

+ KNOWLEDGE
EXCHANGE
DIFFUSION
INNOVATION
COMMUNITY
+ EMPOWERMENT
FORUM
NETWORKING
CREATIVE IDEATORS

**9
T
H** INTERNATIONAL
CONFERENCE ON
APPROPRIATE TECHNOLOGY

**I
C
A
T** THE CAPITAL MENLYN
MAINE, PRETORIA,
SOUTH AFRICA

T NOVEMBER 23-27
2020



Tshwane University
of Technology
We empower people

(9TH ICAT)



TECHNOLOGY
EXCHANGE AND
EMPLOYMENT
CREATION FOR
COMMUNITY
EMPOWERMENT:
CROSS-POLLINATING
INNOVATIVE MODELS

The 9th ICAT will:

1. *Promote Knowledge-Based Technology Exchange and the related diffusion of innovation to support the practice of Appropriate Technology (AT)*
2. *Identify, initiate and combine AT contributions based on both pre-modern and modern knowledge exchange in a manner that is rooted in community empowerment*
3. *Provide a forum for networking and debating AT solutions for the 21st century and facilitating the cross-pollination of innovative thinking in AT; bringing together a diverse group of creative ideators in the field of AT*
4. *Allowing for the recognition, valorisation and re-appropriation of innovative and appropriate technologies*
5. *Allowing an opportunity to explore AT at all levels human activity and through the investigation of the diverse range of carefully compiled sub-themes*

Technology is never neutral. Decisions about technology are based on deeply embedded belief and value systems. As professionals and educators, we are constantly taking a position through technical decision-making, and the content and process of our teaching. This was evident in the spiritual and intellectual transformation that led to the emergence of the appropriate technology movement.¹

Creativity, innovation and technology transfer ecosystems motivate entrepreneurial minds, both tacit and codified, and are one of the most reliable bases for long term, sustainable development. Unfortunately, much of this knowledge transfer remains under-recognised and undervalued, due to non-exposure to new perspectives, the dearth of innovative ideas or lack of improvement on previous ones. At present, large numbers of people in the Global South, particularly in Africa, still lack access to clean water, sanitation, clean energy, reliable food and nutrition, and safe transportation, among other challenges. Yet in those same societies, some people have adopted time-tested, demonstrable approaches to resolving them, while others are engaged in cutting-edge scientific research and technological development. All of these efforts, to the extent that they are informed by contextually-relevant needs and priorities, represent the exchange of knowledge for Job Creation and Community Empowerment. However, refining, upgrading, applying and diffusing this knowledge in the form of improved products, services and practices also requires the dissemination of lessons and experiences between similarly-motivated actors from a broad cross-section of any given society.

In exploring various local challenges together from an Appropriate Technology perspective, we believe that we can contribute to a more pluralistic, multi-centric, equitable, sustainable - and ultimately - more peaceful global community.

¹ Leondard, R., 2018, E. F. Schumacher and Intermediate Technology, Document de Travail/Working Paper, No. 2018-22, ESG Recherche, University of Quebec Montreal, available at https://economie.esg.uqam.ca/wp-content/uploads/sites/54/2018/05/2018-22_docdt_eco.compressed.pdf, accessed 05.07.2019, 09.50

