DRONES FOR DEVELOPMENT

Dr.One

DR.ONE PROOF OF CONCEPT

EXECUTIVE SUMMARY- NOVEMBER 2016

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The Dr.One Proof of Concept has been a joint project of the Ghana Health Services (GHS), the United Nations Population Fund (UNFPA), the Netherlands Aerospace Center NLR and IDI Snowmobile B.V.

AKWAABA! WELCOME!

Dr.One aims to improve health care in remote areas of developing countries by using small drones for the transportation of small medical goods. Between February 2015 and May 2016 the Dr.One "Proof of Concept" (PoC) took place in both Ghana and the Netherlands. The main purpose was to establish whether the concept of Dr.One could provide a sustainable solution for the "last mile" transportation of (emergency) medicaments to people living in remote and hard to reach areas.

The programme was enabled by private investments and the "Life Science & Health 4 Development" funding of the Dutch Ministry of Foreign Affairs. The activities were performed in a partnership between the Ghana Health Service (GHS), the UN Population Fund (UNFPA), the Netherlands Aerospace Centre (NLR) and IDI Snowmobile. Close cooperation took place with the Ghana Civil Aviation Authority (GCAA), the Upper East Regional Coordinating Council (RCC) and the Navrongo Health Research Center (NHRC).

At the start of the Dr.One Proof of Concept (PoC) we wanted to identify how to best use small drones for augmenting the health care supply chain in remote areas of developing countries. Now, approximately one and a half years later, after an intense and successful PoC we have the answers we were looking for, and many more. We can now state with confidence that the Dr.One concept will save time and costs compared to current means of transportation, while having a positive effect on important health indicators.

The Dr.One concept is designed to operate as part of community based health care systems, in compliance with rules and regulations, including those for civil airspace. As part of the concept, a blueprint for its ecosystem has been developed, including the underlying business models, allowing for local production and maintenance. Low resource settings require a low cost, robust, long range, easy to maintain small Unmanned Aircraft System (sUAS) that does not require an extensive additional infrastructure: the Dr.One sUAS is developed as such.

We have no doubt that in the future small drones will serve patients in need in developing countries, even in the most remote areas. Performing test with delivery is a first step, but many more is required. Dr.One has developed a comprehensive overview of many follow-on activities required for realizing a sustainable solution.

The Dr.One concept is now ideally positioned for the next phase. It needs a final round of investments to get ready to go to the market, as described in the investment plan. Global and local partners have been identified and several prospect donors and investors have been approached, and options for additional funding are still being sought. As soon as funding for a next phase has been secured, Dr.One can further evolve to a solution that supports both the health care system and the economy of developing countries.

We want to thank all partners for their consistent support, knowledge, advice, insights and hospitality. This executive report provides an overview of the results of the Dr.One PoC, and we hope you enjoy reading it!

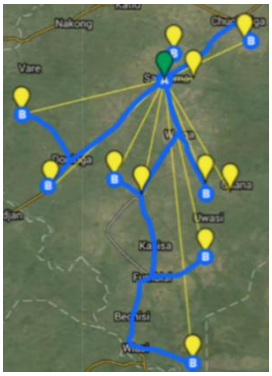
Gerald Poppinga

DRONES FOR DEVELOPMENT

Mirjam Jansen op de Haar

DRONES FOR DEVELOPMENT

THE DR.ONE CONCEPT



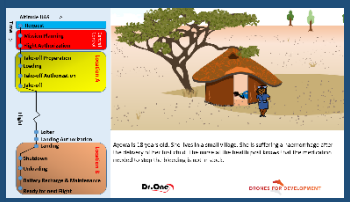
More than 2.5 billion people (about 40 % of the world's population) live in rural and remote areas of developing countries. Low income of the population, long distance to adequate health care facilities, poor public transport and inaccessible roads during the rainy season are barriers for the timely provision of health care.

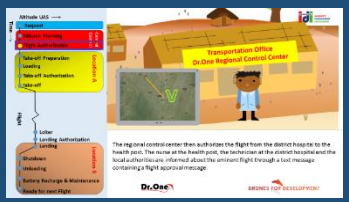
Health posts and dispensaries at community level can only function if there is regular supply of essential medical commodities from the regional and district centers. A lack of robust transportation systems makes it difficult for these medical facilities to adequately equip themselves and to handle emergencies. Consequently many medical situations get out of hand leading to complications, prolonged sickness and needless deaths.

The Dr.One concept aims to alleviate this problem by transporting health care commodities to remote communities in developing countries by small Unmanned Aircraft Systems (sUAS, often called 'drones' in popular language). The drone may be used for the transportation of health care commodities such as drugs, contraceptives, blood samples, rapid diagnostic test kits, vaccines, etc. The Dr.One concept is focused on 'last-mile delivery' of these health care commodities. This is coarsely defined as the last stretch of the supply chain, typically the last 50-100 km, e.g. from a district hospital or dispensary to a patient living in a small community in a remote area.

