National Technical Ass...

Sudanese Knowledge Society

JEF Inc.

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# Proceedings
# Of
# The

INAT
INTERNATIONAL NETWORK ON APPROPRIATE TECHNOLOGY.

# 8th International Conference on Appropriate Technology

Université d'Abomey Calavi

## Songhaï Center, Porto-Novo, Benin

### November 22-25, 2018
Endogenous Knowledge, Appropriate Technology and Innovation:
Linking the Past and the Future

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## Gibela-TUT Partnership
**Rail Manufacturing and Skills Development**

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International Network on Appropriate Technology (INAT)
www.appropriatetech.net

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# WELCOME TO THE 8<sup>TH</sup> INTERNATIONAL CONFERENCE ON APPROPRIATE TECHNOLOGY (8<sup>th</sup> ICAT)

We welcome all the participants to Porto-Novo, Benin for our 8th International Conference on Appropriate Technology (8th ICAT). This is the first time Benin has hosted ICAT and the second time an ICAT has been held in West Africa.

The 1st ICAT was held in July 2004 in Bulawayo Zimbabwe. It was largely possible through the support of the National University of Science and Technology (NUST). The theme was "A knowledge Management Approach to the Development of Appropriate Technology, with a focus on sustainable land-based projects". Two years later in 2006, we again hosted ICAT through NUST in Bulawayo. However, we expanded our network of organizers by involving Howard University and the Northern California Council of Black Professional Engineers (NCBPE). Health in underdeveloped countries was addressed with the theme "Sharing the Knowledge from Research and Practice in Appropriate Technology, with a focus on Health-related projects". The 3rd ICAT took place in Kigali Rwanda in November 2008. The theme was "Promoting Research and Practice in Appropriate Technology: Energy Solutions in the Era of Climate Change". The success of the 3rd ICAT was in large part due to the strong support from the Rwandan Ministry of Science and Technology under the leadership of Prof. Romain Murenzi. For the 4th ICAT, we crossed over to West Africa and held the conference in Accra Ghana in 2010. Our theme that year, "Appropriate Technology for Water and Sanitation: Solutions for a Thirsty Planet", extended our conference efforts to link appropriate technology to critical basic needs globally. Two years later, we returned to southern Africa, hosting the 5th ICAT in Pretoria South Africa in November 2012, with strong support from the Department of Science and Technology (DST) in South Africa. The theme "Linking Research, Education and Practice to Inform Policy", linked all areas of appropriate technology with a call for policy development that is truly people-centered. Two years later, our 6th ICAT was hosted by Kenyatta University in Nairobi Kenya in 2014. It featured several new workshops including for the first time: a 3D printing workshop and a Raspberry Pi workshop. The theme of the 6th ICAT "Appropriate Technology for the 21st Century: Technological Innovation to Empower Africa", served to highlight the importance of innovation in advancing technology in general and AT in particular. In 2016, the 7th ICAT returned to Zimbabwe. This time at Victoria Falls with the theme "Sustainable Technologies to Empower Communities – Bridging Theory with Practice." Our work with students increased with both High School and University students participating.

Appropriate technology (AT) is technology that is culturally sensitive yet ecologically sound and economically sustainable. To fully embrace AT, one must be driven by compassion for humankind and Mother Earth. To fully embrace AT, one must be philosophically rooted in the belief that humanism, collectivism and egalitarianism are abiding human characteristics that heighten a collective conscience across human society. To fully embrace AT, one must be committed to organizing for AT to replace unproductive and war centered technologies. This process will move AT from the pronouncement of the goal of AT advocates, to a reality where appropriate technology dominates in all realms of science, technology and education.

The theme of the 8th ICAT, "Endogenous Knowledge, appropriate Technology and Innovation: Linking the Past and the Future", serves to highlight the importance of the practice of appropriate technology linked to endogenous reality. This year we are continuing our practical work with a wide range of workshops and a larger effort with our Appropriate Technology Fair. Recognizing the importance of inclusion we are focused on involving women and youth in our efforts to promote AT. The youth are our future. The organizing of the 8th ICAT makes a special effort to promote and support the involvement of youth and students.

