



KRYPTO | LABS

Krypto Labs

DXC 2020



DRONE X CHALLENGE 2020

Details. Terms & Conditions.

Introduction

Krypto Labs, a global innovation hub that fosters groundbreaking startups, is announcing the Drone X Challenge (“**DXC 2020**” or “**Challenge**”); a US\$ 1.5+ Million global challenge (US\$ 1 Million Final Prize and US\$620,000 in Research and Development Grants) that is pushing the frontiers of innovation in drone technologies internationally. This Challenge is a step forward from the successful Drone Innovation Startup Contest held in May 2018. Krypto Labs brought innovative companies from around the world together to compete in an international event. With DXC 2020, Krypto Labs aims to accelerate the practical deployment of drones and/or Unmanned Aerial Vehicles in key applications focusing on transportation and delivery. DXC 2020 will support innovative solutions that tackle two major challenges: payload capacity and flight endurance.

Cutting-edge solutions developed by participants are anticipated to contribute to technological advancements in manufacturing, avionics and control, and set to enable new deployment scenarios (e.g., disaster recovery and aid delivery).

This document describes the DXC 2020, categories, application process, and the timeline leading to the Final Event.

DXC 2020 reserves the right to revise, adjust and amend aspects of the DXC 2020 Challenge in consultation with Krypto Labs’ team, its organizing committee and any other team involved for the purpose of the Challenge, at any time without giving prior notice.

Challenge Timeline

October 2018	Applications open for Phase I
January 2019	Applications deadline for Phase I
May 2019	Announcement of R&D Grants' winners for Phase I
May 2019	Applications open for Phase II
December 2019	Applications deadline for Phase II
March 2020	Announcement of R&D Grants' winners for Phase II
March 2020	Applications open for Phase III
October 2020	Applications deadline for Phase III
November 2020	Announcement of Finalists
December 2020	Final Day Event

Awards and Grants

	Amount	Description
Phase I	US\$320,000	R&D Incentive grants
Phase II	US\$300,000	R&D Incentive grants
Final Prize	US\$1 Million	Final Winners during the Event Day

Shortlisted finalists will be flown to Abu Dhabi, United Arab Emirates to compete with each other for the Final Prize of US\$ 1 Million. Participants are expected to bring their platforms with them and demonstrate them in the proposed applications. Participants and winners should abide by all terms and conditions as per the scoring criteria which will be announced at a later stage.

All rewards and payments listed in these terms and conditions may change at the sole discretion of Krypto Labs and without notice to any participant and/or finalist. Also, all rewards and payments are non-transferable.

All monetary amounts in these Terms and Conditions are indicated in United States Dollars and all monetary prizes will be awarded to the selected winners subject to these Terms and Conditions and the terms of the agreement between Krypto Labs and the finalists.

Challenge Criteria

Overview

The DXC 2020 Challenge aims to foster competition and innovative development in drone technology. The Challenge is divided into four categories: battery powered fixed-wing drone, hydrocarbon-powered fixed-wing drone, battery powered multi-rotor drone, and hydrocarbon-powered multi-rotor based drone. The hydrocarbon drones can be powered either by hydrocarbon fuel (hybrid-fuel allowed) or battery, with different minimum entry specifications. Drones will be benchmarked against each other, and evaluated according to the scoring criteria, and only the best performing drones will progress to the Final Day Event. Participating teams should demonstrate their ability to design, develop and demonstrate these drones throughout the Challenge Phases. Drones should be largely custom-made. Using off-the-shelf components and electronics (rotors, sensors, ESC's, motors) will be allowed.

Challenges

The DXC 2020 Challenge requires the participants to design and develop a drone within one of the categories listed below and fly the drone to demonstrate the minimum required payload and endurance capabilities in an innovative commercial application.

It is required that drones must be designed and developed by the participating teams themselves, using commercially available or custom developed components. These drone systems should be developed with inherited safety and stability.

Teams should consist of at least 3 members with proven competence in designing and developing advanced drone systems.

Teams can submit up to 2 applications to the Challenge categories, but each application should target only one of the following categories:

Category 1: Battery powered fixed-wing drone

(Fixed-wing rotor hybrid is considered to be a fixed-wing drone, hybrid power systems will be considered as hydrocarbon-powered drones)

The aim of this category is to develop a battery powered fixed-wing drone system with the specifications listed in the table below.