Integrating Dr.One in the Community Based Health Care System

The preliminary Dr.One Concept of Operations provides a detailed description of the Dr.One concept within the Community Based Health Care System of Ghana. The major components of Dr.One and their interactions are described, together with the interfaces to external systems. An illustrated example of how the concept will be operated in daily life is provided. The technical policies and constraints and the challenges that Dr.One faces are described. Additional information is provided in *IDI-TP-2016-015 Preliminary Concept of Operations (42 pages)* and *IDI-TP-2016-016 Preliminary Concept of Deployment (30 pages).*

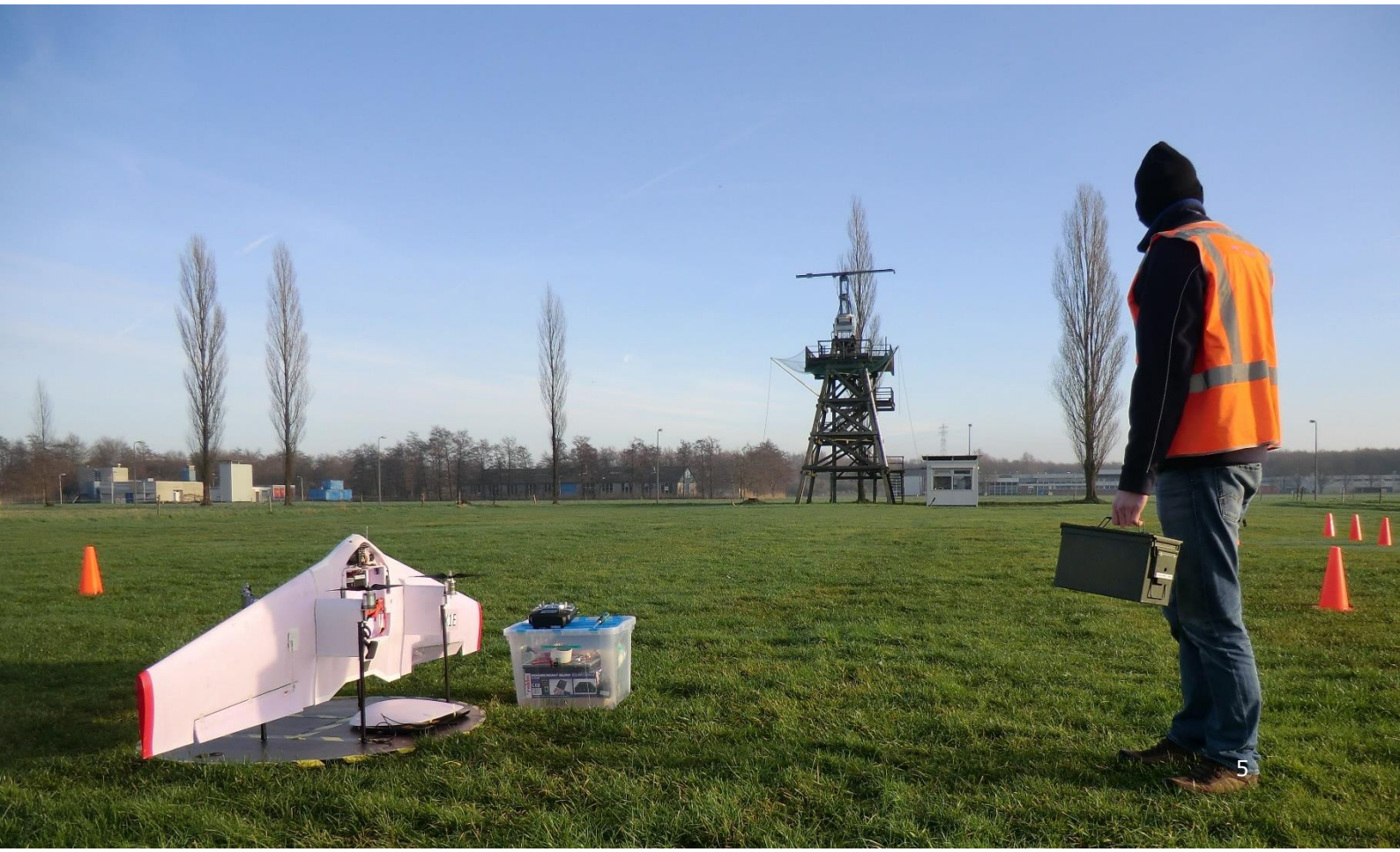




KEY FINDINGS

Dr.One:

- Brings small medical goods to and from remote areas;
- Helps to address several life threatening health emergencies;
- Addresses challenges that cannot be addressed properly otherwise;
- Fits into Community Based Health Care Systems;
- Is complementary to the existing motorbike system;
- Costs for a drone are comparable to that of a decent light motorbike;
- Is financially self-sustaining within the existing supply chain system;
- Saves time of personnel and costs of fuel;
- Is operationally self-sustaining with solar panels;
- Completed the Proof of Concept phase successfully.



USE CASE SCENARIOS

The Dr.One use case scenarios provide a solid basis for many aspects of Dr.One, e.g. for research on economical, medical, technical and social feasibility.