The 8th ICAT could not be possible without the support of our local organizing committee under the leadership of Dr. Aime Segla as well as the support of the Songhai Center.

# International Network on Appropriate Technology

## MISSION

Public education on "what is appropriate technology" is central to the mission of the International Network on Appropriate Technology (INAT). Our ongoing work is to bring Appropriate Technology to the forefront of discussion and practice regarding science and technology—in education, policy, research, development, and deployment.

## VISION

"Appropriate Technology" (AT) is the technology to empower people. The more the world population is empowered, the more the world's human resources can be utilized, and the better equipped the mass of human society is to exercise democracy.

## OBJECTIVES

*Objective 1* – develop an international network of appropriate technology researchers and practitioners (focusing on people of color) committed to assisting poorer communities and the global south.

*Objective 2* – Support appropriate technology projects to empower the disadvantaged, focusing on people of color.

*Objective 3* – Organize regional and international conferences, workshops and symposiums to facilitate objectives 1 and 2.

*Objective 4* - Develop a web portal to support objective 1, 2 and 3

**What is Appropriate Technology?** Public education on 'what is appropriate technology' is central to our mission as the International Network on Appropriate Technology (INAT). The cornerstone of our platform on appropriate technology (AT) is that AT is 'technology to empower people'. Focusing on technologies that are human-centered promotes: better health, better education, improved access to clean water, necessary shelter and safe food, as well as transportation and energy solutions that are do not cause ecological imbalance. The more the world population is empowered the more the potential of the world's human resources can be utilized. The broader the world population is empowered, the better equipped society is to exercise democracy. The nature of 'appropriate technology' is technology that is culturally sensitive yet ecologically sound and economically sustainable.

**What we do:** The INAT group currently comprises academics and professionals from the USA, Trinidad and Tobago, Guyana, India, Senegal, Ghana, Nigeria, Kenya, Rwanda, Ethiopia, Sudan, Zimbabwe, Botswana, Namibia, Swaziland, and South Africa, who are united in their commitment to enhancing, broadening and connecting appropriate technology education, research and practice with the undergirding philosophy of empowering local communities in enhancing and controlling technologies to improve their quality of life.

Please visit our website – www.appropriatetech.net

# Joint Educational Facilities, Inc.

Joint Educational Facilities, Inc. (JEF) is a non-profit K-12 organization in Washington, DC USA with national and international impact. JEF works primarily with pre-college and undergraduate students and teaches them advanced computing, contemporary mathematics, robotics, research skills and oral and written communication skills with an emphasis on artificial intelligence (AI) and high performance computing (HPC). These students participate at local, national, and international meetings, conferences and symposia to present the results of their research. Their papers are published in the proceedings of those conferences. Many of our students have continued their education through the Masters and Doctoral levels. Representative program areas are as follows:

The **Raspberry Pi Program** uses Raspberry Pi computers to teach students to relax and become familiar with technology (Hands on), to write code, to develop projects in robotics, Internet of Things (IoT) and to provide entertainment.

The **JEF Robotics program** was instituted in 2008 when the senior physics instructor at Eastern High School requested assistance in developing and fielding a robot team to participate in the DC Regional FIRST Robotics competition. JEF staff developed a strategy and curriculum to fit the students and the FIRST Competition criteria. Both staff and students were novices at FIRST Robotics Competition. The JEF-Eastern High School team ranked 16 out of 67 teams competing. The program has expanded to include multiple robot platforms using visual and traditional programming languages.

The **High Performance Computing (HPC)** started when JEF students were introduced to the high performance computing/supercomputing community in 2005 at the Supercomputing Conference in Seattle Washington after extensive training at the University of Illinois Urbana Champaign ACCESS Center in Arlington, Virginia. The following year, 2006, a JEF student won the CyberInfrastructure Award at the first national TeraGrid Conference in Indianapolis. During succeeding years, JEF students have attended, competed, and presented research findings at various national and international HPC/SC events.

