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1 Background and purpose of AfroSAFE

The primary objective of AfroSAFE is to make a significant progress in propagation of the Safe System modus operandi within the road safety work context in African countries. This is reached by exposing the local practitioners and decision makers to the state-of-the-art knowledge and practices within road safety management based on Safe System principles, as well as supporting them by sharing necessary knowledge, tools and methods for road safety improvement—adjusted to the African conditions and in tight cooperation with the local actors.

The project’s solid base is the Safe System perspective on how road safety work should be organised (WHO & UN, 2021). Its content is inspired by the recommendations of the Africa-EU Transport and Connectivity Task Force (Africa-EU Partnership, 2020) that have been operationalised to activities that are relevant and implementable in the specific conditions of the African countries involved. The activities are organised around the five pillars of road safety, namely: i) road safety management; ii) safer infrastructure; iii) safe vehicles; iv) safer road users and v) post-crash response (WHO, 2010).

The project entails activities covering all aspects of road safety in Africa, including: identifying current practices that are not in line with the Safe System, as well as existing formal and informal constraints within road safety management and suggest ways of addressing these problems; introducing additional/alternative road safety data, such as safety performance indicators; support establishment of national in-depth accident investigation teams and standardized databases; introduce infrastructure safety management tools, analyse and revise when needed the current practices of vehicle safety rating and control; suggest systematic measures to address the most safety-critical road user behaviours; analyse and improve the current practices in post-crash care; support establishing of training programs and contribute to building the local capacity in all the pillars of the Safe System; establishing local centres of excellence to sustainably the reproduction of the knowledge and skills; implementing pilot projects and demonstrations covering all pillars of road safety work; and finally, expanding the dissemination and demonstration activities to cover other African countries.

While these activities cover all aspects of road safety in Africa, two areas get particular attention and are emphasised in all work packages: vulnerable road users (VRUs) and local expertise building. VRUs are the largest but most underprivileged road user group in Africa, disproportionately impacted by traffic accidents. Creating safe environments for VRUs has a direct positive impact on several of the Sustainable Development Goals (UN, 2017), such as related to health and well-being (Nr.3), gender equality (Nr.5), sustainable and liveable cities (Nr.11) and climate action (Nr.13). To achieve Safe System in Africa, it is necessary to reach a critical mass of both road safety professionals and road users with the right knowledge and attitudes. It is a long-term process, and the local educators play the key role in it. The project thus adopts ‘train-the-trainer’ approach, creating the initial momentum and concentration of local expertise that will continue to spread after the project end.

2 Exploitable Results

2.1 Products

2.1.1 AfroSAFE Centre of Excellence

The project will develop a (primarily web-based) centre of excellence (CoE) to advance academic education and research in African countries. Among the main tasks of the CoE is to serve as a platform for sharing curriculums and educational materials and provide possibilities for online distance learning, serve as an academic community hub to stimulate research and teaching collaborations, and for the exchange of knowledge and lessons learned. The CoE will also organize several scientific events, such as webinars, annual conference in one of the African countries, research schools, etc. Among the activities envisioned for the CoE is also to actively collect and keep an updated list of available research funding, international and specific for African countries.

2.1.2 Educational material

Suitable and adapted training and capacity-building activities will be developed to fill the training gaps with respect to the Safe System approach and specifically emphasise vulnerable road users' safety. These training activities will take the form of lectures, interactive workshops and sessions, case studies and practical assignments, study tours, field trips, success stories and lessons learned (from both European and African countries).

2.1.3 Recommendations & guidelines

The following guidelines and tools will be developed:

- Guidelines for the development of national road safety strategies in line with Safe Systems principles.
- Local guidelines for the introduction of Road Infrastructure Safety Management tools.
- Recommendation for enhancing national guidelines regarding vehicle import, registration and inspection.
- Guidelines for emergency services in order to improve the interoperability and co-ordination amongst the emergency services.
- A business plan to detail the resources needed to ensure the sustainability of the capacity building and knowledge transfer.

