

# The International TRIZ Conference ITC-2023

## PIONEERING BORNEO TRIZ AND FURTHER PROLIFERATE KNOWLEDGE WITH REMOTE LOCATIONS

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### Abstract

TRIZ knowledge has made its way from Russia to many places around the world. It arrived in South East Asia in early 2000 and made great proliferation led by the Malaysia TRIZ community from 2010. With a focused effort to share knowledge, more than 15,000 practitioners were certified in the region over 10 years. Many achievements enjoyed “city” advantage and lacked “rural” comparative support. This paper describes how TRIZ finds its way to Borneo-island. It will document the journey and relate how less-populated locations with limited infrastructure and resources embrace the innovation culture while preserving the traditional tribal way of life. This paper will cover the multifaceted knowledge proliferation and development effort through the pioneering and formation of the Borneo TRIZ community. It showcases the creativity of the community equipped with TRIZ to solve unique local problems and develop solutions that address challenges of constrained resources.

### 1. Inventive problem

The discovery of 40 Inventive Principles by Genrich Altshuller has not only benefitted many inventors around the world but has inspired an adaptation of the knowledge into the development of an ecosystem for promoting a knowledge-based society. Building on the core set of 40 Inventive Triggers, a community-centred approach was undertaken in Sarawak. The set of triggers as cards was initially intended to assist school students in learning about inventions, turned to be a tool to motivate a native community to document their tribal knowledge. Further sharing of the TRIZ methodology and tools with remote indigenous communities of Borneo Island has led to the use of the inventive knowledge to connect to their implicitly held traditional knowledge.

Sarawak, the largest state of Malaysia, has stepped up its focus on innovation and talent development as it strives to transform toward a developed state target by 2030. The state houses a population of 2.9 million consisting of more than 40 ethnic groups, majority from indigenous communities spread across a vast 48,000 sq. miles of one of the oldest and most biodiverse

rainforests in the world. The state aspires to address the challenges of driving sustainable innovation development while preserving its living indigenous heritage. In a quest to address the digital divide, it is important to ensure that all communities, especially those in remote locations, are included and not excluded in the development efforts. Furthermore, efforts in modernization and catching up with the development agenda, in spite of noble intentions, often lead to conflicts by overlooking cultural preservation, causing a steady erosion of the local living cultures.

Universiti Malaysia Sarawak (UNIMAS), a leading university in Sarawak, undertook the challenge to ignite a strategic change for its institution and state. In the UNIMAS Strategic Plan 2021-2025, it has committed to play an active role in fulfilling the state and country’s aspirations to deliver highly skilled and competent innovative workforce while preserving the traditions within the boundary of advancing infrastructure by 2030. A pioneering undertaking of leveraging inventive problem solving as a way forward was explored. The graphic representation of the inventive problem and solution generation approach is summarized in Figure 1. The Theory of Inventive Problem Solving (TRIZ) methodology was adopted to tackle contradictory needs of balancing development needs without comprising inherent cultures and traditions. The methodology complemented the Strategic Change Management framework and refined the thinking in strategy development and implementation.