Based on discussions with the Ghana Health Service, the UNFPA and other experts on African health systems, five use case scenarios have been developed for Dr.One:

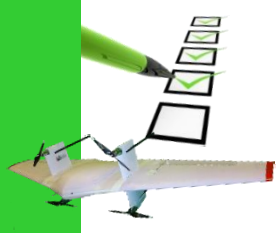
- Scenario 1: **Emergency medicine for a mother after giving birth**
- Scenario 2: **Out of stock delivery of medicaments/contraceptives**
- Scenario 3: **Additional delivery during a vaccination campaign**
- Scenario 4: **Emergency treatment of severe malaria in children**
- Scenario 5: **Antiretroviral therapy for pregnant women with HIV**

The use case scenarios are set up such that they contain information on both the current and the expected future practice. The scenarios have been extensively verified with various stakeholders and domain experts. The use case scenarios are assumed to be representative in general for remote areas in nations with Community Based Health Care systems. For detailed information please refer to the report *IDI-TP-2016-013 Dr.One Use Case (26 pages)*

DR.ONE REQUIREMENTS

At the start of the Dr.One Proof of Concept (PoC) phase, numerous implicit requirements have provided a solid foundation for the Dr.One Concept. During the PoC these requirements have further evolved. The relevant business- and political requirements, requirements on usability and on the interaction with the operational environment, and operational requirements for both the Dr.One systems and the production of Dr.One systems have been identified. Some of the resulting overall requirements for Dr.One have been included in the green block directly below. For detailed information please refer to the report *IDI-TP-2016-014 Dr One User Requirements (18 pages).*

- **Safe to use**
- **Easy to use**
- **Legal to use**
  - **Automated Flight**
  - **Beyond visual line of sight**
- **Politically compelling**
  - **Creates jobs**
  - **Contributes to Reducing maternal deaths**
- **Technology**
  - **Low cost**
  - **Carries up to 2 kg**
  - **Range of 100 km**
  - **Minimal moving parts**
  - **Vertical take-off and landing**
  - **Can be produced locally**
  - **Does not require complex infrastructure**



THE IMPACT OF DR.ONE IN GHANA

The impact on health indicators of adding Dr.One to the mix of "last mile" delivery vehicles is difficult to predict. In addition to having timely availability of medication, aspects such as sufficiently trained staff, healthcare seeking behavior and hygiene are also crucial. The actual impact of Dr.One can only be estimated by measuring the effects of Dr.One operations for a certain period of time. The following questions relating to the impact of Dr.One have been addressed during the Proof of Concept:

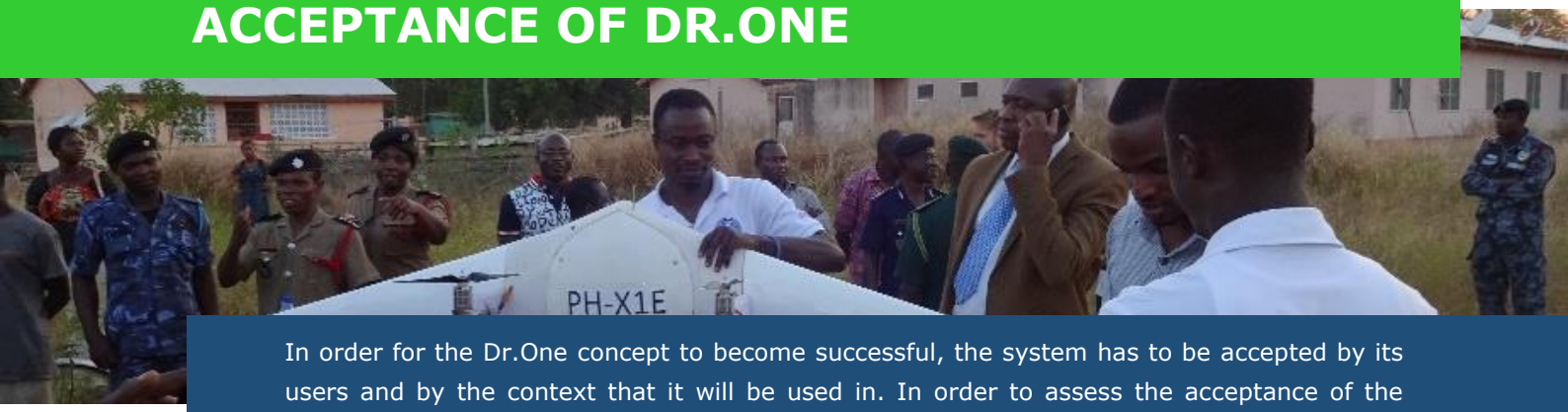
- **Is implementation of Dr.One services in line with the Ghana national strategy?**
  This question can be answered positively. The Dr.One concept focuses on the lowest level of health care and therewith strengthens the Primary Care Concept, which is a common strategy in many African countries. Moreover, the "Health Sector Medium Term Development Plan 2014-2017" states that expanded community based health services are seen as the strategy for achieving universal access to health.

- **Is Dr.One a solution for high-priority problems in remote/hard to reach areas?**
  This question can also be answered positively. Based on information retrieved by the Ghana Living Standards Survey from chiefs, elders and opinion leaders from rural communities in rural areas, approximately 63% of the communities in the Upper East Region mention the lack of adequate facilities and the distance to health facilities as their major problems for health care delivery.
  Approximately 68% of the communities mention that the community can only be reached part of the year by public transport. Dr.One services operate independent of road infrastructure and can deliver (emergency) medication and commodities when there are no other options. The focus of Dr.One is on facilitating care at the community level, at the local health facility that is staffed by a Community Health Worker or a nurse. The local health facility is where a pregnant woman with complications will most likely turn to in case of an emergency. When the roads are impassable and an ambulance is not available, Dr.One might be the only option to send required emergency medication to a local health facility.

