



United Nations  
Educational, Scientific and  
Cultural Organization

UNEVOC Global Forum on  
Advancing Learning and  
Innovation in TVET



The Marketplace

# Innovation in Action

2-3 December 2019  
UN Campus, Bonn, Germany



United Nations  
Educational, Scientific and  
Cultural Organization

UNEVOC

International Centre  
for Technical and Vocational  
Education and Training

**fundación  
paraguaya**

**CIV  
water**



UNIVERSITÄT **BONN** **ZFL**



**SENAI  
CIMATEC** **SISTEMA  
FIEB**  
Federação das Indústrias do Estado da Bahia

**VIKEN**  
TEKNOLOGIKLYNGE 4.0

**bkal**  
Berufskolleg  
an der Lindenstraße



**JET EDUCATION  
SERVICES**



**POLITEKNIK  
ATMI  
SURAKARTA**



## Introduction

Today, Technical and Vocational Education and Training (TVET) is adapting to the most significant social, economic and environmental disruptions of our time. The emergence of digitalization and artificial intelligence (A.I.), alongside rapid technological advancements and climate change, have radically transformed the future of work and education, and training systems.

Consequently, TVET has had to adapt. In the wake of these challenges, bottom-up innovative strategies and practices are being developed and implemented around the world as an effective response to ever-changing landscapes in labour markets and business practices. Therefore, TVET is not only adapting to these changing environments, but also anticipating them, as evidenced by the contributors to The Marketplace.

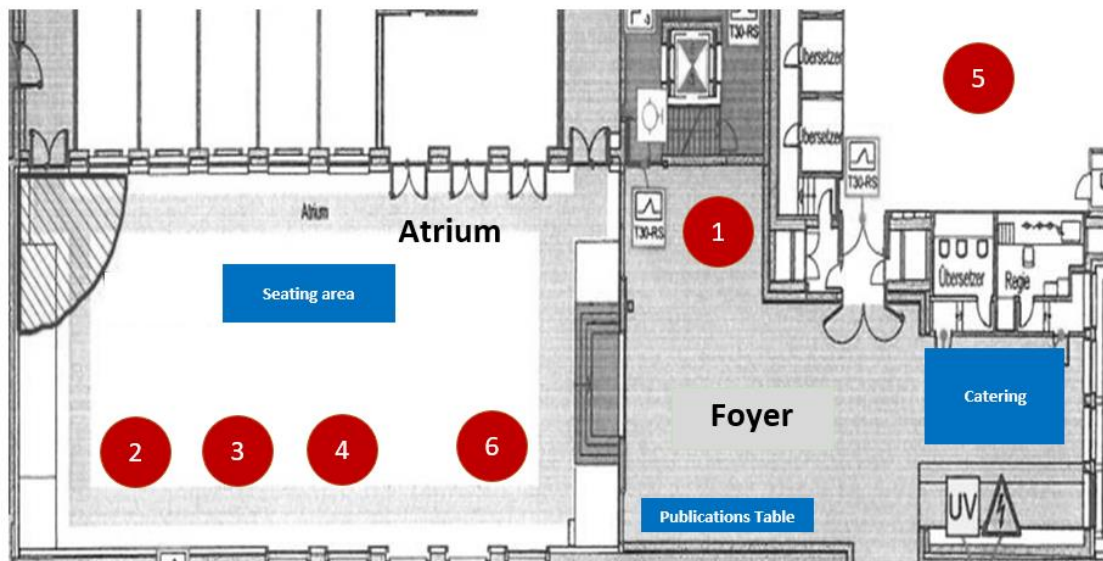
The Marketplace provides the opportunity to showcase what happens when action and bottom-up innovation come together. Through the prism of digitalization, entrepreneurship and greening - as well as actions that have already been initiated and drawn from different regional contexts – The Marketplace contributors from the UNEVOC Network and TVET community will share concrete steps and approaches that they have adopted in designing innovative practices, projects, products, and solutions.