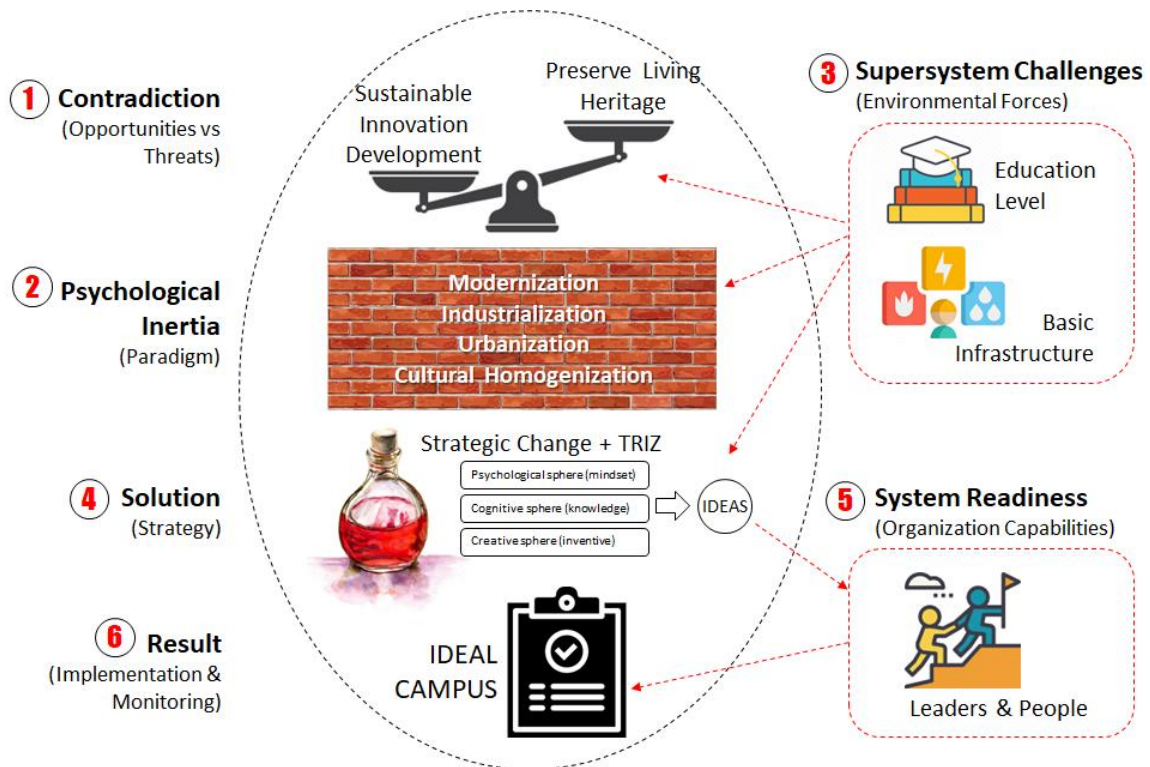


Figure 1: Inventive problem statement and solution generation approach

## 2. Research methodology

With the rapid adoption of digital technology, the modern world is experiencing an unprecedented pace of changes that require constant monitoring of the changes and building a system that is flexible to respond to these changes. The UNIMAS Leadership has benefitted from the adoption of the Strategic Leadership and Change Management Framework with consideration

of environmental changes. The model was documented and published by P. Schoemaker, S. Heaton, D. Teece in 2018.

The Strategic Change Management Framework, as shown in Figure 2, encouraged strategic leaders to closely monitor environmental changes in 4 key conditions; V-volatility, U-uncertainty, C-complexity, and A-ambiguity. Leaders are encouraged to use their leadership skills to sense (anticipate the future and challenge the status quo), seize (interpret the trends and decide the strategic change), and transform (align the workforce and encourage continuous learning) to look ahead, plan in advance, and move the organization forward.

