Supporting Female Founders in Africa
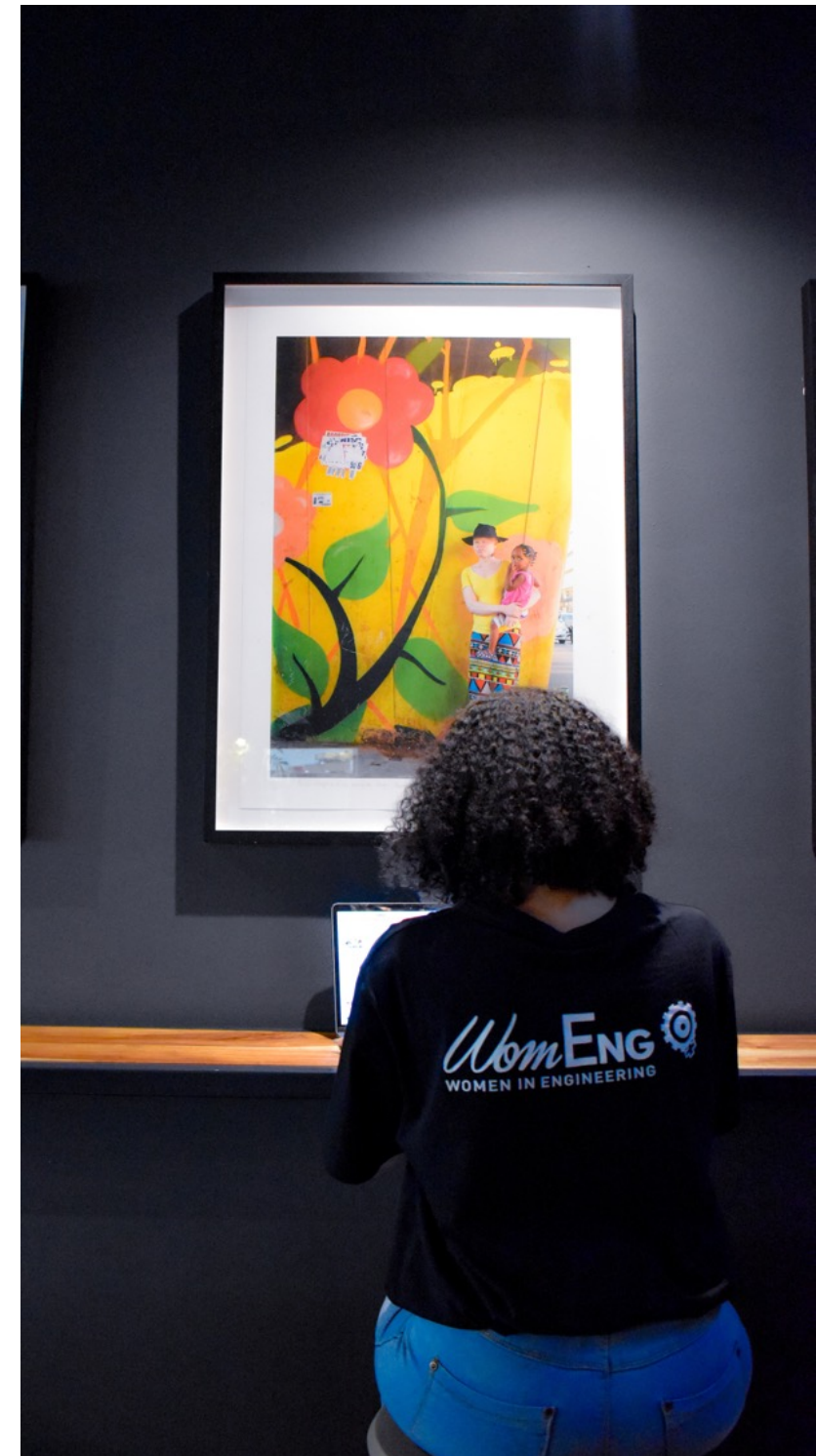Insight Report

Special thanks to

Executive Summary

WomEng has been working on Science, Technology, Engineering and Mathematics (STEM) interventions for women and girls in engineering and tech since 2006. Understanding the true drivers of change lies in ownership of the industry, where women comprise around 10% of professionals, targeted intervention is required. We (WomEng and WomHub) are working on how to make lasting, sustainable change and impact by understanding the needs and frustration of female founders. The vision is to create a sustainable support ecosystem for female entrepreneurs in the engineering and tech industries to thrive.

This insight report provides a needs assessment of female founders in Sub-Saharan Africa based on surveys of female founders across the continent, desktop research and the development and piloting of courses on emerging technology.

Key Findings:

1. Key factors stifling the growth of female founders globally include access to funding, an ecosystem rife with sexual harassment and lack of exposure to business and emerging technology skills.

2. Women in engineering and tech, specifically female founders feel alone in their professional environments and are looking for a support system to connect and learn from peer experiences.

3. There is a need for spaces specifically designed to meet the needs of female founders, that looks holistically at supporting the entrepreneur as well as the business.

Contents

Introduction

WomEng has been working on Science, Technology, Engineering and Mathematics (STEM) interventions for women and girls in engineering and tech. Understanding the true drivers of change lies in ownership of the industry, where women comprise around 10% of professionals, targeted intervention is required. In June 2019, we (WomEng and WomHub) hosted the first a pan-African entrepreneurship accelerator for female founders in partnership with the Royal Academy of Engineering. It was the first of its kind on the continent as it focused on female entrepreneurs specifically in the engineering and tech industries. 175 applications were received showcasing a high calibre of founders, the businesses they were running and the revenues and opportunities they were creating in their countries.

However, in addition to having started successful businesses with potential to grow, all these women founders had something else in common; none of them had venture capital funding. They lacked the funding to grow, with most of these entrepreneurs self-funding, borrowing money from family, having a separate day job or applying to competitions for prize money to grow their business. In a time when a new fund for entrepreneurs is announced every other day, most female founders in Africa have yet to access funding.