- **How many lives can be saved/improved when Dr.One services are added to the transportation mix?**
  This question is difficult to answer due to lack of detailed data. For each use case scenario the lives that might be saved has been determined by using historical data. Although the factor transportation was of importance to these cases, it is not possible to guarantee that the cases would have ended differently when Dr.One services would have been available. However, currently a substantial percentage of medication that is most often transported by motorbikes reaches the patients too late or not at all.

The health indicators of the Upper East region are better than those in several other regions. It is plausible that implementing a Dr.One in a more challenged region will result in a higher impact. For detailed information on the impact of Dr.One please refer to the report *IDI-TP-2016-006 Metrics and Impact (44 pages)*.

ACCEPTANCE OF DR.ONE



In order for the Dr.One concept to become successful, the system has to be accepted by its users and by the context that it will be used in. In order to assess the acceptance of the concept as a whole and the operations with small Unmanned Aircraft Systems specifically, several interviews on the acceptance of Dr.One were held in Ghana.

From the lowest till the highest level of personnel at the various Dr.One stakeholders, the Dr.One concept generated a positive response. All persons in Ghana that were interviewed on Dr.One, and especially in the Upper East Region, display an open and welcoming attitude for the innovative idea of the Dr.One concept. Several persons indicate that they are used to simply give new things a try, and if something doesn't work, the idea is then to adapt it until it does work, or to try an alternative that might work.

Literature studies on the acceptance of drone technology in the western world, and on the acceptance of new technologies in Africa also provides valuable insights for the acceptance of Dr.One. As learned from input at the higher management in health care and at the political levels, it is very important to find broad support; at the political level, within the Ministry of Health, at the regional and at the community level. Transparent and reliable communications on the use of Dr.One will be very important.

Building customer awareness and informing the public on the positive aspects of Dr.One are all part of the acceptance strategy, when Dr.One is to be introduced within the Ghana Health Services. For more detailed information please refer to the report *IDI-TP-2016-001 Final acceptance study report (28 pages)*.

APPLICABLE RULES AND REGULATIONS

The most relevant rules and regulations for Dr.One operations in Ghana lie primarily within the fields of health care, aviation and national security. With respect to health care rules and regulations, the Ghana Health Services (GHS) Code of Code of Ethics applies. With respect to aviation, the Ghana Civil Aviation Authority (GCAA) has provided Dr.One with a set of rules that has to be adhered to. For reasons of national security the regional and local authorities, the regional and local police and the immigration services need to be asked for permission. For more detailed information please refer to the report *IDI-TP-2016-005 Applicable Laws and Regulations (50 pages).*

MARKET OVERVIEW

The civilian market for drones is expected to grow rapidly to extensive proportions. There are many forecast for the market, with widely varying scopes and timelines. A recent forecast specifically for small UAS indicates an annual market of 1.9 billion dollar by the end of 2020. Although there is a complete ecosystem for drones materializing, the current market mainly focuses on the application of drones as a platform for sensors, e.g. cameras.

Drone delivery is currently strongly restricted by regulations. For cost efficient drone delivery, a drone should be allowed to fly in an automated manner from one location to another that can be many kilometers away. Regulations in many countries do currently not allow for this type of operation, creating an important cause for the drone delivery market to be virtually non-existing. Expectations are, however, that as of 2019 drone delivery will evolve to become a significant market.

The worldwide need for the Dr.One concept can probably be identified with the help of four relatively simple criteria: developing country, poor infrastructure, challenged health care system, and a high percentage of people living in rural areas. An assessment of various data sources indicates that there are 35 countries that qualify for these criteria. Next to the Ministry of Health of these countries, organizations for National Health Service, International/Non-Governmental Health Care Organizations, Third Party Logistics Service Providers, Pharmaceutical manufacturers and specialized medicine supply organizations qualify as potential customers for Dr.One.

A top down analysis was performed to estimate the total market for the "last mile" delivery in Ghana; in 2014 the expenditure would have been approximately 15 M€. A bottom up estimate provided a potential market volume specifically for Dr.One, based on the number of facilities from which Dr.One would operate; this results in a market volume of approximately 2.5 M€ per year. As this volume might not provide sufficient critical mass for Dr.One, product diversification and/or expanding the market to Sub-Saharan Africa should be considered. The total addressable market for Dr.One in Sub Saharan Africa varies between 100 M€ and 140 M€ per year. The estimates for both Ghana and Sub-Saharan Africa are conservative, as they are based on MoH expenditure only, and do not incorporate potential other customers nor any kind of product diversification for Dr.One. For more detailed information on the market for Dr.One, please refer to the report *IDI-TP-2016-008 Market overview (38 pages).*

Dr.One is developed for use in Africa, in low resource settings with the need to be highly robust. Expectations are that once the Dr.One small UAS has evolved to a fully operational system in developing countries, it is more than fit to operate in other parts of the world as well.

INVESTMENT PLAN

More than 1.2 M€ in means and hours has been invested in Dr.One so far, resulting in a successful Proof of Concept (PoC). Additional investments are required for the *Pre-Market phase* and the initial *On-the-Market phase*. A structured analysis of the Dr.One concept identified the necessary investments. All elements required to implement Dr.One successfully were identified and included in the calculations.