Item	Description
Launching mechanism	Runway (up to 20 meters), pneumatic or similar type of launching
Design/Configuration	Fixed-wing, VTOL/Hybrid
Payload	Minimum 15kg
Endurance	Minimum 45 minutes
Capabilities	GPS based navigation; Precision payload delivery
Power source	Only batteries (no electric generators)

Category 2: Hydrocarbon/hybrid powered fixed-wing drone

(Fixed-wing rotor hybrid is considered to be a fixed-wing drone, hybrid power systems will be considered as hydrocarbon-powered drones)

The aim of this category is to develop a hydrocarbon/hybrid powered fixed-wing drone system with the specifications listed in the table below.

Item	Description
Launching mechanism	Runway (up to 20 meters), pneumatic or similar type of launching
Design/Configuration	Fixed-wing, VTOL/Hybrid

Payload	Minimum 50kg
Endurance	Minimum 360 minutes
Capabilities	GPS based navigation; Precision payload delivery
Power source	Hydrocarbon; Electric generator

Category 3: Battery powered multi-rotor drone

(Fixed-wing rotor hybrid is considered to be a fixed-wing drone, hybrid power systems will be considered as hydrocarbon-powered drones)

The aim of this category is to develop a battery powered multi-rotor drone system with the specifications listed in the table below.

Item	Description
Launching mechanism	VTOL in a 5mx5m zone
Design/Configuration	2+ rotors
Payload	Minimum 50kg
Endurance	Minimum 45 minutes
Capabilities	GPS based navigation; Precision payload delivery
Power source	Only batteries (no electric generators)

Category 4: Hydrocarbon/hybrid powered multi-rotor drone

(Fixed-wing rotor hybrid is considered to be a fixed-wing drone, hybrid power systems will be considered as hydrocarbon-powered drones)

The aim of this category is to develop a hydrocarbon/hybrid powered multi-rotor drone system with the specifications listed in the table below.

Item	Description
Launching mechanism	VTOL in a 5mx5m zone
Design/Configuration	2+ rotors
Payload	Minimum 50kg
Endurance	Minimum 180 minutes
Capabilities	GPS based navigation; Precision payload delivery
Power source	Hydrocarbon; Electric generator

Phases

The overall Challenge timeline is divided into 3 Phases, in addition to the Final Day Event. During the first three Phases as set out in the timeline, the participating teams will have to design, develop and demonstrate their drone systems according to the specifications of the chosen category set out above.

Phase I - Drone Design Proposal

Teams at this Phase were requested to submit a technical proposal, detailing all the aspects of the drone design, and how this drone system can be used in an innovative commercial application. The technical proposal was not to be more than 8 pages, and was to contain the following information:

1. Proposed commercial application (idea and proposed delivery and potential impact);
2. Proposed system design (hardware/software; advanced sensors, control, and avionics technologies used to support the application);
3. Innovative aspects;
4. Feasibility study and Scalability (evidence of ability to reach desired payload and endurance);
5. Budget; and
6. Timeline and Development Plan.

An evaluation committee evaluated the applications submitted which were compliant with and in accordance with these Terms and Conditions and then selected a limited set of teams to support with grants to develop the proposed idea. Teams not selected for R&D grants progressed to Phase II. However, all teams were re-evaluated against scoring criteria that were eligible for R&D grants for Phase III.

Phase II - Develop a Minimum Viable Product

Teams at this Phase were requested to develop a drone based on the proposed design, capable of achieving the minimum payload and endurance requirements of the selected category, minimum viable product (MVP). To participate in this Phase, teams were requested to submit a technical document (8 pages max) containing the following information:

1. Proposed commercial application (idea and proposed delivery and potential impact);
 1. The application and business potential.
 2. The application domain (e.g., transportation, agriculture, delivery, infrastructure, surveillance, etc.).
 3. Impact of high payload and high endurance in these application domains.
2. Detailed drone specifications: (hardware/software; advanced sensors, control, and avionics technologies used to support the application);

3. Characterization of the drone's capabilities (payload, endurance, etc.) as evident by experimental results that address the scoring criteria components;
4. System scalability in terms of design, manufacturability, flight dynamics, behavior, and feasibility;
5. Innovation: how the proposed solution compares with state-of-the-art, with references and supporting evidence;
6. Budget details (if requesting support); and
7. Plan leading to Phase III (demonstrate the system in the proposed application).

In addition to the technical document, teams **were requested to** submit a video demonstrating a functional drone based on the proposed design (10 minutes max).