This insight report provides a needs assessment of female founders in Sub-Saharan Africa (SSA) based on surveys with female founders in SSA, desktop research and pilot testing of courses to equip women with skills on emerging technologies. These courses will upskill women to start or grow businesses in engineering and tech.

The Global Ecosystem and Market

Women + Funding

Women have always played a significant role in the entrepreneurship ecosystem, especially in Africa. However, it has largely been in the informal sector. Over the last few years, there has been a rise in female founders in the formal economy, with women leveraging technology to support and scale their businesses. However, while there is a promise of female entrepreneurship to lead Africa's economic growth, women face a number of barriers, the biggest being access to finance.

According to research by the IFC, from 2012 – 2017 only $30 million of approximately $500 million VC investment in Africa went to female founders (5.3%). To put that number into context, in 2019, $130 billion of venture capital was invested in entrepreneurs in the US. This means that over a five year span, female founders in Africa received only 0,02% of what is invested in US ventures in just a year. This huge capital gap however is not stopping the rise of female entrepreneurs and unfortunately it is not just an African female founder challenge. In the US, female founders received 2.2% of venture capital and in the UK, around 1%. The challenge is compounded by female founders of color, who since 2009 have received only 0.0006% of the tech venture funding in the US.
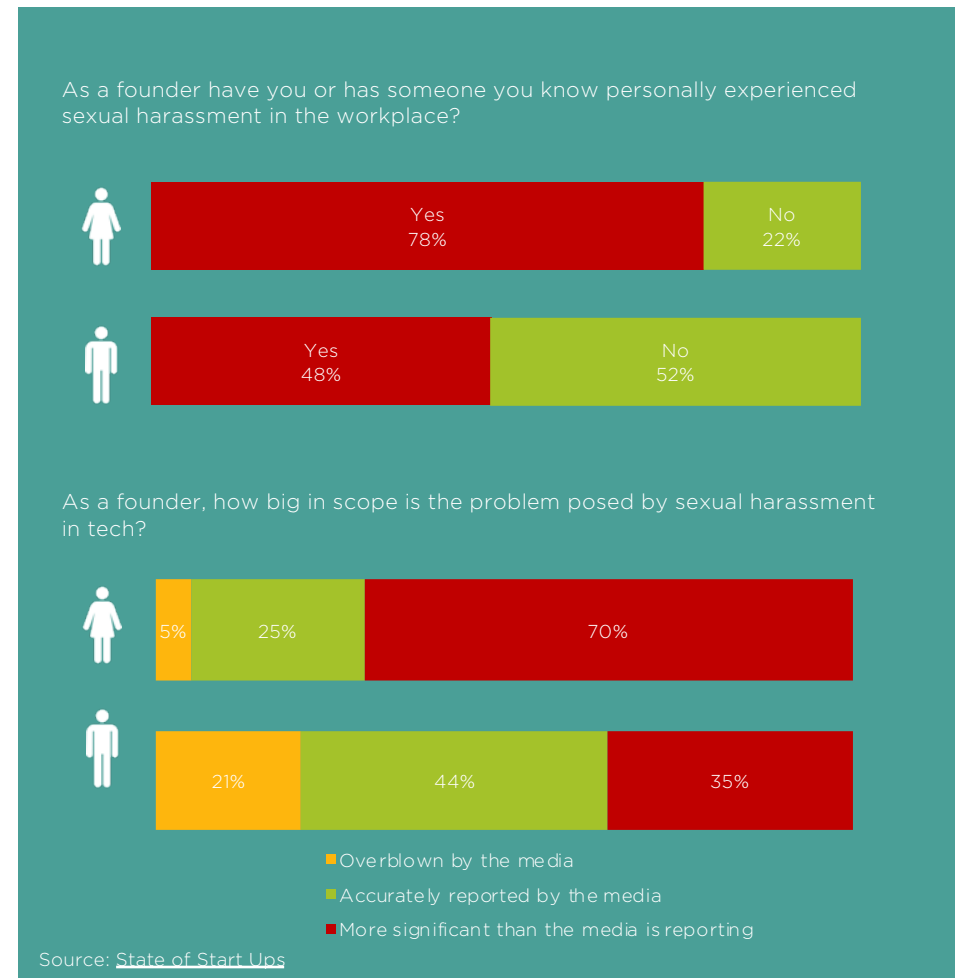

- Total VC Funding for men in the US
- Total VC Funding for women in the US
- Total VC Funding for men in Africa
- Total VC Funding for women in Africa

Women + The #MeToo Movement

"Female founders are treated as sexual opportunities rather than investment opportunities."

The challenge for female founders is not just limited to funding. Female founders are also sometimes subject to sexual harassment where they are treated as sexual opportunities rather than investment opportunities. The #MeToo movement started in Silicon Valley shed light onto the predatory behavior of venture capitalist, but many female founders have their own story. The State of Start Ups 2017 Report noted that 78% of female founders said they've been or know someone who's been sexually harassed. In our accelerator, one of the workshops requested by the female founder cohort was how to deal with sexual advancements when trying to raise capital. It has made many weary of seeking VC funding as the costs are too high considering that VCs are looking to take a stake in both the entrepreneurs business as well as exploit her body.

Even with the challenges of funding gaps, sexual harassment and difficult economic conditions, studies by SCORE, a non-profit business mentoring organisations in the US have shown that female founders have the same entrepreneurial success, growth revenue, and longevity despite the unequal playing field. Female founders continue to be equally as successful. Female founders have proven to be equally as successful. They could be more so if the barriers like funding gaps and sexual harassment were removed.

As a founder have you or has someone you know personally experienced sexual harassment in the workplace?

👩	Yes 78%	No 22%
👨	Yes 48%	No 52%

As a founder, how big in scope is the problem posed by sexual harassment in tech?

👩	5%	25%	70%
👨	21%	44%	35%

■ Overblown by the media
■ Accurately reported by the media
■ More significant than the media is reporting

Source: State of Start Ups

Closing the Gap in Africa

Understanding the gap and the opportunity, there are a number of funds that are starting to cater for women led by women but the funds are smaller and can't meet the demand. When women VCs are in the room, more female founders are funded. But there are few female VC's, making only 11% of VC partners at the traditional VC firms.

