Ignite
NATIONAL TECHNOLOGY FUND

IGNITING
INNOVATION
IN PAKISTAN

YEAR BOOK 2018

MISSION

To fix the innovation value chain in Pakistan.

VALUES WE LIVE BY

Clash of ideas & continual learning with humility

Transparency, learning & decision making

NO TITLES

DATA DRIVEN

TAKING PAIN

DIVERSITY

Evolution through diversity & inclusion

Reach out to the marginalized & underserved

BOARD OF
DIRECTORS

Dr. Khalid Maqbool Siddiqui
Federal Minister for IT & Telecom

Mr. Maroof Afzal
Secretary, IT & Telecom

Mr. Mudassar Hussain
Member (Telecom)

Mr. Syed Raza Shah
Member (IT)

Mr. Zahoor Ahmad
Senior Joint Secretary
Finance Division, Ministry of Finance

Dr. Shahid Qureshi
Program Director, Center for
Entrepreneurial Development, IBA Karachi

Mr. Akbar Jamal Shaukat
Program Director, CNS Group of
Companies

Mr. Khawaja Saad Saleem
Managing Director,
Nayatel (Pvt) Ltd, Islamabad

Maj. Gen. Amir Azeem Bajwa (R)
Chairman,
PTA

Mr. Yusuf Hussain
CEO,
Ignite - National Technology Fund

Ignite
NATIONAL TECHNOLOGY FUND

CEO'S REVIEW

Yusuf Hussain

Ignite seeks to solve the most meaningful problems in Pakistan and avail global opportunities through innovation based on Fourth Industrial Revolution (4IR). Innovation is the transformation of ideas or inventions into products or services that impact society. Over the last many decades, innovation around the world has been driven by startups, which are new companies with innovative business models and technology, seeking to transform industries. Ignite incubates startups, funds them, runs its own startup, DigiSkills.pk and also funds university innovations. Following are some notable examples of Ignite achievements over the last one year:

Poverty alleviation has been the cornerstone of our new initiatives, Bakhbar Kissan was one of 8 startups that received a total Ignite funding allocation of Rs 203 million. Employing precision agriculture, it will utilize satellite imagery and drones to dispense fertilizers and pesticides, doubling yield of small farms by Feb 2020. Byoniks is developing patentable tech, which will provide non-intrusive and pain free kidney dialysis at a fraction of the current cost by July 2020. Ignite also worked with PM Advisor on poverty alleviation to introduce high impact tech measures in the national strategy. An electrical surgery instrument developed by NIC Peshawar incubatee, Aprus, has now performed around 100,000 surgeries across KPK at a fraction of the cost of imported equipment, making it affordable for the poor. NIC Lahore incubate, Fine Living have also acquired venture capital (VC) funding. It provides essentials like cooking utensils and monthly rations to hawkers and daily laborers on daily and weekly installments, with sales crossing Rs. 15 million with healthy profits.

Major milestones in existing projects include the filing of 9 nanotech USA patents by NIC Lahore incubate, Pak Vitae, which has developed a very low-cost quality drinking water filter. By the end of year 2020, 1 million additional Pakistanis are expected to have access to clean drinking water on a regular basis. By the end of year 2021, 10 million Pakistanis, South Asians, and Africans are expected to have the same access. Ignite funded Mera Maweshi was launched; it used Artificial Intelligence (AI) to provide cattle disease diagnostics to small farmers on their smart phones, which drastically reduces death incidents of livestock that can turn a small farmer's life upside down. NIC Quetta incubatee, Smart Helmet, uses Internet of Things (IoT) for poisonous gas detection, location and environmental monitoring to guide illiterate miners to safety. Thousands currently lose life and limb annually in horrific mining accidents.

Job creation has been the hallmark of Ignite initiatives which include provision of training in marketable intermediate digital skills to over 312,000 enrolled trainees, many of whom are now self-employed and earning foreign exchange through freelancing across the country. Already an estimated USD 14 million have been earned. The NIC network created an additional 9000 jobs. NIC Islamabad incubate, Mauqa Online, obtained VC funding to expand its job creation and digital financial inclusion services for the illiterate across the country.

Pakistan is becoming water starved and over 80% of water is used for agriculture. In new initiatives, Aqua Agro, NIC Karachi incubatee, is launching an AI and IoT based water monitor that reduces consumption by 50%, at a cost affordable to small farmers i.e. Rs 30,000 for a 5-acre holding. Agri yield increases by 30% as fertilizer and pesticide is not stripped away by excess water. NIC Peshawar incubatee, Smart Tubewell, is now managing water delivery far more intelligently at several locations in KPK. NIC Lahore incubate is designing a new jet engine, which eliminates contrails in jet engine exhausts, that cause up to 20% of global warming. NIC Karachi's Trashit converts organic waste to fertilizer and is handling 2 tons of daily waste in Karachi.

Ignite has partnered with Pakistan Aeronautical Complex, Kamra, to help build a local aeronautical components industry that can plug into global supply chains. Ignite has joined Agha Khan Medical University to bring latest medical innovations to Pakistani and global healthcare through incubation, funding, clinical trials, regulatory approvals and partnerships. Facebook has set up an Augmented Reality (AR) and Virtual Reality (VR) Lab in NIC Lahore. AR/VR is expected to be a high growth area over the next decade with applications in education, training, maintenance, and gaming. Ignite has partnered with Japan External Trade Organization (JETRO), to bring Pakistani innovations to Japanese conglomerates operating in the country. Ignite has funded blockchain based international remittances and Know Your Customer (KYC), which are expected to launch in Feb 2020.

Major milestones in existing initiatives include launch of Ignite funded Electrocure in 2 power distribution companies (DISCOS). Electrocure saves 90% of electricity transmission line losses and theft. Ignite funded Orbit, an AR based education has now expanded to over 60 schools in USA and Europe. NIC Islamabad's Deaftawk acquired foreign funding and is now offering its sign language and interpretation services to the deaf community across Pakistan and also overseas.

UNIDO RECENTLY RECOGNIZED OUR ACCOMPLISHMENTS

"This is to inform you that, owing to the remarkable efforts of IGNITE in promoting 4th Industrial Wave Revolution related technology, the UNIDO HQ in Vienna would feature the Case Study of Ignite as one of the good government initiatives for supporting 4IR. This would be an honour for IGNITE as well as Pakistan to be featured in the Industrial Development Report (IDR 2020)."

CORPORATE SOCIAL RESPONSIBILITY —
TREE PLANTATION

Ignite team planted trees to further the national cause of green Pakistan.

COMPOSITION OF BOARD

A Public Private Board with MoITT and Other Government Representatives Governs Ignite

Thirteen (13) directors including:

Ex-officio office bearers in the Federal Government **-5**

Chairman of the Authority - PTA **-1**

From amongst the nominations made by the relevant licenses

(Data Service Provider, Fixed Line and Cellular) **-3**

From amongst the nominations made by the scientific and academic community **-2**

Corporate management executive **-1**

CEO of the Company **-1**

Sub Committees of the Board

Finance & Audit Committee (FAC)	HR Governance Committee (HRGC)	Project Appraisal Committee (PAC)
Dr. Shahid Qureshi	**Mr. Akbar Jamal Shaukat**	**Mr. Mudassar Hussain**
Mr. Syed Raza Shah	Mr. Mudassar Hussain	Mr. Akbar Jamal Shaukat
Mr. Zahoor Ahmad	Mr. Khawaja Saad Saleem	Mr. Syed Raza Shah

IGNITE IS CREATING A KNOWLEDGE ECONOMY

MANDATE
To create a knowledge economy through R&D in ICT and commercialization of research.

CORPORATE STATUS
A Public Company Limited by Guarantee, incorporated in 2006 by the Federal Government, under Section 42 of Companies Ordinance, 1984.

SOURCE OF FUNDING
0.5% of gross adjusted revenue of telecom operators.

OUR CORE
ACTIVITIES

SEED Fund
Solving meaningful problems and availing opportunities with Fourth Industrial Revolution (4IR) Tech.

National Incubation Centers
Accelerating entrepreneurial eco system by nurturing startups and engaging them with investors and corporations.

DigiSkills.pk
Creating a populace that is learning continuously with an initiative.

FYP Fund
Igniting university innovation and providing final year students with hands on skills.

Outreach
Ignite Outreach engages corporates, professionals, entrepreneurs, academics, media and policy makers with Ignite programs and informs them about importance of innovation, and the challenges and threats posed by the 4IR.

Innovation is the prime determinant of the rise and fall of societies. The new surge of innovation is the fourth industrial wave, where creativity and innovation are at a premium. Startups are the building blocks of the knowledge economy. Governments provide incentives to address market failures and agile regulation that balances risk with innovation.

Ignite funds startups and innovative projects that utilize 4th industrial wave tech to solve local problems and target global opportunities in health, education, energy, agriculture, telecom, finance and other verticals. Our national network of incubators across Pakistan nurtures startups and engages them with investors and corporations. We have launched a program to prepare one million people for the future of work. Through studies and stakeholder engagement, we help planning in the public and private sectors.

Ignite outreach activities seek to inform professionals, media, students, corporations, media and policy makers about the challenges and threats posed by the new economy and the importance of innovation and seek to increase engagement in Ignite programs.

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SEED FUND

SEED FUND

Overview

Ignite funds startups and innovative projects that utilize 4th industrial wave tech to solve local problems and target global opportunities in health, education, energy, telecom, finance and other verticals.

CLOUD INFRASTRUCTURE & CYBER SECURITY
Building a Safe Virtual World

NEUROTECH
Thoughts Controlling Things

BLOCKCHAIN
Building Trust and Slashing Cost

ROBOTICS
Perform Repetitive Tasks Quicker, Better and Inexpensively

ARTIFICIAL INTELLIGENCE BIG DATA
Creating a New Intelligence with Data – the New Oil

THEMATIC AREAS

SHARED ECONOMY
Using the Under Used

AUGMENTED/ VIRTUAL REALITY
Illuminating Our World & Fashioning New Ones

INTERNET OF THINGS
Taming the Physical World

3D/4D PRINTING
Igniting Creativity with Makerspaces
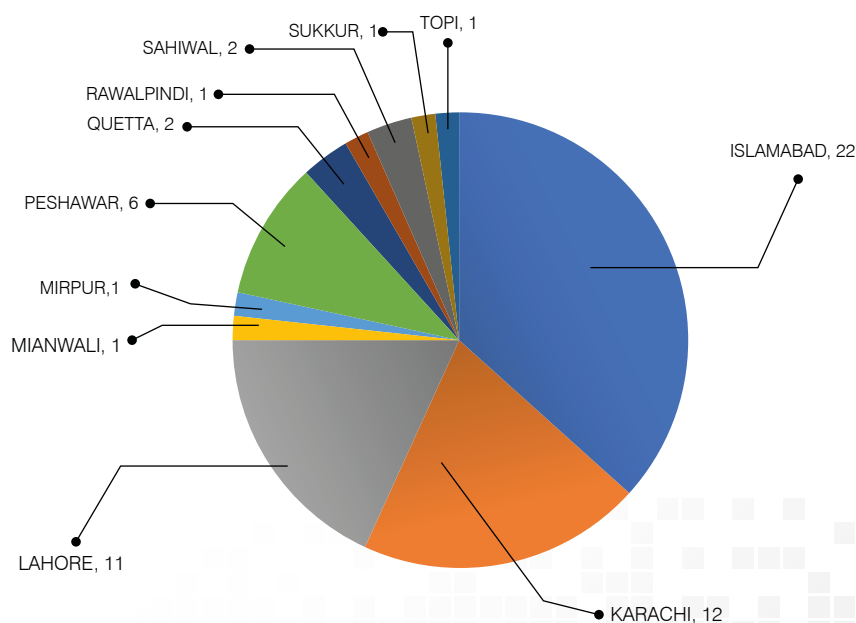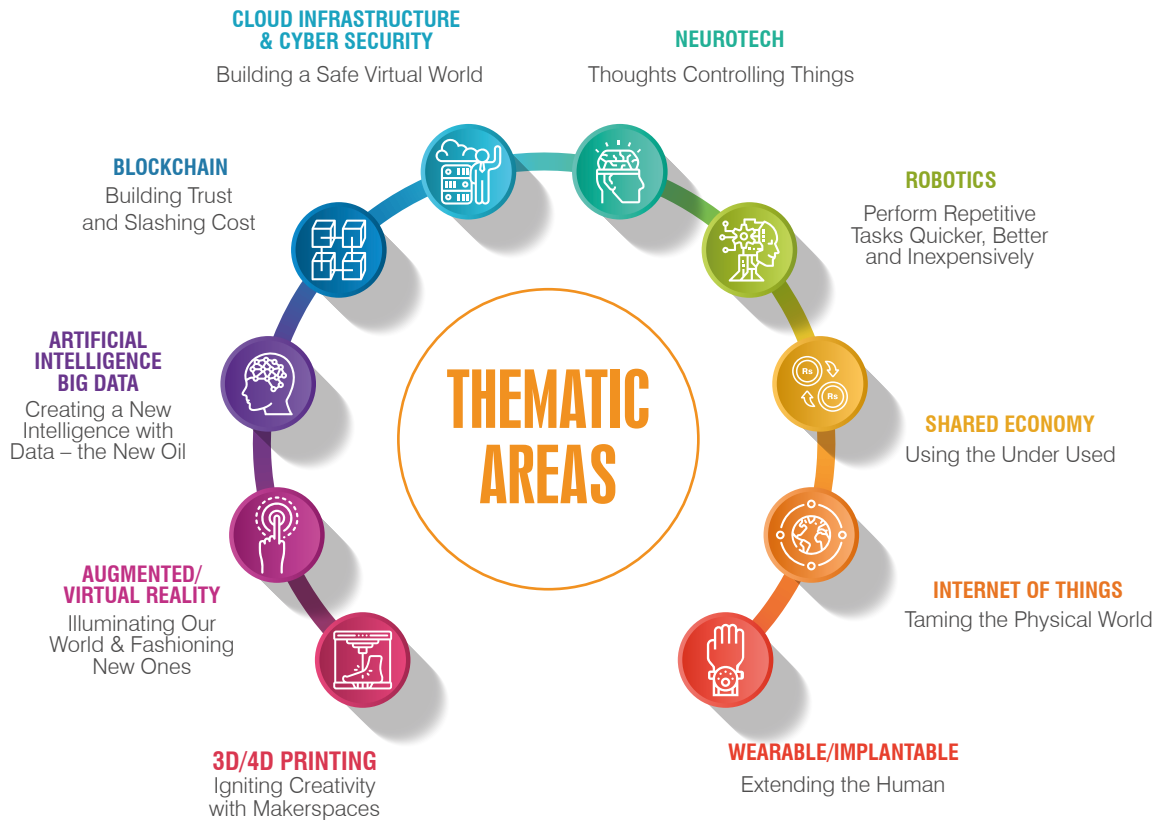
WEARABLE/IMPLANTABLE
Extending the Human