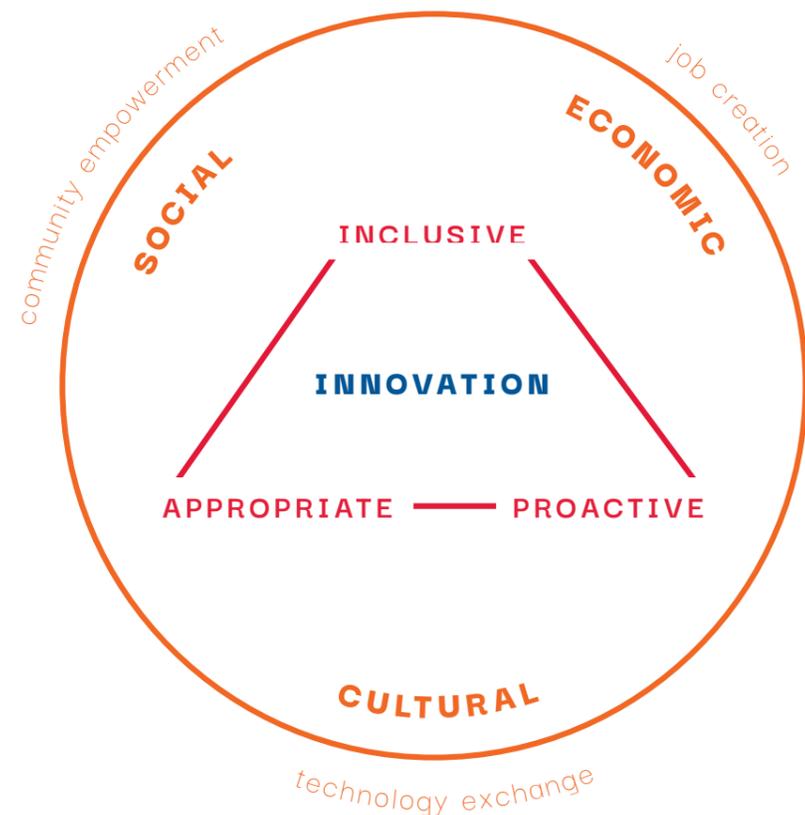
(9TH ICAT)

Appropriate Technology (and its manifestations) is a movement, which encompasses technological choices and applications that are decentralised, energy-efficient, environmentally sustainable, and locally autonomous. Although Dr. E.F. Schumacher is generally credited as the first to articulate the concept of “appropriate technology” in his 1973 book, “Small is Beautiful”, the INAT has significantly revised and expanded those ideas since its inception. Thus, rather than being limited to basic tools and machines, the INAT has embraced the idea of Endogenous Knowledge, which offers a framework for integrating useful and locally-grounded knowledge with cutting-edge science and technology, where relevant. Furthermore, the INAT endorses the notion of “Authentic Technology”, as advanced by Fr. Dr. Godfrey Nzamujo² of the Songhai Centre³, which is one that leverages ecological knowledge for the design of human technologies, thereby moving from “bio-arrogance to bio-mimicry”. In alignment with its continuing conceptual development and practical commitment, INAT developed an “Appropriate Technology Declaration” which is posted on its website.⁴

This quote captures INAT’s core mission:

“We declare that a primary goal of the ‘Appropriate Technology movement’ is to use science and technology research, development, deployment, implementation and policy to work toward worldwide egalitarianism. We envision – a social reality where all women, men and children of our planet have equal access to resources to meet their basic needs and a controlling voice in how resources are to be distributed and technology is to be developed.”

This image graphically presents the intentions and themes of the conference.⁵



VISIT THE OFFICIAL 9TH ICAT WEBSITE: WWW.APPROPRIATETECH.NET

A few key members of the Local organising Committee:

AMIRA OSMAN, a Sudanese/South African Professor at the Tshwane University of Technology, architect, researcher and joint coordinator for the international ‘Open Building Implementation’ group, has an interest in cities, urban policy and housing.

Amira studied in the Sudan, Netherlands and South Africa. She worked as an architect in Sudan (1988-1997), a United Nations Volunteer, Lesotho (1997-1998) and a Senior Researcher at the CSIR (2010-2012). She lectured at the Universities of Khartoum (1988-1997), Pretoria (1998-2009) and Johannesburg (2012-2017).

Amira was the convener for the World Congress on Housing (2005), the Sustainable Human(e) Settlements (2012) and General Reporter, International Union of Architects (UIA 2014 Durban).

PROF PATRICIA POPOOLA obtained her BSc (Honours) degree in Metallurgical and Materials Engineering from Obafemi Awolowo University, Ile-ife, Nigeria; Master’s and Doctoral degrees in Metallurgical Engineering at Tshwane University of Technology, Pretoria, South Africa.