The entrepreneurship ecosystems need to fundamentally change the way we view and engage female founders. The status quo will only change when female founders are treated as equal and are judged on the same criteria and invested in equally as their male counterparts. According to a study by the Boston Consulting Group on supporting women as entrepreneurs, if women participated equally as entrepreneurs the rise in GDP could be between 3%-6% adding up to $5 trillion into the global economy. According to the Global Gender Gap Report 2020 by the World Economic Forum, it will take another 95 years for Sub-Saharan Africa to reach gender parity. The contribution women could make in Africa is substantial if more capital was invested and the barriers for female founders removed. It is understanding this context that we have developed this insight report on the data we have gathered through this process, as well as launch the first Imagineering lab, co-working space, and eventually a women in STEM fund to support female led innovation and entrepreneurs in industry.

There are a number of incubators and tech hubs in South Africa, however, there are no specific offerings which provide a holistic suite of offerings from business training, developing leadership skills, funding and housing what we call "Imagineering" but is commonly referred to as innovation opportunities. The project is specifically geared at women entrepreneurs in STEM (Science, Technology, Engineering and Mathematics) as we believe that is where the biggest opportunities lie to leverage the 4th industrial revolution and meet the sustainable development goals. The focus is on developing capabilities in AI and cybersecurity.

Mapping Female Founders in Africa

Where Are They? What Are They Doing?

With the support of the Royal Academy of Engineering in the United Kingdom, we developed and ran the first Pan-African accelerator for female founders in engineering and tech in 2019. Applications were received from female founders across 24 Sub-Saharan African (SSA) countries with innovations based in 21 of these countries. Applicants are collectively working towards all 17 Sustainable Development Goals. The top 3 goals are SDG 9 (Industry, Innovation and Infrastructure), SDG 8 (Decent Work and Economic Growth) and SDG 3 (Good Health and Well-Being).
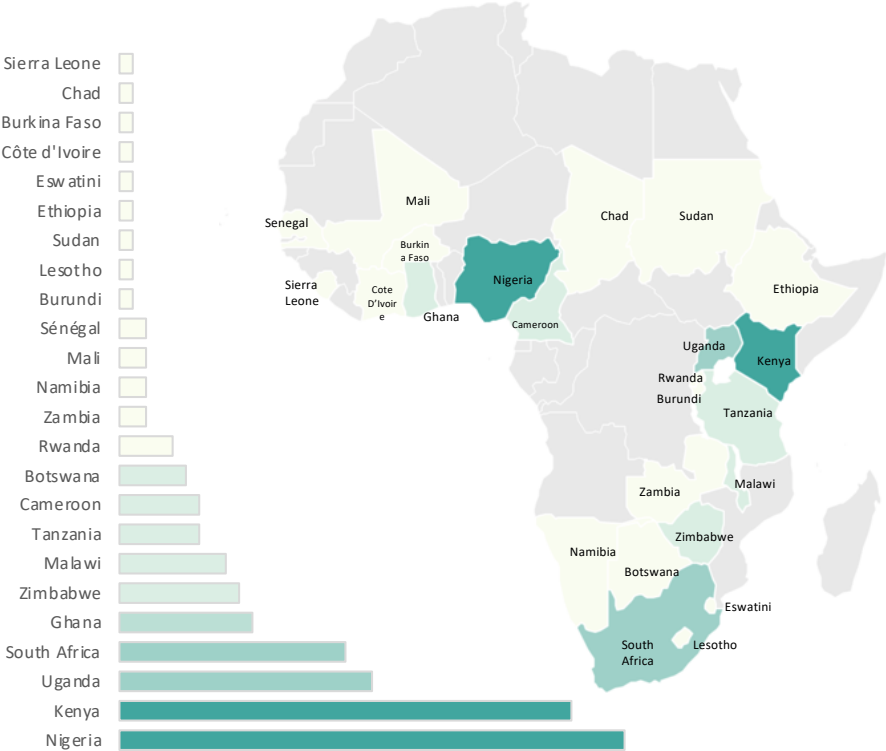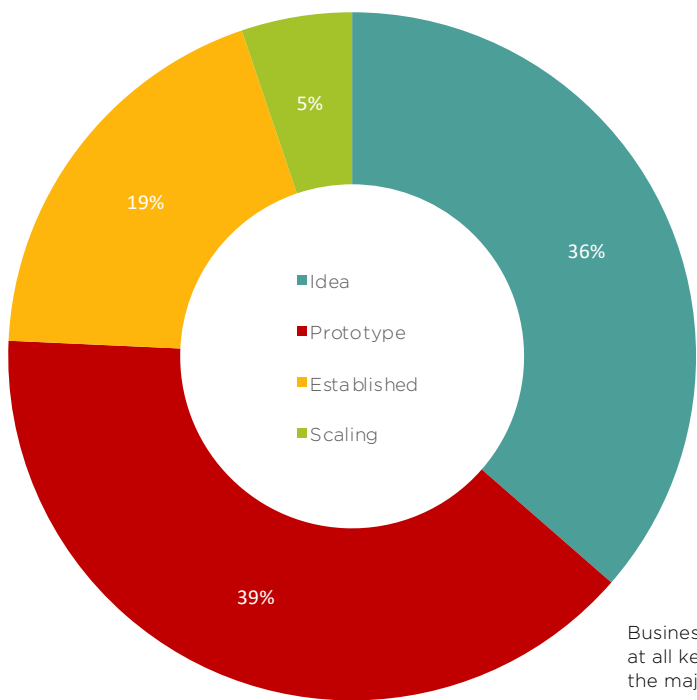