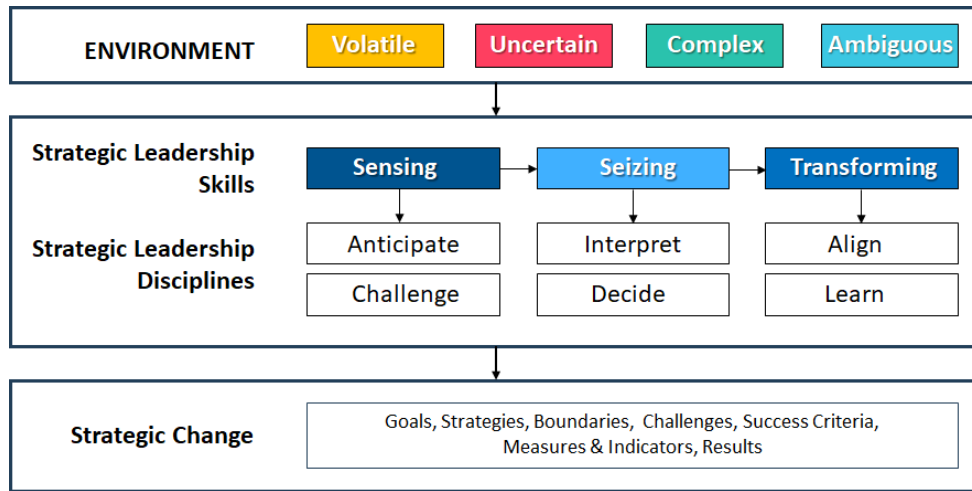


Figure 2: Dynamic capabilities, strategic leadership, and change framework

Through the collaboration of UNIMAS’s Leadership Centre and the Institute of Social Informatics and Technological Innovation, the awareness of contradiction analysis as part of the strategic change initiative has taken serious consideration. The Strategic Change Management framework and TRIZ methodology were used to resolve the identified contradictions, develop a change strategy, analyze organizational capabilities, and refine the implementation plan.

The work of Silverstein, DeCarlo, and Slocum, shared in 2007, guided the usage of TRIZ into the strategic change initiative to achieve the competitive advantage. Figure 3 shows the inclusion of TRIZ elements. TRIZ concepts enhance operational excellence with its inclusion in both strategic and operational leadership aspects. It enhances innovation velocity with the adoption of TRIZ tools in process management and quality assurance drives. Third, the TRIZ elements must take a top- to-bottom role in people functions.



Figure 3: TRIZ and Strategic Change Initiatives

The TRIZ ideality concept was used to think of the ideal system. It derives the concept of the Ideal Campus. This idea excited senior management and was used to guide the majority of its strategic change plans.

Several inventive principles, such as no. 1-segmentation, no. 3-local quality, no. 15-dynamicity, and no. 22-blessing in disguise, contributed significantly in shaping the solutions to the changes. The Su-Field model was also used to map a Transformation roadmap for individuals in the system.

When the strategy was mapped with the strategic change management and implementation factors, as shown in Figure 4, it highlighted two major needs. One need is to establish an innovation ecosystem (externally to university), not just about making changes within the university (internally). The second need is formalized as a cross-organization coordination body to ensure coherent of alignment, monitoring, and implementation: this mooted the idea of Borneo TRIZ formation.

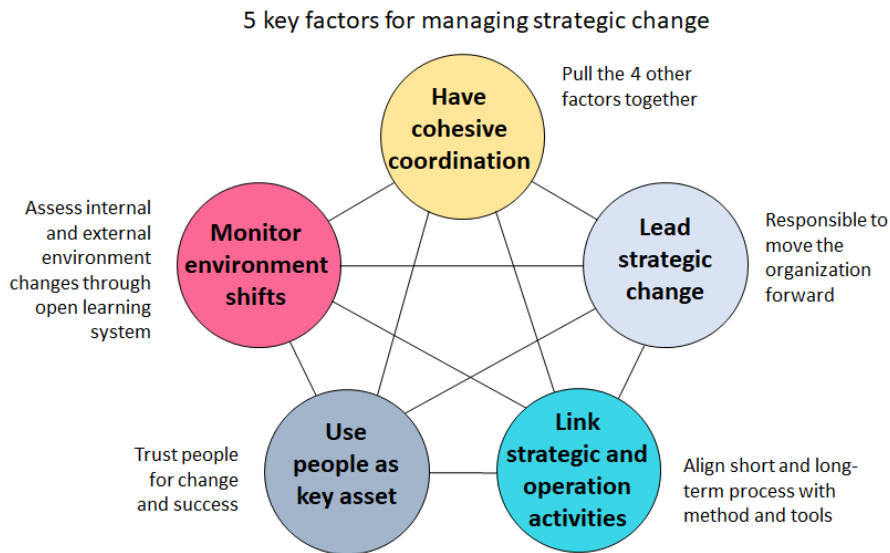


Figure 4: Manage and implement strategic change factors

The main strategic goal was to develop a highly skilled and competent innovative workforce (people) while preserving local traditions (culture) and strengthening community inclusion (people). The second strategic goal is to conserve resources and minimize waste to protect the environment (environment), while advancing the modern infrastructure (infrastructure) by 2030.

