education, and industry, ultimately contributing to a better performance of the Tunisian innovation system and increased innovation, employment, and income potentials in the country.

5 Potential challenges of Solution Labs in Tunisia

The Solution Labs Tunisia project addresses various opportunities and is expected to generate significant positive impacts, yet it also presents potential risks and challenges. As the project's team works toward developing a "Solution Labs made in Tunisia" approach, several milestones have been established to mitigate risks and enhance outcomes.

First, the experimental nature of Solution Labs, being new to the Tunisian context, requires careful adaptation to the local socio-economic and innovation environment. While the concept has been successfully piloted in Europe and Algeria, its success in Tunisia depends heavily on tailoring it to local needs. A key risk lies in the lack of engagement from local actors, which could hinder the adoption by Tunisian stakeholders beyond the funding period. Limited involvement from academic, public, and innovation-supporting institutions may prevent the approach from gaining traction or relevance, while inadequate transfer of skills could create competence gaps that undermine long-term implementation.

To address these challenges, the project employs several strategies. A robust network of local partners is being established to align with Tunisia's specific needs and priorities. The development of this format draws on insights from five pilot Solution Labs, ensuring continuous refinement. Competence transfer is facilitated using a "learn-to-learn" model by pairing international coaches with local counterparts to build capacity for independent operation. Challenges are carefully tailored to the Tunisian context through collaboration with companies, supported by on-site visits for deeper understanding. Local actors are actively involved in decision-making processes to foster ownership and accountability for the initiative's success. Additionally, regular evaluations, feedback loops and three strategic self-reflection meetings involving German and Tunisian stakeholders are planned to ensure that the approach remains relevant and effective. These meetings serve to review completed Solution Labs, identify learning outcomes, refine methodologies based on local needs, and develop long-term strategies for continuing the initiative after the BMBF's funding. The aim is to create a successful Tunisian version of the Solution Labs that can create lasting impact on Tunisia's innovation capacities and employment opportunities for highly qualified individuals.

A second key risk for Solution Labs is identifying the right innovation challenges. Without that, there is a risk of disengagement, reduced participation, and a lack of impactful outcomes. If the challenges are not relevant, engaging, or ambitious enough, they may fail to foster meaningful innovation. Companies often struggle to define specific challenges on their own, as this requires time and resources. The process also involves transaction costs and the potential risk of sunk costs if no clear success is achieved. Furthermore, opening internal processes and sharing company-specific data with external parties can raise concerns about intellectual property protection. This is particularly relevant for young Tunisian companies and start-ups relying on new technologies, due to a mistrust in the protection of intellectual property instruments existing in the country. Balancing knowledge disclosure and protection is critical to avoid conflicts of interest when partners with differing goals collaborate.

To mitigate these risks, the project team plans to co-design challenges with companies to define relevant and inspiring problems. Preliminary interviews with companies will establish trust and a mutual understanding of the Solution Lab approach. The cultural diversity of the project team ensures an embedded understanding of local needs, combining various backgrounds and expertise. Confidentiality will be safeguarded through non-disclosure agreements between participants and the project team. Additionally, being funded by the BMBF lends credibility to the initiative, fostering trust among Tunisian stakeholders. These measures aim to ensure alignment with real-world needs while building confidence and engagement from all participants.

The third key challenge identified for the Solution Labs Tunisia project is attracting and selecting suitable creative talents. This challenge is crucial as the success of the initiative hinges on forming diverse teams with complementary skills. Ideal participants should possess strong hard and soft skills that align with the specific topics and needs of the challenges identified by participating companies. They should also demonstrate divergent thinking and excel in multidisciplinary and multicultural collaboration. Without such tailored diversity, Solution Labs may struggle to generate creative solutions or effectively address complex problems. Additionally, accessing external knowledge that precisely fits companies' specific innovation needs can be challenging.

To address this, the project team must clearly communicate the benefits of participation to potential talents, including networking opportunities, skill development, and career advancement prospects. A carefully designed recruitment process, involving a call for applications, intensive involvement of excellent institutions like the National Engineering School of Tunis (ENIT) and a thorough selection procedure, will ensure a mix of backgrounds, skills, and cultural insights among participants, all while maintaining a focus on the specific requirements of each company's challenge. At the end of the project, a significant outcome will be the creation of a pool of talented individuals who have been trained in the Solution Labs methodology and have gained valuable experience in addressing real-world innovation challenges. This pool of talents, along with the networks established during the project, will be a valuable resource for the Tunisian team to continue organizing and running Solution Labs beyond the project's funding period.