The *Pre-Market phase* of Dr.One requires an investment of 3.06 M€. This includes additional development of the Dr.One drone, the implementation of the Dr.One concept in a realistic district setting, and a detailed impact study. At two hub and several spoke locations, Dr.One will then start to provide operational services, in order to mature the concept further whilst validating the sustainability of the operations. Next to an initial Operator Organization for Dr.One, a local Maintenance, Training and Production facility are set-up. At the end of the *Pre-Market phase*, the Dr.One concept is considered to be a market ready product.

During the initial *On-the-Market phase*, equipping a region similar to the Upper East Region with the Dr.One concept is expected to require an investment of approximately 2.2 M€. The Dr.One hub and spoke network will then cover one Regional Medical Warehouse, 10 district hospitals or district health directorates and 120 health posts. The figure includes the costs for setting up an Operator, a Maintenance and a Training Organization, together with a Production Facility. If the Dr.One concept is integrated into existing real estate, and a cost efficient solution for defining the routes is established, investments go down another 65% to 72.5k€ per district. Once Dr.One gets to scale, and the basic infrastructure is in place in a country, the investment for adding an additional location are limited to approximately the cost for an drone. For more details on the investments required for Dr.One, please refer to the report *IDI-TP-2016-010 Investment Plan (36 pages).*

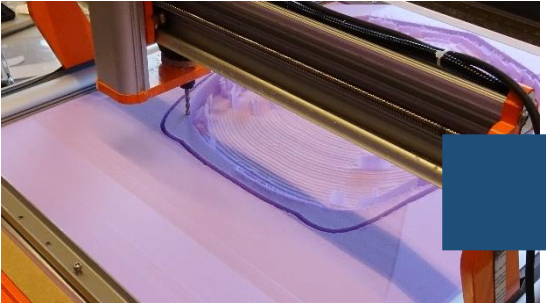
FINANCIAL OPPORTUNITIES

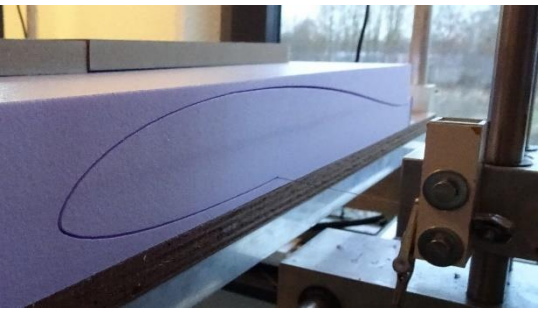
The Dr.One Proof of Concept (PoC) has been funded by private investments and the Dutch Ministry of Foreign Affairs. For the *Pre-Market phase* and the consecutive *On-the-Market phase,* many relevant financial opportunities have been identified, ranging from grants, subsidies of foundations and governments, social impact/investments funds, venture capitalist, crowdfunding, traditional investment to other opportunities.

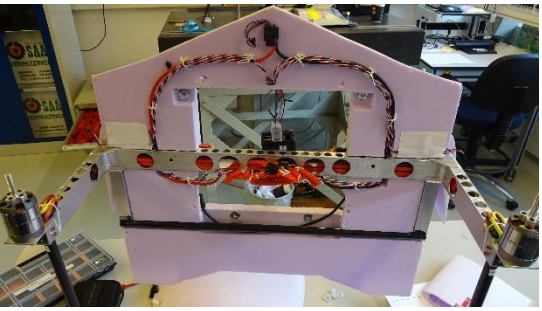
During the PoC, many opportunities to attract funding were chased after and numerous proposals have been developed. However, so far it has proven to be impossible to attract additional funding. The Dutch government does not (yet) provide any instruments for bridging the gap between *proven concept* and the *ready to go to market*. Several characteristics of the Dr.One Concept are perceived as high risk, and in combination with the low direct return on investment, it seems impossible to attract financing from investment funds, venture capitalists and traditional investors. Crowd funding requires a significant campaign and ditto resources, and even if successful, will most likely lead to amounts that are insufficient for the *Pre-Market phase* of Dr.One. Private parties show an interest in Dr.One, yet do not (yet) see the need to invest.

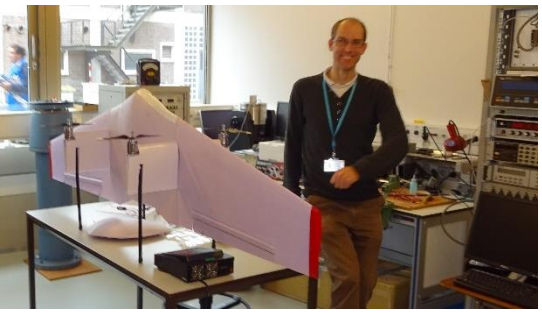
Expectations are, that after completion of the PoC, when all findings of the PoC have been consolidated, the willingness to further finance the Dr.One Concept might increase. For detailed information please refer to the report *IDI-TP-2016-007 Financial opportunities overview (90 pages).*