Patricia is an NRF rated researcher (C3-category) with a research focus in Advanced Engineering Materials. Patricia has over 400 publications (journals and conference papers) apart from book chapters. As a researcher, her publications have shown dedication to research and development in the engineering field, which is an indication of her ability to work independently.

Until date, Patricia has made a lot of impact on her publications, which have been acknowledged both locally and internationally. Google scholar citation - (h-index 27, i10-index 105, citation 3288). Currently, she has produced twenty-seven Masters’ and thirteen Doctoral degrees graduates. Patricia and her students are recipients of numerous academic excellence awards. Prof Popoola continues to network with numerous national and international scientists; Mentorship of students remains her prime objective.

PROF JOHN TRIMBLE is currently the Flagship professor at TUT with a joint appointment in Industrial Engineering and Operations Management. Before that, he served two years as a Fulbright professor with Industrial Engineering at TUT. He has worked in the industry for over 12 years and as an academic for over 30 years. He has served as HOD and Dean of ICT. He has taught at universities in Rwanda, Zimbabwe, South Africa and the USA. He has published extensively in engineering and computer science.

Prof. Trimble is founding director of the International Network on Appropriate Technology (INAT) and has coordinated eight international conferences on appropriate technology, all in Africa, dating back to 2004. He holds BS and MS degrees in engineering, a PhD in ‘Industrial and Systems Engineering’ from Georgia Institute of Technology and a Masters in Computer Science from Stanford University (all from the USA).

ISAAC TLHABADIRA a South African Executive Director: Technology & Innovation, Faculty of Engineering & Built Environment has a great interest in Innovation and Technology Development.

Isaac studied at the then Technikon Northern Transvaal, Vaal University of Technology, University of Pretoria and University of South Africa where he completed his Certificate in Intellectual Property Law. He worked as an artisan and technician (1987 - 1991), maintenance engineer (1992 - 1994), lecture (1994 - 1997), HoD (1998 - 2004), Dean (2005 - 2008), Executive Director (2008 - Current) and Deputy-Vice Chancellor (2012 - 2017). His research focus is in Material Development and Intelligent Manufacturing. He is registered with the Engineering Council of South Africa (ECSA).

Isaac was instrumental in the establishment of the Institute for Advanced Tooling (IAT), located in Soshanguve, Pretoria North. He is currently the convener of the Tshwane Engineering Education Forum (TEEF). He has forged successful partnerships with the Japanese International Cooperative Agency (JAICA) (2005 - 2017). He has been a board member of Resource-Driven Technology Concept Center in South Africa (RECTEZA). He served on the Tshumisano Trust Technical Advisor (2006 - 2009). He also served on the City of Tshwane: Town Planning & Infrastructure (2005 - 2006). He served on Hitachi - DST Scholarship Programme for South African Engineers (2005 - 2012). He served on the Joint Social Dialogue on Technical and Vocational Education & Training (2012).

² https://www.icwe-secretariat.com/icwe_webprojects_cms/preview/profile_popup.php?biold=1284

³ <http://www.songhai.org/index.php/en/home-en>

⁴ INAT, Declaration of Appropriate Technology, available at http://www.appropriatetech.net/media/attachments/2017/12/05/declaration_of_at.pdf, accessed 05.07.2019, 09.39

⁵ Inspired by Drosou, N., Soetano, R., Hermawan, F., Chmutina, K., Boshier, L., Hatmoko, J. U. D., 2019, Key Factors Influencing Wider Adoption of Blue-Green Infrastructure in Developing Cities, in Water 2019, 11(6), 1234, available at <https://www.mdpi.com/2073-4441/11/6/1234/htm>, accessed 05.07.2019, 09.39

