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Just in Time Blood Delivery

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A vision for the future of healthcare

Ensure patient access

Fast and reliable access to all essential medicines & health products

15-45 min.
response time

Empower providers

All health workers have the supplies needed to practice at the top of their training

0%
stock-outs

Eliminate waste

No expiries or losses from improper storage

0%
waste

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Autonomous vehicles and robotics are transforming logistics

- Driven by ecommerce, parcel delivery is growing by 7%-10% per year[1]
- In 10 years, autonomous vehicles will deliver 80% of parcels in the developed world[1]
- By 2020, the market for drone-powered transport will be worth over $13B[2]

1 McKinsey & Company, “Parcel Delivery - Future of the Last Mile,” September 2016
2 PwC, “Global Report on Commercial Drones,” May 2016

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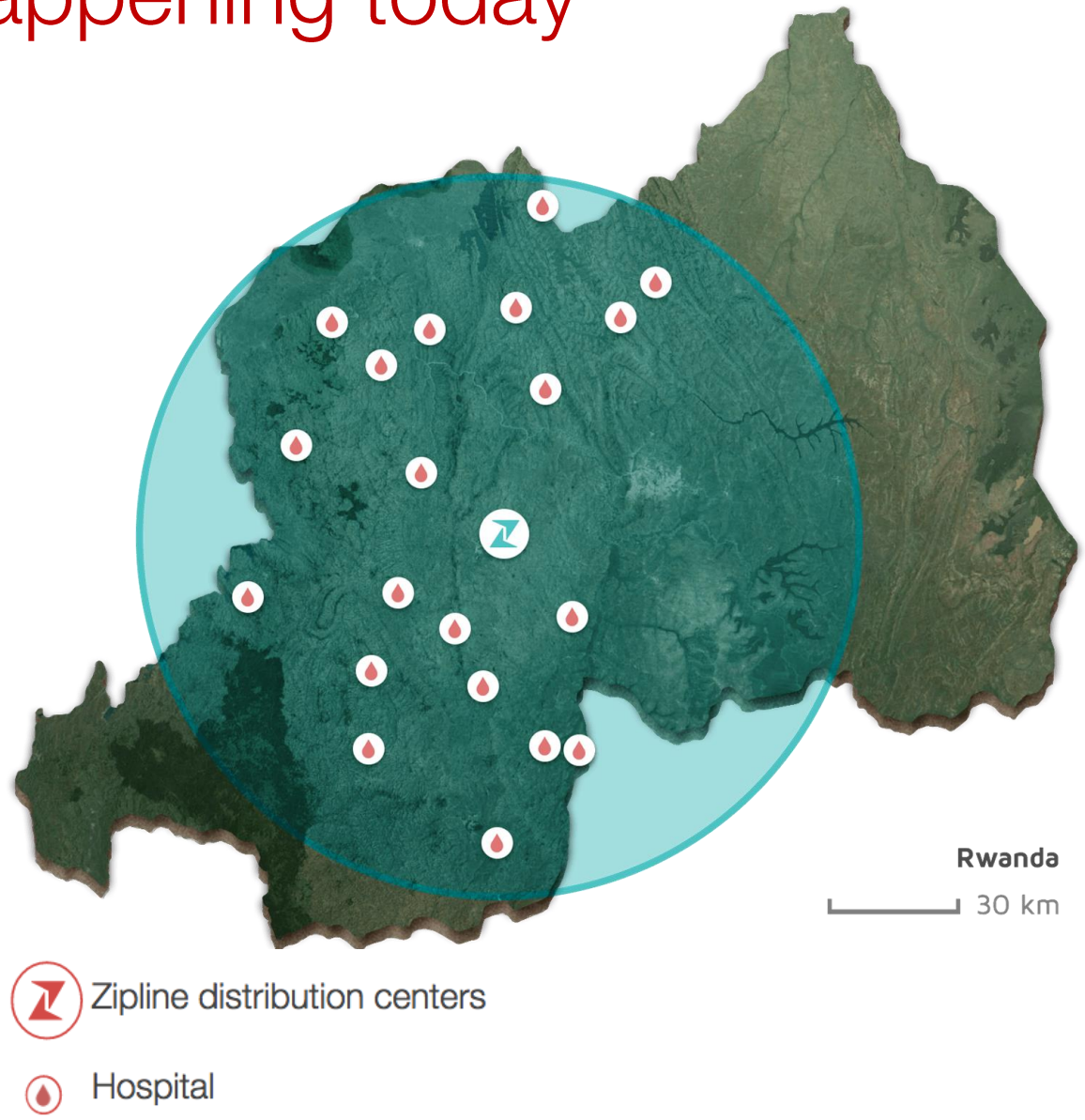
Zipline is a Silicon Valley-based logistics company that designs, manufactures, and operates drones to deliver urgent medical products on demand
zipline