2.2 Capacity building

Within each of the Safe System pillar, training of road safety professionals will take place to create a critical mass of relevant, up-to-date local expertise so that additional capacity can relatively quickly be built locally through education of additional personal, and by this achieve sustainability of changes. More specifically:

- A guided subject expert/practitioner workshop, in which participants will identify concrete ways to develop national safety management practices towards goal-driven Safe System management.
- Training of local professionals in applying Road Infrastructure Safety Management tools.
- Vocational training required of vehicle mechanics as part of the vehicle inspection procedures.

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- Training of driver education teachers with the aim to provide them with tools enabling them to increase their focus on the so called “higher order skills” in driving and to develop drivers’ risk awareness and cognitive skills related to interaction with VRUs.
- Training of the local university road safety academics to develop the capacity of exposing and training road safety professionals, key actors and decision-makers in governments, the private sector, and NGOs to the state-of-the-art knowledge on road safety management based on the Safe System approach.

2.3 Pilots

Several pilots are planned and will be conducted throughout the project, as follows:

2.3.1 Road safety management

Road safety management in three African and three European countries was studied and assessed regarding their alignment with the Safe System principles. Among the African countries, the formal road safety management plan in Ghana appears promising in a Safe System perspective. In this pilot, the actual implementation of the formal National Road Safety Strategy (NRSS) in Ghana will be studied, and the different Key Performance Indicators for each Safe System pillar in the Ghanaian road safety strategy will be compared with respect to their fulfilment, including factors that facilitate and impede fulfilment. This will provide information that other African countries can learn about successful road safety management.

2.3.2 Infrastructure safety

A pilot idea is to construct a bicycle track for demonstration purposes in Tanzania. This idea came about following discussions with Tanzania National Roads Agency (TANROADS) officers. The idea must be anchored at TANROADS leadership, and funding for planning and construction must be secured.

2.3.3 Vehicle safety

The aim within this pillar is to investigate existing regulations and standards in Zambia, Tanzania, and Ghana. Suggestions for improvements of the regulations and vehicle inspections will be proposed. A pilot will be conducted with local authorities to set up a demonstration of a vehicle inspection centre in one region, to test proposed methods of vehicle inspections. The skills of the vehicle inspectors will be a constraint of the technical controls being proposed, so an element of this task will be to suggest vocational training required of vehicle mechanics.

2.3.4 Safe road users

Within the safe road users pillar, three different pilots are proposed targeting three different groups of road users as follows:

Community empowerment of vulnerable road users: In Ghana contacts have been established with AMEND’s office in Accra, and we have discussed how we can cooperate and perhaps extend their existing work in connection to safe schools. In Tanzania, the focus will be on traffic safety for children leaving and entering the bus. The plan is to build a safe crossing if the AfroSAFE local partner in Dar Es Salaam would be able to secure funding for this from relevant stakeholders.

Safe transport company: Discussion has started with a company in Zambia (Coca-Cola) who would like us to train their drivers. The focus will also be to influence company safety culture through management commitment.

Training of driver education teachers: Contact has been established with a governmental driving school in Dar Es Salaam, Vocational Education and Training Authority (VETA) and in Accra

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(TOPTECH TRANSPORT & LOGISTICS). The aim will be to provide teachers with tools enabling them to increase their focus on the so-called ‘higher order skills’ in driving (e.g., risk awareness, hazard perception and cognitive skills).

2.3.5 Post-crash care

Within the post-crash care pillar, two pilots are planned:

Guidelines for emergency services to improve the interoperability and co-ordination amongst involved stakeholders (e.g., police, EMS, fire brigade, hospital) will be developed, and then test the guidelines by conducting simulations and exercises to see how they work in practice and ensure there is a system in place for reviewing the guidelines periodically to ensure that they remain relevant and effective. The specific African country has not yet been selected.

A joint training exercise for emergency services (hospital, police, fire brigade, and ambulance) to improve capacity, interoperability, operational effectiveness, etc. Also, here, the specific African country has not yet been selected.

2.4 Summary of the results

Table 1 presents the summary of the exploitable results of AfroSAFE.

Table 1. Exploitable results.