PAPER CATEGORIES	SOME SUGGESTED TOPICS	
GREEN ECONOMY AND INNOVATION	<p>Smart Manufacturing, small scale industry, mining and mineral processing, socially relevant computing, economics of technology, textile technology, recycling, social business/social entrepreneurship, appropriate technology innovation, ecological economics.</p> <p>Maximise awareness of technologies; Moving towards a sustainable, eco-friendly and pollution-free world; Opportunities to fully integrate new forms of manufacturing, prototyping and representation; Creating an interface between places of living and the technologies made possible with the developments of the 4th Industrial Revolution.</p>	<p>Environmental impact, irrigation projects, forestry & wildlife, agricultural technology, climate change, air quality, remediation of contaminated environments.</p> <p>Climate change will impact the poorest countries and their people the hardest. Curtailing harmful climate change and eradicating poverty requires sustainable and ecologically sound solutions. Many have inadequate access to safe water, lack basic sanitation, have no access to a stable, reliable energy and many more access to the internet and the information and opportunities that this may offer. Eliminating poverty and improving the quality of life requires increased agriculture, industry and transport productivity, which is possible via improved water, energy and information utilisation.</p> <p>Appropriate technology for small-scale urban agriculture. Including urban agriculture in all urban planning. We view urban agriculture as being an integral part of every urban project in the near future - we would like to explore opportunities for the use of roof tops, gaps between buildings and forgotten and neglected spaces in the city fabric.</p>
ENERGY AND MATERIALS	<p>Hydro power projects, alternative energy systems, renewable energy, distributed power, rural electrification, hydrogen fuel cells, Compressed Natural Gas, solar and energy efficiency.</p>	
WATER AND SANITATION	<p>Water supply, storage and sanitation, water scarcity, water quality, water stress and recycling, toilets, waste management.</p> <p>How do we deal with landfill sites in innovative ways?</p>	
HEALTH	<p>Indigenous medical technologies, food preparation/processing, technologies addressing malaria/TB/HIV/AIDS related issues, pharmaceuticals and Universal Health Care (UHC). Public health and human productivity require technology practices that address basic community needs.</p>	
CONSTRUCTION AND INFRASTRUCTURE	<p>Appropriate architecture, appropriate construction, appropriate transportation, sustainable building materials. Passive systems, locally-available materials and existing skills must be considered with regards to appropriate technology and building practice; the creation of environments that are healthy and beautiful, where social acceptance and environmental appropriateness are taken into consideration; affordability and durability. Small, medium and large scale construction enterprises can be considered in this process of investigating appropriate technology. Glass and steel, air-conditioned towers emerging are not only problematic in environmental terms, but they have implications by focusing on “big capital” and “big players”; in order for future developments to be inclusive of small and medium construction enterprises, the design and building heights need careful consideration. We need to consider materials that can be sourced locally, transported easily on smaller vehicles, carried by a maximum of two people, easily installed by unskilled labourers and easily dismantled and reused if the need arises. Inspired by the new Future Africa Campus the University of Pretoria, the conference sets out to explore these concepts in more detail.⁶ This is in direct opposition to a building like the Leonardo that is just about to be opened in Sandton.^{7,8}</p> <p>Appropriate Architecture for Open Building⁹: The conference subscribes to a view of using an infrastructure model of the built environment based on levels of intervention and the separation of design tasks, polycentric rather than centralised governance and innovations by means of agreed interfaces between levels. It also considers the resilience of the whole built environment with change and transformation of its components.¹⁰</p>	<p>Education and training, knowledge engineering, knowledge management, community development, indigenous knowledge, people’s science. Collaboration between academics, policy makers, users and society at large.</p> <p>Decolonisation of knowledge. The promotion of design for social innovation in higher education institutions so as to generate useful knowledge and to create meaningful social changes in collaboration with other stakeholders.</p> <p>Combining ‘learning goals’ and ‘community service’ in a manner that aims towards ‘knowledge exchange’ as opposed to ‘knowledge transfer’, and to encourage a search for design and technical solutions through deeper understanding of people, place and context, rather than deriving solutions in isolation, using abstract theories that may not have relevance to communities.</p> <p>Establishing long term partnerships with communities and gearing teaching programmes towards problems that are of high relevance to the socio-economic conditions of the contexts were we practice. Global approaches to social innovation. The conference will explore how communities can achieve more awareness of their agency, influence and decision-making capacity in the built environment. Activism through ‘service learning’ and in providing documentation, design and/or building services with the intention of achieving education, empowerment for communities.</p>
		<p>Skills gaps; Appropriate technology adoption for a various industries; Barriers in the job market; Nature of tasks in various industries; Desirability of automating or augmenting tasks; The production of goods and services; Opportunities growth and productivity.</p>