The **JEF Computer Gaming Program** teaches students the mathematics and physics needed to create games that are realistic, story boarding so that the games have goals and are not just mindless exercises. Computer Science Education Week provides our students with games that allow students in the community to get a hands on introduction to coding

The **JEF GIS Program** began in 2011 when JEF was awarded an ESRI GIS software grant. Students mapped the Park Naylor Apartment complex where the JEF center is located. In preparation for this exercise, students and staff participated in a 4H event which involved GIS and GPS.

# Sudanese Knowledge Society

The Sudanese Knowledge Society draws its values from the following definition of a knowledge society: "*A knowledge society is a society that is nurtured by its diversity and its capacities ... It is about its capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for human development*." UNESCO

**BACKGROUND**

The beginning of 2011 saw the birth of a community that emanated from the Workshop on Knowledge Management Capacity in Africa with the theme "Harnessing Tools for Development and Innovation". The workshop, co-organised by the University of Khartoum, Garden City College, the International Network on Appropriate Technology, and the Epidemiological Laboratory, was held from 4 – 7 January, 2012 at the Friendship Hall in Khartoum with over 400 participants from 16 nations.

Planning for the workshop was a collaborative and multidisciplinary project that involved different people and sectors in the organisation and in the sponsorship of the workshop. After the workshop, as a response to the increasing local interest in knowledge management, the group decided to build on the success of the workshop and continue the efforts of spreading the ideas and reflecting on the value and approach of knowledge management for the benefit of organisations, communities and individuals.

SKS is the body that embraces the ideas of this community. It is composed of students, academics, professionals, from a wide array of educational, business, government, and civil society. We have a common goal which is to take forward he fruits of the hard work of many people throughout 2011, in order to contribute to the transformation of our society into one that capitalizes on what it knows and one that can utilise the tools of the knowledge age, such as knowledge management.

Our **KEY STRATEGY** is Knowledge to empower people, and our **VISION AND MISSION** are about working towards realising the knowledge society in Sudan. We are a multidisciplinary and diverse group of individuals that includes academics, professionals, craftspeople, students, development workers, who aim to work for enabling institutions, organizations and the people of the Sudan to utilise the concepts, methods and values of the knowledge society – with particular emphasis on the utilisation of knowledge management. The **OBJECTIVES** of SKS:

- Foster knowledge sharing and Networking among the Sudanese society (**KM as Culture**)
- Raise KM awareness and develop the capacities among the different segments of society (**KM as Science** )
- Mapping for sources of knowledge in Sudan (**KM as Application**)

**TOOLS & MECHANISMS:**

1. **Organising** seminars, forums, open days, training courses, workshops and conferences, to contribute to building the capacity of its members and reach out to the wider community to realise its vision for Sudan as a prosperous knowledge society. The society will also engage in community projects of relevance to our mission, participate in related local and international events, support research and development efforts and share the expertise and ideas of society members with interested individuals, communities and organisations.
2. **Focusing** on Knowledge management as a knowledge age discipline, promote and support its application for personal and organisational use.  Examples of other topics include:
   - Information and communication technologies as an opportunity for development.
   - Preservation and protection of Indigenous forms of knowledge.
   - Social, ethical and political dimensions that shape a knowledge society.

Please visit our website sksociety.org

# NATIONAL TECHNICAL ASSOCIATION, INC.

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The National Technical Association (NTA) is the oldest African American technical organization in the United States. Since 1925, NTA has developed a remarkable legacy in the areas of education, research, engineering, science and technology for minorities, women, and youth pursuing technical careers. It was incorporated in 1926.  This year it is celebrating its 90th Anniversary.

It encouraged professional development through conferences, scientific journals and/or competitions. NTA has garnered a diverse membership, crossing all disciplines in science, math, technology, etc., from educators, scientists, doctors, astronauts, to award winning inventors.  The only minority technical organization up until the mid-1970's, NTA laid the foundation for the many new minority organizations that would follow in its footsteps.  It developed the NTA Journal, the first minority technical publication, to provide the minority technical voice during a time it was very difficult for African Americans to get their work published.