Drone delivery of blood is happening today

- Service began 2016 and operates 7 days/week
- Delivers ~25% of national blood supply outside the capital
- Depended on by hospitals for routine and emergency needs
- 50% of blood transfusions benefit mothers experiencing postpartum hemorrhaging; 30% benefit children with severe anemia
- Serves 12 million people



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First ever commercial drone delivery of
blood to a hospital

In one year since launch, Zipline has transported

5000+ DELIVERIES

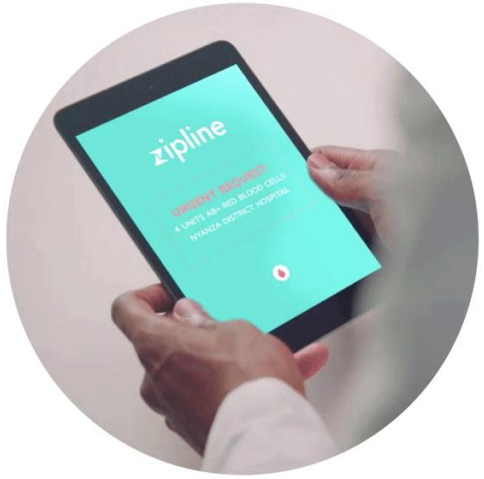
10,000+ UNITS OF BLOOD

30% of the orders we fulfill are for medical emergencies.

Before, getting an emergency supply could take up to 8 hours.

This process now takes ~30 minutes.

How Zipline's autonomous, on-demand deliveries work



Health facility places order for products via mobile

+ Processes both routine and emergency orders

Distribution center prepares package and dispatches a Zip

+ Orders are packaged in no more than 10 minutes

Zip flies to health facility via pre-calculated flight path

+ Reaches delivery site in 15-45 minutes
+ Real-time data provided to health and aviation authorities

Zip notifies recipient and drops off package

+ Package delivery is gentle and precise
+ Zip returns to the distribution center

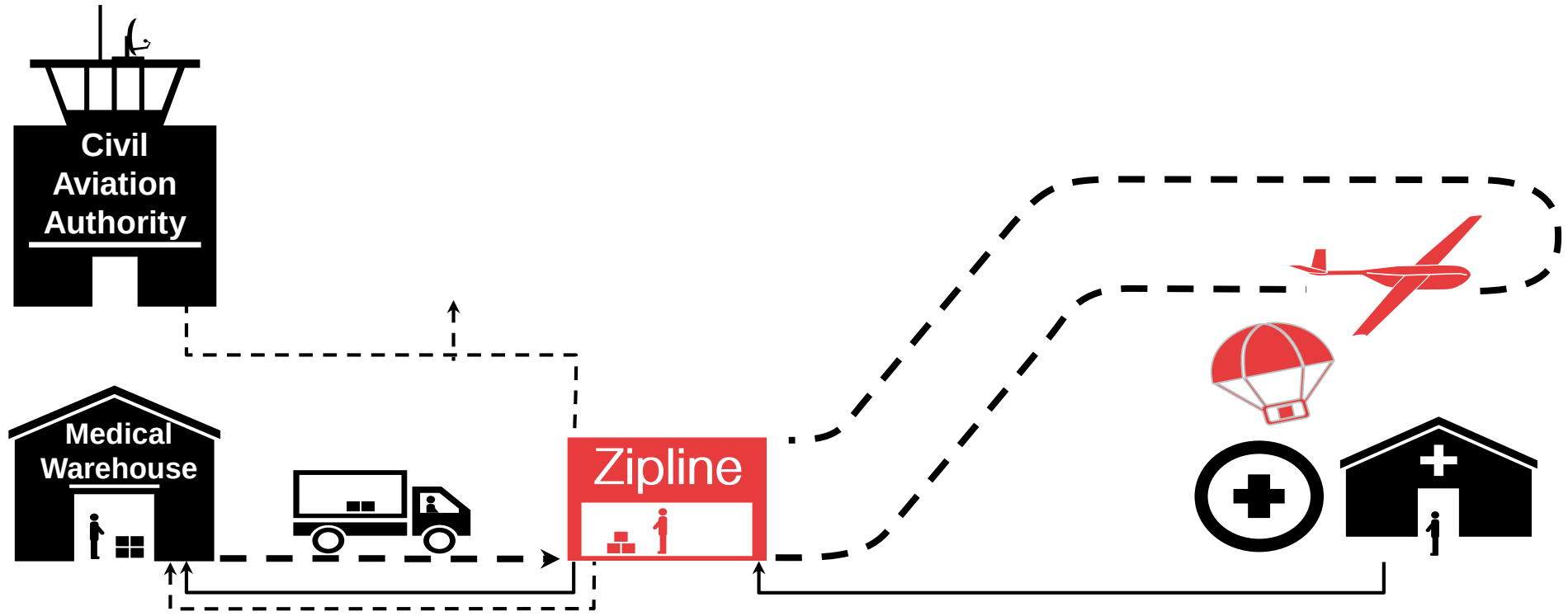
Zipline co-locates with existing warehouse, increasing reach & responsiveness