Figure 1: Proposal Submissions by City

Proposals Received

A total of 60 technical proposals worth PKR 1,700 million were received from academia, industry and startups.
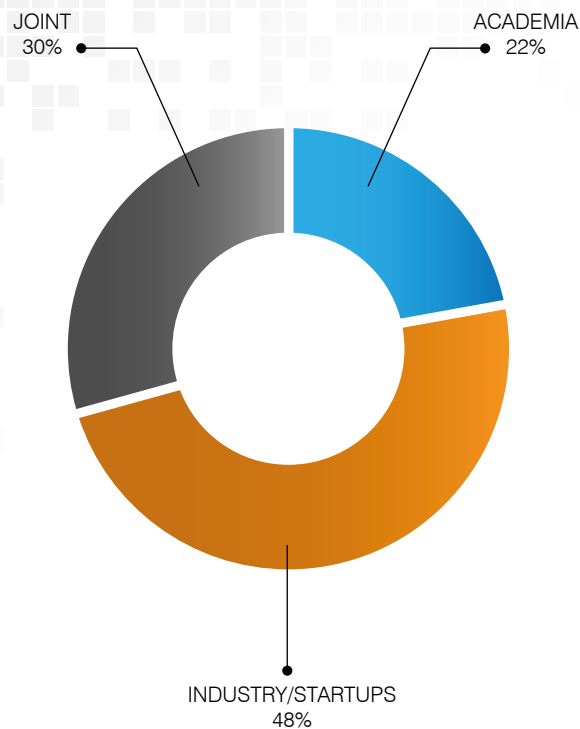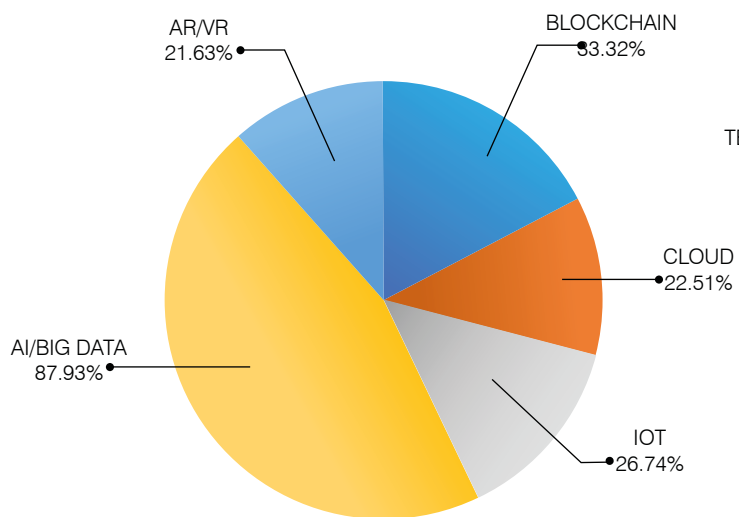
Figure 2: Proposal Submissions by Segment

JOINT 30%
ACADEMIA 22%
INDUSTRY/STARTUPS 48%

Figure 3: Investment in Technologies by Million

AR/VR 21.63%
BLOCKCHAIN 33.32%
CLOUD 22.51%
AI/BIG DATA 87.93%
IOT 26.74%
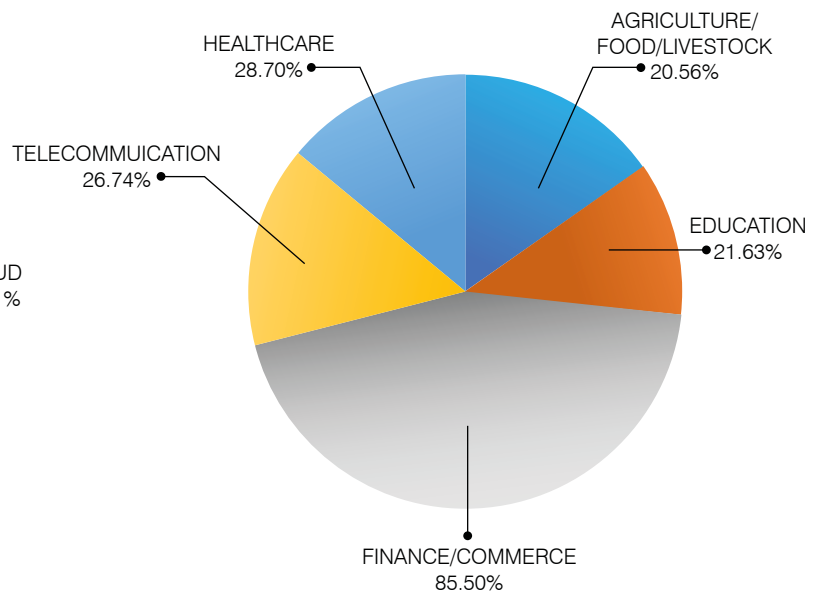
Figure 4: Proposal Submissions by Vertical

HEALTHCARE 28.70%
AGRICULTURE/ FOOD/LIVESTOCK 20.56%
TELECOMMUICATION 26.74%
EDUCATION 21.63%
FINANCE/COMMERCE 85.50%

Proposal Acceptance

The proposal acceptance rate was at 19% and the SEED fund, focused on 4th industrial wave tech and provided a funding of PKR 192 Million.

FUNDED PROJETCS

Orbit: Bringing Augmented Reality to Classrooms

Textbooks and blackboards are no longer good enough to teach children in this rapidly advancing technological age. Some schools have taken the initiative and introduced the usage of tablets and other audiovisual aids to teach children educational concepts, however, it is high time that a collective effort is made to overhaul the existing education system using technology. In this vein, Orbit aims to introduce augmented reality (AR) into classrooms and make the teaching and learning process three-dimensional – sparking creativity in children and improving their understanding.

There have been attempts in the past to introduce AR into classrooms, but these attempts have mostly been unsuccessful due to high costs involved or the poor quality of the product. However, the introduction of development platforms by Google and Apple (such as ARKit, ARCore and Tango) has made developing flawless augmented reality solutions at low cost possible.

Another issue with AR solutions for education that Orbit aims to address is the non-uniformity of curriculum. Previously, solutions were developed haphazardly – without segregation according to grades or age groups. Since children of different age groups are required to be taught different details of the same concept, the same generic 3D model cannot be used in all the grades. This is another reason why schools have not been eager to employ AR into classrooms.

Orbit will build over 100 concepts in 3D using AR from Science, Technology, Engineering and Mathematics (STEM) topics according to the Cambridge curriculum for grades 3 till Grade 11. During Orbit's pilot, one-third reduction in teaching time was observed and 80% of the students in class showed an improvement in grades. Orbit promises to change the face of education without requiring drastic changes to the structure and internal operations of schools.

Pakistan's First Portable Kidney Dialysis Kit

There are quite a few challenges that are faced by kidney patients in Pakistan. Presently, only hemodialysis machines are available locally for kidney dialysis. These machines drain the body of blood, clean the blood in a synthetic filter and then pump it back into the body. This process is not only painful, expensive and time consuming, it also exposes the patient to other life-threatening diseases such as Hepatitis C and consumes around a million litres of water for each 100 patients a year. To top that off, there are not even enough hemodialysis machines available in Pakistan to cater to all patients. According to Al-Shifa, "Pakistan needs half a million machines to meet the need."

Byonyks is Pakistan's first biotechnology startup that exclusively focuses towards developing affordable healthcare devices using state-of-the-art medical technology. It aims to develop an Automated Peritoneal Dialysis (APD) machine that eliminates all the problems associated with a hemodialysis machine. How an APD works is that a solution is inserted through the machine to the peritoneum in the body. This solution helps to extract urine and the machine then drains this urine from the body. This process is repeated four times during the night, while the patient is asleep. It is low-cost, hassle-free, does not pose any health risk and neither does it require constant supervision, as in hemodialysis.

With the help of its partners in this project, Byonyks plans to manufacture these APD machines in Pakistan for both local use and export. This will be the first machine of its kind to be made in Pakistan.

Byonyks is Pakistan's first biotechnology startup that exclusively focuses towards developing affordable healthcare devices.

Automating International Remittances & Customer Records With Blockchain

Blockchain is the buzzword these days in the online financial world. It is paving the way for secure, smooth and efficient transactions, making traditional banking processes fully automated thereby reducing and, in some cases, eliminating the need for manpower.

Ovex Technologies' BlockEdge division has identified two key areas where the banking sector will benefit majorly from blockchain. The first being the international remittance process. In 2015, cross-border payments exceeded $150 trillion globally. The average time to process an international remittance is anywhere between 3-9 working days and the fee per transaction ranges from 2%-10% of the total amount. If you calculate the resultant processing times and total cost of transactions for trillions of dollars worth of remittances, it quite seriously boggles the mind. The proposed blockchain for international remittances would cut down the processing time to 1-2 working days and similarly, reduce up to 70% of the cost involved, thereby making remittances simple, quick and hassle-free. Also, the transparency of the process has the potential to remove money laundering from the equation completely.

The second blockchain component that BlockEdge aims to introduce is called 'Know Your Customer' (KYC). This aims to bridge the disconnect between the various departments of a bank and the customer. For example, presently, if a customer requires an additional service from a bank; like a loan or lease; they must complete multiple forms, provide documentation again and again, and wait for approval processes even if they are an old customer. This again results in high operational costs, hours wasted and poor customer experience. The blockchain application will create a permanent customer record maintained in a single database that would be accessible to all departments and other financial institutions which would help them determine customers' financial ratings and customers would enjoy quick approvals and straightforward transactions.

Just these two blockchain processes have the potential to transform the customer experience and lead the way for more processes to be implemented via blockchain making banking entirely automated.

Software-defined Radios for 5G Networks

The world is preparing to shift to 5G technology from the existing 4G networks to fulfil the growing demands of communications. These demands arise not just from regular data traffic, but an array of applications from different modes of service and traffic which did not exist earlier, e.g. Internet of Things, advanced gaming and virtual reality, telemedicine etc.

With the global rollout of 5G services being aimed for 2020, this project's purpose is to be at the forefront of developing technologies for 5G on the international level. These technologies will have applications for commercial use as well as developing tailor-made tactile technologies for our defense forces.

Particularly, this project aims to develop next-generation tactical communications, i.e. Software-Defined Radio (SDR) waveforms based on 5G technology. Through SDR, various modes of communication that operate independently can be brought to a single platform in 5G. For example, presently, various entities such as defense forces, law enforcement agencies, rescue services etc. have their own devices and platforms for communicating and their signals do not mix or communicate with each other. With 5G SDR, this will become possible and will thus have a far-reaching impact for all entities involved, with many applications.

This project will also serve the needs of global customers by licensing developed modules including transceiver algorithms and hardware configurations for commercial use. The showcase demo of 5G air-interface will also make PTA a beneficiary as this demo can be used by PTA to attract telecom operators to 5G, making them understand how it works and what all it can do. With 5G on its way, a whole new world of exciting possibilities awaits.

Servup: A Comprehensive Digital Marketplace Solution

Servup is a digital services platform that will help large enterprises and SMEs reach out to customers via telcos and other service providers to offer their products, deals and discounts and other customized services.

There is a large untapped market right now with respect to offering services and products on-the-go which telcos, enterprises and customers can all benefit from. The increasing demand for mobile data is not translating into a proportionate increase in revenue for operators. This service also aims to bridge that gap. It will create digital catalogues for small and large businesses and then bundle products and services from different enterprises to give the customer what they want. Servup will remove the formalities and hassle that comes with extensive contracts between businesses when they want to partner up, making it a win-win situation for all. It will also go a step forward and provide customer services for startups and small businesses, so that the end consumer gets a seamless experience.

Through the extensive digital catalogue built by Servup for various businesses, customers will get customized offers through email, SMS, social media and the Servup app. The customer will be able to interact with these offers and learn more about the services, subscribe to them, save them, share them and even negotiate. Once a customer opts to go for a service, Servup will provide them real-time interactions and data support from its back-end to ensure a smooth experience.

A Comprehensive
Digital Marketplace Solution

SERVUP

Online Shopping for Eastern Wear using Image Search

Imagine this: you are on Instagram scrolling through your feed, you see a socialite wearing a kameez that you immediately fall in love with and want to wear. Unfortunately, the post does not mention the brand or designer for the kameez, so you decide to search for it. You put in certain keywords describing the shirt, but the search results fail to bring it up. You instead take a screenshot of the photo and use that to search. Immediately, you have options of the same or similar clothing that you can buy online – from both local and international brands.

The first scenario is what presently exists. The second scenario is what this project aims to build, with emphasis on eastern wear.

E-commerce has just very recently taken off in Pakistan, with majority of the larger brands launching online stores in the last couple of years, and smaller businesses and individuals selling via social media pages and accounts. As the customer becomes more familiar with the online shopping experience and the market expands, the scope for customized services is also growing. This unique visual search technology will use AI to continue to improve its performance and bringing the most relevant and on-point results.

This special technology is to be built to understand the richness of textures, colors, cuts and designs characteristic of eastern wear. Presently, none of the local e-commerce websites offer the option of visual searching, and the results are not very good of the few international ones that exist. The project will support industry-standard applications, making it easier than ever before for online retailers to offer – and customers to enjoy – smarter shopping opportunities.

ONLINE SHOPPING FOR EASTERN WEAR USING DEEP LEARNING
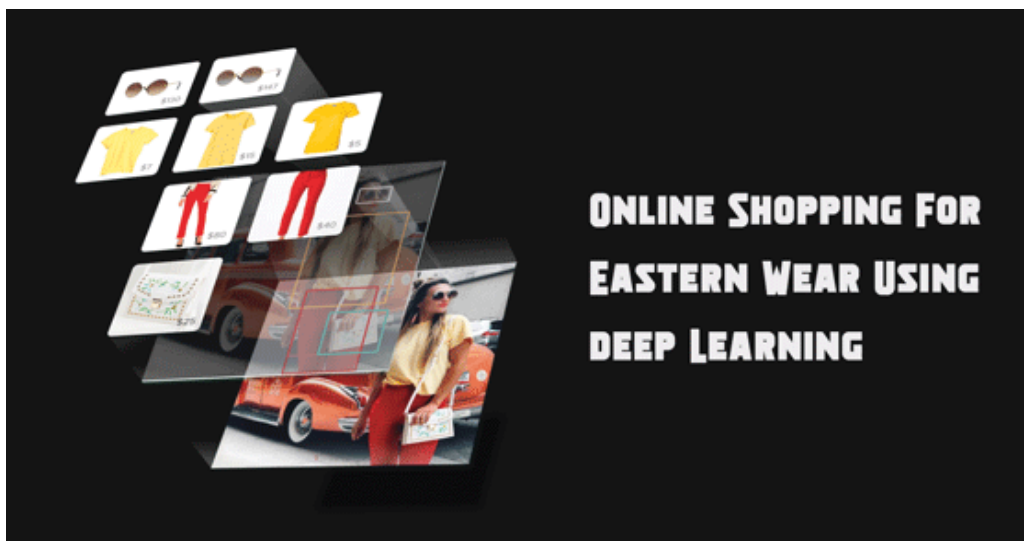
Bakhabar Kissan: Revolutionalizing Pakistan's Agricultural Landscape

Despite being a predominantly agricultural country, Pakistan still lacks the best practices in farming and agriculture. However, if one considers the reasons for this being so, i.e. lack of education and awareness, untapped and underdeveloped modes of communication, limited mobility, vast distances and low funding, it makes sense why we have lagged and continued to produce below average yields.

With the right technology and awareness, the average farm yield can be improved by 30%-40%, bringing up the country's agricultural production substantially. In these times especially, to face challenges such as climate change and acceleration in population growth, it has become even more imperative that Pakistan adopts precision agriculture and applies innovative technologies to improve agricultural production.

With Bakhabar Kissan (BK), all the stakeholders of the agricultural supply chain come together under one umbrella and operate interdependently to share and spread information, use machinery and technology and utilize resources intelligently to produce optimum yield. BK brings together research institutes and universities, financial institutions and insurance companies, pesticides, fertilizers and seed suppliers, equipment vendors, and smart devices in the form of drones, mini weather stations, soil testing kits, etc.

At present, BK is already providing advisory services employing various platforms like SMS, VMS, IVR, call centers, mobile apps and social media, etc. With over 1.35 million farmers registered over the last 18 months since its inception, the project has proven to be successful in its objective and is further looking to expand its operations with more features and resources.