These approaches share the overall goal of making TVET an effective tool to tackle youth unemployment and promote lifelong learning, thus contributing to the achievement of the SDGs.

## Marketplace goals

- To cultivate a marketplace ‘experience’ where ideas, knowledge, solutions and methods are shared and transferred in a lively and engaging discussion.
- To showcase how bottom-up, innovative projects, practices, products and solutions are being developed and implemented to position TVET as a key player in the innovation skills ecosystem.
- To create opportunities for networking, knowledge transfer, and collaboration in innovation and solutions.

## Floor plan





## Marketplace schedule

The Marketplace Slot 1  
2 December 2019 from 2.30pm to 4.00pm

### *Institutional innovations in TVET content, delivery and learning outcomes*

*See corresponding station numbers to marketplace floor plan (see page 3)*

Station	Marketplace Contributors
1	<b>The Flatfish Case – Innovation in TVET</b> <i>Contributor: Luis Alberto Breda Mascarenhas, SENAI-CIMATEC, Brazil</i>
2	<b>BKaL 360°</b> <i>Contributor: Lars Lamers, Berufskolleg an der Lindenstrasse (BKaL), Germany</i>
3	<b>Preparing Indonesian youth to be productive and engage in ‘greening’</b> <i>Contributor: T. Agus Sriyono, Politeknik ATMI Surakarta, Indonesia</i>
4	<b>Interoperable data ecosystems: Enabling South African innovation</b> <i>Contributor: Kelly Shiohira, JET Education Services, South Africa</i>
6	<b>Oxygeni.us</b> ( <i>WorldSkills, BeChangeMaker 2019 winner</i> ) <i>Contributors: Laura Gam, Alaeddin Al Khoraki and Mathias Kannegaard, Oxygeni.us, Denmark</i>

**The Marketplace Slot 2**  
**3 December 2019 from 10.30am to 12.30pm**

*Innovating to make TVET relevant for inclusive, sustainable and digital societies and economies, and the demands of new careers and qualifications.*

*See corresponding station numbers to marketplace floor plan (see page 3)*

Station	Marketplace Contributors
1	<b>ThingLink's virtual course on entrepreneurship</b> <i>Contributor: Louise Jones, ThingLink, Finland</i>
2	<b>VIKEN Academy 4.0 – a bottom-up approach to addressing challenges and competence demands of Industry 4.0 in SMEs</b> <i>Contributor: Hans Bjørn Paulsrud, VIKEN Technology Cluster, Norway</i>
3	<b>CIV Project - Upskilling and re-skilling for sustainable water technology</b> <i>Contributor: Pieter de Jong, Wetsus, Netherlands</i>
4	<b>Training for Amazon indigenous communities on clean energy and planning</b> <i>Contributors: Valerie Graw and Javier Muro, ZFL, University of Bonn, Germany</i>
5	<b>Self-sustainable school</b> <i>Contributor: Luis Cateura, Fundación Paraguaya, Paraguay</i>
6	<b>Oxygeni.us</b> ( <i>WorldSkills, BeChangeMaker 2019 winner</i> ) <i>Contributors: Laura Gam, Alaeddin Al Khoraki and Mathias Kannegaard, Oxygeni.us, Denmark</i>

Day 1 (Monday)

## 1. The Flatfish Case

### *Problem-based learning using real projects to bring students closer to market needs*

The Flatfish – developed by SENAI CIMATEC, DFKI and Shell – is an AUV (Autonomous Underwater Robot) that is used for underwater inspection. Following a three-year development phase, the project began in 2013. The launch of a strategic training programme to prepare technicians and engineers was a fundamental step in the project development.

As 'The Flatfish' combines a real-world project with new skill needs, SENAI CIMATEC had to create a strategic programme to prepare a project team that included trainees, technicians, interns, engineers and experts in different areas such as leadership, scheduling, team risk analysis and technical support.