This research paper will focus on the main strategic goals of leaders, people, and culture.

### 3. Key Results

#### 3.1 Ideal Campus

During the UNIMAS strategic change management retreat at the end of 2018, with a selected number of senior leaders exposed to some knowledge of TRIZ, the Ideality concept was referred to begin the strategic thinking process with the end in mind. The picture of an ideal system delivering all its benefits but not of its cost or harm, led to the idea of the UNIMAS Ideal Campus. The objectives were to develop UNIMAS toward a self-driven, self-sustained, and

innovatively nurtured institution. Its functionalities were identified and summarized in Figure 5.

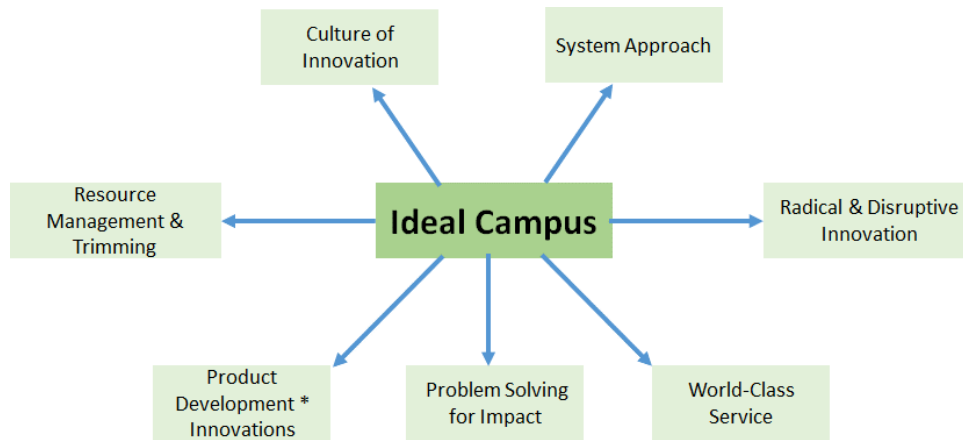


Figure 5: Ideal Campus and its functionalities

It is critical to involve all human resources directly or indirectly affected by the strategic change to be part of the effort. With this understanding, the UNIMAS senior leaders made a landmark decision to train all middle managers of the university with TRIZ. The decision marked a first for a university to proliferate TRIZ organization-wide in Malaysia and South East Asia. More than 200 university administrators were TRIZ trained in 2019 and 2020. Before the decision, 118 TRIZ Level 1 practitioners consisted of academicians and postgraduate students from 2011 to 2018 were trained. A trajectory climbs of TRIZ trained practitioners from 15 pax per year for 8 years (2011 to 2018) to 100 pax per year in 2 years (2019 and 2020). The momentum also propelled sharing with undergraduates, where more than 1,200 students from 4 faculties were trained since 2019.

### 3.2 Indigenous community outreach

The Ideal Campus also launched Collaborative Engagements between different faculties in the university. The collaboration engagement framework is shown in Figure 6 below.