ONE STOP SOLUTION FOR FARMERS
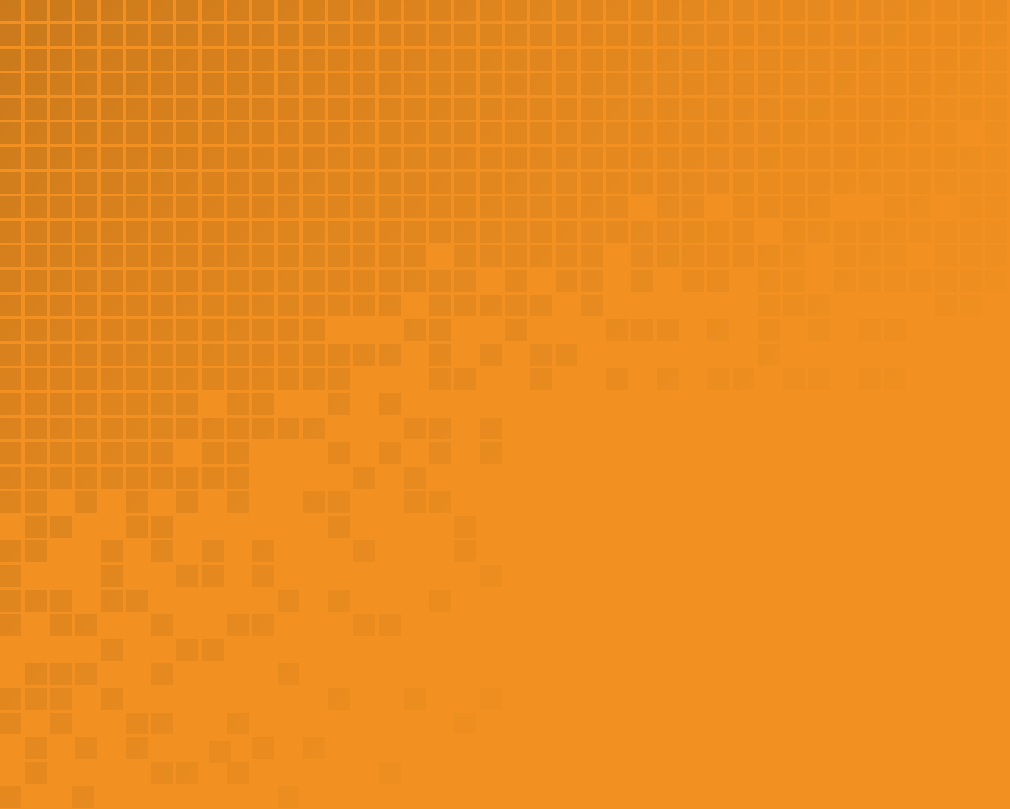
NIC PROGRAM

NIC PROGRAM

OVERVIEW:

Our national network of incubators across Pakistan (Islamabad, Lahore, Peshawar, Karachi and Quetta) nurtures startups and engages them with investors and corporations. Ignite startup portal gives single point data access to national and international venture capitalists interested to invest in Ignite startups.

Visit NIC Portal:
https://ignite.org.pk/nic/

ACCELERATING ENTREPRENEURIAL ECO-SYSTEM THROUGH NATIONAL NETWORK OF INCUBATORS:

150+ Companies including telecom operators, leading businesses, media groups, universitites and companies in 40+ consortiums responded to RFP

90k Sq. ft. area

PKR 2.8 Billion Total cost of 5 projects.

170+ Startups to be inducted per annum

OVERALL OUTCOMES:

National Incubation Center
Dream. Build. Rise
Funded by Ignite, MoITT

NIC LAHORE
Funded by Ignite, MoITT

NIC QUETTA
Funded by Ignite, MoITT
From Innovation to Impact and beyond!

NIC Peshawar
Funded by Ignite, MoITT

NATIONAL INCUBATION CENTER NIC KHI
Funded by Ignite, MoITT

480+
Females Empowered

11k+
Jobs Created

120+
Mentors

68
Startups Graduated

PKR 4+B
Investment Committed

177
Startups Currently Incubated

PKR 900+M
Revenue Generated

NIC ISLAMABAD

OUTCOMES/ACHIEVEMENTS:

330+
Females Empowered

1,288+
Jobs Created

40+
Star Mentors

30
Startups Graduated

PKR 392.79M
Investment Committed

49
Startups being Incubated

PKR 404.42M
Revenue Generated
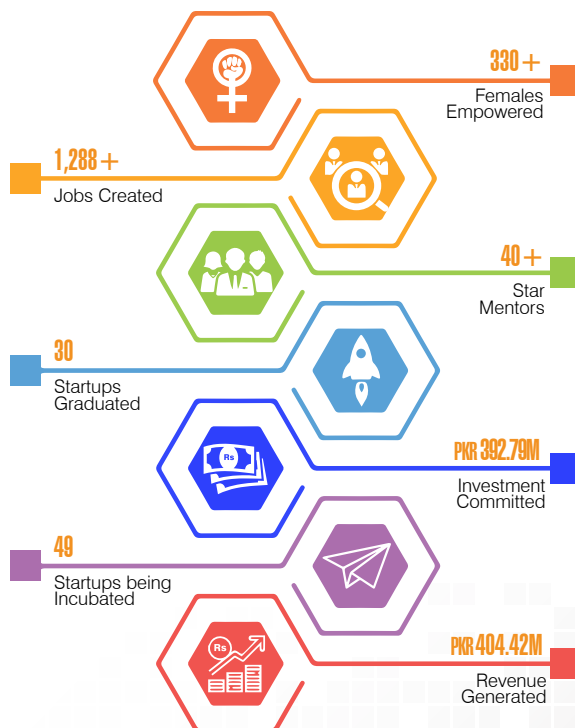
STAR STARTUPS:

MAUQA ONLINE

Mauqa.Online is an Uber for blue collar workforce, employed from slums across twin cities. 35,000 hours by employing & training over 100,000 uneducated, underprivileged domestic helpers (90%+ are women).

INTEGRY

Integry provides ready-to-use integrations that you can drop in your app. Users can then bring their data from other apps into your app and have a 40% reduced churn, double the LTV. Also incubated at THE ALCHEMIST, a famous accelerator in USA.

EASY INSURANCE

Easy Insurance is an online aggregator for insurance in Pakistan. On their web-app, customers

can compare features from various plans from different companies and purchase insurance online.

RADARVIEW 360

RadarView 360 is a field service platform that can be integrated into existing ERP, CRM, and accounting systems. The startup's API can communicate with web-based and locally hosted products to enable two-way data transfer, automating the service chain.

KAZZOLA

Kazolla is an application that allows users to chat and share images, forms and tasks with groups. The Islamabad Capital Police is currently using Kazolla app allowing citizens to report crimes and file complaints.

CRICFLEX

CricFlex offers wearable technology for cricketers to improve their performance. Their patented technology comprises of an arm sleeve that is embedded with sensors. It can detect illegal bowling action, tracking arm force, action time, and spin factor. It displays the results on the users' smartphone, helping them in bowler training.

FABRICARE

FabriCare is a smartphone app that provides dry cleaning and laundry services to its users in an affordable and efficient manner. They provide a doorstep service by offering free laundry pickup and delivery service, the smartphone app provides added convenience.

RASAI

Rasai is an inter-city carpooling platform that enables commuters to offer an empty seat for a shared car ride over a fixed route and timing. It allows the users to save on fuel costs and make extra cash through making their vehicle available for car pooling. The startup also offers shuttle service with premium vans, vetted drivers and a tracking system.

NASEEM

Naseem is a R&D ed-tech startup that is integrating artificial intelligence with education. The startup is developing a digital tutor that teaches primary school students by implementing the latest trends in neuroscience, cognitive science, and learning science.

ROAMER

Roamer is an app based vehicle renting service that offers chauffeur driven vehicles on demand. The users can book a trip ranging from one hour to 12 hours, up to a 90-day booking. The service offers flat hourly rates without any additional charges, also offering free mileage allowance.

NEORRIC

Noerric removes disruption from the cricket match detecting no ball through AI based wickets without any change being required to the pitch. This reduces the match time to upto 30 minutes per match and provides real time detection.

OVUE TECH

Ovue Tech is a digital service startup that offers client solutions across three key areas: web development, CAD designing, and graphic designing. They offer design services for interior and exterior elevation.

PANWifi

PANWifi is a marketing tool that works with clients like restaurants, cafes and other establishments to offer Wifi to their customers, first directing them to sign in using Facebook, email or phone numbers. This list of customers can be used to send targeted coupons, offers and other advertisements.

KONNECTIN

The KonnectIn platform tries to redefine social networks by developing deeper and more meaningful interactions through physical meetups.

WOLFOUT

WolfOut is a food tech startup that empowers home-based chefs to earn a livelihood. With its e-commerce platform, WolfOut provides fresh and healthy food from certified home chefs.
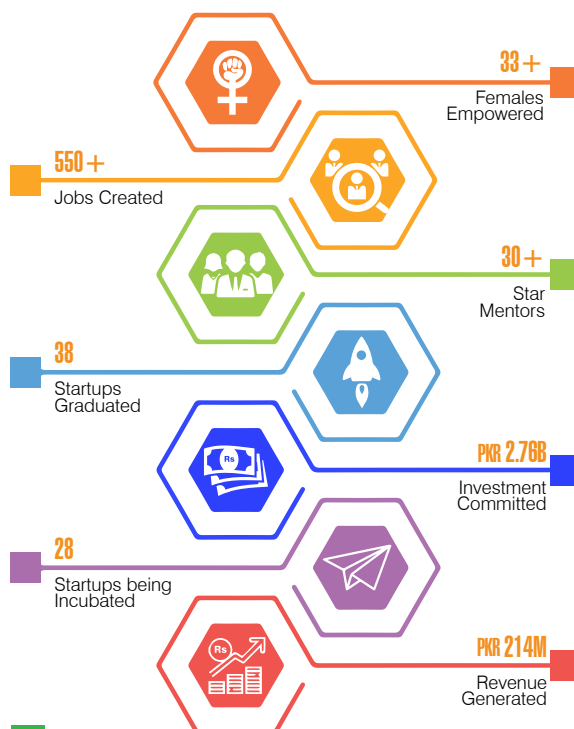
MECHANIC ON THE GO

Mechanic on the Go is a technology based startup that offers on-demand mechanic service to the doorstep.

NIC LAHORE

OUTCOMES/ACHIEVEMENTS:

33+
Females Empowered

550+
Jobs Created

30+
Star Mentors

38
Startups Graduated

PKR 2.76B
Investment Committed

28
Startups being Incubated

PKR 214M
Revenue Generated

STAR STARTUPS:

PakVitae
Purity for humanity.

FL Fine Living

Aero Engine Craft

PAKVITAE

PakVitae is a Nano technology based startup that has developed a patented water filter which uses no energy. It purifies water to 99.9999% purity and provides clean drinkable water at less than 1 paisa per litre. It will affect millions of people who do not have access to clean drinking at the most affordable price.

FINE LIVING

Fine Living, a startup led by a woman entrepreneur, is impacting the lives of people at the bottom of the pyramid. They sell household needs to daily wage earners with a very unique model of providing customers with goods on day one without any deposit and collect daily instalments.

AERO CRAFT ENGINE

Aero Craft Engine is a patented design for attachment to engines of jet liners to suppress water vapor trails at high altitudes. This simple invention has huge impact on global warming as frozen water vapor is at least 5 Times more damaging than CO_2.

ZARI FAISAL DESIGNS

Zari Faisal Designs is an e-commerce website manufacturing high end clothing and accessories, offering a fashion and content influencer platform.

STORYKIT

StoryKit is a popular program of Kitab which publishes children literature, Urdu language resources, and runs storytelling programs. StoryKit turns classical texts through interactive storytelling and board-games into a community building exercise for children.
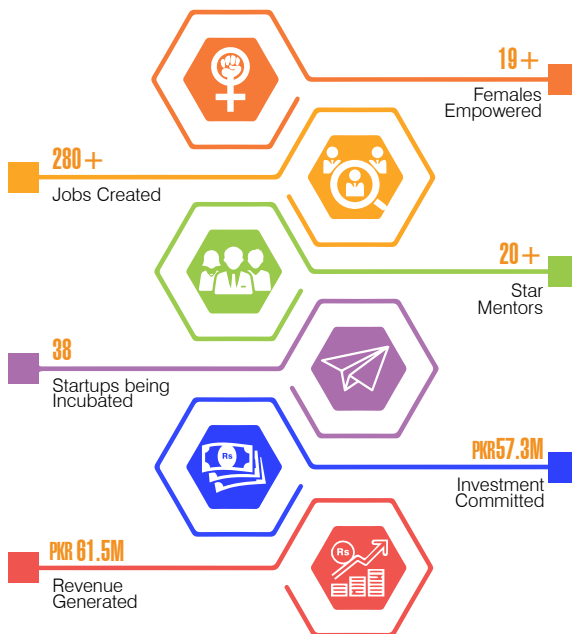
VCEELA

Vceela is a fair trade startup that focuses on the revival of dying arts and crafts through supporting artists by guiding them to develop sustainable businesses. The startup offers skill development, design consultation, partnerships, and market access to local artisans.
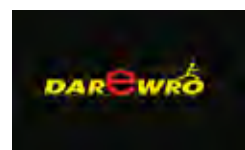
NIC PESHAWAR

NIC Peshawar
Funded by Ignite, MoITT

OUTCOMES/ACHIEVEMENTS:

19+
Females
Empowered

280+
Jobs Created

20+
Star
Mentors

38
Startups being
Incubated

PKR57.3M
Investment
Committed

PKR 61.5M
Revenue
Generated

STAR STARTUPS:

APRUS

Aprus is an electrosurgical instrument that has been developed to remove tumours, cut tissues, and seal blood vessels with increased hygiene and precision. Over 100 units of this device have been deployed across clinics and hospitals in KPK and have been utilized in over 70,000 surgeries.

BERA

Bera offers indigenous craft of Peshawari shoemaking with a mix of century-old skills and modern fashion. Offering luxurious Peshawari chappals, Bera develops its products with quality materials offering comfort and market dominant design.

DAREWRO

This Peshawar-based startup has an app that picks up food, medicine and clothes for you. They partner with local businesses to pick up orders and deliver them directly to customers' homes.

FRANCHISE.PK

Franchise.pk is a market place of franchises in Pakistan. The startup enables different kinds of business to potentially become a franchise business. The businesses can range from education to digital services, restaurants to retail and various others.
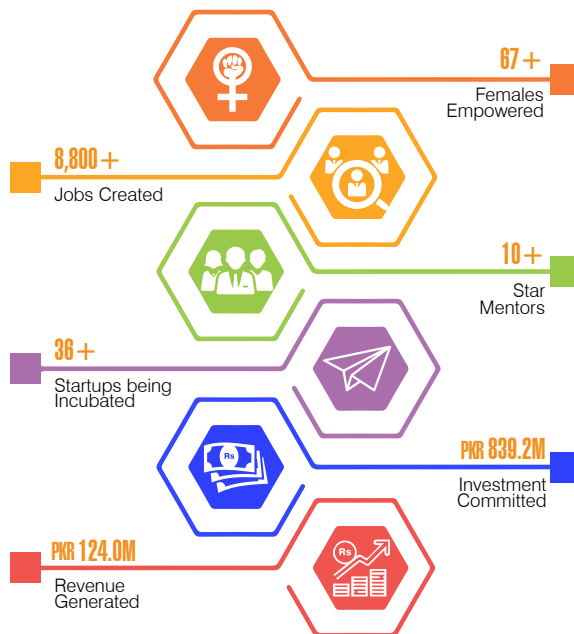
SMART TUBE WELL

Smart Tube Well is an IoT based clean water management system to monitor the flow, water level, electricity consumption and water pressure. The device is installed to a clean water pump and the data is analyzed remotely through a mobile device. The device has been piloted in three different water stations of Mardan. The startup has also fostered a partnership with Water Sanitation Services Peshawar (WSSP).