What followed was an integration between TVET and R&D project needs. For example, ROV (remote operated robots) are more commonly used which means they have to be constantly controlled. However, a UAV does not need an operator. Skilled people must programme, plan and teach the robot how to react when encountering challenging situations until it is capable of moving on its own. The skills learned by TVET students ensured that they were closer to market needs following the project experience.

**About the contributor:** Luis Alberto Breda Mascarenhas is the Deputy Director of Innovation and Technology of SENAI-CIMATEC, Brazil. He holds a Ph.D. in Aeronautical and Mechanical Engineering from the Technological Institute of Aeronautics.

## 2. BKaL 360°

### **Innovating young people's paths to technical and vocational education and training**

For many young people, the path through school and into higher or technical education is often associated with rigid interpretations of what is considered the norm. But what if there were more options that allowed schoolchildren a degree of flexibility, while providing a more robust vocational education? The Berufskolleg an der Lindenstraße (BKaL) in Cologne, Germany, is exploring ways of making this an attractive option.

At BKaL, a new approach to the entire concept of secondary school, vocational training, and university certification is taking hold and changing norms long held by teachers, students, parents, and business stakeholders.

By working within the school's own network of 16 courses of study and by shifting expectations among external stakeholders, the BKaL 360 approach toward attracting students to TVET is as promising as it is intriguing. As the name suggests, it quite literally takes students full circle: BKaL's efforts begin before students even enroll, continue during their time at the institution, and will soon feature activities involving alumni.

BKaL 360 seeks to combine the opportunities inherent in both the full-time and part-time paths to ensure all students can utilise BKaL's vocational expertise, excellent general education, and links to the business community.

**About the contributor:** Lars Lamers is the Director of Studies at Berufskolleg an der Lindenstrasse (BKaL), Cologne, Germany.



### 3. Preparing Indonesian youth to be productive and engaged in greening

#### *Preparing youth for a sustainable future*

ATMI's 'Greening TVET' project aims to raise awareness among youth on the topic of sustainability, with a specific focus on sustainable energy, food, and housing practices. The emphasis is on teaching young people sustainable practices at an early age which will shape their attitudes and behaviours in the future. ATMI engages in different activities to green its processes. The use of solar panels, biodiesel, the treatment of waste and solid waste responsibly are examples of innovative answers to climate change and health-related challenges.

While the international community discuss about renewable energies, the world is still looking for examples of its effective implementation. It is clear that we need to raise awareness.



Education for sustainable development encourages students to think about how their practices – in the classroom, in the workplace and at home – have an impact on their environment. However, this approach also requires drastic changes in the way curriculum is designed (content and pedagogy) and the way a campus is setup (installation and maintenance).

**About the contributor:** T. Agus Sriyono is Director at the Politeknik ATMI in Surakarta, Indonesia.



## 4. Interoperable Data Systems

### South African Innovation

*Using Big Data to create interoperable data ecosystems that bridge the gap between demand and supply in TVET*



What if career advisors could guide school-leavers towards in-demand jobs, or young unemployed graduates could see employment vacancies in their immediate areas in real-time? What if employers could plan the opening of new vacancies to coincide with the graduation of strong candidates with the relevant qualifications or government departments could design accurate scenarios for workforce development?

The Post-School Education and Training Collaboration and Learning Opportunities for the Utilization of Data or PSET CLOUD initiative, seeks to leverage new technology to improve governance of education and training, enhance strategic planning and decision-making, improve collaboration, harvest the knowledge and intelligence of the sector and improve efficiency.

The PSET CLOUD initiative can be utilized by institutions, government, employers, education non-profits, funders, and students to improve the quality, speed and accuracy of system data as well as encourage meaningful collaborations in pursuit of national priorities, with an end goal of ensuring that South Africans make informed education and labour market decisions that lead to increased employment.