The fourth risk concerns the ability of coaches to effectively guide teams toward achieving their objectives without directly intervening in the content of the challenges. Coaches play a critical role in facilitating collaboration, ensuring that teams remain focused, and introducing tools or methodologies when needed, while at the same time not intervening in the creative process of ideation. However, if coaches lack the necessary skills, cultural awareness, or methodological expertise, it could hinder team dynamics and the quality of outcomes. Additionally, striking the right balance between providing guidance and allowing teams to independently explore solutions can be challenging.

To tackle this, teams of German and Tunisian coaches are paired to combine complementary strengths. Tunisian coaches bring in valuable cultural insights, ensuring guidance is contextually appropriate, while German coaches provide specialized tools and methodologies in innovation management, introducing them as needed to support creative outcomes. Communication is further facilitated by the German coaches' proficiency in French, enabling seamless collaboration with Tunisian participants. This pairing not only enhances cultural sensitivity but also ensures methodological rigor, creating a balanced approach that fosters creativity and meets the expectations of all stakeholders. By implementing these strategies, the project aims to mitigate the coaching-related risks and create a robust framework for guiding teams towards innovative solutions in the Tunisian context.

In total, the project context provides the opportunity to develop a sound methodological base for the various steps from the preparation of Solution Labs, their implementation to their evaluation and further development, enriched by different and heterogeneous backgrounds and expertise of the project team members. Finally, the high motivation of Tunisian actors serves as important push factor for the success of the approach. So even though starting on a small scale with a limited number of people and innovation topics, Solution Labs in Tunisia may unfold their potential to generate "snowball effects" and involve an increasingly broad spectrum of interested parties to effectively bridge the gap between science, education and the private sector, enhance innovation activities and business opportunities, as well as employment opportunities for young graduates and improve societal welfare in Tunisia.

6 Conclusion

This paper focuses on the first phase of the three-year research project "Solution Labs Tunisia", funded by the German Federal Ministry of Education and Research (BMBF) and realized by two Fraunhofer institutes (the Institute for Systems and Innovation Research ISI and the Center for International Management and Knowledge Economy IMW), the University of Applied Sciences Kehl, and the National Engineering School of Tunis (ENIT) and further associated Tunisian partners.

The project aims to strengthen Tunisia's innovation system by fostering collaboration between academia, industry, and public institutions to enhance innovation activities and economic potential. Using a tailored workshop format called Solution Labs, based on a methodology initially developed in Germany that will be adapted to the Tunisian context, the project addresses gaps between science and industry while considering Tunisia's unique socio-economic and cultural characteristics. Over three years, five Solution Lab events will be piloted to adapt the approach to the Tunisian context. These labs bring together young talents, businesses, and academic experts to collaboratively solve real-world challenges, creating new knowledge and networks. Involving scientists in coaching roles provides them with valuable insights into business challenges, access to new networks, ultimately contributing to a more collaborative innovation ecosystem in Tunisia. Thanks to the SolLabTUN project, companies gain access to innovative solutions developed by interdisciplinary teams of young talents. This format allows businesses to tap into fresh perspectives and creative ideas while receiving support from scientific experts. Additionally, the project provides companies with opportunities to identify and potentially recruit new talent. By engaging in this collaborative process, businesses can also explore possibilities for future applied research projects with excellent Tunisian researchers, fostering long-term partnerships between industry and academia and ultimately contributing to Tunisia's economic development.

The Solution Labs Tunisia project faces several key risks that could impact its success. The experimental nature and novelty of the concept in the Tunisian context pose challenges in implementation and acceptance, requiring careful adaptation to local conditions. Identifying appropriate innovation challenges that align with local needs while balancing knowledge sharing and protection among diverse partners with different interests is crucial. Attracting and retaining teams of creative young professionals with the right skills and mindset is essential for the project's success. Additionally, ensuring coaching quality is critical, as coaches must effectively guide teams to reach intended deliverables without directly intervening in the solution development process. These risks collectively highlight the complexity of implementing the Solution Labs approach in Tunisia and underscore the need for careful planning, continuous adaptation, and stakeholder engagement throughout the project. To mitigate these risks, the project will employ continuous improvement strategies, including pairing coaches with diverse backgrounds, gradually transferring process ownership to a Tunisian team, and conducting regular assessments with client companies and participants. These evaluations will help refine the Solution Lab approach to better fit the Tunisian context and bridge gaps between academia and industry.

A stronger interrelation between these actors could be supported by enhanced interlinkages on the governance level, through a comprehensive strategy on research and innovation, enhanced coordination between ministries and within research organizations.