NTA is and always has been about rising above the impossible; taking on new challenges. NTA Chapters primarily located along the East Coast and Mid-West develop and run programs that allow minority youth to experience the fun of science and provide awareness of the variety of science and engineering career opportunities.

It continues to play a vital role in STEM minority development.  NTA has initiated the dialogue among the various minority technical organizations to leverage their influence on the diversification of the STEM workforce.

Please visit our website http://www.ntaonline.org/

# Northern California Council of Black Professional Engineers
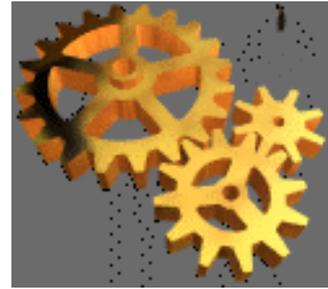
Established in 1970 by concerned engineers to form ties between the Black scientists and engineers in Northern California, the Northern California Council of Black Professional Engineers (NCCBPE) is a Professional Society that promotes technical professional development, and encourages youth to enter STEM careers through programs such as the Museum of African American Technology Science Village (MAAT), field trips, seminars and conferences.

The purpose of the organization is to establish camaraderie, and to act as a pressure group as needed to enhance the professional opportunities of black engineers. Initially, emphasis was placed on becoming registered Professional Engineers. Later the number of disciplines represented in the organization began to diversify, with no one discipline having a clear majority, and more scientists joined.

Today, the organization addresses the needs of scientists and engineers. Although professional development continues to be emphasized, the need to encourage more African Americans to enter technical fields has become a major priority.

For information go to www.ncalifblackengineers.org

Gibela, a new age and efficiency driven rail company, will spearhead the revitalisation of rail transport in South African metro areas ushering in an 'age of rail'.

Black empowered, conscious of its role as a catalyst for economic development and technologically robust through its global references – thanks to its majority share- holder, Alstom, Gibela will deliver sleek and innovative rolling stock that is ideally suited to the needs of new generations of rail commuters. While the nostalgia for steam harks back to a bygone era and the early days of rail travel, South Africa is moving forward with a rail technology solution that will change the face of rail transport forever.

Gibela, derived from the Nguni word which means 'go aboard', was formed as a consortium to replace South Africa's outdated rolling stock and will deliver 600 pas- senger trains into the South African rail network over the next 10 years. In a seminal contract signed in 2013, the Passenger Rail Agency of South Africa (PRASA), which holds responsibility for rail transport in metropolitan areas, assigned Gibela, a fully operational company, the mammoth task to replace its ageing equipment with a modern service that will offer maximum transportation value for passengers. PRA- SA, in commissioning the project, is executing its mandate in terms of the National Development Plan (NDP) for 2030 which aims to achieve prosperity and equity for all South Africans. This involves improving national infrastructure, including public transport, and boosting the economy in order to create jobs.

Gibela, headquartered in Johannesburg, will establish a manufacturing and training facility in Ekurhuleni, Gauteng. Through the rolling stock project, Gibela will generate 1,500 direct jobs and thousands of indirect jobs through the supply chain over a ten-year period. Thousands of people – engineers, artisans, technicians, train drivers and technologists – will benefit from training and upskilling.

Gibela is a consortium of which 61% is held by Alstom, 30% by Ubumbano Rail and 9% by New Africa Rail.  Alstom, an internationally recognised leader in rail engineering has had a presence in South Africa for over 100 years. Ubumbano Rail consists of a number of companies that are keen to enter the rail sector space as suppliers.  New Africa Rail (NAR) is a new and dynamic rail entrant created to drive the process of rebuilding Africa through rail. NAR is focused on infrastructure projects including rail, ports, signalling systems, rail logistics, energy efficient technologies and rail real estate.

For information go to - www.gibela-rail.com

# ADDITIONAL BENIN SPONSORS