6 <https://web.facebook.com/andre.eksteen.754/posts/2645710785438900>, <https://www.ewarch.co.za/post/3096/futureafrica/>.
7 <https://www.iol.co.za/preTORIA-news/leonardo-in-sandton-will-be-africas-tallest-building-33385524>
8 <https://mg.co.za/article/2019-10-11-00-after-45-years-africa-has-a-new-tallest-building>
9 <http://open-building.org/about/objectives.html>
10 https://councilonopenbuilding.org/?fbclid=IwAR1fMc82LSoxGNSVvMMloEsBJiwukOJ5XH-TqvvQocV89_t_XegiVxifHEQ

CITIES AND SPACE

Cities as hubs of innovation and experimentation; Technology in the service of the African city of the future. Current debates about the environment, the realities about our cities and our practice will influence our understanding of technology.

The “segmentation of critical thought about cities, urban and architectural space into non-communicating subspecializations”¹¹ is challenged. It is believed that innovations in technology for our future cities will be found at the interface of various professions.

In South Africa, with the president’s recent State of the Nation address and the call for the development of a new, smart city, there is much to be debated with regards to the technologies that could serve this vision.

“Cities are by definition contextual creatures. The greatest cities in history and in our era are those who work with their soil, local cultures, endogenous knowledge, appropriate technology, and in the process become hubs of experimentation and innovation. Such cities are also marked by a celebration of diversity and openness—the lifeblood of creativity.”¹²

Buildings, space and communities in cities: this conference being positioned in Tshwane is significant. Firstly, Tshwane has an exciting innovation strategy and intends becoming the “innovation capital of Africa”. The City of Tshwane has a particular interest in innovation eco-systems. Secondly, the city has the largest number of students between all other South African cities; the inter-university innovation challenge between the three universities in the metro encourages the students to become involved in imagining exciting futures for the future of Tshwane.

Investment in technology; Research and Development agendas; Economic viability and appropriate technology;

“Making” as a strong theme at TUT: some of our key projects are the TUT solar car and the Architecture Department’s “Maker Space”. We are involved in numerous community engagement projects that revolve around innovations in materials and technology. Through this event, we are seeking new partnerships and showcasing projects.

This is aligned with the City of Tshwane’s innovation statement says: “To embed the creation and implementation of new ideas within the City’s core activities for the efficient and effective delivery of basic services, enhanced democracy, and to create a platform for a sustainable knowledge economy.” The conference will support the activities of the Tshwane Innovation Zone.

Technology policies, technology standards, ethics, culture, quality assurance, responsible wellbeing.

Identify a process of infusing AT in technology policy on national and international levels. We must hold our governments, private enterprises, scientific organisations, NGOs and communities accountable for technologies that impact peoples’ health and wellbeing and the ecological balance of the planet.

Ethics of teaching and practice in community contexts.

TECHNOLOGY R&D

POLICY, STANDARDS AND ETHICS

SERVICES INDUSTRY

Optimisation of service delivery such as water, energy or postal services (Internet of Postal Things). Innovation in service industries particular state run services. Community engagement in service improvements.

SECURITY AND SAFETY

In the emerging world of the 4th Industrial Revolution, where digital technology and automation are central, the aspects of security and safety cannot be an after-thought. As such, the security and safety becomes paramount across the digital ecosystems.