NIC KARACHI

Funded by Ignite, MoITT

OUTCOMES/ACHIEVEMENTS:

67+
Females Empowered

8,800+
Jobs Created

10+
Star Mentors

36+
Startups being Incubated

PKR 839.2M
Investment Committed

PKR 124.0M
Revenue Generated

STAR STARTUPS:

BYKEA

LEARNING PiTCH
Making quality education affordable and accessible

AquaAgro
The Smart Irrigation System

BYKEA

Bykea is a logistics startup that has two offerings. It provides on-demand ride-hailing service through which users can travel around the city by taking a bike ride. The second service provides parcel delivery on either Cash on Delivery (COD) or non-COD.

LEARNING PITCH

Learning Pitch is an online educational platform for Pakistani market in local languages and local context. Launched www.myinteracademy.com – a platform for Intermediate students of Punjab and Sindh. All lectures are recorded on "Learning Glass" a new technology for video lecturing.

AQUA AGRO

AquaAgro provides farmers of Pakistan and regional countries (South Asia) the best solution for maximizing their yield and profit margins while using 50% less water resources. IoT/AI enabled devices on the fields of the farmers that give crop specific decisions and monitoring access to the farmer through a centralized cloud and mobile app service.

DOT

Dot manufactures wearable devices that use a data-driven approach to diagnose mental health and suggest treatments. The device is driven by analytics to determine the individual needs of patients.

BOGO

Bogo offers buy-one-get-one-free vouchers through its Bogo book. Currently operating in Karachi, Lahore, and Islamabad, the Bogo book has offers from an array of restaurants, salons, gyms, and brands across the cities. They also offer discounts for photography and travel services.

SUKOON

Sukoon is an online service that offers home repair and maintenance solutions. It connects users looking for household repair services with skilled and pre-vetted blue collar labour. The startup has electricians, plumbers, carpenters, and painters to provide affordable and quality service to its users.
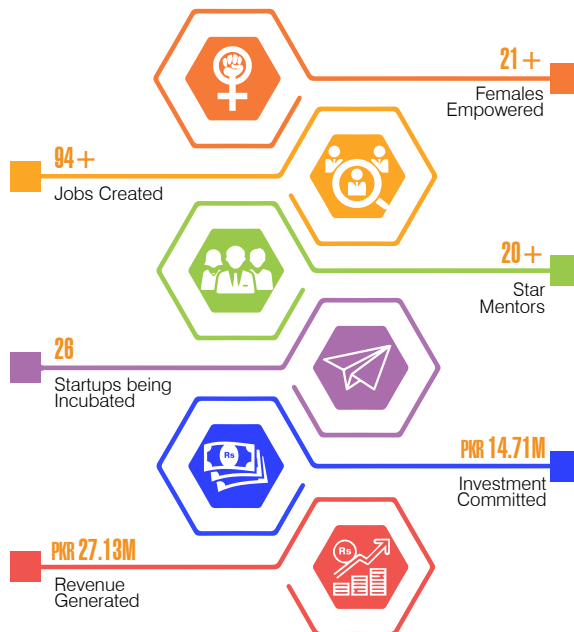
NIC QUETTA

OUTCOMES/ACHIEVEMENTS:

21+
Females Empowered

94+
Jobs Created

20+
Star Mentors

26
Startups being Incubated

PKR 14.71M
Investment Committed

PKR 27.13M
Revenue Generated

STAR STARTUPS:

GiL Technology

تاھیر

Dr Abdul Qayoom

GUL TECHNOLOGY

Gul Technology has developed an IoT enabled Smart Helmet to protect miners from catastrophic incidents. The helmet detects poisonous gases, monitors body biorhythms and location, and helps guide uneducated and semi-educated miners to safety.

TAHEER

Regional music in Pakistan is dying. The taste of audience is shifted drastically from regional music to other genres and modernization music. Regional artists could not earn from their albums because of piracy and lack of platform. The audience who want to listen regional music does not have a good and reliable platform where they can easily listen their favorite artists and language.

DR ABDUL QAYOOM

Dr Abdul Qayoom, a physician with 35 years of practice, has now floated his idea of developing a unique thermostat which has a large application in laboratories and poultry incubation. The same equipment is now imported into Pakistan at a high cost and has health hazards as well.

COMMERCIALIZATION & OUTSIDE INVESTMENTS:

OVERVIEW:

A new function was created with aim to provide relevant support to startups and researchers for successful commercialization of their funded projects and to further facilitate them in creation of relevant linkages with industry, investors, government and academia. After development of product through Ignite seed grant, obtaining next round of funding is very essential so that go-to-market strategy is developed and implemented effectively. Ignite also facilitates in making relevant introductions with local and foreign investors.

Initial process for comprehensive evaluation and analysis of all ongoing funded projects was conducted in order to screen and identify key projects that have potential of commercialization. After initial screening, hands-on exercise to identify, develop and build a comprehensive commercialization strategy including development of go-to-marketing strategy and viable business model was conducted with around 20 ongoing funded project. As an outcome, each one of them was able to develop their relevant pitching decks including a complete road map for commercialization.

PROGRESS:

Few of the noteworthy commercialization developments are:

MeraMaweshi: An AI based product which increases milk production and cattle life, was facilitated in creating linkages with leading telecom operators who showed great interest in the product. As per the guidance of one of the leading telcom company, a pilot phase is implemented in an identified niche and more than 500 cattle farmers in rural areas of Pakistan are now actively using the app. The user data is being analyzed for refinement of the product for its further improvement.

DynaFlight: A high powered computing platform for novel airplane design, has been selected in 3rd cohort of National Incubation Center, Islamabad. They are now under process of commercialization of the product.

Electrocure: AI & IoT based solution for electricity theft, had received an investment offer of $46 Mn from an investor from China. To further explore the possibility of product implementation through a public-private partnership model, facilitation was done through arrangement of a presentation session to Federal Minister for Energy (Power Division), wherein, great interest was shown in the technology and further exploring its implementation in pilot region. Similarly, Electrocure has also raised another round of funding amounting to £ 200,000 from GSMA for further deployment.

V-BRAS: A key linkage with PTCL has been created for V-Bras. A detailed presentation was given during which the technology being developed locally was well appreciated and was further agreed to conduct a detailed workshop with PTCL planning team to explore how Xflow can work with PTCL in areas of QoS, Network probes, NFV, SDN, VBRAS etc.

WonderTree: An AI based solution redefines special education and therapy, has also received offer of funding for commercial deployment of the product all across Pakistan. The product had earned around $80,000 as revenue. Currently, the product has been deployed in 14 major hospitals/clinics and 26 Special schools in 6 cities across Pakistan with more than 2,500 children are active users. Wondertree, with this funding will take the product further into 25 new hospitals/clinics and more than 60 Special schools in 15 cities across Pakistan.

OUTREACH AND INDUSTRY LINKAGES

Development of relevant industrial linkages is essential for achievement of Ignite mandate for solving the key challenges of innovation eco-system of Pakistan. During this period, Ignite reached out and established key linkages with several key national and international organizations for exploring further opportunities of mutual collaboration. The main purpose is to identify relevant partners for Ignite funded and NIC incubated startups. Following is a summary of the outreach:

- Mitsui Pakistan was linked with National Incubation Centers.
- Few of the relevant startups were introduced with Mitsubishi Pakistan.
- JETRO Pakistan was engaged to further create linkages of Pakistani startups with Japanese Companies in Pakistan. A complete program is under execution for the same.
- Facebook, commited its support for establishment of AR/VR Innovation Center in network of National Incubation Centers.
- SIEMENS Pakistan was partnered to conduct Innovation Workshop for exploring opportunities of further collaboration for commercialization of funded projects.
- Hosted a JICA study mission for investment potential in Pakistan industry. A detailed briefing about Ignite Pakistani entrepreneurial eco-system was given in addition to organizing a tour to NIC Islamabad.
- In order to spur innovation and growth in Surgical Manufacturing Industry of Pakistan, the Surgical Manufacturing Association of Pakistan (SIMAP), Sialkot Chamber of Commerce and Industry and University of Sialkot was engaged.
- Pakistan Microfinance Investment Company, Pak-China Investment Company, TPL E-ventures, i2i Ventures, Sarmayacar, Fatima Ventures, 47 Ventures, Cres Ventures, Bakery, Startup Genome, Askari Investments, etc. are few of the investors/funding agencies engaged for collaboration of further investments in our funded and NIC startups.

IGNITE SIEMENS INNOVATION WORKSHOP

In collaboration with SIEMENS, an innovation workshop was conducted during which funded projects in energytech domain were reviewed for potential commercialization. The purpose of the workshop was to enable SIEMENS Pakistan Team to understand more about the technology developed and to further explore the commercialization aspect and identify future roadmap for further collaboration. During the workshop, a detailed presentation regarding the developed technology and its proposed business model was given to SIEMENS Team. Mr. Stuart Zhang, Pakistan Taskforce Lead, led the SIEMENS team.

After the workshop, the screened products were referred to relevant Divisions of SIEMENS for further review and verification and few of the projects are currently under discussion to explore further opportunities of collaboration.

UBER PITCH 2018

In order to further spur the innovation centric growth in the country, Ignite in collaboration with Uber Pakistan, and its network of National Incubation Centers (NIC) conducted a program Uber Pitch 2018, which is providing a platform to aspiring startups all across Pakistan. The platform provided budding entrepreneurs an opportunity to polish their business ideas, and eventually were judged by some of the biggest players in the industry on trip. The whole program was conducted all across Pakistan from August 15 to October 29, 2018.

The Pitch Camps were organized to polish the business ideas of the startups and for enhancing their confidence through training and mentorship. These camps were held in Ignite funded NIC: Islamabad, Karachi, Peshawar and Quetta.

PROGRAM STRUCTURE:

- Launch event was held in Palm Royal, Lahore.
- Top startups were shortlisted with the help of Ignite from all five cities. These startups went in to the Pitch Camps where they were mentored to polish their business idea.
- After the Pitch Camp, startups presented in Qualifiers in front of a panel of three judges who further shortlisted top 3 startups from each city.
- Finalists presented in In-Car during their trip in Islamabad.
- The winner from In-Car Pitch travelled to Arbanet (Beirut) to pitch their ideas on global platform.

WINNING STARTUP AT ARBANET

Xylexa Labs, startup incubated at NIC Islamabad, was National Winner of this year Uber Pitch. They were sent to Beirut from 12th-13th June, 2019 wherein they got a chance to present their idea in front of potential partners, developers, media, and investors. Certificate of completion was given to Xylexa Labs at Arbanet.

NETWORK WITH OTHER STARTUPS AND INVEST

Interactive games, competitions and fun activities, VR food vendors, product launches were conducted to engage the audience at the event.
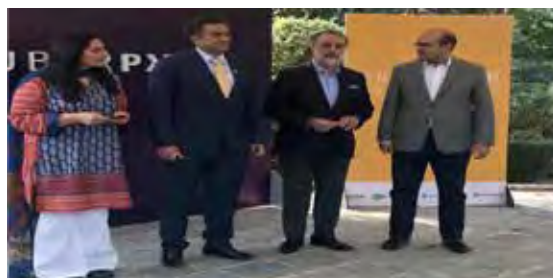
NATIONAL GRASSROOTS ICT RESEARCH INITIATIVE (NGIRI) — FINAL YEAR PROJECTS

The program aims to assist final year undergraduate students of ICT related disciplines by providing them with financial assistance for developing prototypes/working models of their Final Year Projects (FYP) in order to promote R&D and innovation at grassroots level.

The program is being executed since 2011-12 and so far, six phases of the program have been rolled out successfully.

SUMMARY - NGIRI 2011-18

| Year	Universities	FYP Received	FYP Approved	FYP Funded	Disbursements (Pkr in Millions)
2011-12	68	785	272	272	15.27
2012-13	78	1016	418	418	31.70
2013-14	72	1247	430	430	25.13
2014-15	75	1324	436	436	29.59
2015-16	76	1167	512	359	18.14
2017-18	89	1623	569	439	21.45
Total	**455**	**7162**	**2637**	**2354**	**141.28**

STATS FOR THE YEAR 2017-18

Province	Universities	FYP Evaluated	FYP Approved	FYP Funded	Disbursements (Pkr in Millions)
AJ&K	3	12	8	4	0.13
Balochistan	5	54	21	19	1.13
Federal Capital	15	659	190	148	7.21
Khyber Pakhtunkhwa	13	145	63	41	1.82
Punjab	27	353	138	93	4.69
Sindh	25	399	148	133	6.45
Gilgit Baltistan	1	1	1	1	0.02
Total	**89**	**1623**	**569**	**439**	**21.45**

Ignite

FYP SUBMISSIONS BY TECHNOLOGY - (NGIRI 2017-18)

During the year 2017-18, sixth (6th) phase of the program was rolled out.
Summary of FYP submissions by technology is provided below:
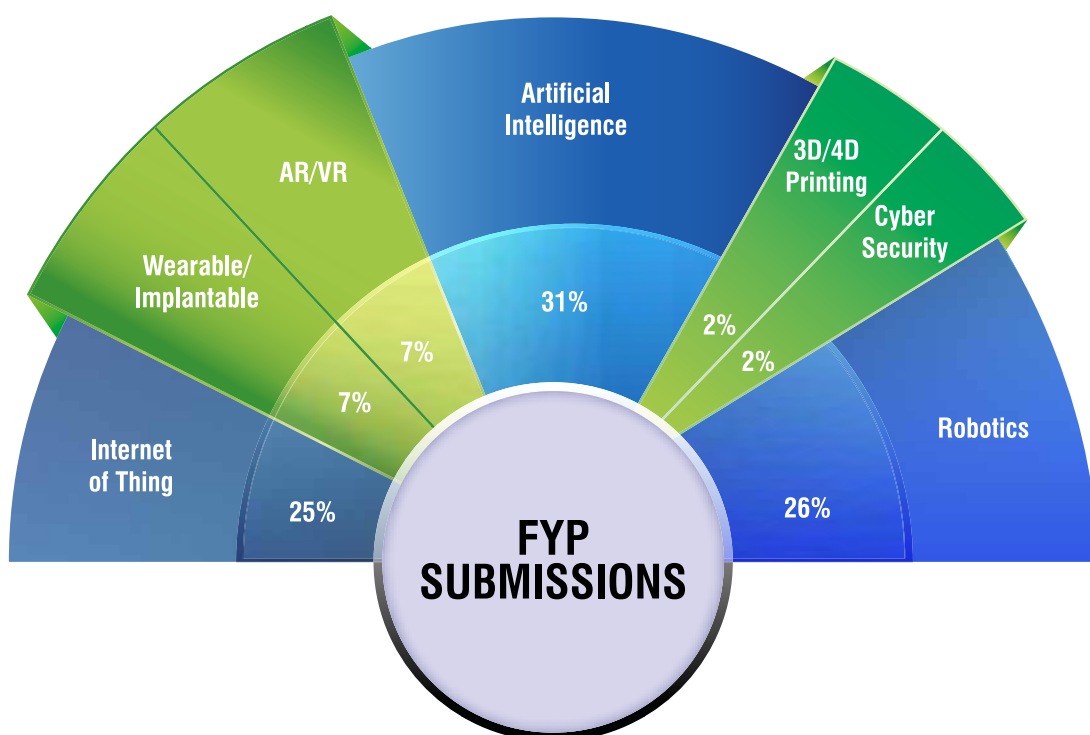
National Championship 2017-18:

Under NGIRI 2017-18, National Championship among top rated nominated final year projects (FYP) was held in Islamabad. A total of 38 final year projects competed the championship and various stakeholders from industry & academia also extended their expertise as mentors and judges.