**About the contributor:** Kelly Shiohira has an MSc in International Educational Development and an MA in Applied Linguistics. She has applied her expertise to curriculum and policy design, research design and implementation, strategic planning and monitoring and evaluation in the education sector.

## 6. Oxygeni.us

***Be the change you want to see in the world: student entrepreneurs applying innovative thinking to develop innovative solutions***

Air pollution kills approximately 1,500 children daily worldwide. This reality led Laura Gam, Alaeddin Al Khoraki and Mathias Kannegaard, high school students from Denmark's Herningsholm erhvervsskole og gymnasier, to recognize that air pollution is one of the biggest health threats facing society today. While adults can easily purchase facemasks to protect themselves from the harmful consequences of air pollution, they found that there was no adequate product for children. Thus, Oxygeni.us was born.

Oxygeni.us is a small, young company from Denmark and one of the winners of the WorldSkill's BeChangeMakers 2019 Award. They began researching and quickly discovered the potential to help a neglected population group, all the while creating a new market and producing a much-needed solution to an increasingly troubling problem. The young entrepreneurs are currently developing solutions that will solve one of the biggest threats to children's health now and in the future: air pollution.



At The Marketplace, Oxygeni.us will talk about their experience in the WorldSkills BeChangeMaker 2019 competition, and about what they have learned. Additionally, they will discuss how effective the mentors were in their journey as well as the HP LIFE courses, which have been a great resource. They also intend to present their social entrepreneurship project and their journey including the support from their school, which is known for introducing innovation to their students.

**About the contributor:** Laura Gam, Alaeddin Al Khoraki and Mathias Kannegaard, are high school students from Denmark's Herningsholm erhvervsskole og gymnasier. Together, they form a formidable team leading the Oxygeni.us a young entrepreneurial venture. Their venture has been recognized by the WorldSkills International as one of the winners of the BeChangeMaker 2019 Kazan competition.

# 1. ThingLink's Virtual Course on Entrepreneurship

### *Visual learning solutions for education, remote training and skills development*

Virtual lessons and learning experiences in TVET are increasingly being used for simulations, campus tours, introductions to working environments, safety drills and teacher training. These examples have inspired ThingLink to explore the next step for globally accessible, cloud-based TVET programmes, and the ways in which 360-degree learning environments can cost-efficiently improve

access to quality education and increase instructional time in real-world working environments.



ThingLink's pilot project, designed and produced with Omnia Education Partnership, aims to build an example of a 360-degree course module that a remote learner could complete in their own time. They intend to find a way for the educator

to customize this experience for the student, and lastly, include multiple content paths for students with different levels of previous knowledge.

ThingLink is a UNESCO ICT in Education prize 2018 laureate.

**About the contributor:** Louise Jones has worked with colleges and councils across Scotland to develop innovative approaches to work-based learning. As ThingLink's Social Purpose and Community Manager, Louise contributes to the development of ThingLink's partner and education community in the UK and EMEA region through large-scale education initiatives and partnerships.



## 2. VIKEN Academy 4.0

### *Improving competences in small and medium-sized enterprises related to Industry 4.0*

Norwegian company Viken Teknologiklynge 4.0 is creating a robust bottom-up competence development model for SMEs to enable continuous digital competence upgrades and improve their global competitive edge. What makes this model different is the fact that the cluster of SMEs become the teaching institution's customers. They work in close collaboration with the teaching institutions to define the areas of competence and training needs of their companies.

This customer driven collaboration is a unique method in developing a robust competence model based on specific needs. The model is designed to upgrade the teaching institutions, making them 'Fit for Future', and making the SMEs considerably more competitive in the digitalized global market.

CEO Hans Bjørn Paulsrud will present the project's 1<sup>st</sup> year results at The Marketplace and will ask guests to participate in a workshop. Those who participate will receive updated information on the project's development during the coming months and will have the possibility to contribute in making the project a success. The project's results will then be shared with the participants of The Marketplace when the project is completed in 2020.