The conference will explore appropriate technologies that enhance safety and security systems, build safer communities and empower citizens by ensuring their security and safety in a digital domain.



THE INTERNATIONAL NETWORK ON APPROPRIATE TECHNOLOGY STEERING COMMITTEE

C. Bedney, USA

J. Bemley, USA

P. Bofah, USA

H. Carwell, USA

M. Castro, Puerto Rico

T. Dalgety, Guyana

J. Gwamuri, Zimbabwe

G. Kadoda, Sudan

K. Madzima, RSA

K. Mpfu, RSA

M. Muchie, RSA

A. B. Nyoni, Zimbabwe

K. Ngige, Kenya

M. Poe, USA

A. Segla, Benin

D. Soumonni, RSA

B. Stephenson, USA

J. Tharakan, USA

J. Trimble, RSA

C. Verharen, USA

THE 9TH ICAT SOUTH AFRICAN LOCAL ORGANISING COMMITTEE

Prof Amira Osman, TUT, RSA; Prof Patricia Popoola, TUT, RSA;

Prof John Trimble, TUT, RSA;

Mr Isaac Tlhabadira, TUT, RSA; Mr Simon Phuluwa, TUT, RSA;

Mr Tshifhiwa Nenzhelele, TUT, RSA;

Dr T Adenuga, TUT, RSA;

Mr Pule Sekano, TUT,

RSA; Prof Mammo Muchie, TUT, RSA; Prof Khumbulani Mpfu,

TUT, RSA; Prof Diran Soumonni, WITS Business School, RSA;

Prof Ilesanmi Daniyan, WITS, RSA;

Prof Mokgok, TUT, RSA;

Ms Ms Tsholofelo Queen Mokolopo, TUT, RSA; Ms Zanele Sibiyi,

TUT, RSA;

Mr Kgabo Mokgohloa, UNISA, RSA;

Dr Grace Mukondeleli Katumba, UNISA, RSA; Dr. Jabu Mtsweni,

CSIR, RSA

LANGUAGE

The official language of the conference will be English.

Format of Abstracts, Papers, Posters and Projects

The process to be followed by the SCIENTIFIC COMMITTEE will guaranteed the academic quality of what is delivered at the Congress and what is published in the proceedings. An international PANEL OF REVIEWERS will be appointed with expertise aligned with the conference sub-themes. All abstracts will be double blind, peer-reviewed. Authors of accepted abstracts will be invited to submit full papers, which will also be double, blind, peer-reviewed. This is to comply with the requirements for subsidy and accreditation by the South African Department of Higher Education of South Africa. All submitted abstracts and papers should adhere to a format provided through the document titled: INSTRUCTIONS FOR AUTHORS.

A rigorous review process will be followed to check the abstracts and papers in terms of:

- Relevance to the conference theme and objectives;
- Originality of material;
- Academic rigour;
- Contribution to knowledge, and
- Research methodology

Abstracts and papers submitted at:

www.appropiatetech.net

Conference announcement and call for participation:
November 2019

Abstract submission deadline:
January 20, 2020

Notification of acceptance:
February 20, 2020

Full paper submission deadline:
~~April 20, 2020~~ **May 18, 2020**

Paper reviews and feedback:
~~May 30, 2020~~ **June 22, 2020**

Final paper submission:
~~June 30, 2020~~ **July 30, 2020**

PLEASE NOTE THAT WE ARE NOW ACCEPTING NEW FULL PAPER SUBMISSIONS. THE FULL PAPERS WILL GO THROUGH THE SAME REVIEW PROCESS AND, IF ACCEPTED, WILL BE INCLUDED IN THE CONFERENCE PROCEEDINGS.