WINNERS OF NGIRI 2017-18:

Position	FYP Title	University	Prize Money (Pkr)
National Champion	White Coal Machine: Converts organic garbage into white coal	Usman Institute of Technology, Karachi	500,000
First Runner Up	Control & Operation of Micro-Grid: Microgrid to smooth electricity fluctuations	University of Management & Technology, Lahore	375,000
Second Runner Up	Crypto Currency Predictor	GIKI of Engineering Sciences & Technology, Topi	250,000
		Total	1,125,000

DIGISKILLS.PK
OVERVIEW:

On August 1, 2018, Ignite National Technology Fund has launched a Digital Skills (DigiSkills.pk) Training Program to provide one (1) million free of cost online trainings across the country over a period of 2 years. DigiSkills.pk is aimed at equipping our youth, freelancers, students, professionals, etc. with knowledge, skills, tools & techniques necessary to seize the opportunities available internationally and locally in online job marketplaces to earn a decent living. The program seeks to develop key specialized skills, besides imparting knowledge about various freelancing and other self-employment entrepreneurial opportunities. This knowledge plays a critical role in enabling our trainees to grab opportunities, that are increasingly becoming more competitive.

Freelancing	Digital Literacy	Quickbooks	Graphic Design	Creative Writing
Search Engine Optimization	AutoCAD	WordPress	Digital Marketing	e-Commerce Management

The program further targets to increase:

- Number of individuals working as freelancers in the country
- Number of hours worked per freelancer
- Earnings per hour/project for freelancers
- Household incomes
- Financial inclusion
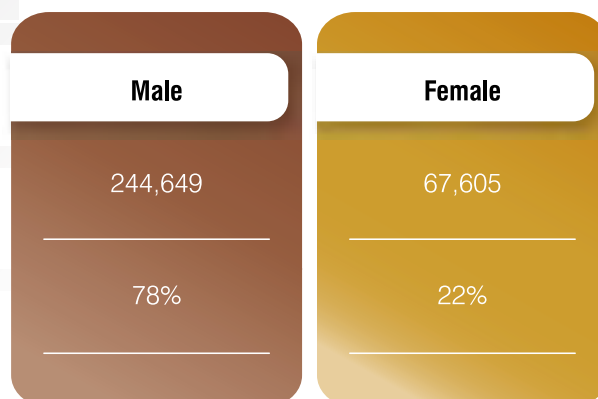- IT exports
- Number of experts in specialized skills

Batch	Target Enrollment	Actual Enrollment
I	20,000	30,804
II	30,000	81,119
III	100,000	200,331
August 2018 – June 2019	Total Enrollments:	312,254

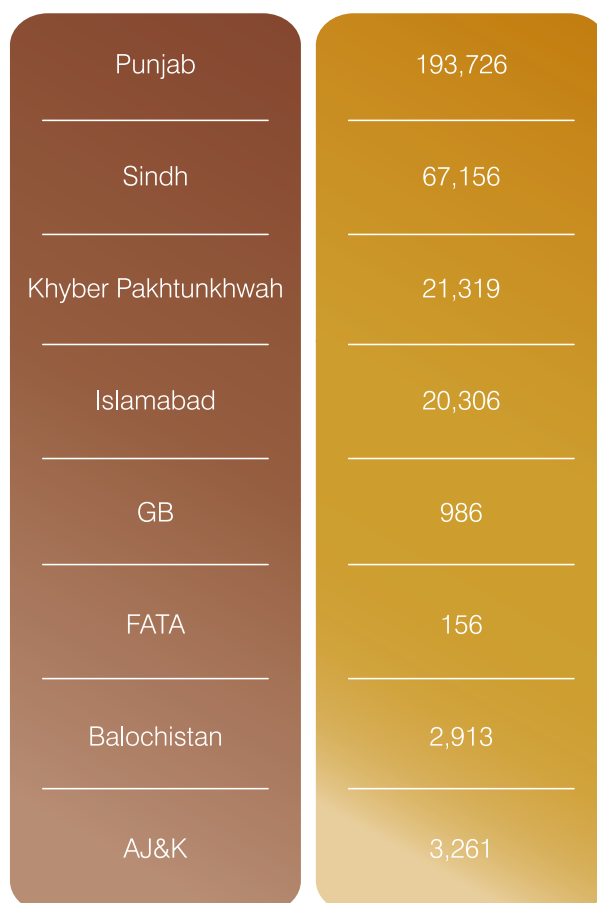## Course-wise Enrollments till Batch-III (30 June 2019)

S. No.	Course	Enrollments
1	Freelancing	137,280
2	Digital Marketing	29,045
3	Digital Literacy	8,637
4	E-Commerce Management	15,331
5	Word Press	28,212
6	Auto Cad	14,623
7	Search Engine Optimization	16,927
8	Quick Books	6,666
9	Graphic Design	36,744
10	Creative Writing	18,789

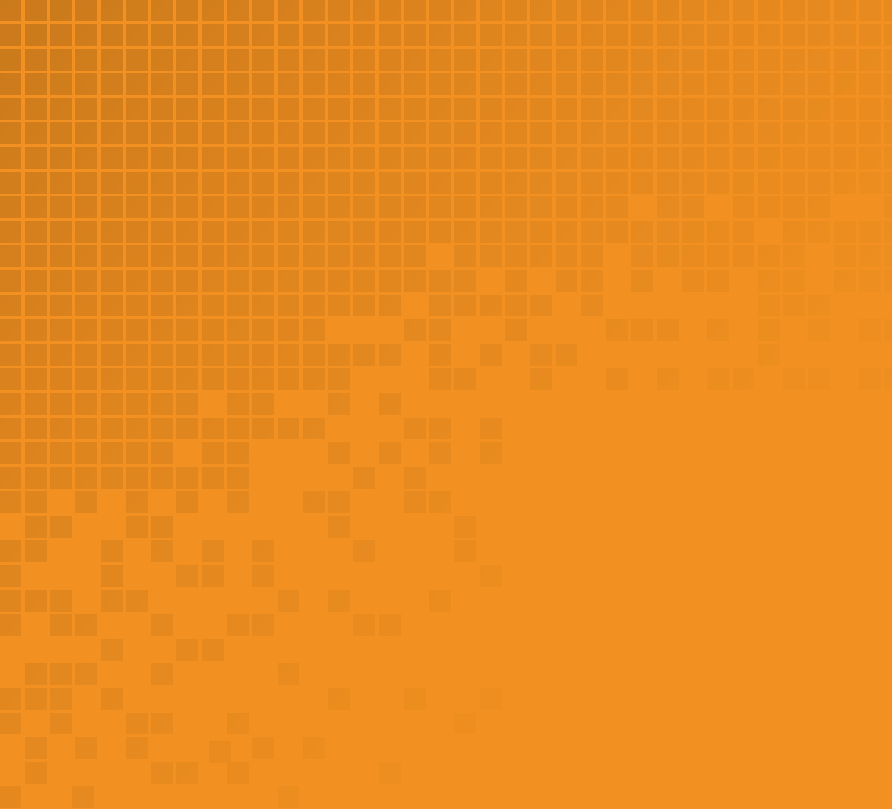## Gender-wise Enrollments Breakup till Batch-III (30 June 2019)

Male	Female
244,649	67,605
78%	22%

Province-wise Enrollments Breakup till Batch-III (30 June 2019)

Province	Enrollments
Punjab	193,726
Sindh	67,156
Khyber Pakhtunkhwah	21,319
Islamabad	20,306
GB	986
FATA	156
Balochistan	2,913
AJ&K	3,261

For more information and updates visit: www.digiskills.pk

OUTREACH

OUTREACH
OBJECTIVES:

Disseminating information about our programs nationwide so that people and entities participate in our programs from all over the country.

Engaging in debate with stakeholders and experts nationwide when designing our programs.

Engaging corporations, investors and industry with our programs, particularly unsolicited funded projects and incubatees to increase their chances of commercialization and success.

Educate stakeholders, like media, policy-makers, students, professionals and businesses to spread awareness about pillars of the knowledge economy like innovation, technology, entrepreneurship, work of the future, and future trends.

Brilliance & Passion Displayed at the Annual NGIRI National Championship

Brilliance and passion displayed at the annual National Grassroots ICT Research Initiative (NGIRI) Championship, where students displayed final year projects, funded by Ignite - National Technology Fund, that use technology to solve problems.

NATIONAL CHAMPIONS - 2018

Federal Minister for IT & Telecom Dr. Khalid Maqbool Siddiqui, Chairman PTA, Maj Gen (R.) Amir Azeem Bajwa, Rector GIKI, Jehangir Bashar, and CEO USF, Rizwan Mir, encouraged and inspired students and their supervisors. Special thanks to the judges, 5 ladies and 5 gentlemen, including Shahida Saleem, Farhat Bashir, Asim Ghaffar, and Murtaza Zaidi, leaders of the innovation and entrepreneurial ecosystem, who selected the champions, though all participants were winners because these projects inculcate skills in demand today and tomorrow: Creativity, hands-on-engineering, and soft skills like work ethics, team spirit, and perseverance. Some will go on to build industry grade products, which proliferate, like Ali Gul, one of last year's champs, with his smart helmet for miners, now under testing by the Balochistan Government Mines Department. Jawad Azfar and team put the NGIRI program together, and Nadeem Nasir put the event together, which trended #1 on Twitter for quite a while.

Some worthwhile innovative projects: Gas leakage kills thousands annually, a BUITEMS Quetta team built a detector that sets off alarms, activates exhausts, shuts down supply and provides cell notification. Cyber attackers can steal passwords; University of Hazara, Mansehra, has built a numeric-alphabet encoder, which allows you to enter numbers that correspond to letters in a password field, rather than the actual password, which reduces chances of theft. With the proliferation of drones, controlling them can be challenge for many; CECOS, Peshawar has developed a wearable motion-based controller. NUST Islamabad has built a vibration based therapeutic device for neurological disorders, which you apply to different spots in your head and forehead for quick relief.

An AI powered spoken language translator from local Gilgit-Baltistan languages to Urdu and English, to support the imminent tourist surge, by Karakoram University, Gilgit. The Winner: Usman Institute of Technology, Karachi, team project, which converts organic garbage into white coal. First Runner Up: UMT, Lahore microgrid to smooth electricity fluctuations. AI powered website where you paste pictures of plants with suspected diseases, which diagnoses the disease, by Fatima Jinnah Women's University, Rawalpindi. A drone that estimates crop productivity and detects diseases, by the University of Balochistan, Quetta. A self-driving material transfer vehicle by Mirpur University, Azad Kashmir.

The Air University team, uses AI to diagnose heart disease from ECG monitors. FAST Islamabad's Raspberry Pie based high performance parallel processing computer for matrix manipulation, accessible from the cloud. Institute of Space Technology's Can Satellite for educational purposes. Second Runner Up: GIKI crypto currency predictor. A hand held presentation controller that you can use to click on a projected computer screen, roll a presentation forward or backward, and even prevent light from the projector to fall on your face; An IoT based garbage can that monitors garbage levels, helps optimally route garbage trucks saving loads of fuel, and suggest where to place additional garbage cans, by IBA Sukkur.

Addressing the ceremony held to award winners of the National Grassroots ICT Research Initiative (NGIRI) Championship Federal Minister for Information Technology and Telecommunication Dr. Khalid Maqbool Siddiqui said his ministry was endeavoring to provide academic and entrepreneurial growth opportunities to the youth.

The Minister appreciated the students' technological acumen, which, he said, was not only commendable but would also bring homegrown solutions to local and international problems.

He congratulated winners of NGIRI Championship and said that winning was important but the journey should not stop here. "Winning students must take their prototypes to the next level and those who could not make it this time should improve upon their ideas and prototypes," the Minister said.

Earlier speaking on the occasion, CEO Ignite Yusuf Hussain said the work force of the future would need creativity, programming and other practical skills, and soft skills like team work for advancements in their careers.

Jehangir Bashar, Rector, GIK Institute said that he greatly appreciated the excellent work being done by Ignite and its CEO by nurturing entrepreneurship and promoting startups in the country, and by imparting training in modern technologies. He said that the GIK Institute was one of the many beneficiaries of Ignite, which has been funding innovative students' projects at the Institute."

Cash prize of Rs. 500,000/- was awarded to the first position holder from Usman Institute of Technology, Karachi for their project: White Coal Machine. Second position was won by University of Management & Technology, Lahore with cash prize of Rs. 375,000/- for their project titled Control and Operation of Micro-Grid while the third position with cash prize of Rs. 250,000/- went to GIKI for their project titled Crypto Currency Predictor.

Five final year projects were given wild entries to National Incubation Center Islamabad, Lahore, Peshawar, Karachi and Quetta. The projects included Gas Leakage Safety from Balochistan University of Information Technology and Management Sciences Quetta, Electric Self-Driving Logistic Vehicle from Mirpur University of Science and Technology (MUST), Mirpur AJ&K, UoH Gas Safety Project from University of Haripur, Load Sharing in DC Microgrid for Effective Utilization of Renewable Energy Resources from University of Lahore, Online Monitoring of Electrical Transformer by Monitoring Load Current from National University of Science & Technology (NUST), PNEC, Karachi.

Design Thinking Workshop for Japanese Companies in Pakistan

Ignite National Technology Fund in coordination with Japan External Trade Organization, Karachi organized a one day Design Thinking Workshop for the Japanese companies working in Pakistan on Tuesday, 18 June 2019 at National Incubation Center Karachi.

Dr. Suleman Shahid LUMS, Shahjahan Chaudhry Director NIC Karachi , Ali Iqbal GM SEED Ignite, Nadeem Nasir Head Outreach Ignite, Asfand Yar Khan Head Outside Investments Ignite, Yasir Ahmed Manager SEED Ignite, Saadia Manzoor Head of Research & Business Development and Participants of the Design Thinking Workshop

The workshop was conducted to provide a guidance to the Japanese companies to strategize and use the Design Thinking approach to define and redefine their problems (iteration), identify the end user, challenges and constraints, targets and impact, identify alternative strategies and solutions that might not be instantly apparent with the initial level of understanding. Businesses need to apply human-centered techniques to solve problems in a creative and innovative way. Group activities were conducted for brain storming and developing specific and concrete drafts of issues/problems, being faced by Japanese Companies, on pre-designed problem statement templates.

In the opening address, CEO Ignite, Yusuf Hussain said that the development of technology entrepreneurship is a priority of the Government, as a driver of growth and jobs. Collaborations between Japanese conglomerates and Pakistani startups and IT companies should help achieve these goals by providing opportunities for tech product and solution development in Pakistan that will also improve the competitiveness and productivity of Japanese corporations.

Mr. Osamu Hisaki, Country Director JETRO Karachi said that JETRO has been actively supporting the collaboration of Japanese companies and Pakistani start-ups and is optimistic that such endeavors will be beneficial for both Pakistan and Japan.

Dr. Suleman Shahid an assistant professor of Computer Sciences at one the most prestigious universities of Pakistan - Lahore University of Management Science (LUMS) was invited to conduct the session. Dr. Shahid is also Director at NIC Lahore, and holds a PhD in Affective Human Computer Interaction from Netherlands. He specifically explained the case study of Disney Land where with the introduction of wrist bands backed by complex technology driven programs, have been able to increase operating profits by 22 percent in just six months. Such 3 point approach; human centered – technology driven – business ideation; are the key to innovative solutions that are transforming the business cycles, and businesses need to adapt to the current technological changes in order to survive in the future.