The VIKEN Technology Cluster 4.0 is the tool making the collaboration between several representative SMEs and the teaching institutions possible. The VIKEN Academy 4.0 is sponsored by the Government of Norway.

**About the contributor** Hans Paulsrud is the CEO of VIKEN Teknologiklynge 4.0. He is the author of several textbooks for the vocational training of industrial insulators in Norway.

### 3. CIV Water: Upskilling and re-skilling sustainable water technology

#### *Strategic cooperation for the development of sustainable water treatment technology*

Wetsus, European centre of excellence for sustainable water technology, is a facilitating intermediary for trendsetting know-how development. Wetsus creates a unique environment and strategic cooperation for development of profitable and sustainable state of the art water treatment technology.

Inside Wetsus, the inspiring and multidisciplinary collaboration between companies and research institutes from all over Europe results in innovations that contribute significantly to the solution of the global water problems.

WaterCampus stimulates cooperation between (inter)national businesses, knowledge institutes and governments within the water technology sector, in order to create synergy for world class innovation, education and entrepreneurship. Additionally, WaterCampus offers a unique research infrastructure, and is a meeting point for scientists and companies from all over Europe.

The international cooperation organized and stimulated by WaterCampus Leeuwarden leads to knowledge, talent and entrepreneurship that contribute to solutions for global water problems.

**About the contributor:** Pieter de Jong is an Environmental Engineer who graduated from Wageningen University and Research Centre. He has worked for Wetsus, European Centre of Excellence for Sustainable Water Technology, since 2011.





## 4. Training for Amazon indigenous communities on clean energy and planning

### **Including indigenous communities in the decision-making process**

The indigenous communities of the Ecuadorian Amazon often face high levels of isolation, marginalization, and a lack of access to basic services. Therefore, support to integrate these communities in the decision-making process on development plans is needed.

For the Participatory Mapping to Support Sustainable Energy for All in the Amazon initiative (SE4Amazonian), remote sensing analysis is combined with socio-economic information and participatory mapping to determine the best way to provide clean energy to those who are left behind. Electricity is the gateway to foster other basic services that trigger rural development. By working closely with indigenous communities, the project is mapping the potentials and needs of clean renewable energy provision for isolated areas.

The direct involvement of indigenous communities and providing opportunities to conduct their own data collection through an app makes this project unique. Using satellite imagery to observe the development of settlements and directly link this to the data collection by the local indigenous technicians helps to develop a GIS based model which analyses the energy demand comes up with a plan for clean energy provision.

**About the contributors:** Valerie Graw is the Scientific Coordinator at ZFL, University of Bonn. Within the SE4Amazonian project, she trains indigenous communities on the use of GIS technologies to plan clean energy provisions. Javier Muro is a Research Associate at ZFL. He completed his Ph.D. research on mapping wetland dynamics. Within his current project, he is developing GIS and EO based methodologies that contribute to estimate energy needs in the Ecuadorian Amazon.

## 5. Self-sustainable Schools

### Building a community of “rural entrepreneurs”

Fundacion Paraguaya’s self-sustainable school programme has been in implementation since 2003. Its objective is to educate the sons and daughters of poor farmers to become “rural entrepreneurs” with technical/ vocational skills, soft skills and financial skills. Currently, Fundacion Paraguaya has 3 agricultural high schools in Paraguay and 50 around the world following this model.

Its model uses the Learning by Doing, Selling and Earning methodology. This means that school businesses are incorporated into the daily activities of the students and teachers.

Students participate in the complete productive cycle including the marketing of products. This motivates them to be entrepreneurs and acquire job skills, it increases their self-esteem and the earnings from these sales pay the school’s operating costs. After students graduate, they either go on to employment, self-employment or continuation of studies into universities.

**About the contributor** Luis Cateura is Manager of the self-sustainable schools at the Fundacion Paraguaya.