Demographic spread of female founders that applied to the Africa Innovation Fellowship.
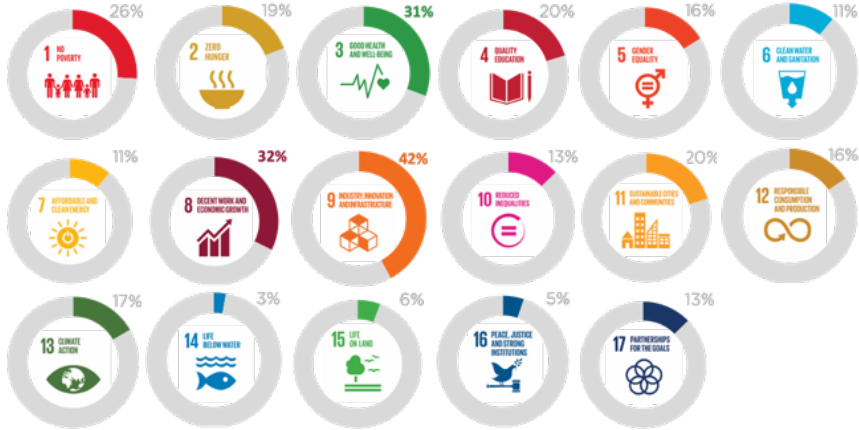

The Sustainable Development Goals (SDGs) that SSA female founders are working towards.

From the 175 applicants, zero received any venture capital. Most female founders have utilized personal funds or borrowed funds from friends and family. Others received funding from pitch competitions, mainly in the impact space.
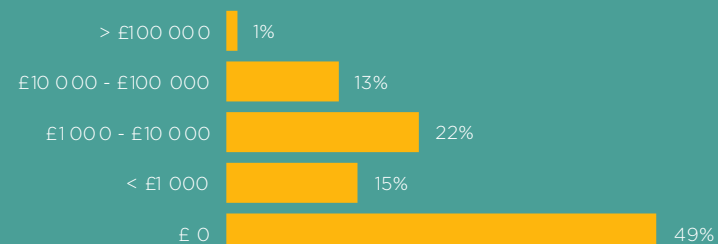
The implications of the funding gap means that female founders often grow slower, and are more susceptible to setbacks, especially around invoicing and payment terms. Often female founders are unable to go beyond a 30-day carry. This can be devastating for their enterprises when clients do not pay on time. Female founders in SSA don't have the extra cash to invest and scale as rapidly as well as opportunities to do research and development. Often, these female founders are working existing jobs and their salaries are being spent in their ventures.

Legend:
- Idea
- Prototype
- Established
- Scaling

- Idea: 36%
- Prototype: 39%
- Established: 19%
- Scaling: 5%

Business Stages: Applicants have innovations at all key business development stages with the majority of applicants at prototype stage.

- > £100 000: 15%
- £10 000 - £100 000: 47%
- £1 000 - £10 000: 28%
- < £1 000: 5%
- £ 0: 5%
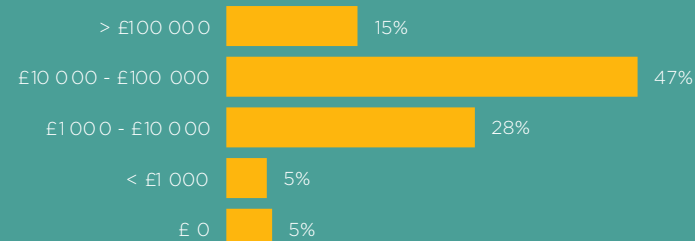
Capital Needed: The median capital needed by applicants to start/grow their business is £15 240.

- > £100 000: 1%
- £10 000 - £100 000: 13%
- £1 000 - £10 000: 22%
- < £1 000: 15%
- £ 0: 49%

Capital Raised: The highest individual capital raised is £190 618.

- Personal Funds: 60%
- Friends and Family: 24%
- Grants: 19%
- Awards & Competitions: 17%
- Accelerators: 6%
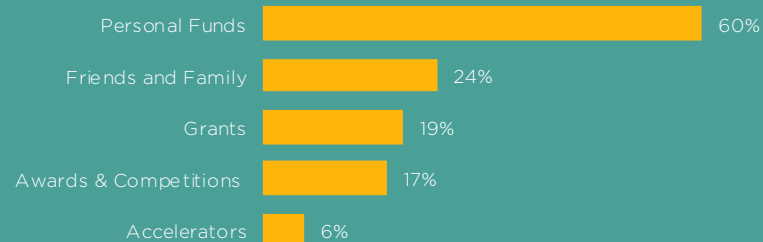
Funding Sources: The top 5 funding sources utilized by applicants are listed.

Business Challenges

25 out of 175 female founder applicants were selected for our Africa Innovation Fellowship (AIF) in 2019. Fellows come from 14 SSA nationalities with innovations based in 14 SSA countries highlighted on the map below. The majority of Fellows' businesses are at prototype or established stage. Based on feedback from these 25 female founders on their various business challenges, WomEng identified the top 3 business challenges.
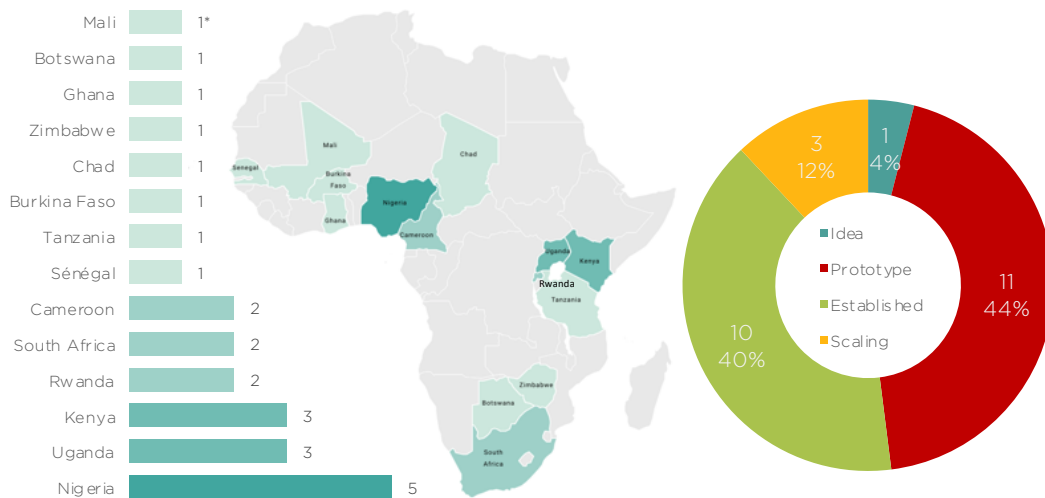
Demographic spread and business stage of the female founders selected for the Africa Innovation Fellowship.