The platform facilitated the knowledge sharing and interaction with relevant stakeholders particularly with Japanese entrepreneurs, discussion about the existing problems in key verticals in Pakistan requiring solutions from technology interventions and opportunity to discuss projects of interest to academia, industry and government departments.

As many as 20 participants from 8 Japanese Companies participated in this event. Earlier, in May an introduction session was also organized by JETRO Karachi in collaboration with IGNITE in which 16 participants from 10 Japanese companies had participated.
Further steps include sharing of problem statements of the companies with a group of potential startups/accelerators and pitching of possible solutions to the identified problems by the startups.

This event was also covered in print and electronic media. Ignite highlighted that the promotion and collaboration in the IT sector of

Pakistan has been one of the priorities as a result of the Joint Government Dialogue between Japan and Pakistan held in Tokyo in December 2018, whereby Advisor Commerce, Mr. Abdul Razzak Dawood had emphasized the need for such joint interaction in this sector.

Pakistan's digital market is growing rapidly and has the potential to become an innovation hub. Pakistan has a population of 207 million with 62.9% under the age of 30 years. This huge pool of youth is very active and strong in IT and is rapidly adapting to the technological and digital transformation of the 4th industrial Revolution. As of latest statistics available, Pakistan has a 76.6% tele density with 161 million cellular subscribers.

JETRO Karachi is working with Government of Pakistan for providing an opportunity for the Japanese companies to partner with the Pakistani startups/accelerators to have their problems solved through their IT based innovative solutions.

Civic Tech Hackathon

EVENT OVERVIEW:

Ignite National Technology Fund – Ministry of IT & Telecom, organized a 3-day Civic Tech Hackathon from Nov 30 to Dec 02 2018 at National Incubation Center (NIC) Karachi in a bid to create solutions to meet challenges faced by the citizens of Karachi in areas such as, water access & quality, smart waste & sewage management, mobility & transportation, public safety and other citizen services.

EVENT HIGHLIGHTS:

Federal Minister for IT & Telecom, Dr. Khalid Maqbool Siddiqui was the Chief Guest of the prize distribution ceremony. The Minister congratulated Ignite - National Technology Fund and partner organizations for extending their support in putting together this platform for the youth for creating solutions to meet civic challenges that this megacity faces today.

With a population of around 15 million, Karachi is the 9th largest city in the world. In terms of liveability, Karachi is ranked at 134th among 140 cities on Global Liveability Index of Economist Intelligence Unit.

The event brought together civic-minded IT professionals, software developers, designers and data analysts to innovate in public services by creating technology solutions to address the needs of fellow citizens.

CLOSING CEREMONY:

Mr. Patchamuthu Illangovan, World Bank Country Director Pakistan explored ways in which World Bank can open doors and create opportunities for innovative tech companies of National Incubation Center Karachi.

Earlier, speaking at the occasion, Yusuf Hussain CEO Ignite said "Civic Hackathons allow smart people out there to help local Government solve its problems."

Momentum Tech Conference 2019

The annual two-day event, billed as Pakistan's largest technology and startup conference is renowned for being the single-largest platform in Pakistan to bring together startups, investors, technologists, industry luminaries, experts and large corporations as well as tech heavyweights.

This year Ignite showcased its SEED funding, national network of incubators, DigiSkills.pk, National Grassroots ICT Research Initiative and five startups; Mera Sabaq Learning Systems, BaseH Technologies, Aqua Agro, Aprus Technologies, WonderTree and White Coal Machine to entrepreneurs and investors at Momentum.

The conference's agenda comprised a Startup and Technology Expo designed to showcase concepts and ideas on the future of cutting-edge technology.
The conference also featured a line-up of speaker sessions, panel discussions, workshops and a plethora of networking opportunities for young entrepreneurs to interact with mentors, potential investors and discuss new avenues of business and the ways forward for scalability and nationwide economic growth.

"The Momentum Tech Conference is conceived of as a platform that understands the Pakistani market and has the capacity to revolutionize the eco-system to

support Pakistani entrepreneurs. This year conference saw the launch of the "Startup 100 Competition". Ignite National

> **JOAN WAGNER, US COUNSEL GENERAL USAID RECOGNIZED IGNITE FOR ITS CONTRIBUTION IN INNOVATION AND STARTUPS ECOSYSTEM AT MOMENTUM 2019 KARACHI.**

Technology Fund, Virtual Force X+, a NewYork based technology acceleration platform which helps create next generation software products, has partnered with Momentum to facilitate the competition. Startup 100 is a unique launchpad for young entrepreneurs who have been waiting for that first big opportunity.

The final three were awarded cash prizes of $8,000, $3,500, and $1,500 respectively — sums that can serve as seed capital for these companies. In addition, the inducted startups got the opportunity to showcase their products or services on the Momentum 2019 exhibition floor.

The Momentum Technology Conference is also tapping into a "currently red-hot area of development with its Fintech Hackathon. Developers, designers, and entrepreneurs came together to create new customer experiences and revenue models by leveraging Pakistan's digital payment ecosystem.

Joan Wagner
US Counsel General USAID

Launch of Ignite Startup Portal

www.ignite.org.pk/nic

Ignite startup portal gives single point data access to national and international venture capitalists interested to invest in Ignite startups, was also launched on the occasion.

Dr. Khalid Maqbool Siddiqui, Federal Minister for IT & Telecom who was the chief guest at the occasion said, "Innovation is the prime determinant of technology knowledge-based economy that can bring maximum dividends in the areas of agriculture, energy, water resources and IT. It is about time that alongside natural resources we should also start focusing on intellectual capital, quality human resources, industrial development and value-added production. We are trying to encourage more innovative products like ElectroCure that has the potential to bring our electricity woes to an end."

He further said "I'm sure Ignite startups will raise funding from national and international venture capitalists."

Earlier speaking on the occasion, Yusuf Hussain, CEO Ignite said, "the portal provides access to hundreds of startups like Electrocure or those on the way." Dr. Gul Muhammad, Director Company of Intelligent Systems Networks research (CISNR) explained that his Ignite funded product ElectroCure (which is now commercially available) aims to reduce electricity losses up to 90% through theft detection, load balancing and identifying other administrative/technical losses reduction procedures within the electricity infrastructure.

ElectroCure is an innovative idea and solution for effective and efficient electricity data management with meter-less architecture that also provides a low-cost smart metering solution with added features of both prepaid and post-paid billing systems. The advance feature of ElectroCure introduces a Smart High Voltage Distribution System (HVDS) for reliable and secure electricity distribution.

Launch of Ignite Website

EVENT OVERVIEW:

Celebrating World Sight Day and creating awareness resonates perfectly with the Ignite philosophy of using ICT as a tool for wealth creation and upward mobility for economically/physically challenged groups of citizens. Engaging in activities like these will help Ignite transform the lives of visually impaired population of Pakistan and empowering them to add value resonating with our vision of Equal Opportunities for Everyone.

EVENT HIGHLIGHTS:

The mission of Ignite National Technology Fund is to fix the innovation value chain in Pakistan. In order to achieve our mission under the auspices of Ministry of Information Technology & Telecom, we believe in equal representation of all social groups including the big number of visually impaired emerging youth.

One of the core values of the organization is to educate people on how to defeat all challenges, social or physical, and excel against all odds. Ignite has developed a new website that enables visually impaired and people with other disabilities to make the best use of its funding resources.

One billion people, or 15% of the world's population, experience some form of physical or mental impairment with its prevalence being higher in developing countries. One-fifth of the estimated global total, or between 110 million and 190 million people, experience significant disabilities, according to the World Bank.

People with impairments, on average and as a group, are more likely to experience adverse socioeconomic outcomes than people without such impairments. These may include less education, poorer health outcome, lower levels of employment and higher poverty rates.

There cannot be an opportune moment for us but to launch this website on World Sight Day - Thursday, 11 October 2018 for creating awareness that resonates perfectly with the Ignite philosophy of using ICT as a tool for wealth creation and upward mobility for economically/physically challenged groups of citizens, said Mr. Atif Sheikh Executive Director STEP (Special Talent Exchange Program).

"Ignite has already provided funding of over Rs. 100 million for training and development of new applications for people with mental or physical challenges. We employ innovation to help fellow citizens, challenged by impairments, to lead engaged and fulfilling lives," commented national technology fund Ignite CEO Yusuf Hussain.

TV PROGRAMS

AI Based, No Ball Calling Wickets

Noerric removes disruption from the cricket match detecting no ball through AI based wickets without any change being required to the pitch. This reduces the match time to upto 30 minutes per match and provides real time detection.

Watch video:

https://www.youtube.com/watch?v=qmJV3XFAk1Q

What is the Future of Work and What Skills are Needed to Compete? EagleEye Program - Din News

Is the ratio of jobs to applicants really around 1:400 in our part of the world? What is the future of work? What skills and attitudes do we need to compete? What about our out of school children and illiterate citizens? Get the job seeker's view from Monis Rahman, founder/ceo of rozee.pk, the largest job portal and richest job data set in Pakistan, as we search for patterns and trends. Fatima Asad said from abacus, one of pakistan's leading globally competitive tech firms, then dives into the DNA that will allow organizations to survive and thrive in this fast changing environment. But is it just about re-skilling or do values need to fundamentally change? Why are continual learning and initiative so important for the worker and entrepreneur of the future? Farrah arif, LUMS professor and Edtech entrepreneur, takes a swing at those questions and pulls them to the fence. Eagleye program with leading tech anchor Muhammad Moazam Shahbaz and Yusuf Hussain, CEO Ignite as co-anchor!

Watch video:
https://www.youtube.com/watch?v=OjmaWxam5js

5 Incubators in 15 months nurturing amazing startups - Dr. Tech PTV Home

"5 Incubators in 15 months nurturing amazing startups". Jawad Azfar Head NIC Pakistan in Dr. Tech Program on PTV Home

Watch Video:
https://www.youtube.com/watch?v=1KcCM8vvOlQ

Yusuf Hussain, CEO Ignite with Zara Hat Kay Team - Dawn News

NIC Pakistan startups - Aqua Agro, TrashIt, Smart Tubewell, Aero Engine Craft and Smart Helmet for Coal Miners, offering promising local solutions to our chronic water, waste and safety related problems.

Watch video:
https://www.youtube.com/watch?v=vuoiHQJ-ukM

Ali Gul Founder Smart Helmet Features in Zara Hat Kay Program - Dawn News

Thousands of poor miners, working in abject conditions, have lost their lives in terrible accidents underground. The younger brother of one such miner who was hurt in an accident, Ali Gul, resolved to use his computing skills to save miners lives and wellbeing. His IoT enabled Smart Helmet, being incubated at National Incubation Center Quetta and winner of an Ignite - National Technology Fund FYP grant, detects poisonous gas, monitors body biorhythms and location, and helps guide illiterate and semi-literate miners to safety.

Have Your Say #ZaraHatKay

Watch video:
https://www.youtube.com/watch?v=pZPZ2lBlJ2U

Mauqa Online Alleviating Shantytowners - VOA

Mauqa Online incubated in NIC Islamabad - Ignite funded project, is making a real dent in alleviating the low income groups whereby these shantytowners can fulfill their children's basic needs such as education, health, nutrition etc.

Watch video:
https://www.youtube.com/watch?v=okOJetK7KRc

Cutting Electricity Loss with Electrocure - Dr.Tech Program

Cutting electricity loss with ElectroCure – a Project Funded by Ignite. Watch Dr.Gul Muhammad Khan whose ideas is saving Billions for Pakistan through use of Technology.
Dr. Tech Program on PTV Home.

Watch video:
https://www.youtube.com/watch?v=Zvn1yLVJxdc

E Guard - Preventing Fuel Slippages - Dr.Tech Program

E Guard - Preventing fuel slippages through physical and VR technology in power generators and oil tanks. It also maintains a reliable fuel inventory with predictive maintenance features.
Dr. Tech program on PTV Home.

Watch video:
https://www.youtube.com/watch?v=PSjwLIklEMM

4th Industrial Revolution, DigiSkills and Entrepreneurship

Yusuf Hussain, CEO Ignite - National Technology Fund, discussing 4th Industrial Revolution, DigiSkills and Entrepreneurship on EaglEye Talk Show with anchor Moazam Shahbaz, on DIN News.

Video Link:
https://www.youtube.com/watch?v=qBMnZuliSPE

Alibaba eFounders Fellowship Program - Preparatory Session for Startup Founders and Entrepreneurs

Ignite and NIC Karachi hosted a panel discussion moderated by Yusuf Hussain, CEO Ignite, to introduce and explain the Alibaba eFounders Fellowship Program and how to increase the chances of getting into Alibaba eFounders Fellowship Program. The Alibaba eFounders Fellowship is a program for startup founders, entrepreneurs in the domains of eCommerce, Logistics, Fintech, Big Data or Tourism, who have attained some traction, learnt some lessons, and demonstrated leadership potential.

Watch video:
https://www.youtube.com/watch?v=4xlIm94tbFY

Ignite Collaborated Uber Pitch Islamabad

Yusuf Hussain, CEO Ignite listens to startups in Uber Pitch with Zouhair A. Khaliq, Erum Rabbani and Shafi Shah.

Watch video:
https://www.youtube.com/watch?v=Sw2sPpEIWM4

Mr. Patchamuthu Illangovan, World Bank Country Director Pakistan at NIC Karachi

Mr. Patchamuthu Illangovan, World Bank Country Director Pakistan explored ways in which World Bank can open doors and create opportunities for innovative tech companies of National Incubation Center Karachi.

Watch video:
https://www.youtube.com/watch?v=uLfPR2tVZAI

VoA Features Aprus: A startup Incubated in Ignite Funded NIC Peshawar

Ignite Funded NIC Peshawar - On the ground innovation and entrepreneurship solving real problems in Pakistan: AI enabled EM Surgery instrument for lesion and tumor removal. More precise, quicker recovery, fraction of cost vs imported German and American instruments it replaced. 82 clinics using, 10k+ surgeries performed.

Watch video:
https://www.youtube.com/watch?v=1oCduYVqDAc

CEO Ignite Discussing Artificial Intelligence Roadmap for Pakistan - Cafe News

Yusuf Hussain, CEO Ignite discussing Artificial Intelligence Roadmap for Pakistan alongside Dr. Naved Baqir with Sharmeen Ali in Cafe News (Ptv News)

Watch video:
https://www.youtube.com/watch?v=bj5NnTSvwoI

Eye Smart Helmet on it's Trajectory - A Startup Incubated at NIC Quetta

Eye Smart Helmet by Ali Gul, a Startup incubated at NIC Quetta made its debut by winning first runner up prize worth PKR 300,000/- at National Championship 2017 - National Grassroots ICT Research Initiative (NGIRI) - Final Projects. Smart Eye Helmet is on it's trajectory raising PKR 14 Million from HEC Technology Development Fund.

Watch video:
https://www.youtube.com/watch?v=iBtc21Cabzc

Why Cybersecurity is
Critical to Our Future

Yusuf Hussain, CEO Ignite

Published in Hilal (English) ISPR

Malware, which is a software designed to disrupt, damage, or gain unauthorized access to digital systems, is on a rising vector of volume and complexity, propelled by increasingly sophisticated criminal networks and state-sponsored "cyber armies." Cybersecurity comprises the technology, processes, and practices that protect the digital (also called cyber) infrastructure and its ability to deliver critical and desired services. Pakistan is one of the most targeted countries in the world and needs to develop legal, technical and organizational capacity to secure its digital assets.