THE DR.ONE SMALL UAS









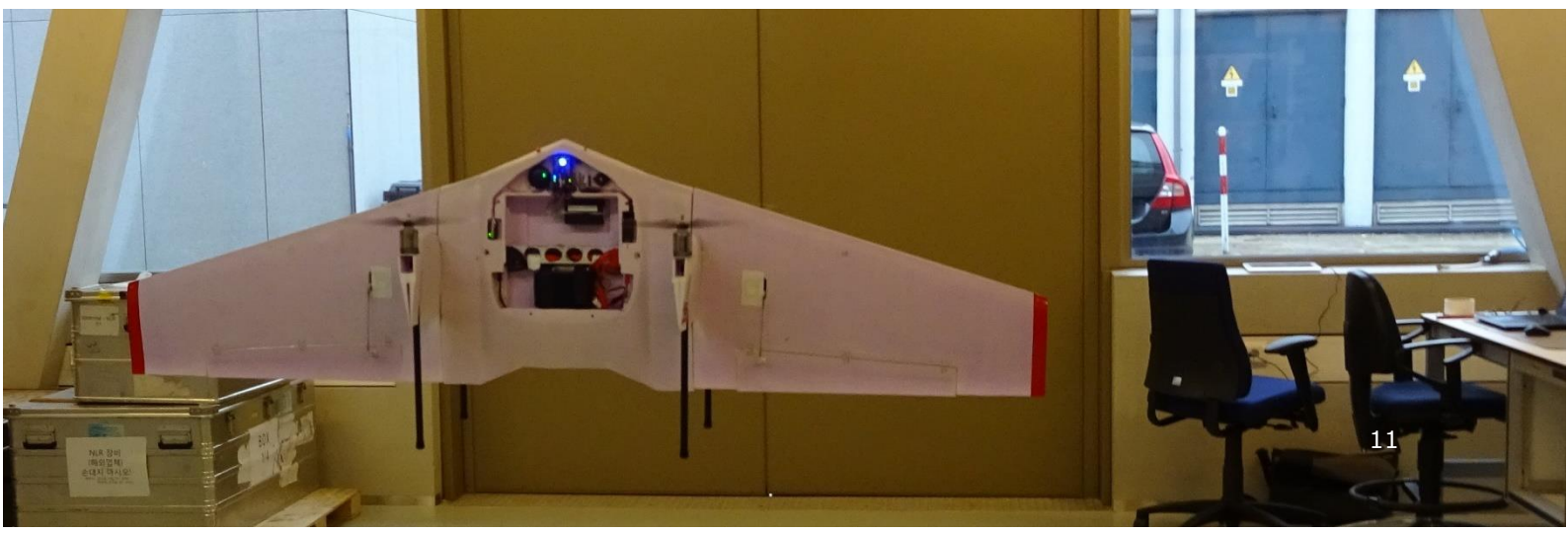
Dr.One is a scalable design of low cost components, and aims to transport up to 2kg over a distance of up to 100 km. The on-board electronics are based on commercially off the shelf and open source products, and a low-cost reliable data link is used for controlling the Dr.One drone.

Four Dr.One prototypes have been designed, implemented, and flight tested in an iterative evolutionary process during the Proof of Concept (PoC). Results of flight tests with the consecutive prototypes have been used to improve the system design. The first steps towards the development of a robust and reliable autopilot, adjusted to the specific configuration and characteristics of the Dr.One design, have been made. An initial ground control solution for take-off, landing, and flight monitoring has been established. Airworthiness checks have been performed to address safety and airworthiness concerns.

For detailed information about the design and testing, please refer to the reports *NLR-CR-2016-026 System Design Description (86 pages)* and *IDI-TP-2016-017 Developmental, Initial Operational and Final Test Report (58 pages).*

The transition from hover to horizontal flight for the Dr.One small UAS has been demonstrated with the fourth Dr.One PoC prototype. Further experimental flights are required to finalize the autopilot development. The data collected during these flights will be used to improve the Dr.One aerodynamic model, to generate an improved autopilot and to facilitate the removal of the elevons and associated actuators and electronic circuitry, to further reduce the number of moving parts on the system.

Additional improvements of the system design are required to improve robustness and enable low-cost production of the Dr.One system. This includes replacement of the welded aluminum frame with a frame of glued carbon components. The integration of solar panels in the body and wings is also part of the Dr.One roadmap.



PRELIMINARY BUSINESS CASES

The Business Case for Dr.One is considered viable when Dr.One is cost effective in comparison to the current processes for last mile delivery of health care commodities. Three consecutive evolutions of a business case for Dr.One have been developed.

The ***initial business case*** was drafted by a team of the *Marshall School of Business* of the *University of Southern California* (USC). The high level findings were: the distance of a drone trip to a health facility are on average two third of the distance of a motorcycle trip to that facility; the costs for a trip by a drone to a health facility are significantly below that of a motorcycle; a trip by a drone to a health facility is significantly faster than the same trip by a motorcycle; when the weight of the goods that need to be transported exceeds twice the maximum capacity of the drone, it becomes cheaper and faster to deliver the goods by motorcycle. For more detailed information, please refer to the report *IDI-TP-2015-006 Initial Business Case (26 pages).*

The ***intermediate business case*** compares the financial costs of Dr.One operations to those of the current Motorbike Supply Chain System (MSCS). The analysis is based on the Dr.One use case scenarios and is put in the context of a representative district, the Builsa in the Upper East Region of Ghana. The average occurrence for each of the scenarios have been determined by using actual health care statistics, in consultation with the Navrongo Health Research Center (NHRC).