A single distribution center can:

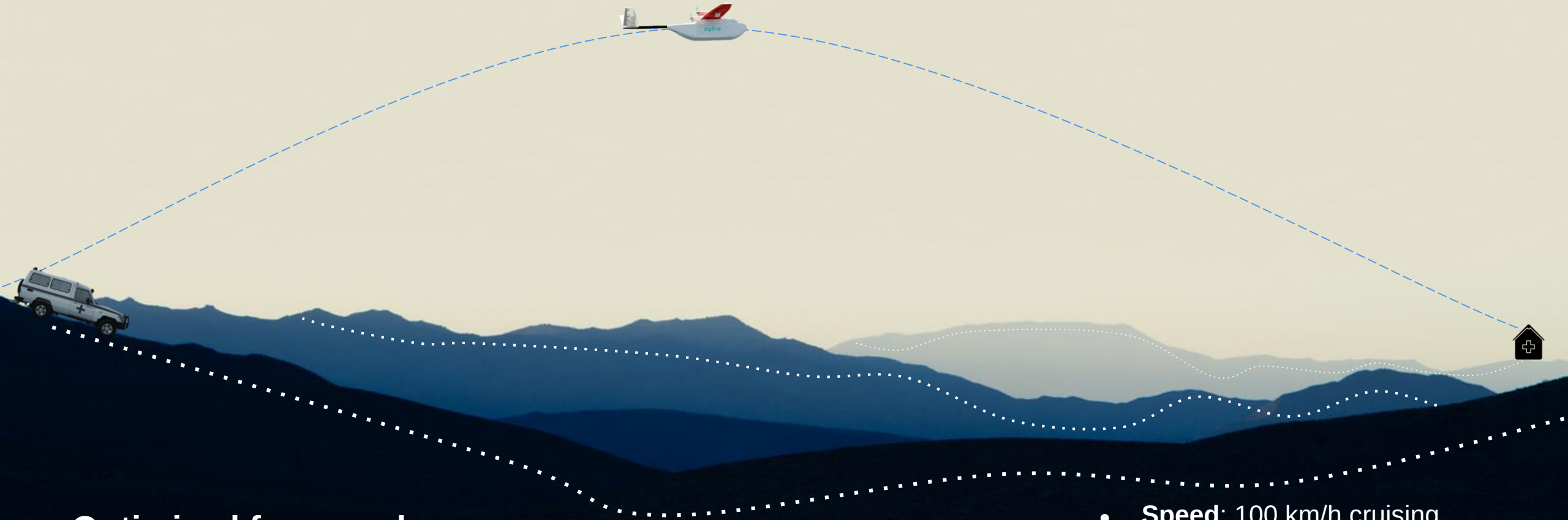
- fulfill hundreds of orders per day to facilities across the region
- make just-in-time deliveries in 15-45 minutes
- Deliver up tp 0.875 metric tons from each DC
- serve any delivery site in a 25,000+ square km area, even in severe weather