Symantec, which maintains the most prolific civilian database of incidents, ranks Pakistan among the ten most targeted destinations in the world. Pakistan's nuclear and other sensitive installations are probably targeted, with publically reported attacks on a variety of telecommunications, banking, government, health, transport, utility, and ridesharing organizations. Snowden files revealed that the NSA was spying on Pakistan's civilian and military leadership, using a malware called SECONDATE.

Cybersecurity is the Flip Side of Digitization

Digitization is driving growth, creating jobs, increasing human well-being, and force multiplying defense capability around the world and in Pakistan — whether it is Careem providing jobs and safe transport to women or Telenor mAgri increasing incomes of farmers, or Siemens' controllers modulating electricity generation. Underlying these applications is foundational tech like telecom 3G/4G broadband networks, cloud infrastructure, NADRA NIC identification, and bank switches. Around the world, governments are bounding ahead to provide a platform

The cost and time savings, along with an increase in accountability, transparency, and citizen engagement are gargantuan ; Gov.uk estimates it will save $50 billion a year while boosting citizen delight, ease of doing business and global competitiveness. UAE, on the other hand, expects to save 50% of government spending, while ratcheting up effectiveness and efficiency, using Artificial Intelligence (AI), Internet of Things (IoT) and Blockchain. McKinsey projects that by 2025 Pakistan can save $7 billion annually in government leakages, add 4 million new jobs, lift 100 million people out of poverty, and add $36 billion annually to GDP by integrating into the digital economy.

— akin to an integration of the kind of data and services that NADRA, SECP, SBP, PRAL, and provincial IT boards and land record departments provide today in an isolated or "stove-piped" way. Only a unified architecture offers the possibility of substantial productivity gains through easy-to-use mobile apps for citizens and businesses, for example, that preclude visits to offices and use of paper.

Yet all these current and future tech advances are threatened by cyber attacks, willful or unintentional, that degrade or even destroy digital infrastructure as well as physical and biological assets that may be associated with it such as robots and sensors or wearables and implantables like Apple watches and SmartStents whose R&D is being funded in Pakistan by organizations like Ignite and others.
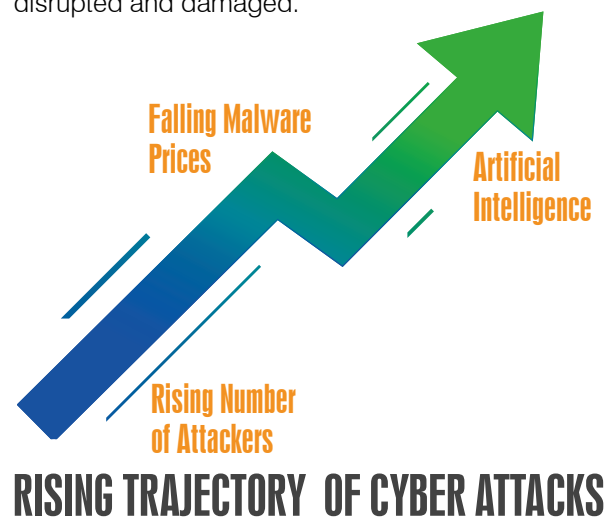
Of Spectacular Attacks and Rising Trajectories

Pakistan has a storied association with cybersecurity. In February 2008, PTCL "held hostage all the world's cute cat videos," when it inadvertently redirected 2/3rd of YouTube traffic to an internal site while trying to constrain access to YouTube from Pakistan. Seeking to protect their medical software from copyright infringement, two brothers from Lahore purportedly mistakenly launched one of the first computer viruses ever that went viral through floppy discs back in 1986, before the advent of the Internet. In this decade, three top-tier global cybersecurity companies were built and launched by Pakistani-Americans: FireEye, Elastica, and SparkCognition.

Toward the end of the George W. Bush administration, American and Israeli intelligence launched a futuristic cyber attack, categorized as an Advanced Persistent Threat (APT) on the Iranian nuclear reactor at Natanz. Stuxnet, considered the Oceans 11 of cyber attacks – after the Hollywood movie about a highly sophisticated gambling casino heist, managed to cripple the nuclear reactor even though it was air gapped i.e., not connected to the internet. A tactic called candy drop was used, where infected USB drives are offered to workers at sensitive installations with the hope that at least one of them will insert the USB into internally networked computers. Stuxnet USB drives were infected with a worm, or network virus, which infected computers worldwide, including in Pakistan, but was configured specifically to only impact the Siemens Programmable Logic Controllers (PLC) models connected to the specific number of centrifuges and frequency converters known to be deployed at Natanz, as reported by International Atomic Energy Association's (IAEA) routine monitoring visits. The centrifuges were made to spin excessively until they broke down, without the Iranian nuclear scientists even suspecting what was happening.

Estonia was perhaps the earliest adopter of digital governance and commercial services. Back in 2007, its citizens could vote, file taxes, access emergency services, verify identity, and conduct banking online. Then, around the same time as the Stuxnet attack, the tiny European nation suffered a cyber attack emanating from Russia, with whom it was embroiled in a political spat. Russian hackers were able to commandeer over a million computers in seventy-five countries to launch what is called a Distributed Denial of Service (DDOS) attack, which paralysed Estonia's digital infrastructure. Such was the enormity of the disruption, that Estonia, a member of NATO, considered the cyber attack an act of war, and invoked Article 5 of the NATO charter to demand reprisal against Russia. Other NATO members decided that Article 5 did not apply in this instance as there was no loss of life or damage to property, and an outbreak of war was averted. In the future though, a cyber attack may well do so if critical defense or civilian infrastructure like power generation and transmission, water supply, telecommunications, banking, nuclear reactors, nuclear and missile weapons systems, or military C4I systems are disrupted and damaged.

Falling Malware Prices

Artificial Intelligence

Rising Number of Attackers

RISING TRAJECTORY OF CYBER ATTACKS

Several universities in Pakistan are now offering degrees in cybersecurity or information security, though overall course quality needs improvement, much like other disciplines. Examples include NUST, COMSATS, NUCES, Bahria, and Riphah, with NUST offering Ph.D. as well and having awarded four. Many other universities offer courses in cybersecurity. Several foreign Ph.D.s were trained under the Ministry of Science and Technology and HEC programs, with returning scholars working in academia and the military.

In 2016, over $100 million were removed through fraudulent online instructions from the Central Bank of *Bangladesh* on the heels of a similar unsolved heist of $250,000 from *Sonali* Bank in 2013. This time though, the attack was traced to hackers in Sri Lanka and Philippines using FireEye, a product developed by a Pakistani, Ashar Aziz, which was employed by American investigators invited by the Bangladesh Government.

Such attacks and other more mundane ones comprising malware like virus, trojans, zero day attacks, phishing, spoofing, spyware and ransomware, which propagate through clicking on apps, e-mails or URLs, by installing external storage devices, through merely being connected to the Internet, or even by existing in hardware, firmware and operating systems of commercial computing and communication devices, cause hundreds of billions of dollars of loss annually around the world and compromise confidential information.

Many Pakistani websites and other data are hosted overseas, where system and network administrators, who may hail from other South Asian countries, can provide confidential corporate data to competitors in those countries. Compromised details of textile and leather shipments, with customer names, prices and dates, in the hands of competitors is a powerful weapon of corporate espionage, which hurts Pakistani exports. Spoofing, where e-mails are sent from the target's e-mail address, and are not discernible from genuine e-mails, are also a threat. Unsuspecting recipients can click on a fake URL contained in the spoofed e-mail, a threat termed phishing, which can open them up to all sorts of data theft. Such data can then be used to extort from recipients or targets through ransomware. Hacking of mobile phones remotely or of *Windows* machines using pirated operating systems results in similar outcomes and is happening across the country.

The volume and, what is more menacing, types of cyber attacks are increasing; the *World Economic Forum* estimates that by 2020, $3 trillion will be lost annually to cybercrime. *Symantec*, which maintains the most prolific civilian database of incidents, ranks Pakistan among the ten most targeted destinations in the world. Pakistani nuclear and other sensitive installations are probably targeted, with publically reported attacks on a variety of telecommunications, banking, government, health, transport, utility, and ridesharing organizations. Snowden files revealed that the NSA was spying on Pakistan's civilian and military

leadership, using a malware called *SECONDATE*. Then there is the Dark Web, which is not indexed by search engines and does not return in any search results, but is accessible through anonymous browsers like Tor, where a parallel marketplace of illicit goods and services exist, often transacted through cryptocurrencies. The horrific Zainab snuff incident may well have Dark Web connections. Stolen corporate and Government data is also sold on the Dark Web.

The global threat trajectory is fuelled, firstly; by easy availability of cheap softwares like *SkyGrabber* (cost: $30) which can intercept video feeds from drones costing millions of dollars, and satellites costing billions of dollars, secondly; by AI, which can render attacks undetectable, and thirdly; by the mobilization of offensive cyber attack "armies" by countries like USA, with its Department of Homeland Security's National Cyber Security Division, China, with its Information Security Base, and others. ■

USA	Has placed cyber security as number 1 on the top risk list and proposed budget of $19 B for 2017
UK	Has placed cyber security as number 1 on the top risk list and allocated $2.4 B to beef up cyber security
18	countries have placed cyber security defense in 2015
$75.4 B	were spent on cyber security defense in 2015
2020	cyber security market will grow from $75 Billion to $170 Billion

Source: The 4th Industrial Revolution, World Economic Forum

Lifting the Fog

With attacks like Stuxnet, which ushered in a new era of sophisticated copycats, and Estonia DDOS, some analysts liken the situation today to the one that existed at the eve of World War II, when governments and armies didn't know the impact of tech in the field of war and inadvertently triggered it. Technological advances can make attacks exponentially more destructive, akin to a 1000 mph tank, while being much harder to detect than, say, a missile silo or fighter jet manufacturing facility. General Michael Hayden, former Director of the CIA, laments: "Rarely has something been so important and so talked about with less clarity and less apparent understanding than this phenomenon… [we have] been unable to decide on a course of action because we lacked a clear picture of the long-term legal and policy implications of any decision we might make."

LEGAL
- Cyber Security Strategy
- Cyber Crime Act
- Data Protection Act

ORGANIZATIONS
- Multiple Cert
- Standards, Compliance, Data
- APEX Body

CAPACITY BUILDING
- Education, Training & Awareness
- R&D, Innovation & PPP
- Local Service Industry

LEGEND
- HIGH PRIORITY
- LOW PRIORITY
- MEDIUM PRIORITY

Cyber preparedness, strategic thrust areas and elements

Part of the reason for this lack of clarity is the complexity of concepts involved, which specialists, researchers and academics find hard to translate into simple language that non-technical policymakers can understand. At Ignite, which seeks to commercialize research and innovate, we grapple with this problem on a daily basis and have made some headway in coaching researchers to speak the language of business. A similar simplification is required here, else policymakers will not grasp the threat until it manifests, which may be too late. FireEye's story is instructive.

When Ashar Aziz left his CTO job at Sun to grapple with the challenge of AI based cyber attacks that could not be detected as their signature kept changing, he had an epiphany: How about testing incoming traffic on a virtual replica of a network — much like a cat tasted the King's food to detect the presence of any poison in the old days? His gamble paid off when he came up with a stellar product, the problem was that no one wanted to buy it and the company almost folded. Then a series of spectacular attacks on corporate networks in U.S. caused executives to scramble for cover. Overnight the demand for his wares soared. Today FireEye is a multi-billion dollar public company in U.S. with a global customer base. It has become a first responder on major attacks.

Global Cyber Risk Level and Spending

Estonia also paid heed after it got burnt. To its credit, it did not back down from its ambitious X-Road e-Estonia program — the brainchild of its Prime Minister, a former programmer. Conversely, it became the first government in the world to adopt blockchain, which it used to segregate its databases, appreciably improving their resilience to future attacks, while expanding digitization. The resolve of Estonia should be a lesson to risk-averse bureaucrats and policymakers everywhere, who often cringe at the notion of eGovernment due to the threat of attacks that they cannot fathom. The way forward is to prioritize cybersecurity by putting it high on the national agenda as many other countries have done.

How does one mitigate the risk? The first step is to profile the current situation in the country in terms of what has been done in Pakistan till now and where are the gaps.

With respect to preparedness, Pakistan, stood 67th on the respected Global Cybersecurity Index (GCI) of the International Telecommunications Union (ITU) in 2017. That should ring alarm bells because, while low rankings in ease of doing business, competitiveness, human development, transparency, and innovation are also concerning, inadequate cybersecurity means critical telecom, electricity, and banking networks can be compromised, and digital financial inclusion and eGovernment initiatives stifled. Cybersecurity preparedness can be divided into three strategic thrust areas: legal, organizational and capacity building. Legal refers to legal frameworks and institutions, policies and rules underlying and helping formulate cybersecurity initiatives. Organizational refers to policymaking and technical institutions and frameworks responsible for formulating and implementing cybersecurity strategy. Capacity building is a catch-all term with a wide application toward cybersecurity initiatives like research, education, industry, international collaboration and the rest of the ecosystem. In some elements, headway has been made, while others are both nascent and important, demanding higher prioritization.

Building Legal Foundations and Making Tradeoffs

The government introduced cybercrime legislation in 2016, which imposed criminal penalties on infractions like spamming, libel, stalking and unauthorized access. The Prevention of Electronic Crimes Act (PECA) did not pass through without controversy, which is not surprising because cybersecurity legislation in general has to balance three often competing needs: On one hand state security, legitimate interests of businesses and other organizations, and well-being of citizens have to be protected; while on the other hand, the civil liberties guaranteed by the constitution, such as freedom of speech and right to privacy, have to be safeguarded. And finally, everything comes with an economic cost, which is often a constraining factor. For example, when traffic is stopped for a motorcade security protocol, it will exact both an economic cost and cause inconvenience to commuters. An allegation hurled as an exercise of freedom of expression may attract anti-libel penalties, which was the concern of rights activists.

Nevertheless, the passing of the PECA has not yet attracted the kind of human rights violations that were feared, though it has provided a vehicle to address online harassment, particularly of women. If anything, there are calls to expand and diversify the staff of the FIA's National Response Center for Cyber Crimes (NR3C) and district prosecutors, who deal with such crimes. In FY 2017-18, NR3C conducted 2,295 inquiries, registered 255 cases and made 209 arrests in 2018.

The Ministry of IT has been working on a Data Protection Act, which hopefully will be passed soon. It is required to safeguard the data rights of citizens, organizations, and the government in a broader and more nuanced manner than the few data-related clauses in PECA, such as rights to access and grant access to your data, to be "forgotten," to be able to port your data to other users, and timely notification of any breaches. Such an act would also establish compliance verification requirements and penalties.

Source: couldbric.com
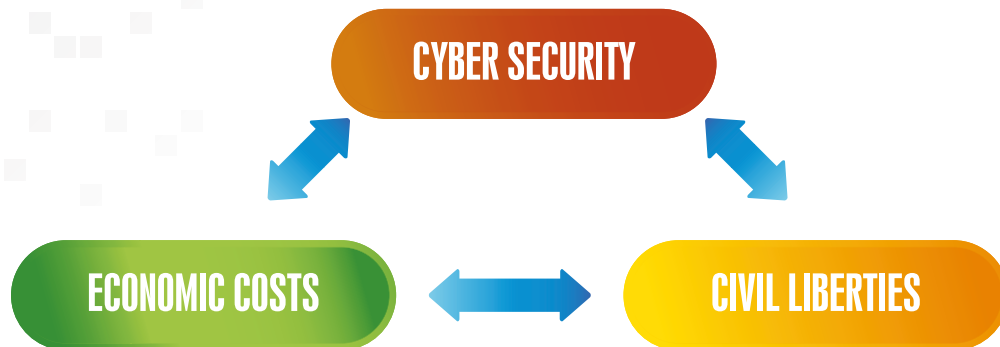
Policy Balances Three Often Competing Considerations

The most important action required, though, is the articulation of a cybersecurity strategy, which will define the following strategic elements to the level of detail where they can be implemented: research focus, development of industrial and technical resources, public-private partnerships, international collaborations and multilateral agreements, establishment of more CERT (Computer

Source: smart-energy.com

Emergency Response Team), compliance and standards bodies, public awareness, and, most importantly, the contours of an apex cybersecurity body. Even some Gulf, African, and South Asian countries, like Qatar, Ghana and India, have come up with cybersecurity policies, though their success in implementation, and in attaining outcomes like cyber resilience and reduction in cybercrime is questionable. Nevertheless, like any challenge involving complexity, significant expenditure of resources, and deep, broad, and long-term impact, a strategic approach has to be taken, and Pakistan will hopefully execute the strategy much better.