Name	Type	Ready for use?
AfroSAFE Centre of Excellence	product	Yes
Educational material	product	Yes
Recommendations, standards & guidelines (RISM tools, vehicle safety and inspections, emergency services)	product	Yes
Training of local professionals (e.g., vehicle inspectors, driver education teachers, emergency services)	training	Yes
Road safety management plan	product	Yes
Infrastructure safety pilots (e.g., cycle path, safe crossings)	pilot	Yes
Vehicle safety pilots (e.g., vehicle inspection centre)	pilot	Yes
Safe road user’s pilots	pilot	Yes
Post-crash care pilots	pilot	Yes

3 Exploitation of results by AfroSAFE partners

3.1 Lund University, Sweden (LU)

Lund University has a long tradition educating and consulting traffic safety specialists from low- and middle-income countries. The experiences and research results of AfroSAFE will provide much better reality connection to be injected in these activities. The educational materials produced in the project will be used both for the external courses given by the Lund University (for LMICs) and, with some adjustments, for the regular master education in traffic safety subject. Lund University plays an active role in other initiatives dealing with the subject of traffic safety in LMICs, such as Vision Zero Academy (<https://bransch.trafikverket.se/en/startpage/operations/Operations-road/vision-zero-academy/>) coordinated by the Swedish Transport Administration and the Vehicle and Traffic Safety Research Centre SAFER (<https://www.saferresearch.com/>). The hands-on experience and knowledge from the project will allow Lund University to take more important and exhaustive role in these activities.

Lund University plans to play an active role in the Virtual Excellence Centre created in AfroSAFE, even after the project end. The wide network of traffic safety professional in African countries and connection to the centre will enable Lund University to initiate new projects (research, education, consultancy) in the future.

3.2 Institute of Transport Economics, Norway (TOI)

The Institute of Transport Economics will exploit the results from AfroSAFE through three main channels. The first is through academic publications, like peer review journal papers, conference presentations, and conference proceedings. The Institute of Transport Economics has a long research history in conducting research on Vision Zero and factors influencing its implementation and success in Norway, e.g., through the Handbook of road safety (Elvik et al., 2009). In AfroSAFE, we take this interest further through a systematic focus on the Safe System approach, applied in a systematic comparison of European and African countries. This focus is important, as 93% of the road fatalities in the world occur in low- and middle-income countries. The second channel for communication of results is through formal and informal meetings with Norwegian stakeholders in road safety. These are included in AfroSAFE’s Norwegian reference group, e.g., the Norwegian Council for Road Safety, Norwegian Public Roads administration, the Norwegian association for traffic schools, the Norwegian trucking Association, the main transit authorities in Norway, large driver unions (e.g., Fellesforbundet). We have had several meetings and interviews with these actors (and plan more), where key actors are informed about AfroSAFE work, results, and experiences, and we receive important feedback. The third channel for communication and exploitation of results is Norwegian based actors within international aid work. We have had an informal meeting with one such actor (NORAD), where future cooperation and communication opportunities have been discussed, and where preliminary results of and experiences from AfroSAFE work have been discussed.

3.3 Swedish National Road & Transport Research Institute, Sweden (VTI)

The Swedish National Road and Transport Research Institute (VTI) has a well-established tradition to conduct multi-disciplinary research, as well as teaching driver trainers and professional drivers. VTI was part of developing the GDE matrix (Goals for Driver Education). In this matrix four different levels are included that begins with control of the vehicle, driving in traffic, goals and context of driving and goals for life. This matrix outlines that education should include all levels and emphasize that the training needs to include much more than just teaching how to handle the vehicle. The results

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from one of the pilots in AfroSAFE will provide us with a greater understanding of how driver training in Africa is conducted and how it can be improved, which in turn will be communicated to a wider audience both inside and outside of Africa.

Through AfroSAFE VTI has established a contact with AMEND, an NGO operating in several African countries. The aim is to cooperate with the above and evaluate one of their projects, which will focus on safe ways to school. By doing this we will share our knowledge and understanding of how to evaluate infrastructure changes which not only focus on those factors which can be observed (i.e., speed of vehicles) but also subjective changes (i.e., increased safety and accessibility). VTI also has the potential to cooperate with African research institutes and can invite PhD students. VTI organizes an international conference, Road safety on five continents (RS5C), which would be a perfect outlet for our research findings.

3.4 University of Education, Winneba, Ghana (UEW)

The University of Education (UEW) will exploit the results of the AfroSAFE project in many ways. Firstly, the project results will provide a useful academic resource for teaching, scholarship, and publication in road safety, especially from the safe system perspective. Through the proposed stakeholder engagements and pilots, the project outcome will also build the capacity of relevant local stakeholders and expose them to best practices in road safety management, road infrastructure safety, vehicle safety, safe road use and post-crash response and care.