Distribution center can be set up in 7 days

Zipline integrates with the healthcare supply chain as a third party logistics service



Zips are designed to safely and reliably serve even the hardest-to-reach locations



Optimized for speed, distance, and weather durability

- **Speed**: 100 km/h cruising
- **Range**: 180 km round trip
- **Payload**: Cargo up to 1.5 kg/9L
- **Weather:** Sustains heavy rains and gale-force winds

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2018 Progress to Date

Deliveries in 2018

106 / 2377

Weekly / Total

Units delivered in 2018

194 / 4426

Weekly / Total

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Delivering at national scale by end of 2018

Just-in-time delivery through Zipline: Lower emergency procurement costs

Reduction in cumulative cost: transport + delay in treatment

Respond to stock-out or emergency by immediately delivering all lifesaving medical supplies

- Shorter response time
- Lower transport cost per unit

Maximum delivery time of emergency blood products

8 hrs
Before Zipline

45 mins
After Zipline

Most importantly, Zipline is directly impact patient health

Following a caesarean section, a patient (female, age 24, blood type B+, gravida 2, para 1) developed complications, which prompted a laparotomy with:

- Hemoglobin = 5.5 g/dl,
- Platelet count = 63 x 10^9/l

Kabgayi DH placed an emergency order for pRBC, FFP, and PLT, and Zipline made 5 deliveries, with the first arriving in less than 20 minutes

The patient was transfused with:

- 7 units of pRBC (3 units O+ already in stock; 4 units B+ delivered)
- 4 units of FFP delivered
- 2 units of PLT delivered

Outcome: Full recovery

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Doctors are in love with the service, which allows them to focus on patients

We are enabling doctors to provide better care

> *“An 8 year old male patient was consulted for severe malaria [and] we needed more pRBC… Zipline made an emergency order to the hospital. Then Zipline immediately brought a second unit, and we saved the boy.”*
>
> – Dr. Pascal, Nyanza DH

- Use of PLT and FFP have increased by over 175% at the hospitals served
- Previously, many doctors did not use PLT or FFP due to challenges with access and long delays

Note: pRBC = packed Red Blood Cells; PLT = Platelets; FFP = Fresh Frozen Plasma

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Zipline is eliminating stock-outs of blood products

100% demand satisfaction rate for hospitals served

> *We can now expect to have blood from any time without delays.*
>
> — Pelagie, Muhororo lab technician

> *The unpredictability of blood requests from the departments ceased to be a problem.*
>
> — Genevieve, Nyanza lab technician

1 Source: Mid Term Review of the Rwanda Third Health Sector Strategic Plan

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Faster delivery means better patient outcomes

"It was because of Zipline that I was able to regain consciousness. They delivered the blood in a few minutes."

- 50% of blood transfusions benefit mothers experiencing postpartum hemorrhaging
- 30% benefit children with severe anemia

Zipline’s partnership in Rwanda has saved over 1,100 lives

Zips can deliver all essential medical products, including cold-chain-dependent items

Blood products: Red blood cells, platelets, plasma

Lifesaving medicines: e.g., antivenin, rabies PEP, oxytocin

Vaccines: Routine childhood immunizations & vaccine campaigns

Essential medicines: e.g., antibiotics, anti-infectives, anesthetics, analgesics

HIV & TB treatments: Including more expensive 2nd- and 3rd-line drugs

Diagnostic supplies: Including POC diagnostics and lab reagents

Specialized & chronic treatments: e.g., insulin, stroke, blood disorders

Emergency response: Critical medicines & PPE for outbreaks or disasters

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Rwanda experience suggests instant, reliable fulfillment can enable broad positive health system disruption

Decentralizing specialized and primary care	System-wide cost reductions	Improved access	Impact on health workers
- Fewer patients require referrals to larger care settings - Strengthening capabilities of alternative care settings	- Hospitals have reduced their on-hand blood inventory by up to 25% - Removal of spoilage risks in the last mile of delivery	- Complete elimination of stock-outs - New access to and use of specialized products	- Increase of morale and retention for health workers - Time spent for care provision (instead of procurement)

…and this is just the beginning

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Questions?