Cyber Threat Target Segments

Command, Control and Clear Organizational Roles

CERT keeps an eye on threats, disseminates information, and responds to incidents. It may also provide training, audits, forensics, compliance and other services. Around the world, CERT are hosted by universities, government ministries and in the private sector. Multiple CERT are needed at the national level by government and critical sectors. Pakistan has a couple of low profile CERT outside the defense sector, PakCert and NTISB in addition to some forensics and device security testing labs. PTA has formed a directorate to conduct surveillance of social media to detect and remove immoral and blasphemous material. Pakistan also needs Level 4 and Level 5 data centers, which are highly resilient and trustworthy, and affordable to customers so that important and confidential data can reside inside the country and be less vulnerable to espionage and stealth.

In 2014 there was an abortive attempt in the Senate of Pakistan to introduce a National Cyber Council Act, which sought to establish a large, high level, public-private sector body, that would meet quarterly to oversee an ambitious agenda including the developing of a cybersecurity strategy, setting up CERT, awareness creation, and other strategic elements, but with a part-time CEO, skeleton staff, and "modest" budget. A much more rigorous, focused, well-funded and well-staffed effort is required in the shape of a high level apex organization for cybersecurity, which would formulate strategy and oversee or coordinate its implementation with bodies around the country, monitor metrics, and enter into agreements and collaborations with international bodies to avoid mutually destructive incident precipitation and to learn from each other. Perhaps because of its long pre-WW2 history of SIGINT (Signal Intelligence), in the U.S., there is a bit of hodgepodge of mandate, which some blame for the recent unchecked Russian cyber interference in the U.S. presidential election: "The Department of Homeland Security is responsible for national protection, including prevention, mitigation and recovery from cyberattacks. The FBI, under the umbrella of the Department of Justice, has lead responsibility for investigation and enforcement. The Department of Defense, including U.S. Cyber Command, is in charge of national defense. What is needed is a sixteenth branch of the Executive — a Department of Cybersecurity — that would assemble the country's best talent and resources to operate under a single umbrella and a single coherent policy." In the UK, which also has a long history of SIGINT, a unification of organizations with overlapping mandates, that acreted over the years, has already been undertaken: "The National Cybersecurity Center (NCSC) is the UK's authority on cybersecurity. The NCSC brings together and replaces CESG, the information security arm of GCHQ, the Center for Cyber Assessment (CCA), Computer Emergency Response Team UK (CERT UK) and the cyber-related responsibilities of the Center for the Protection of National Infrastructure (CPNI)." Cybersecurity Malaysia is the apex federal government body in that country mandated to operate CERT, "conduct outreach and capacity building, strategic study and engagement, and industry and research development." Malaysia is ranked third-best in the world in the ITU Global Cybersecurity Index (GCI). As militaries usually possess deep technical expertise, serving and retired officers usually play important roles in cybersecurity agencies serving the government. The U.S. National Security Agency (NSA), for example, is headed by a serving four star general, who also heads the U.S. Cyber Command of the Department of Defense, though other government cybersecurity agencies in U.S. and UK are headed by civilians.

Spreading the Word and Inculcating Good Habits

According to PTA there are now over 150 million cellular subscribers and over 60 million broadband Internet subscribers in the country, with penetration continuing to rise, particularly among youth. Alongside, 38% Pakistanis bully others online, compared with a global rate of 24%, according to Microsoft. "This means that awareness campaigns about cyberbullying and protection need to be conducted through social, electronic and paper media, with visits to schools and colleges," says Idrees Awan, Cybersecurity Evangelist at Ignite, who has put together a roadmap, and also contributed to the research for this article. DigiSkills.pk, an online digital skills training portal (and example of eGovernment platform) designed and funded by Ignite, which is becoming increasingly popular across the country, offers cyberbullying and protection orientation as part of its regular training. NR3C has provided over 10,000 courses on the subject. The Cloud Security Alliance and Pakistan Information Security Association (PISA) are industry associations that evangelize cybersecurity and provide services, as does Cybersecurity Pakistan.

Smaller companies, which constitute 90% of all enterprises in Pakistan, are easy targets because they often lack resources and expertise to defend themselves. SMEDA published "Cybersecurity for Your Business" in 2017 as a guideline for small businesses. Schools, clinics and smaller charities could benefit from the same guidelines.

Advanced Persistent Threats (APT) whose zenith is Stuxnet have become more widespread both as cyberwar perpetrated on state institutions and as cybercrime where corporations are targeted. APTs are difficult to detect through traditional cybersecurity measures like firewalls and antivirus, leaving organizations particularly vulnerable to data breaches. Many are initiated by employees, usually unwillfully. Employees need training about this threat. Organizations also need AI based solutions, which cater to new threat vectors. Finally, honeypots – deployed parallel to deceive attackers – record their activities, and counter them. FireEye is an example of a virtual honeypot. State Bank of Pakistan has issued an "Enterprise Technology Governance and Risk Management Framework for Financial Institutions." Several universities in Pakistan are now offering degrees in cybersecurity or information security, though overall course quality needs improvement, much like other disciplines. Examples include NUST, COMSATS, NUCES, Bahria, and Riphah, with NUST offering Ph.D. as well and having awarded four. Many other universities offer courses in cybersecurity. Several foreign Ph.D.s were trained under the Ministry of Science and Technology and HEC programs, with returning scholars working in academia and the military. Local companies like Trillium, Security Wall, Ciklum, C@RE, Five Rivers Technologies, Cyphlon, CGRC, Tranchulas, the aforementioned PakCert, and experts like Shahmeer Amir and Rafay Baloch are important parts of the ecosystem, providing a host of services from training to compliance, corporate cybersecurity strategy formulation to system integration.

Why Paul Romer Won the Nobel Prize

Research and innovation can produce solutions to local problems that no foreign products can address to the same degree. In fact Paul Romer won a Nobel Prize this year for his research on the power of ideas to advance even backward societies that are willing to change and become unfettered from old ways of thinking, defeatist attitudes, and stifling rules. Local innovation creates higher value addition, generates employments, creates an export opportunity if globally competitive, and is more trustworthy from a security perspective. Other times of course, the complexity and scale of products is such that they have to be obtained from global suppliers, as is the norm in our country today. Determining which products fall into which category is part of research strategy. Every link in the digital security value chain should be monitored, and the opportunities for local and global product development identified.

Public private partnership (PPP) is foundational to productization and commercialization. A couple of decades ago, the U.S. Department of Defense spent $60 billion trying to develop a secure database inhouse before it abandoned the project and reverted to Oracle. Innovative startups and new companies drive transformation around the world. Kaspersky, Symantec, Microsoft, and Oracle were all startups in the early stages, and new startups with new products are emerging every day around the world. Over 80% of the components of the first smartphone were outcomes of decades of government, defense, and academic research, but it took a Steve Jobs to pull all that together, create a device of such elegance that almost anyone anywhere in the world could use it, and then produce, market, legally secure and finance it so the iPhone could be placed in the hands of customers around the world. The business challenge can be tougher than the technical challenge. In fact, Mariana Mazucatto argues that all radical innovation is funded by the government because its development cycles are too long for private sector appetite. The computer chip and the Internet are other examples; PakVitae, which has filed international patents for a dirt cheap nanotech water filter, and has attracted international funding that will enable it to provide clean drinking water to 10 million Pakistanis by 2020, is a local example. 100 million Pakistanis do not have access to clean drinking water, causing malnutrition and stunting. PakVitae was incubated at an Ignite funded incubator, NIC Lahore – one of five across the country. The problem with local funding for security and defense innovation in economies that are not at the technology frontier is that the taps are turned on only when there is a ban placed by suppliers, which is harmful in the long run.

NETWORK

APPLICATION

DATA

PLATFORM

Layers In The Digital Security Value Chain

As cybersecurity becomes key to operations, larger companies are acquiring cybersecurity startups: *"Airbnb acquired the digital identity proofing startup Trooly. In June 2017, Honeywell acquired NextNine, a provider of security management solutions and technologies for industrial cybersecurity, while Microsoft acquired Hexadite, an Israeli startup that uses AI to identify and protect against attacks. Uber, Docker, Dropbox, Twitter, GoDaddy, and others have founded the Vendor Security Alliance (VSA), a coalition determined to establish cybersecurity standards that businesses can use to assess how secure third-party providers really are."*

Source: arabianbusiness.com

Public-private partnership (PPP) is foundational to productization and commercialization. A couple of decades ago, the U.S. Department of Defense spent $60 billion trying to develop a secure database inhouse before it abandoned the project and reverted to Oracle. Innovative startups and new companies drive transformation around the world.

Ignite has funded 15 information security projects, whose primary purpose was developing technical expertise and furthering research. Recent projects, awarded to startups, are expected to have a shot at commercialization: xFlow Research, which uses deep packet inspection to enhance network security, N-Spire, which uses AI based cognitive analytics for network monitoring, and a 5G Software Defined Radio (SDR). The recently established National Center for Cybersecurity, with its hub at Air University, networks and funds existing computer science departments in select universities, will pursue research directions like forensics for computer, mobile and social media, secure blockchain, implications of quantum technology, honeypot advanced threat protection, and secure IoT.

Future cybersecurity research directions should include lightweight cryptography for embedded systems, cryptographic aspects of next generation identity management e.g., biometrics, computing on encrypted data, and privacy and anonymity. A homegrown CPU, though a challenging undertaking, would cover one of the links in the platform layer of the digital security value chain.

As Pakistan's trajectory of digitization continues with initiatives like Government as a Platform, digital financial inclusion, and fourth industrial wave tech like IoT, AI, and blockchain, cybersecurity must keep pace. CPEC also has a strong digital component with respect to digital corridors, tech parks, and smart cars. There is no other way to help lift the bottom half of the population out of poverty, enter the realm of upper middle income countries, and ensure well-being and security of citizens. Given the challenge, a strategic approach is required, which begins with the formulation of a cybersecurity strategy and an empowered, high level apex cybersecurity body.

FINANCIAL STATEMENT

INDEPENDENT AUDITORS' REPORT

To the members of Ignite

Report on the Audit of the Financial Statements

Opinion

We have audited the annexed financial statements of Ignite (the Company), which comprise the statement of financial position as at 30 June 2018, and the statement of comprehensive income, the statement of changes in funds, the statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies and other explanatory information, and we state that we have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purposes of the audit.

In our opinion and to the best of our information and according to the explanations given to us, the statement of financial position, the statement of comprehensive income, the statement of changes in funds and the statement of cash flows together with the notes forming part thereof conform with the accounting and reporting standards as applicable in Pakistan and give the information required by the Companies Act, 2017 (XIX of 2017), in the manner so required and respectively give a true and fair view of the state of the Company's affairs as at 30 June 2018 and of the income and expenditure and other comprehensive income, the changes in funds and its cash flows for the year then ended.

Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs) as applicable in Pakistan. Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Company in accordance with the International Ethics Standards Board for Accountants' Code of Ethics for Professional Accountants as adopted by the Institute of Chartered Accountants of Pakistan (the Code) and we have fulfilled our other ethical responsibilities in accordance with the Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Information Other than the Financial Statements and Auditors' Report Thereon

The management is responsible for the other information.
The other information comprises the directors' report, but does not include the financial statements and our auditors' report thereon. Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of Management and Board of Directors for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with the accounting and reporting standards as applicable in Pakistan and the requirements of Companies Act, 2017 (XIX of 2017) and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

Board of directors is responsible for overseeing the Company's financial reporting process.

Auditors' Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs as applicable in

KPMG Taseer Hadi & Co.

Pakistan will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs as applicable in Pakistan, we exercise professional judgement and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Company to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation

![KPMG logo]

KPMG Taseer Hadi & Co.

We communicate with the board of directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

Based on our audit, we further report that in our opinion:

a) proper books of account have been kept by the Company as required by the Companies Act, 2017 (XIX of 2017);

b) the statement of financial position, the statement of comprehensive income, the statement of changes in funds and the statement of cash flows together with the notes thereon have been drawn up in conformity with the Companies Act, 2017 (XIX of 2017) and are in agreement with the books of account and returns;

c) investments made, expenditure incurred and guarantees extended during the year were for the purpose of the Company's business; and

d) no zakat was deductible at source under the Zakat and Ushr Ordinance, 1980 (XVIII of 1980).

The engagement partner on the audit resulting in this independent auditors' report is Riaz Pesnani.

KPMG Taseer Hadi & Co.
Chartered Accountants
Islamabad

22 July 2019

Ignite
Statement of Financial Position
As at 30 June 2018

	Note	2018 (Rupees)	2017 (Rupees)
ASSETS			
NON-CURRENT ASSETS			
Property and equipment	6	12,335,841	9,831,063
Intangible assets	7	959,238	2,022,818
		13,295,079	11,853,881
CURRENT ASSETS			
Advances - considered good	8	212,643,196	82,245,778
Short term prepayment		18,073,000	-
Accrued interest on bank balance		9,870,937	7,309,136
Other receivables	9	3,483,365	8,740
Bank balance	10	410,723,983	538,343,501
		654,794,481	627,907,155
TOTAL ASSETS		668,089,560	639,761,036
FUNDS AND LIABILITIES			
FUNDS			
Fund Balance		6,709,285	6,709,285
NON-CURRENT LIABILITIES			
Restricted funds	11	303,600,005	305,889,986
Deferred capital grant	12	13,295,079	11,853,881
		316,895,084	317,743,867
CURRENT LIABILITIES			
Trade and other payables	13	344,485,191	315,307,884
TOTAL FUNDS AND LIABILITIES		668,089,560	639,761,036
CONTINGENCIES AND COMMITMENTS	14		

The annexed notes from 1 to 22 form an integral part of financial statements.

CHIEF EXECUTIVE   **DIRECTOR**

Ignite
Statement of Comprehensive Income
For the year ended 30 June 2018

	Note	2018 (Rupees)	2017 (Rupees)
INCOME			
Grant income recognized	15	1,244,205,362	771,755,828
EXPENDITURE			
Project / program activities	16	(1,034,812,028)	(570,738,757)
Operating costs	17	(222,756,690)	(184,956,934)
		(1,257,568,718)	(755,695,691)
(DEFICIT) / SURPLUS FOR THE YEAR		(13,363,356)	16,060,137
OTHER COMPREHENSIVE INCOME			
Other comprehensive income not to be reclassified to statement of comprehensive income in subsequent periods:			
Remeasurement gain / (loss) on defined benefit scheme	13.3.4	13,363,356	(16,060,137)
TOTAL COMPREHENSIVE INCOME FOR THE YEAR		-	-

The annexed notes from 1 to 22 form an integral part of financial statements.

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CHIEF EXECUTIVE

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DIRECTOR

Ignite

NATIONAL TECHNOLOGY FUND