Country	Count
Mali	1*
Botswana	1
Ghana	1
Zimbabwe	1
Chad	1
Burkina Faso	1
Tanzania	1
Sénégal	1
Cameroon	2
South Africa	2
Rwanda	2
Kenya	3
Uganda	3
Nigeria	5

Pie chart (business stage):
- Idea: 1 — 4%
- Prototype: 11 — 44%
- Established: 10 — 40%
- Scaling: 3 — 12%
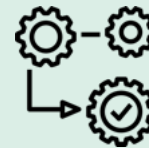
Top 3 Business Challenges

Funding
Access to funding, loans, knowledge on how to raise funding

Human Resource
Skills development for team (business and technical) + recruitment and retention (a result of funding)

Streamlining Production Processes And Costs
Reducing raw material costs, high upfront costs, improving payment systems with customers

Business Stage Challenges

The challenges faced by the Africa Innovation Fellows varied based on business stages. An analysis of the challenges of the 25 female founders is further detailed based on the various business stages.

Idea Stage	No. of Mentions
Designing our product and business model relevant to local market needs	1

Prototype Stage	No. of Mentions
HR - Skills development (business, leadership, technical) & retention	6
Streamlining our production process and costs	6
Access to funding	4
Government laws	3
Being a female and ethnic minority	1
Crime	1
Limited access to technology by users	1
Building trust with users/customers	1
New Technology in the market	1
building a sustainable profitable business model	1
Acquiring distribution channels and avenues.	1

Scaling Stage	No. of Mentions
Access to funding	3
Lack of skilled human resource	2
Market penetration	2
Technical limitations	1
Land related disputes	1

Established Stage	No. of Mentions
Streamlining our production process and costs	6
Skills development for team (business, leadership and technical)	4
Building customer trust	2
Converting client interest into sales	2
Product design improvements required	2
Legal assistance	2
Fluctuating sales periods based on season	1
Access to finance	1
Providing customer feedback	1
Government policies/tax laws	1

Case Study: Ntombiyemfundo Mukwenha, ShareOpps

Meet Ntombiyemfundo Mukwenha, an industrial engineer and founder of ShareOpps. She is passionate about Africa's development through strategic technology and innovation development. Ntombiyemfundo is an alumnus of Global Changemakers, Young African Leaders' Initiative, the Thabo Mbeki Leadership Institute and the WomEng's Fellowship South Africa and Africa Innovation Fellowship programmes.

Ntombiyemfundo founded ShareOpps in South Africa in 2016. ShareOpps is an online platform that connects the youth to career-enhancing opportunities. They are currently building a mobile application that uses machine learning algorithms to match users (youth aged 18 to 35 years old) to industry opportunities in academia, employment and entrepreneurship.

Ntombiyemfundo's biggest challenges in starting up:

1. Access to finance for our solution, to source the best talent through sufficient remuneration and for ad-hoc business needs.

2. Finding strategic partners with the right skills, resources or networks.

3. Sourcing reliable 3rd party service providers.

Future Growth Prospects

ShareOpps aims to be the number one access provider to marginalized youth and early career professionals and entrepreneurs on career opportunities in Africa.

Current Business Needs

Ntombiyemfundo notes, "In building a complex online platform that acts as a one-stop-shop for career opportunities, access to funding is one of our biggest needs. Personal financing and bootstrapping is not generating maximum growth and speed of scale. Strategic partnerships are also essential to link the business to resources, networks, financing and technical expertise."

Business Support

The overall feedback from the 25 female founders selected to participate in the first Africa Innovation Fellowship included:

1. A need for financing their ventures and access to both start-up and working capital. Many of the founders had trouble with suppliers paying them for services and products delivered.

2. More training on financial training to manage a company

3. Support on dealing with issues such as harassment and leadership development

4. Support on prototyping, or better engineering their innovations

5. Technical Support

Image: Female Founders selected for the Africa Innovation Fellowship run by WomEng and Royal Academy of Engineering.

AFRICA INNOVATION FELLOWSHIP

Are you ready to take your innovation to the next level?

WomEng
WOMEN IN ENGINEERING

ROYAL ACADEMY OF ENGINEERING
THE AFRICA PRIZE FOR ENGINEERING INNOVATION

Emerging Technologies

Much has been written about AI and other new technologies. Brian Burke, research vice president at Gartner notes, "Technology innovation has become the key to competitive differentiation. The pace of change in technology continues to accelerate as breakthrough technologies are continually challenging even the most innovative business and technology decision-makers to keep up". According to Gartner, the five emerging technology trends in 2019 with transformational impact included:

1. Sensing and Mobility - By combining sensor technologies with AI, machines are gaining a better understanding of the world around them, enabling mobility and manipulation of objects.
2. Augmented Human - Emerging technologies focused on extending humans includes biochips, personification, augmented intelligence, emotion AI, immersive workspaces and biotech (cultured or artificial tissue).
3. Postclassical Computing and Communications - Enterprises should evaluate technologies such as 5G, next-generation memory, LEO systems and nanoscale 3D printing.
4. Digital Ecosystems - Digital ecosystems leverage an interdependent group of actors (enterprises, people and things) sharing digital platforms to achieve a mutually beneficial purpose.
5. Advanced AI and Analytics - Advanced analytics comprises the autonomous or semiautonomous examination of data or content using sophisticated techniques and tools, typically beyond those of traditional business intelligence.