3.5 Zambia Road Safety Trust, Zambia (ZRST)

ZRST will utilize the outcomes of the AfroSAFE project and highlights the potential benefits that can be derived from its findings. The focus of the AfroSAFE project lies in enhancing road safety, particularly from the safe system perspective. The utilization of the project results encompasses multiple areas, including academia, stakeholder engagements, capacity building, and promoting best practices in road safety management, road infrastructure safety, vehicle safety, safe road use, and post-crash response and care.

ZRST recognizes the importance of leveraging research outcomes to improve road safety and mitigate the adverse consequences of road traffic accidents. The findings of the AfroSAFE project hold significant value as an academic resource for teaching, scholarship, and publication within the field of road safety.

Through proposed stakeholder engagements and pilot initiatives, ZRST aims to disseminate the project outcomes among relevant stakeholders. These engagements will create opportunities for knowledge exchange, promote dialogue, and enhance collaboration among stakeholders, including government agencies, road safety organizations, law enforcement bodies, transportation authorities, and the general public. The involvement of these stakeholders will facilitate the adoption of best practices in road safety management, road infrastructure safety, vehicle safety, safe road use, and post-crash response and care.

Capacity Building of local stakeholders is a crucial aspect of AfroSAFE's strategy. These capacity-building initiatives will equip stakeholders with the knowledge, skills, and tools necessary for effective road safety management and contribute to the overall improvement of the road safety ecosystem in Zambia. ZRST recognizes the immense potential of the AfroSAFE project results in promoting road safety in Africa.

3.6 NTU International, Denmark (NTU)

NTU intends to expand its services portfolio thanks to the know-how acquired from the development of Pilot Projects in the field of post-crash care in Tanzania, Ghana, and Zambia. The development of

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these Pilot Projects and related activities will strengthen NTU’s positioning as a reference organization in the field, and open new opportunities for clients and project development. NTU will be able to offer insights into effective strategies, best practices, and lessons learned, helping clients make informed decisions and improve their post-crash care systems. NTU will use the project's results to benchmark and compare different post-crash care initiatives across countries or regions. By analysing the data and outcomes, the company will identify successful interventions, assess their impact, and identify areas for improvement. Moreover, NTU will apply the insights and findings from the project to design and implement new initiatives related to post-crash care. The insights will help identify target populations, develop intervention strategies, and design monitoring and evaluation frameworks to ensure effective project implementation and measure impact.

3.7 Technical University of Delft, Netherlands (TUD)

TUD will exploit the results from AfroSAFE project, and especially from Task 7.2 designing of training activities, by integrating the developed material in its online and on-campus educational courses, widening the scope of road safety education to include material, use cases, and exercises relevant for low and middle-income countries, both at the postgraduate level, as well as through training of professionals. Furthermore, the project results will be published and presented at national and international conferences and workshops and in scientific journals.

TUD will remain involved in the Virtual Excellence Centre that will be formed within the AfroSAFE project even after the project ends. This will facilitate the establishment of a long-term wide network of connections with traffic safety professionals in African countries and the initiation of future collaborations and projects.

3.8 Volvo Technology AB, Sweden (Volvo)

Volvo will in general exploit the results from AfroSAFE as Traffic safety has been at the heart of what Volvo does since it was founded over 90 years ago, and it remains so. Safety plays a vital role in driving continued prosperity. As a global supplier of transport and infrastructure solutions Volvo has a unique opportunity to contribute to both a safer traffic environment for people all over the world, and a safer work environment for the drivers and operators who use our products.

AfroSAFE WP4 Safe Vehicles will contribute to a better understanding of the key issues and accident causation to deploy vehicle safety technologies suitable for the African market. This could for example be systems to detect if a cyclist or pedestrian is within the risk area in front of a truck, using a front radar and camera, warning the driver if there is imminent risk of a collision. Of key importance is to enhance the regulatory frameworks in African countries to be better aligned with European regulations like the recently updated General Safety Regulation (GSR) to speed-up deployment of available effective solutions.