Appendix

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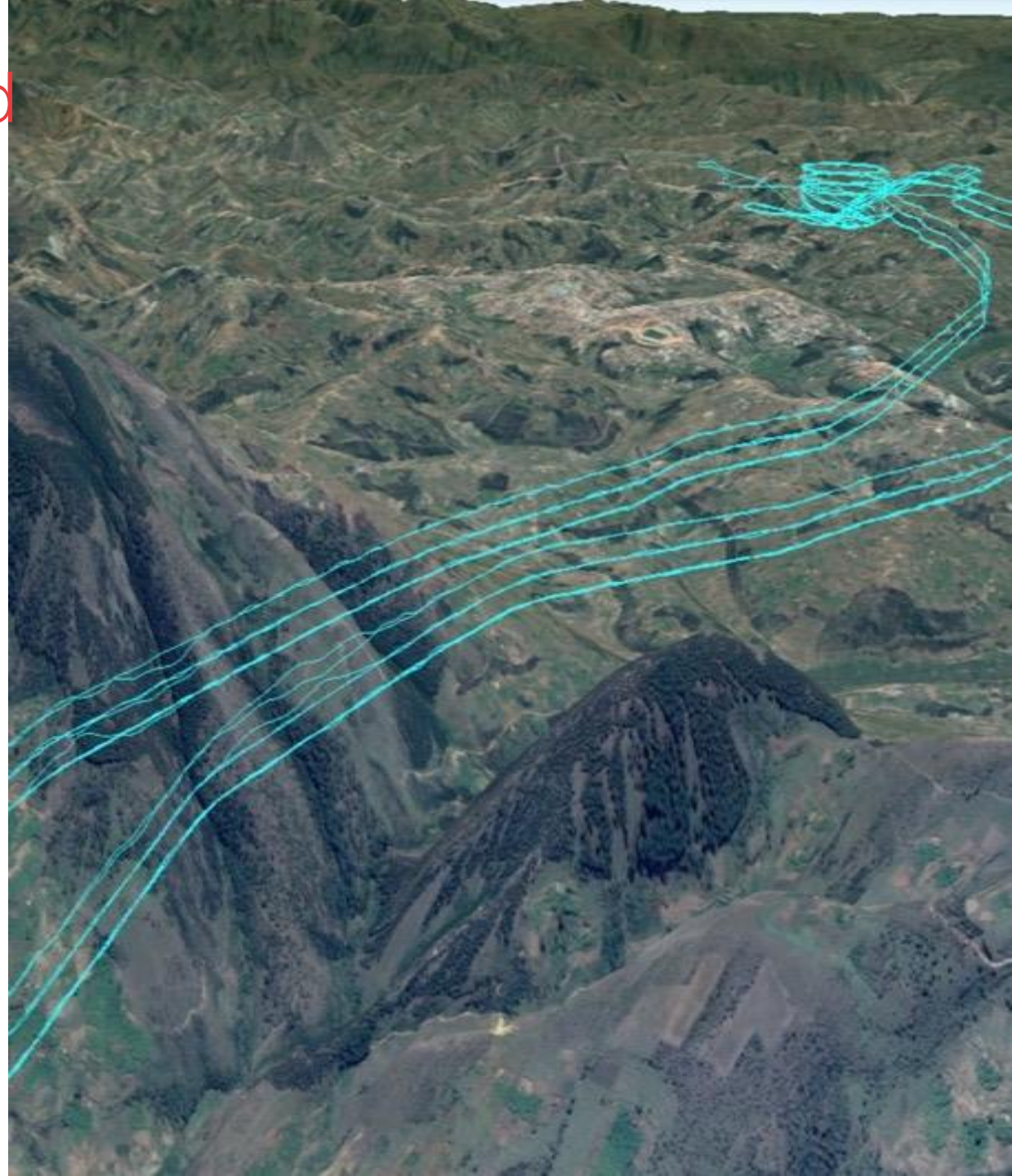
Zipline flights are autonomous and safe

- Zips fly autonomously to the delivery site via pre-calculated flight paths
- Zipline provides near real-time data and reporting to health and aviation authorities
- At the destination, the Zip delivers the package, gently and precisely, and returns to the distribution center