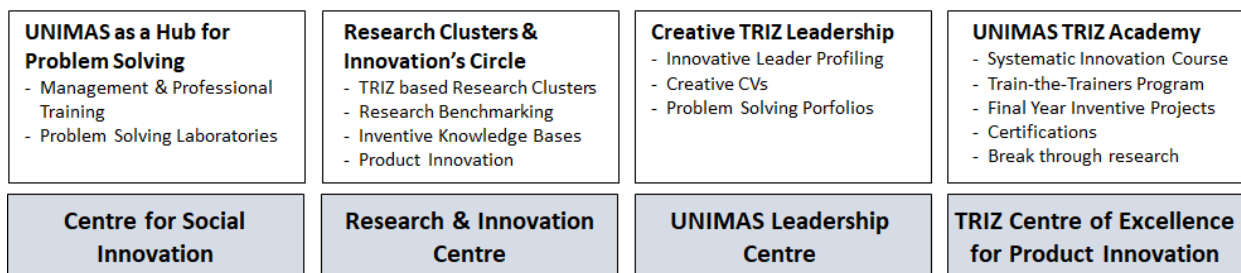


Figure 6: UNIMAS Collaboration Engagement Framework

Two research clusters emerged from this idea. The first cluster works on Bio-medical Technology with TRIZ from a collaboration with the Faculty of Health and Medical Sciences (FHMS) and the Faculty of Computer Science and Information Technology (FCSIT). The second cluster works on the study of an indigenous innovation spearheaded by the Institute of Social Informatics and Technological Innovation (ISITI).

The work by ISITI resulted in the adaptation of the TRIZ 40 Inventive Principles using local examples. The adaptation idea came from the Local Quality inventive principle and the initiative to share advanced knowledge with the indigenous community. The adapted inventive principles were presented in the form of Inventive Trigger Cards. It is a set of 40 cards with the knowledge and made available in two languages, namely English and Bahasa Malaysia.

The indigenous communities living in far-in land could relate to the inventive principles as documented in the Trigger Cards. The use of the 40 inventive cards has become the intermediary between the communities to bridge the gaps in terms of articulating and connecting their past innovation expressions in a contemporary context.

### 3.3 Strategic Transformation Pathway

The adoption of TRIZ has contributed to the university’s strategic change process. It consolidated the distributed and isolated innovation efforts into a coordinated and sustainable innovation agenda. Using the Su-Field model concept, the organization transformation process is summarized in Figure 7a.

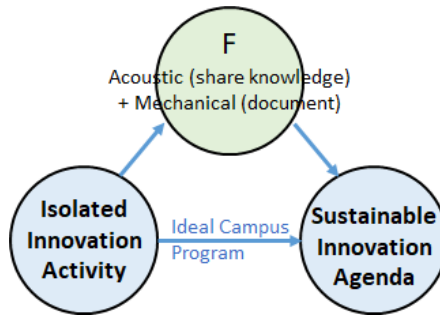


Figure 7a. Organization-level Transformation Strategy

Further usage of the Su-Field model concept was adapted into a people scenario and focused on the individual level, the changes at the strategic level led to a clearer transformation stage career pathway description. Four main transformation stages are documented to guide and direct middle and working levels through the changes. The transformation stage is demonstrated in Figure 7b. These pathways helped clarify the change initiative and process, and are useful for performance management, career and succession planning processes.

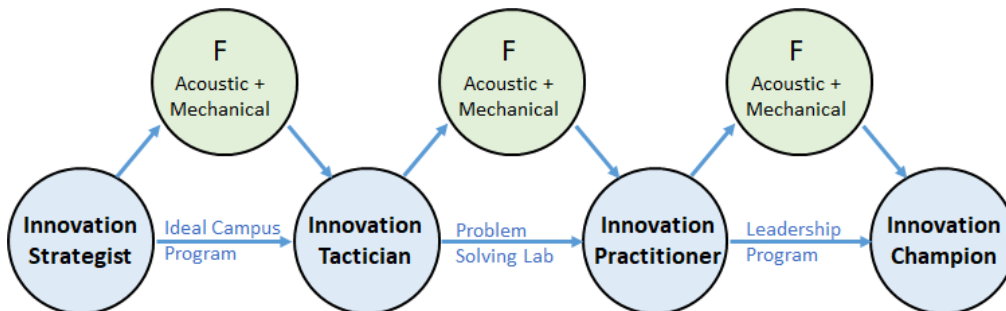


Figure 7b: Individual-level Transformation Strategy

### 3.4 TRIZ@Industry

Proliferating TRIZ to local state-level industry is a key part of the proliferation plan. When a senior leader of the university was charged after attending the International TRIZ Level 3 Professional course, the secret of the TRIZ methodology was communicated with a key energy company named Sarawak Energy. The state-government-linked company was supportive and training started in 2018 and 2019.