AfroSafe WP7 Capacity building will contribute to better training for transport professionals. Volvo supports locally vocational training of truck and bus drivers together with local partners in Africa, for example in Zambia at Nortec (Northern Technical College) in the city of Ndola. It is of key importance to provide high quality training to strengthen fleet operators to attract and retain professional drivers and maintenance personnel. Providing state-of-the-art vehicles and equipment is not enough. Proper usage, operation and maintenance are essential.

Autoliv Development AB, Sweden (Autoliv)

Autoliv, a supplier of global automotive safety systems with strong research and development in Europe, is a key player in the global automotive supply chain of automotive safety applications. Autoliv, Inc., the worldwide leader in automotive safety systems, develops and manufactures automotive safety systems for all major automotive manufacturers in the world. Autoliv is a pioneer in both seatbelts and airbags, and a technology leader with the widest product offering for automotive safety.

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Autoliv is a dominant airbag and seatbelt supplier with a market shares of 44% and 45%, respectively. As a tier 1 supplier, Autoliv supplies directly to all vehicle manufacturers (OEMs). Together with its joint ventures, Autoliv has 64 facilities with approximately 69,100 associates in 27 countries, including 2 facilities on the African continent in Tunisia and South Africa. In addition, the company has 14 technical centres in nine countries around the world, with 20 crash test tracks – more than any other automotive safety supplier. Sales in 2022 amounted to the US \$8.8 billion. Internet homepage: www.autoliv.com.

Autoliv Development AB, Sweden, a wholly-owned subsidiary of Autoliv, Inc., is the operating company within the global Autoliv organisation tasked with strategic research, IP protection and management, monitoring and advocating vehicle regulatory developments, governmental affairs, and exploring new markets and technology.

The results of AfroSAFE will form important input for developing our Africa product and market strategy to enable more vehicles are fitted with protective safety equipment of the highest standards. These results are expected to give us comprehensive understanding of current state and the future direction of vehicle safety regulations and development in the three countries representing the South, West, and East African blocs, which is essential for our future investment and operations in Africa. Further, Autoliv is represented in the Advisory Board of the United Nations Road Safety Fund – an important platform for advocating and stimulating private investments into road safety in Low- and Middle-Income Countries. The results from AfroSAFE will become an important part of our discussions within the forum.

3.9 Chalmers Industriteknik, Sweden (CIT)

Chalmers Industriteknik is a research and development organization with a focus on innovation for a sustainable society. In close collaboration with researchers, academia, and industry, we develop new technical solutions, environmentally friendly materials, and circular business models that provide real benefits to our society. CIT is also a partner of SAFER Vehicle and traffic safety centre at Chalmers. At SAFER, together with more than 50 partners from the Swedish automotive industry, academia and authorities cooperate to create a centre of excellence within traffic safety research and safe mobility. The ongoing project AfroSAFE is one of our international traffic safety projects, where we share knowledge between industry, academia, and governmental stakeholders. SAFER is hosting the IGLAD Global in-depth traffic Accident Database, to harmonize international traffic accident databases. At present, there is no African database in IGLAD, so participation in AfroSAFE will increase SAFER’s knowledge about the traffic situation within the African continent.

The participation in AfroSAFE will create an important input for understanding the African traffic situation in the three countries representing the South, West, and East African regions to improve research in vehicle safety areas.

3.10 University of Dar es Salaam, Tanzania (UDSM)

The University of Dar es Salaam (UDSM) is the oldest and biggest public university in Tanzania. UDSM will exploit the results from AfroSAFE project in the following ways; (1) by incorporating the developed content into its courses related to road safety and expand the coverage of road safety education to its staff, students (both undergraduate and postgraduate), and professionals through training programs and research activities. Additionally, the outcomes of the project will be disseminated through publication and presentation at national and international conferences, workshops, and scientific journals. (2) Through the established web-based Centre of Excellence, UDSM is planning to work with the existing Regional Centre of Excellence in Road Safety (RCoE) in Tanzania to organize training programs and workshops to enhance skills of local road safety researchers, academicians and professionals.

4 Analysis of the external stakeholders

4.1 Academics and researchers

Researchers and academics from different backgrounds (e.g., traffic engineering, behavioural sciences, psychology) who are interested to contribute to road safety will be interested in the outcomes of the AfroSAFE project, especially the educational materials and the possibility of networking with each other.