Purely based on the recurrent costs, calculations imply 11,3 Eurocents per km for the MSCS and of 8,7 Eurocents per km for Dr.One. The biggest savings for Dr.One are in human resource and fuel/electricity costs. Under the assumption that Dr.One has similar indirect costs as the MSCS, the overall costs for Dr.One are expected to be 22,4 Eurocent per km. This alone saves 2,6 Eurocent per kilometer compared to the 25 Eurocent per km for the motorbike. Additionally, the trip distances for Dr.One are significantly below that for a motorbike. When Dr.One instead of the MSCS takes care of all instances of the five use case scenarios in the Builsa district, the savings are little over €3000,- per year.

Once Dr.One is implemented in each rural district in Ghana, as an augmentation to the current MSCS, the overall savings for the whole of Ghana could be slightly more than € 357.000,- per year. When including all health facilities in Ghana located outside of the greater Accra region, the overall savings could become slightly more than € 783.000,- per year. A reduction of about 30% of the costs for transportation at the lowest level in Ghana would then be realized. For detailed information please refer to the report *IDI-TP-2016-011 Intermediate Business Case (54 pages).*

FINALIZED BUSINESS CASE

The finalized Business Case has been developed according to a formal Design For Six Sigma (DFSS) phasing: (1) Define, (2) Measure, (3) Analyze, (4) Develop, and (5) Verify. DMADV is a Six Sigma methodology used to design new processes while ensuring the end product or service is correctly delivered to the customer. The Navrongo Health Research Center helped to collect the data required.

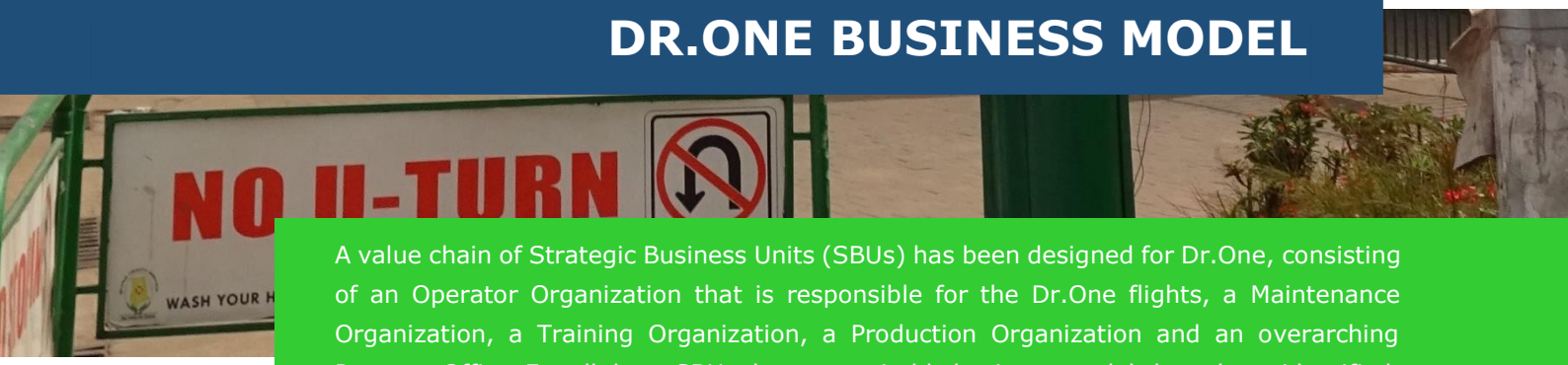
The deployment of Dr.One drones for the transportation of health commodities to remote locations, as an augmentation to the existing motorbike supply chain system, is cost effective. On the basis of actual health care data, the need for five hundred Dr.One flights per year in the Builsa district alone could be established. Actual cost savings for the Ghana Health Services amount to US$ 4,129 per drone per year when Dr.One drones are introduced in small quantities, for example at one location in the Builsa district.

Main cost savings can be attributed to differences in fuel costs (only low energy costs for electrically powered drones) and difference in vehicle speed during transportation (mainly resulting in low operator costs for the high-speed drones, when compared to the costs for motorbike dispatch riders). These two factors alone (fuel and vehicle speed) account for the majority of cost savings. The notion that drones fly point-to-point in a straight line while motorbikes follow a longer route via a road structure accounts for additional but smaller cost savings. Savings on wear-and- tear of motorbikes, savings on replacement of parts and savings on accidental damage to motorbikes are estimated to be smaller, but hard to predict at this stage, due to lack of usage data. Recruitment and training of qualified personnel for the launch and recovery of drones has to be taken into account as an extra cost factor for Dr.One drones.

In terms of size, the districts in the UER are assumed to be representative for the average district in Ghana. Builsa district is assumed to be representative for all other districts in terms of the Use Case scenarios. Linear scaling of the assumed savings of US$ 4,129 per drone per year results in total savings of US$ 412,900 for the whole of Ghana. Initial procurement costs for these 100 drones (US$ 5,000 each, including the rechargeable battery pack) would be $500,000. Hence, expected return on investment in these drones would take slightly more than one year. The resulting 50,000 flights per year, saving US$ 8.00 each, would serve a 20 million population with an initial investment of only 2.5 US$ cents per person of this population and with considerable health care effects, potentially saving thousands of lives.