A total of 34 TRIZ Level 1 Practitioners from the company were trained in 2018, followed by 26 TRIZ Level 2 Practitioners and 20 TRIZ Level 3 Practitioners equipped with advanced TRIZ tools in 2019. The seed was sown, but the rotation of leaders within and a restructuring process deprioritized the learning and stalled proliferation and adoption. It may take longer incubation period but we are sure the momentum will be reignited.

### **3.5 TRIZ Olympiad**

The TRIZ momentum has not only inspired people within the university but also reached the Sarawak Youth Economic Development Foundation (TEGAS). Through the leadership and partnership of TEGAS, UNIMAS, and MyTRIZ, the TRIZ Olympiad program was initiated. The objective was to equip students with advanced problem solving skills, develop their cognitive skills, and build a network of stakeholders.

The Olympiad TRIZ program took on a three-prong implementation strategy. Strategy one involved training the school teachers. With the support of the State-Level Education Department, teachers with a Science, Technology, Engineering, and Mathematics (STEM) background were identified and trained.

Strategy two focused on encouraging the application of TRIZ knowledge by school teachers through a platform called TRIZATHON. The teachers applied their knowledge and were guided by local TRIZ experts. Interestingly, during the teacher training session, the teachers achieved several wonderful ideas such as innovative pens and enhanced face masks, which competed at the national level TRIZ competition held at the end of 2020.

Strategy three involved extensive coordination of the Olympiad through the state schools. School teachers, students, subject domain experts, and TRIZ experts with volunteers contributed their time and effort to organize and participate in the Olympiad.

Several supporting items such as TRIZ Inventive Trigger Cards, Competition Website based on a TRIZ Knowledge Management System were developed by UNIMAS for the event. Quiz and Discussion sessions were included to accelerate knowledge proliferation and creation. Figure 8 illustrates the interaction model of the TRIZ Olympiad key components.

The Covid-19 pandemic put the program at a sudden stop in 2020-2022. But beginning 2023, the momentum has restarted and hopefully more schools from about 1,500 schools, 40,000+ teachers and 480,000+ students will be part of the platform.



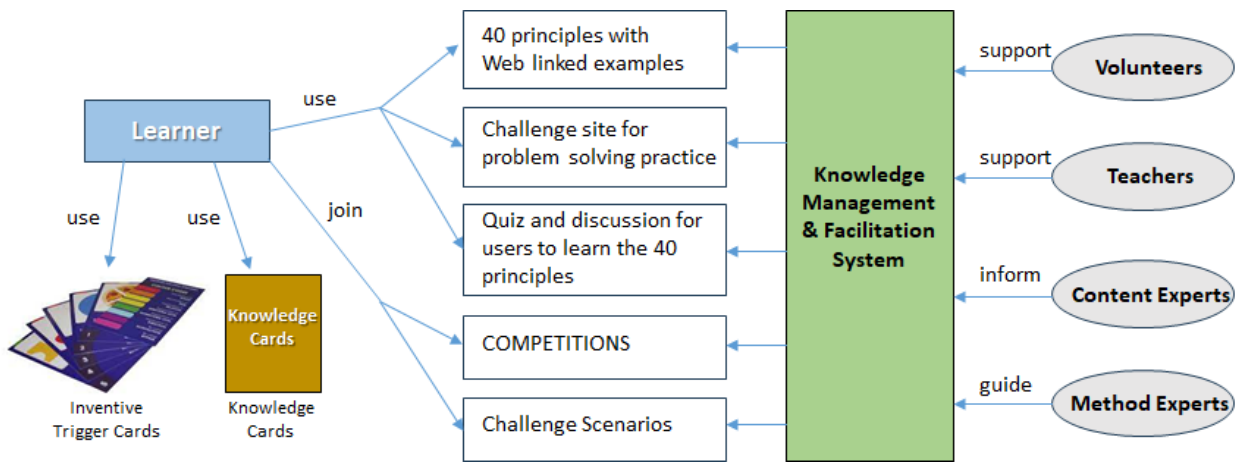


Figure 8: TRIZ Olympiad Component Interaction Model

### 3.6 Borneo TRIZ

With Ideal Campus encouraging TRIZ learning amongst the university lecturers, under- and postgraduates, and administrators, the Research Clusters reaching out to indigenous communities, and TRIZ Olympiad supporting problem solving learning with the school teachers and students, and TRIZ@Industry seeding the knowledge into industry, it looks like Sarawak is set to harvest the fruits of its investment.