An evaluation committee then evaluated the applications based on the scoring criteria and selected a limited set of teams to support with R&D grants to further develop the drone system and demonstrate it in the proposed application. Other teams were allowed to progress to Phase III but were not supported.

Phase III - Demonstrate the Minimum Viable Product in an Application

During this Phase, teams should demonstrate the utilization of the developed drone in an innovative commercial application. The drone at this stage should satisfy all the specifications of the chosen category (payload, endurance, autonomy, accurate delivery of payload, etc.), in addition to its practical deployment in an application. The technical document (8 pages max) should contain the following information:

1. Details on the MVP and how it achieves the minimum criteria as per category;
2. Detailed drone aspects (hardware/software; advanced sensors, control, and avionics technologies used to support the application);
3. Application demo scenario (demonstrate the proposed application using the drone);
4. Flight test results addressing the scoring criteria components; and
5. Business plan.

In addition to the technical document, teams must submit a video demonstrating the MVP capabilities (10 minutes max).

Scoring and Evaluation Criteria

Drones built by participating teams will be benchmarked against each other. The team with the maximum number of points will progress throughout the challenge until the Final Day Event. Scoring and evaluation criteria may be revised throughout the Phases.

Phase II

In addition to the technical document described above, teams were requested to address the following scoring criteria, and provide all the data necessary for evaluating the application.

1. Endurance with Maximum Payload

The maximum flight endurance in minutes with the minimum effective payload (as per category) that a team can achieve.

Conditions:

- For multi-rotor entries, teams will have to hover at an altitude of at least 10 meters carrying the maximum weight.
- For fixed-wing entries, teams have to loiter at a minimum altitude of 10 meters carrying the maximum weight.
- Time is recorded from take-off until landing.

Verification and Delivery Method:

- Video (10 minutes max) showing the payload measured on a scale, attached to the drone, and hovering with a clock in the background for the duration of the video.
- Raw autopilot data logs (in csv format) and graphs showing altitude (also overlaid on video), duration, and other relevant information.
- Detailed section in the technical document specifying hardware components, software and all relevant technical information.

Score: 50%

2. Compactness

The volume occupied by the drone once packed (the drone should remain in one piece; no disassembly of arms, landing gear or components are allowed).

Verification and Delivery Method:

- Video showing the full size of the drone unpacked, and the compact size once packed (next to a scale).

- 3D drawings showing the scale and dimensions of the packed drone.

Score: 10%

3. Operational Range

Maximum traveling distance in kilometer (km) while flying at a minimum altitude of **10 meters** and carrying the minimum allowed weight (as per category).

Verification and Delivery Method:

- Raw autopilot data logs (in csv format) and graphs showing GPS, travel distance over time and other relevant data.
- Detailed technical document specifying hardware components, software and all relevant technical information.

Score:10%

4. Innovative Technologies

Usage of non-conventional power, positioning, communication, avionics, sense and avoid, safety, autonomy or other technologies.

Verification and Delivery Method:

- A section in the technical document detailing how the proposed solution compares with state-of-the-art solutions and existing commercial service and products, backed up by references and supporting evidence.

Score: 15%

5. Innovative Commercial Application

How innovative, practical and scalable the proposed commercial application is.

Verification and Delivery Method:

- A section in the technical document detailing:
 - The application and business potential.
 - The application domain (e.g., transportation, agriculture, infrastructure, surveillance, etc.).
 - Impact of high payload and high endurance in these application domains.

Score: 15%

Phase III

The scoring criteria for Phase III will focus on demonstrating how the large payload and long endurance systems can be used in innovative applications.

In addition to the technical document described above, teams should address the following scoring criteria, and provide all the data necessary for evaluating the application.

1. Endurance with Maximum Payload

The maximum flight endurance in minutes with the minimum effective payload (as per category) that a team can achieve.

Conditions:

- For multi-rotor entries, teams will have to hover at an altitude of at least 10 meters carrying the maximum weight.
- For fixed-wing entries, teams have to loiter at a minimum altitude of 10 meters carrying the maximum weight.
- Time is recorded from take-off until landing.

Verification and Delivery Method:

- Video (10 minutes max) showing the payload measured on a scale, attached to the drone, and hovering with a clock in the background for the duration of the video.
- Raw autopilot data logs (in csv format) and graphs showing altitude (also overlaid on video), duration, and other relevant information.
- Detailed section in the technical document specifying hardware components, software and all relevant technical information.

