

## **EXPANDING NIGERIAN *ELECTRONICS* TECHNOLOGY**

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### **ABSTRACT**

**The economic power of engineering , science and technology is described to lay the foundation for five action plans for Nigeria to put the country on a trajectory toward a sustained economic revitalization. The most important action plans involve education and stimulation of entrepreneurship bringing creative engineering into action to bring Nigerian products to market. Specific examples of breakthrough products are provided involving inexpensive radio receivers and transmitters, medical use of acoustic tomography, and software. Nigeria is on the cusp of a new age and with resolve and commitment among its engineers, scientists, and government professionals, it will go forward to the benefit of all of Africa and the world.**

**KEYWORDS:** Five action plans for Nigeria, Acoustic tomography, Software, Electronics

### **I INTRODUCTION**

It is an honor and a pleasure to be invited to be a guest author for this first issue of a Nigerian IEEE journal. My task in writing this paper is to provide ideas, concepts, and processes to assist the Federal Republic of Nigeria in improving its technological foundations for electronics in academia, government, and business.

First let me digress to congratulate the Nigerian Government for its efforts to reduce the violence in Darfur and for its services to the world community in the matter of Charles Taylor. The world is watching Nigeria to see the next big thing that is done to improve its place in the sun and to help the African Community.

The last 70 years of my life I have watched with great interest as the fruits of science and

engineering have brought many favorable changes to the world. The United States has been particularly fortunate in its ability to combine investment in education, encourage market incentives, effectively use natural and human resources, and encourage science applications. Electrical engineering and computer sciences have been increasingly useful to increase productivity, stimulate creativity, and improve communication. To be fair I must note that the United States has struggled hard to overcome its many shortcomings.

I hope you don't mind if I tell an anecdote that describes the position I am in when writing this article. Many years ago all the metallurgical experts thought it was impossible to produce ductile tungsten. One amateur metallurgist did not know it was impossible. He found a way to make tungsten ductile enough to draw into filaments for light bulbs. It appears to me that I am like the amateur metallurgist and, not being an expert on Nigeria, I could have some naïve but different approaches and even useful ideas for Nigerians to consider.

## **II. ACTION PLANS**

Nigeria is now about to take its place upon the world stage and some action plans are worth thinking about.

### **Action Plan # 1: INVEST IN EDUCATION**

Begin at the teacher's college by providing meaningful Federal fellowships to cover tuition and books with a small stipend. At the same time begin to build elementary and high schools facilities in large numbers by

providing grants to the states. Then move to the great colleges and Universities in Nigeria to provide large scale grants for engineering, business, and science departments that will allow them to add high performance to the faculty. After a few years establish a new Nigerian Federal Institute of Technology (NFIT), modeled after Caltech and MIT.

### **Action Plan #2: ESTABLISH CENTERS FOR TECHNOLOGY MANAGEMENT**

Near or within colleges and universities set up centers where courses are taught on developing new products for market success, new venture creation, entrepreneurship, and business planning similar to the center at the University of California at Santa Barbara [Internet 1 ].

### **Action Plan #3: SET UP SMALL BUSINESS INCUBATORS**

The incubators are located in small buildings where several small ventures or companies can share secretarial and administrative services and facilities such as conference rooms and custodians. State or Federal Government would own the facilities and hire the people providing common services. Rent must be kept low because the companies are vulnerable in their early stages of development. The centers reduce the cost for the new businesses. Private investors and venture capital investment companies should be encouraged to geographically locate nearby. Locate the incubators near the Centers for Technology Management described in Action Plan # 2.

### **Action Plan #4: REVIEW STATE AND FEDERAL GOVERNMENT REGULATION**

Corporation law should be reviewed and patent and copyright regulations should be assessed to determine if the right incentives are in place to encourage small business

ventures and creativity. Stock markets should be strengthened to ensure the flow of capital into small business as the transition to initial public offerings.

**Action Plan #5: ESTABLISH ELECTRONICS ENTERPRISE INSTITUTE**

This institute will find Nigerian solutions of common science and technology problems to Nigerian industry by research services for sale to consortia of African electronic companies. It could be part of a government department or, alternatively organized and operated by the consortia. The enterprise institute will seek out research solutions that aid in bringing new products to market with emphasis on medical electronics (acoustic tomography), consumer electronics (radios), and computer products such as software that meets a unique African or Nigerian need, such as an agricultural data base software system especially tailored to serve small farmers.