Submissions at: bit.ly/9ICAT2020

CATEGORIES OF PARTICIPATION AT THE CONFERENCE

There are several categories of participation at this event. These different categories will be beneficial to the participants in several ways, including publicity where all participation will be acknowledged. Pre-conference publicity will include radio and printed information and will be designed to promote AT in general and the conference in particular. A pre-conference and post-conference press release and meeting will be scheduled. Local and international press will be invited and a press package will be distributed to all press representatives.

a) **ABSTRACT PUBLICATION AND PRESENTATION:** participants will be notified of acceptance of their abstracts. The abstract is published in the BOOK OF ABSTRACTS and a time slot is provided in the OFFICIAL CONFERENCE PROGRAMME for presentation in a thematically-relevant stream. This type of presentation allows for those who are involved in practice, but who may not want to submit a full academic paper and where the topic was considered relevant to the Conference Theme and Sub-Themes. Where a full paper is submitted, but not accepted for publication in the proceedings, the abstract is also automatically considered for this option.

b) **FULL ACADEMIC PAPER PUBLICATION AND PRESENTATION:** This group of participants will submit full papers for review and the papers will be reviewed for inclusion in both the BOOK OF ABSTRACTS as well as THE CONFERENCE PROCEEDINGS (digital publication only). The author, in this case, will also be allocated a time slot in the OFFICIAL CONFERENCE PROGRAMME. *All authors will have the opportunity to submitted significant additional contributions of their research to a special edition of the African Journal of Science, Technology, Innovation and Development.*

c) **SPECIAL PRESENTATIONS:** There will be a number of special sessions within specialised FOCUS AREAS. In some cases, the authors/presenters will be advised to present within these special sessions. The requirements and publication options will be discussed on a case-by-case basis. Some full papers, which may not be accepted in the academic proceedings but considered important will be published in a special publication digitally available.

d) **CONFERENCE PROGRAMME PARTNER:** One aim of the conference is to further and develop new collaborations around AT research and implementation. The Conference Partners will be instrumental in expanding the scope of the conference. These partnerships aim to use the event as a platform for furthering conversations around the conference themes and pertinent built environment issues. They have therefore been initiated with a particular focus on enhancing and supporting the academic aspects of the Congress. They will also assist in the development of the Conference Programme and Content. The Programme Partners will act as advisors to the Scientific Committee and editors for the various sections of the Abstract and Proceedings Books. The coordinators in these partnerships will be fully acknowledged in all produced documentation.

e) **POSTER PRESENTATIONS:** Poster presentations from both professionals and student participants are a key part of the academic portion of the conference. Abstracts of posters with author information will also be included in the conference proceedings.

f) **SPECIAL STUDENT SESSION:** The special student session will allow postgraduate students to present their research and seek advise from international experts. The conference will allow postgraduate students to submit their research as conference papers and receive the reviews of international scholars in their research area. For many students this is not only a valuable learning experience but also a requirement for graduation. PhD colloquium: Africana Post Graduate Academy (APGA) - more details to follow.

g) **WORKSHOPS:** Special sessions, before, during and after, the conference will provide hands-on experience with appropriate technology, such as the 3D printing workshop. Submissions for workshops are requested. They will be reviewed and selected by the INAT Steering committee.

h) **EXHIBITOR:** The AT Technology Fair is free to small enterprises and academic innovators to display and a minimal cost to medium enterprises. This offers a further opportunity to develop collaborations.

i) **SPONSORS:**
Diamond - R100 000: two year highlight on website; page in program book, featured location in Technology Fair; logo featured on conference materials and USB drive.

Platinum - R50 000: one year highlight on website; ½ page in program book, logo featured on conference materials. or

Gold - R25 000: ¼ page in program book, logo featured on conference materials.

REGISTRATION COSTS

Early Professional	R5000
Regular Professional	R5500
Early Student	R2000
Regular Student	R3000

Further information will be shared on methods of payment. Rates are in South African Rands.



APPROPRIATE ARCHITECTURE FOR AFRICA [A3]



CIB W104 Open Building Implementation



All communications to be directed to Prof Amira Osman: osmanaos@tut.ac.za or 0027(0)832874006

ALL IMAGES IN THIS DOCUMENT ARE SOURCED FROM ON-GOING TUT PROJECTS.