In Africa, there are still ongoing conversations of the massive job losses at a political level, however, the younger, more mobile generation understands the opportunity these new technologies present to leapfrog developmental challenges. WomEng shares the opinion that the time is now to include women at the coding and design table or risk having the same racial and sexist bias and constructs perpetuate through the historic datasets, as well as how the algorithms work.
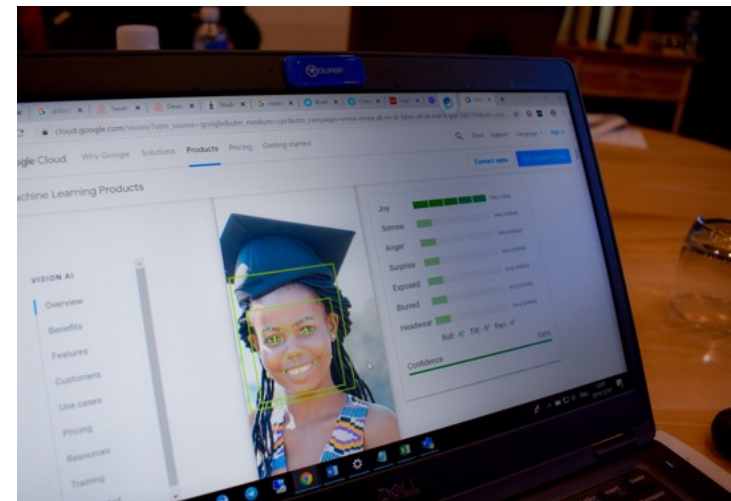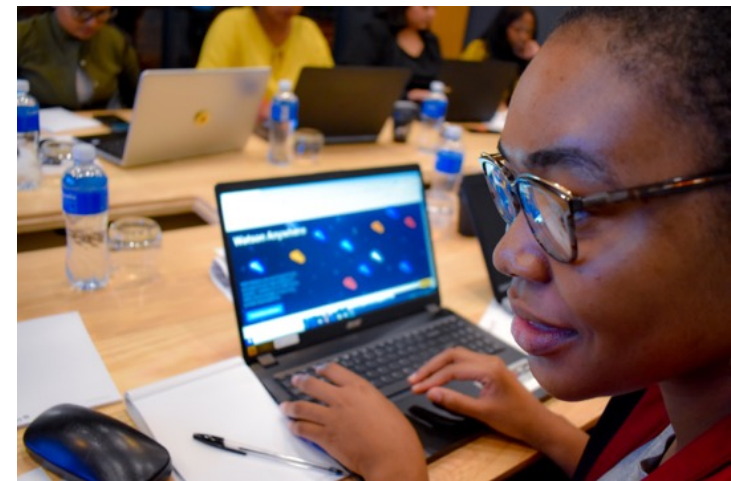
Equipping Women to Own the Industry

Our vision is to develop an "Imagineering lab" for engineering and technology professionals that aims to create a sustainable support ecosystem for the engineering and tech workforce industry to thrive. The aim of this initiative to do this by upskilling them through ongoing engineering education on emerging technologies. There is a specific focus on women in engineering and tech in Africa as they are considered as most vulnerable to losing work opportunities to emerging technologies. The Imagineering Lab acts as a virtual hub and physical hub (to be launched in South Africa) for innovation and technology. The diagram below details the various components of the Imagineering Lab.
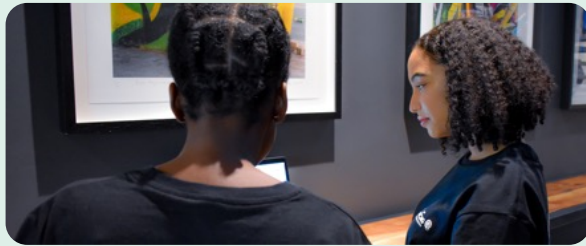
People
- Team for programme execution/admin
  - Mentors/facilitators
  - VC Fund managers

Tools
Startups:
- Entrance criteria
- Progress/monthly evaluation (KPIs)
- Exit evaluation (KPIs)
- House rules

Courses:
- Course content
- Facilitators guide

Environment
Working space & meeting rooms

Tech Gym
Gadgets, schedule, trainers, access to emerging technologies to tinker with and use for work.

Course Content

As part of the Imagineering Lab, we envision developing a suite of online and in-person courses related to emerging technologies and innovative thinking. The in-person courses are critical as equitable access to technology, and data is still a challenge in South Africa and Africa at large. We aim to adopt a train-the-trainer model in equipping trainers to run our courses to scale the reach and impact of these courses. Below is an overview of the initial suite of courses we intend rolling out.

Introduction to AI

- What is AI?
- What is ML?
- AI history
- AI landscape
- Neural networks
- Basic coding

Introduction To Cybersecurity

- What is cybersecurity?
- Why is cybersecurity important?
- How is cybersecurity measured?
- Coding with defense in mind
- Creating safer spaces for women online

Introduction To AI And Robotics Policy/Ethics

- What is ethics?
- Why is ethics important?
- Future of work
- Robot rights vs human rights
- Machine culture
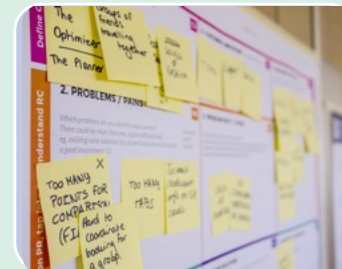
Introduction To Design Thinking

- What is design thinking?
- Agile methodologies
- Tools for design thinking

Introduction To Cognitive And Behavioral Skills

- What is etiquette?
- Speaking, greeting, walking with confidence
- Inspirational aspects

Piloting The Idea

In December 2019, WomEng piloted a 1-day AI & Cybersecurity in-person workshop for twelve (12) women in the engineering and tech industry in Johannesburg, South Africa. The aim of this workshop was to test the relevance and effectiveness of the curriculum that has been developed.

The workshop was designed by Naadiya Moosajee and Dr. Reevana Balmahoon, both engineering professionals. Naadiya Moosajee has 13 years of experience in entrepreneurship, engineering and tech and gender diversity and inclusivity. Dr. Reevana Balmahoon has a PhD in electrical engineering and currently works in the AI and cybersecurity innovation sector.