UNIMAS and TEGAS have spearheaded much of the initial efforts, there is no doubt that every single stakeholder has put in their efforts and played their roles, but the various organizations are responsible for working together and driving the culture into their respective systems. To achieve real strength, the idea of Borneo TRIZ was floated by MyTRIZ. Taking the system thinking approach, a combined effort in a single local cohesive unit will deliver more than the sum of its part. Borneo TRIZ formalization was embraced by the Sarawak TRIZ communities and launched on 19 October 2022. The historical moments are shown in Figure 9.

Borneo TRIZ Association aims to generate awareness of TRIZ, share common goals among stakeholders, stimulate localized participation to upskill on advance problem solving and innovation skills, represent unique issues of threatening tribal heritage and ensure no one is left behind. Ultimately, it is to drive teamwork and achieve synergy to resolve the contradictions.



Figure 9: Promoting TRIZ in the Region



## 4. Conclusion

TRIZ arrived into Borneo Island through Sarawak at the end of the first decade of double zeros (Year2000). Through the initiative led by UNIMAS, TEGAS, and MyTRIZ, TRIZ has proliferated into all levels of societies in Sarawak.

Several breakthrough projects have been deployed, ranging from the concept of Ideal Campus, training of university administrators, sharing and adapting modern innovation tools while documenting tribal knowledge of indigenous communities, encouraging problem solving skills for school teachers and students via TRIZ Olympiad, and creating a career pathway for local innovators.

The Borneo TRIZ initiative was initiated in 2022 and is expected to accelerate the preparation for future skills that also allows indigenous communities to be able to connect and benchmark with scientific inventions by linking to the inventive principles that came from patent analysis. It is important to refine the strategy, implement the solutions, obtain the results and not forgetting to connect the communities and achieve synergy in the effort.

With the leaders, people, and culture being worked out, we are enthusiastic about the ChatGPT era developments with TRIZ to fully empower all underserved people.

## References

1. Sawaguchi, Manabu. (2016). How does Japanese “Kaizen activities” collaborate with “Jugaad innovation”?. 1074-1085. 10.1109/PICMET.2016.7806683.
2. MATRIZ Level 1 Training Manual, 2019. <https://matriz.org/wp-content/uploads/2019/01/Level-1-Manual-Word.pdf> . Last accessed: March 22, 2020
3. Kaloshin, N.G., A brief overview of TRIZ (In Russian) <https://www.trizland.ru/trizba/articles/3033/> Last accessed: March 22, 2020
4. Silverstein, D., DeCarlo, N., Slocum, M., *Insourcing Innovation: How to Achieve Competitive Excellence Using TRIZ*, Auerbach Publications, 2007
5. Schoemaker, P.J.H., Heaton, S., and Teece, D. (2018). Innovation, Dynamic Capabilities, and
6. Leadership. *California Management Review*, Vol. 61(1) 15–42.
7. Altshuller G., “Creativity As An Exact Science”, Gordon & Breach Science Publishing House, New York, 1984, ISBN 978-0677212302.
8. Belski,I,(2005). The Role Of Practice In Mastering TRIZ, *Proceedings of TRIZFest*, St. Petersburg, Russia, June.
9. Belski,I, (2007). TRIZ Course Enhances Thinking and Problem Solving Skills of Engineering Students, *Proceedings of the TRIZ-future conference*, Frankfurt, Germany, 6-8 Nov., pp 9-14.

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