Introduction of larger numbers of drones for transportation of health commodities in Ghana provides increasingly larger marginal cost savings per drone. Apart from the cost savings in transportation, which are relatively tractable, there are health care benefits that are at least as important, if not more important, but that we were not able (and did not attempt) to quantify within the current study. However, it must be realized that the cost savings associated with such health care benefits are more than substantial. For detailed information about the finalized business case, please refer to the report *IDI-TP-2016-012 Finalized business case (108 pages).*

DR.ONE BUSINESS MODEL

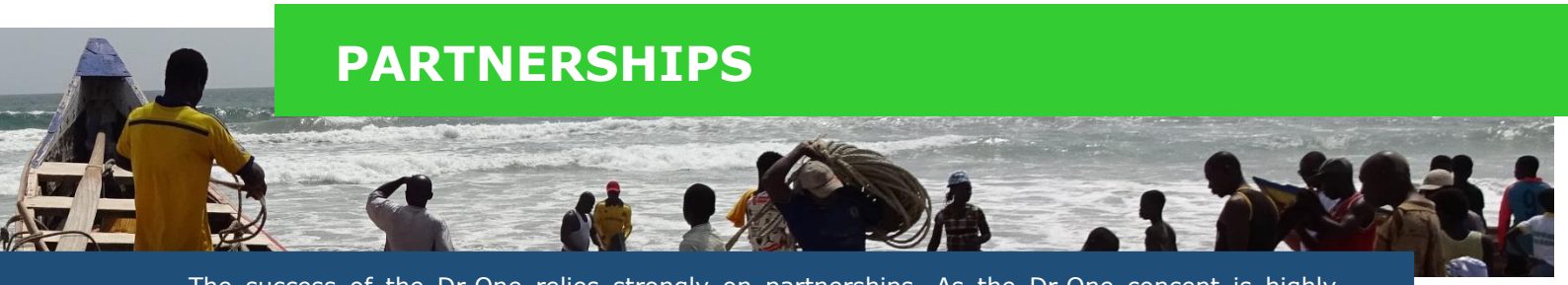


A value chain of Strategic Business Units (SBUs) has been designed for Dr.One, consisting of an Operator Organization that is responsible for the Dr.One flights, a Maintenance Organization, a Training Organization, a Production Organization and an overarching Program Office. For all these SBUs the most suitable business models have been identified.

The Dr.One operator organization makes use of the *usage based* model; every delivery made is charged with a small fee to the health supply chain. In addition, the operator organization generates revenue by the *advertisement* model, through providing targeted digital content at remote locations. An operator organization can operate as part of a national Dr.One organization, can be integrated within existing health care organizations, but can also be *franchised* out to contractors. The production and maintenance organization initially start off with models that respectively focus on paying for products and hours spent, and as the concept matures, migrate towards a *usage based* model as *power by the hour*. The training organization uses a *onetime up-front charge plus maintenance* model, and a *subscription* model is used for continued access to training information.

The Dr.One program office initially uses a model that focuses on paying for products and hours spent, and then migrates towards a *fixed price* model. For its recurrent activities and for the further development of Dr.One the Program Office offers a *subscription* model. For more detailed information please refer to the report *IDI-TP-2016-009 Business Model Study (36 pages).*

PARTNERSHIPS



The success of the Dr.One relies strongly on partnerships. As the Dr.One concept is highly comprehensive, it requires many well-chosen partnerships.

Many Dr.One partners have been identified during the Dr.One Proof of Concept. For the *Pre-Market Phase* there is a need for financial partners, development oriented research organizations, implementing partners and technology partners. During the *On-the-Market Phase* there is an add-on need for partners to help shape the Strategic Business Units (SBUs) described in the Business Model Study.

More than 120 "global" organizations have identified that provide added value for Dr.One and that have shown interest in contributing to the project. Additionally, similar initiatives as Dr.One have also been identified and consulted. One finding of the latter activity is that Dr.One is well positioned. For detailed information please refer to the report *IDI-TP-2016-003 Global Partnership Overview Report (60 pages)*

From its inception, Dr.One has the intention to operate locally as much as possible: one example is the aim to have Dr.One locally produced and maintained. Strong local partnerships are considered to be key for success of the Dr.One concept. For this purpose a local partnership analysis has been performed by the Dutch Embassy in Ghana. For detailed information please refer to the report *IDI-TP-2016-004 Local Partnership Overview Report (32 pages).*

"I firmly believe your hybrid Dr.One is a brilliant solution to the dual requirements of safe landing and range, that have not been addressed satisfactorily any other way, to my knowledge. The closest alternatives would be to use landing nets or parachutes for fixed wing aircraft, both of which have been tried, but in my view they are clumsy methods that will probably not find traction in a third world setting."

Prof. Dr. Barry Mendelow

Early pioneer in the use of small unmanned aircraft systems for health care purposes at the National Health Laboratory Service, South Africa (from 2004 ~2010).

Professor Emeritus at the University of Witwatersrand, Johannesburg, and chair, Academy of Sciences of South Africa Consensus Study on Nutritional Influences on Human Immunity.

Picture of a Dr.One small UAS prototype taking-off during flight tests at the district hospital in Sandema, Builsa North district, Upper East Region, Ghana, in November 2015

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Dr.One

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