The workshop was facilitated by Dr. Reevana Balmahoon and included a combination of interactives sessions that involved peer to peer discussions and exposure to open source AI technology such as Google facial and trends analysis and coding programmes such as Kaggle. Key questions posed to participants for discussion included:

1. How do we leverage the 4th industrial revolution to suit our environment?

2. What does a future with AI mean for us?

3. What are the threats to women online and how do we think of cybersecurity?
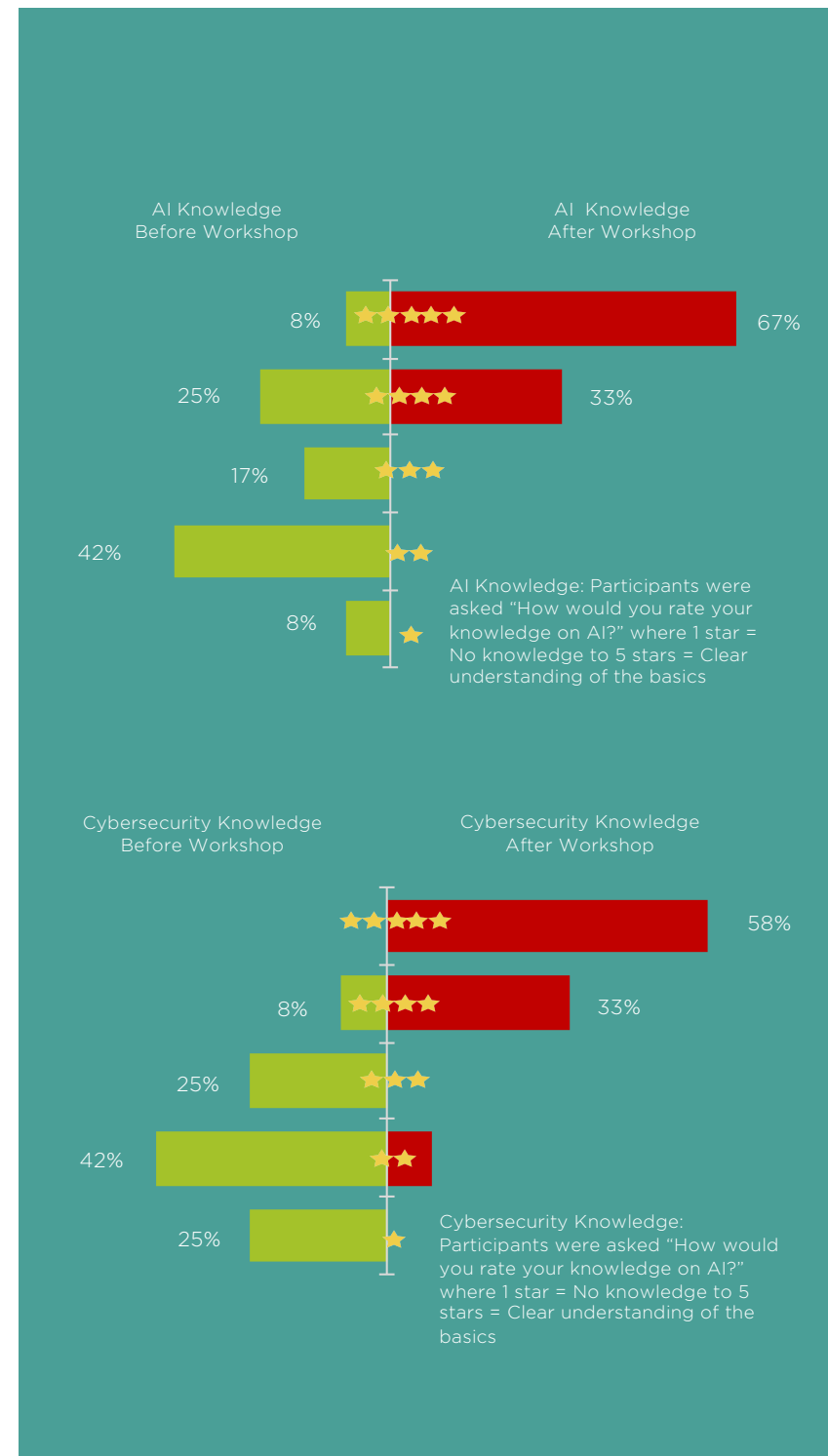
Pilot Workshop Feedback

At the end of the AI and Cybersecurity workshop, participants completed a feedback survey based on their experience of the workshop. Participants rated and provided feedback on the following:

1. Their knowledge on AI and cybersecurity before and after the workshop;

2. The facilitation of the sessions;

3. Relevance of materials;

4. Biggest takeaways from the workshop;

5. Recommendations for future target markets and product pricing.
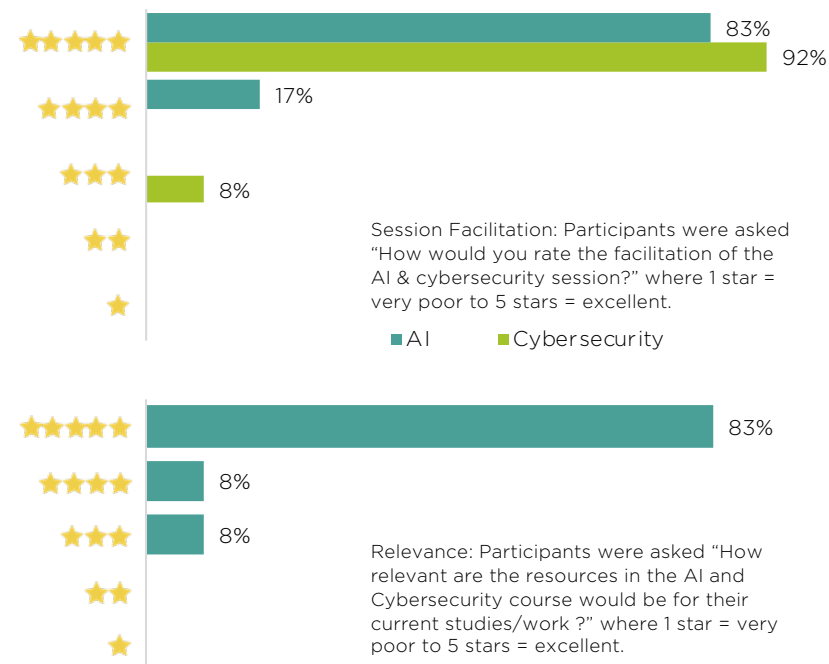

Key Findings:

1. The biggest takeaway for participants was gaining more insight into AI and cybersecurity and learning about the various open source tools to learn AI further.