How to reach?

AfroSAFE adopts 'train-the-trainer' approach, creating the initial momentum and concentration of local expertise that will continue to spread after the project ends. One important product of AfroSAFE is the establishment of the Centre of Excellence which will serve as a platform for researchers and academics to connect and communicate with respect to sharing curriculums and educational materials and research and teaching collaborations.

4.2 Professionals

One focus area and main aim of the AfroSAFE project is to disseminate the Safe System way of thinking and road safety management approach among professionals (e.g., road authorities, vehicle authorities, driving schools, hospitals, emergency medical services, police, fire brigade and emergency dispatch services) that have a stake in road safety.

How to reach?

Different professional groups will be reached during the training activities planned within the AfroSAFE project. Furthermore, the educational materials can be further used by the Regional Centre of Excellence in Tanzania, which provides vocational training to professionals, by Transaid work in Ghana, which supports drivers, governments, and training institutions to improve road safety. Also through formal and informal meetings with Norwegian stakeholders in road safety which are included in AfroSAFE's Norwegian reference group, e.g., the Norwegian Council for Road Safety, Norwegian Public Roads administration, the Norwegian association for traffic schools, the Norwegian trucking Association, the main transit authorities in Norway, large driver unions (e.g., Fellesforbundet).

4.3 Policymakers

Policymakers need scientific research to make evidence-based and effective decisions and action plans to improve road safety. These action plans need to have SMART (specific, measurable, achievable, relevant, time-bound) goals and targets. They also need safety performance indicators to monitor the progress and impact of these plans. Allocating responsibilities and ensuring funding are key factors to guarantee its success. AfroSAFE will suggest recommendations and improvements to the current national road safety plans to align them with the Safe System thinking.

How to reach?

Decision makers on the national and local levels are already involved in the project, such as national and local road authorities, police departments and traffic authorities. The project outcomes will be presented at the final event in the last month of the project's lifetime. The final event will target the relevant African and European stakeholders and research community. Special attention will be given to inviting political decision-makers, including those from countries not directly involved in the project. The final event will contain presentations and a poster exhibition; mingling and personal face-to-face communication, demonstrations and show-cases based on the various pilots that have been implemented during the project.

4.4 Educational Institutions

It is highly important that newly educated traffic practitioners receive the most recent knowledge on the subject.

How to reach?

Within AfroSAFE, two African universities are already involved as partners: University of Education, Winneba and University of Dar es Salaam. Furthermore, as part of the AfroSAFE Centre of Excellence, other educational bodies will be involved.

4.5 Road users

This group relates road users in general and their input to traffic safety as well as to professional drivers (e.g., truck drivers, taxi drivers), and the local community along the selected corridors. These are individuals who may not directly participate in providing care but can still play a crucial role by contacting emergency services, providing information about the crash, or offering emotional/physical support to the injured until professional help arrives.

How to reach?

This external stakeholder group will be reached via collaboration with local and international organizations in Ghana, Tanzania and Zambia that provide vocational training, such as the Regional Centre of Excellence in Tanzania, and Transaid work in Ghana. The project will utilize social media platforms, websites, and online forums to share information, tips, and resources related to post-crash care. Moreover, we will collaborate with non-governmental organizations (NGOs) and advocacy groups that focus on road safety, emergency response, or public health. AfroSAFE will join forces to amplify the message, leverage their existing networks, coordinate awareness campaigns and events, and collaborate with schools, colleges, and universities to incorporate road safety and post-crash care education into their curriculum.

5 Conclusions

The exploitation results of AfroSAFE will include the AfroSAFE Centre of Excellence, educational materials, recommendations and guidelines, trainings of local professionals, and several pilots. The results of AfroSAFE will be exploited by the AfroSAFE partners through several channels, the produced educational materials can be included in Bachelor and Master education, also for organizing training programs and workshops to enhance the skills of local road safety researchers, academicians, and professionals. Furthermore, it can be used as input for consultancy, academic publications and conferences, formal and informal meetings with stakeholders, cooperation with actors within international aid work, promoting best practices, using the input to develop Africa product and market strategy to protective safety equipment, and for advocating and stimulating private investments into road safety in Low- and Middle-Income Countries.

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