Much of the coming success is dependent on Action Plan #1 because education is the key to almost all modern technology, business, and informed citizenship. The California University, State College, and (two year) Community College systems improved under the leadership of Gov. Edmund G. Brown beginning about 1961. They have spurred the state economy to surprising level. Private Universities such as Stanford, Caltech, the University of Southern California and a host of smaller schools have often set the high standards needed for education and have provided teachers and researches throughout the state and the world. The expected results from these action plans is academic excellence and a stronger electronics industry in Nigeria with benefits for all of Africa.

**III. SPECIFIC PRODUCTS AND IDEAS**

Specific products are worth considering although detailed work is required to determine if these are right for Nigeria. Acoustic tomography is still not well developed for medical needs and is an area where the cost of entry would not be exorbitant as contrasted with other medical imaging systems such as MRI. The low cost of entry is possible due to low cost for equipment such as microphones, sound sources, and computers. Acoustic tomography [Internet 2] can be passive or active. If passive the concept depends on heart sounds, breathing sounds, or digestive function sounds to provide the source. Active systems depend on an artificial sound source put inside or outside the body to provide the signal. A non – medical application of active acoustic tomography is temperature measurement in jet engines. One simple form that acoustic tomography could take is to fix microphones on a belt closely spaced together and then circle the body, the chest, for example, with the belt. Tomographic analysis of the sounds could be accomplished by analog to digital conversion and then using a variety of software packages to perform digital filtering, Fourier transformation, and image rendering using an inexpensive desktop computer.

Very small radios creatively combined with cell phones are another set of products that could be developed for Nigerians who often listen to the radio for entertainment and information. A possible breakthrough product is an expensive radio transmitter system for Nigerian radio stations that is made up of less costly parts in redundant small transmitter controlled by off – the – shelf inexpensive computers using software to switch to another transmitter when one fails. There could be two transmitters, only one of which is emitting a signal but when it fails the computer rapidly puts the other operating transmitter on the air.

While the newly connected transmitter is on the air the other one is repaired or replaced. Assembly and repair of these devices in Nigeria would provide value added and they could be used throughout Africa providing an export market. Google, which has hundreds of thousands of servers, is known to use very low cost, unreliable servers, but to switch to other servers when a failure occurs. Software for African needs is a huge field of interest and can be brought to market with very little capital costs and it has a huge margin to generate net income for reinvestment in established companies or start up businesses. This software could be simple and easy to install and operate, but still meet the needs of Nigerian farmers, teachers, and shopkeepers.

Creativity can be stimulated by looking for new relationships among classes of activities, objects, policies, etc. There is an idea for an organized search for these relationships by using what I call the Fritz Zwicky Creativity Matrix [Internet 3]. Zwicky was Professor of Astrophysics at Caltech for many years and was the first to study supernovae. He first suggested and analyzed the concept of neutron stars that are well known today.

One form of the Creativity Matrix that could be used in the Nigerian electronics industry might have column headings for new products (radios, software, medical electronics, GPS navigation systems, etc.). Row headings represent the classes in which they would be produced such as inexpensive, entry level, luxury for export, etc. This matrix is heavily oriented to marketing. It should have about six headings for columns and six for rows – this gives 36 combinations that are

sorted by desirability for Nigeria. Matrices for engineering issues can also be set up and often result in new ways of looking at solutions. Often a few combinations are unexpected and lead to new insights into the types of products that can be developed. Each combination of interest can be broken down into columns and rows for further creative work.

#### IV. SUMMARY AND CONCLUSION

Adopting the action plans described above will take the commitment and resolve of the people of Nigeria and especially its leadership in the technological, business, and government sectors. These plans can be adapted to Nigerian needs and must be carried out the Nigerian way with sensitivity to the culture and traditions of the country. Thus time is needed to lay down the levels of popular support the plans will need. Time is on the side of Nigeria because its natural resources are so vast and commodity markets are so favorable and are likely to stay that way for several decades. Yet it is possible that alternatives such as tar sands, oil shale, and ethanol will begin to replace more conventional petroleum fuels so Nigeria must start to develop a strong manufacturing and agricultural base for the long range future.

#### V. REFERENCES

- Internet 1, [http://www.tmp.ucsb.edu/about\\_us/overview.html](http://www.tmp.ucsb.edu/about_us/overview.html)
- Internet 2, <http://www.omic.ogi.edu/pubs/abs/oraevsky966.html>
- Internet 3, <http://www.swemorph.com/ma.htmls>