2. 83% of the attendees rated the AI session facilitation a 5 out of 5 while 92% of the attendees rated the cybersecurity session facilitation a 5 out of 5.

3. 50% of attendees recommended that WomEng reach out to companies that could expand their presence in the tech industry to market these courses for their employees.

4. 55% of attendees noted that they would be willing to pay $33 USD or less for such a course. One attendee is willing to pay $300 USD if the course is accredited.

AI Knowledge Before Workshop   AI Knowledge After Workshop

8% ★★★★★ 67%
25% ★★★★ 33%
17% ★★★
42% ★★
8% ★

AI Knowledge: Participants were asked "How would you rate your knowledge on AI?" where 1 star = No knowledge to 5 stars = Clear understanding of the basics

Cybersecurity Knowledge Before Workshop   Cybersecurity Knowledge After Workshop

★★★★★ 58%
8% ★★★★ 33%
25% ★★★
42% ★★
25% ★

Cybersecurity Knowledge: Participants were asked "How would you rate your knowledge on AI?" where 1 star = No knowledge to 5 stars = Clear understanding of the basics

Feedback received on the content of the course:

1. The facilitation on the AI session was rated higher compared to the cybersecurity session.

2. 91% of participants noted that the content is highly relevant (≥ 4 out of 5 rating) to their current work or studies.

3. The biggest takeaway for participants was gaining knowledge on the various facets of AI and cybersecurity and open source tools they can use to further their education.

4. Participants would like to have more practical, interactive activities which includes using AI and cybersecurity tools during the course.

5. Participants would like to learn more about real-life examples/applications of AI and cybersecurity.

⭐⭐⭐⭐⭐ 83%
⭐⭐⭐⭐⭐ 92%
⭐⭐⭐⭐ 17%
⭐⭐⭐ 8%
⭐⭐
⭐

Session Facilitation: Participants were asked "How would you rate the facilitation of the AI & cybersecurity session?" where 1 star = very poor to 5 stars = excellent.

■ AI   ■ Cybersecurity

⭐⭐⭐⭐⭐ 83%
⭐⭐⭐⭐ 8%
⭐⭐⭐ 8%
⭐⭐
⭐

Relevance: Participants were asked "How relevant are the resources in the AI and Cybersecurity course would be for their current studies/work ?" where 1 star = very poor to 5 stars = excellent.

Biggest Takeaways	% of mentions
Knowledge about available open sources tools to learn about AI	33%
Gained more insight about the varying facets of AI and Cybersecurity	33%
The need to cultivate a continuous learning attitude to thrive in engineering and tech	25%
Women are needed in the tech industry to provide varying perspectives	8%

Biggest Takeaways: Participants were asked "What is your biggest takeaway from this workshop?"

Suggested Improvements	% of mentions
Have more practical activities and interactive discussions, including coding	42%
Include more discussions and activities on cybersecurity	25%
Provide more follow on courses with advancing levels	17%
Make it a week long workshop	8%
Have speakers who are AI specialists	8%

Suggested Improvements: Participants were asked "How can we improve our workshop for future AI and Cybersecurity workshops?"

Additional Content Suggestions	% of mentions
Real-life applications of AI and Cybersecurity	42%
No Improvements required	33%
Relevance of AI in different countries	17%
More information on programming	8%
Learning more about cybersecurity	8%

Additional Content: Participants were asked "What more would you have liked to learn from this workshop?"

Key insights on the sales and marketing for the course:

1. 100% of participants be interested in completing an online version of the course

2. 100% of participants would pay for this course.

3. 50% of participants said their company would be interested in using this workshop to train their staff. The remaining 50% stated "maybe".

4. 50% of participants recommended that WomEng markets the course to companies that could expand their presence in the tech industry

5. 58% of participants would pay $35 USD or less for this course.

Target Market	% of mentions
Companies that could expand their presence in the tech industry	50%
High school and university students	25%
Tertiary institutions	17%
Non-technical employees in IT/Software companies	8%

Target Market: Participants were asked "Who would you recommend that we market this workshop to?"

< $35 58%	$35 - $70 25%	> $70 17%

Pricing: Participants were asked "What amount would you be willing to pay to attend this workshop?"

"$70 - $350 if it's sufficiently accredited (Anything less just doesn't sound "legit"). North of $700 if it's a 6 week course with decent accreditation" – Ntombiyemfundo Mukwenha provided the highest price recommendation.

Moving Forward

The Bigger Picture

There is a need for introductory and advance courses. We are currently using the user feedback to create an online version of the in-person courses. It is beyond digitising content but understanding the user experience throughout the virtual modules. This is also part of our long term strategy to be more financially sustainable.

The Imagineering Lab also provides in-person support and helps female founders create a space to develop innovations to meet the market opportunity of products and services for women around the world. This is a $360 billion market opportunity.

How Do We Respond?

We are using a data-driven approach to create sustainable, systemic change. WomEng has created a platform for entrepreneurs to connect, cultivate and convert. The platform is the world's most diverse database for women in engineering and entrepreneurship. The platform allows users to connect across the platform and learn through using innovative online content. Our Innovation team also works on leveraging Artificial Intelligence to support a broad cyber security initiative to help women understand new technology better as well as creating tools to make women safer online.

Our Incubator and Accelerator supports female led innovation by providing an Imagineering Lab with the latest equipment to support rapid prototyping and product development. Our Start-Up and Scale-Up toolkits supports ventures from start-up to scale with everything from business mentors, venture clinics and our women in STEM investment fund.

Underpinning all our streams of work is the use of data analytics to provide insights on current trends, develop new programmes and content and provide thought leadership on the realm of gender, entrepreneurship, engineering and tech.

For partnership or investment opportunities connect with us today.