Score: 40%

2. Compactness

The volume occupied by the drone once packed (the drone should remain in one piece; no disassembly of arms, landing gear or components is allowed).

Verification and Delivery Method:

- Video showing the full size of the drone unpacked, and the compact size once packed (next to a scale).
- 3D drawings showing the scale and dimensions of the packed drone.

Score: 10%

3. Operational Range

Maximum traveling distance in Kilometers (km) while flying at a minimum altitude of **10 meters** and carrying the minimum allowed weight (as per category).

Verification and Delivery Method:

- Raw autopilot data logs (in csv format) and graphs showing GPS, travel distance over time and other relevant data.
- Detailed technical document specifying hardware components, software and all relevant technical information.

Score:10%

4. Innovative Technologies

Usage of non-conventional power, positioning, communication, avionics, sense and avoid, safety, autonomy or other technologies.

Verification and Delivery Method:

- A section in the technical document detailing how proposed solutions compares with state-of-the-art solutions and existing commercial service and products, backed up by references and supporting evidence.

Score: 20%

5. Innovative Commercial Application

How innovative, practical and scalable the proposed commercial application is.

Verification and Delivery Method:

- A section in the technical document detailing:
 - The application and business potential.
 - The application domain (e.g., transportation, agriculture, infrastructure, surveillance, etc.).
 - Impact of high payload and high endurance in these application domains.

Score: 20%

Terms and Conditions

DXC 2020 is subject to Krypto Labs' Terms and Conditions (“**Terms and Conditions**”). By submitting the application, you acknowledge and agree that you have been given ample opportunity to read and have carefully read and understood the Terms and Conditions. Submission of the application shall constitute a binding and enforceable agreement between the applicant and Krypto Labs. We advise that you review the Terms and Conditions with a legal counsel.

1. The promoter of this Challenge is Krypto Labs Limited (“**Promoter**”).
2. The application for Phase I was open online between 12:00 AM Abu Dhabi time on October 2, 2018, and 06:00 PM Abu Dhabi time on January 19, 2019. Any entries received outside of this period were not considered for Phase I. The application for Phase II was open online between 12:00 AM Abu Dhabi time on May 20, 2019, and 06:00 PM Abu Dhabi time on December 8, 2019. Any entries received outside of this period were not considered for Phase II. **Application deadline for Phase III is October 31, 2020 at 11:59 PM Abu Dhabi time.**
3. Challenge entries shall be made by submitting a completed application pack at <https://dronexchallenge2020.com/>. The Promoter shall not be responsible for any failure in the transmission and receipt of entries.
4. By entering the Challenge, you represent and warrant that you are the sole author/owner of and rights holder in all material and ideas submitted within the application pack, that it is accurate in all material respects and that it complies with all applicable laws. You acknowledge and agree that it is your responsibility to ensure all rights in any business proposal or idea submitted within the application pack have been properly secured and will not be prejudiced by your participation in the Challenge.
5. You must not enter this Challenge if you are from a jurisdiction where it is prohibited to do so.
6. The Challenge is only open to all individuals aged 18 years and above or any registered company.
7. Any employees (or family members of such employees) of the Promoter or any of its group companies are prohibited from entering the Challenge.
8. Teams can submit up to 2 applications to the Challenge, but each application should target only one of the following categories:
 1. Battery powered fixed-wing drone.
 2. Hydrocarbon/hybrid powered fixed-wing drone.
 3. Battery powered multi-rotor drone.
 4. Hydrocarbon/Hybrid powered multi-rotor drone.
9. The Challenge is split into three Phases and one Final Day Event:
 - a. **Phase I – Drone Design Proposal**

15. You acknowledge that the Promoter is in the business of technology development and is constantly engaged in developing new products, business plans and methods for conducting its business, which may be the same or similar to your business proposal or idea. You warrant and agree that in no event shall you assert against the Promoter or any of its employees any claim or action based on plagiarism, idea theft, infringement of intellectual property, confidential relationship, implied contract, unfair competition or any other theory arising out of the examination of the application or business proposal or any alleged use or exploitation of the same or any elements of it.
16. Failure to adhere to these Terms and Conditions will result in exclusion from the Challenge.
17. The Promoter reserves the right to change these Terms and Conditions, in its sole discretion, at any time without prior notice.
18. These Terms and Conditions shall be governed by and construed in accordance with the local laws of the Emirate of Abu Dhabi and the federal laws of the United Arab Emirates and all applicants submit to the nonexclusive jurisdiction of the courts of Abu Dhabi.