



## Blue skies ahead

### Safety systems for the fast growing drones market

ParaZero Limited (ASX:PRZ) is an Israeli company that listed on the ASX in June 2018 to raise A\$ 5M in capital and to increase its visibility with international customers, distributors and channel partners. PRZ has developed and is commercializing proprietary UAV (Unmanned Aerial Vehicles) recovery systems, called SafeAir, to be mounted or integrated on commercial and consumer drones. These safety systems prevent drones from crashing in the event of critical malfunctions.

### The drone revolution is here and now

PwC estimates that the value of businesses and labour displaced by commercial drones, e.g. for asset inspection, transportation, delivery of goods, law enforcement, filming and data capture, amounted to more than US\$ 147BN in 2015. In other words, drones are already a big part of our everyday lives.

### Drones need parachutes like cars need airbags

The global drone market for civilian use is expected to grow from US\$ 13.5BN today to US\$ 40BN by 2025. However, the vast majority of drones, including commercial drones, are shipped without any safety system to prevent them from crashing if their operators lose control. In the US alone there are ~270 drone incidents a month reported to the FAA and we see the regulatory environment continuing to move in a favourable direction. PRZ has a full range of safety systems from OEMs to consumers, which enables it to meet the impending demand over the coming years.

### New prosumer model will be a game-changer

In December 2018 PRZ will launch a new SafeAir model aimed at the prosumer market for drones used in "light" commercial work, such as filming weddings, real estate etc. This high-end consumer segment is by far the largest market by unit sales. We expect PRZ to be able to sell significant volumes of SafeAir in this market going forward.

### Conclusion

PRZ is a market leader in a very high-growth market as it has taken an holistic approach to drone safety systems. OEM contracts with companies such as Airobotics are testament to the quality of PRZ's product offering. The large sales volumes expected in the consumer segment, combined with the high-margin professional drone market, are likely to provide a balanced revenue mix longer term. We have refrained from providing a full financial model, and hence a valuation range, given PRZ is still in the early stages of commercialization. We will endeavour to publish a full model and valuation range when further sales materialize.

Share Price: A\$0.12

ASX: PRZ

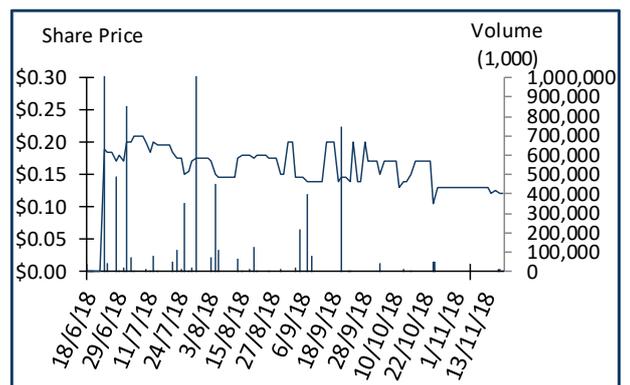
Sector: Industrial Goods

20 November 2018

|                              |                  |
|------------------------------|------------------|
| Market Cap. (A\$ m)          | 10.5             |
| # shares outstanding (m)     | 87.8             |
| # share fully diluted        | 155              |
| Market Cap Ful. Dil. (A\$ m) | 18.6             |
| Free Float                   | 59%              |
| 12 months high/low           | A\$ 0.23 - 0.105 |
| Website                      | www.parazero.com |

Source: Company, Pitt Street Research

### Share price (A\$) and avg. daily volume (k, r.h.s.)



Source: FactSet, Pitt Street Research

| Year to December (US\$ M) | 2015A | 2016A | 2017A |
|---------------------------|-------|-------|-------|
| Revenues                  | 0.13  | 0.44  | 0.54  |
| EBITDA                    | -0.87 | -1.20 | -1.96 |
| Profit before Tax         | -0.88 | -1.31 | -2.48 |
| Earnings per share        | -0.01 | -0.01 | -0.03 |
| Dividend per share        | N/A   | N/A   | N/A   |

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## Safety systems for the fast-growing drone market

While large drones for military applications have been in operation for more than a decade, smaller drones for commercial and consumer use have been around less than five years. Market penetration is currently very limited and we believe this market is only at the very early stages of development.

### Number of drones to grow to more than 13 million by 2025

The value of the global drone market is estimated to be around US\$ 13.5BN in 2018, but is set to grow by 17% CAGR through 2025 to US\$ 40BN according to ResearchAndMarkets. Assuming an average price of US\$ 3,000 per drone (commercial and consumer drones combined), this would represent more than 13M drones sold in 2025.

### The problem with drones: they aren't completely crash-proof

In the last few years a lot of attention has been given to the many application areas for commercial drones in particular, e.g. goods delivery, asset inspection, professional film and photography etc. However, an aspect that has not been very well highlighted is the risk element of commercial drone operations, i.e. drones crashing over groups of people/bystanders.

Typically, drone manufacturers have focused on key metrics that buyers of drones focus on, such as battery/flight time and cargo capacity. And while they are obviously concerned with making drones as safe as possible, relatively little development and design effort has gone into ensuring drones can come down safely when operators lose control of the drone. Most drones do not have a factory-fitted safety system on board.

### ParaZero provides drone safety systems

PRZ's founders recognised the need for drone safety and started developing a proprietary Unmanned Aerial Vehicle (UAV) recovery system more than four years ago.

Today, PRZ's SafeAir drone recovery system can be mounted on top of drones or integrated into them. In case of critical malfunction, it can save payloads, protect people in a drone's crash path and prohibit the drone from flying into restricted airspace. Importantly, SafeAir can protect the drone itself from damage (Figure 1).

Figure 1: ParaZero's SafeAir module deployed.



Source: Company, Digital Trends

*Very limited attention paid to drone safety systems to date*

*SafeAir protects drones, payloads, the crowds below as well as restricted airspace*



*SafeAir is a redundant UAV  
safety system*

## Technology: how it works

The essence of PRZ's solution is a parachute that deploys if SafeAir's sensors detect a critical malfunction that will cause the drone to crash. When a critical malfunction is detected the power to the rotors is terminated and a parachute will deploy within a fraction of a second, triggered by a pyrotechnic release, which blows off the cover and pushes out the parachute. Additionally, an audio buzzer is activated to warn bystanders to move out of harms' way.

## Monitoring and detection

PRZ's SafeAir module (Figure 2) monitors 26 different parameters including speed, altitude, temperature, acceleration along the three axes, vibration, gyration, location based on GPS data etc. All this data is recorded and analysed on a real-time basis.

PRZ's on-board algorithms are continuously looking for two things:

- 1) Abnormalities in a drone's flight profile as compared to previous flight behaviour of the drone and its pilot, and
- 2) Critical malfunctions, defined as any combination of parameters that will result in the drone no longer being able fly.

**Figure 2: ParaZero's SafeAir module mounted on top of a drone**



*Source: Company*

## Taking action in case of a critical malfunction

Once a critical malfunction has been detected, SafeAir will go through five different phases in order to land a drone safely. The entire process is performed autonomously, i.e. without any action required from the operator.

- 1) Firstly, SafeAir will start the flight termination process by shutting down battery power to the rotors.
- 2) As the drone is shut down, SafeAir will send out alerts to professional drone platforms/landing pads in the vicinity through on-board cellular connectivity. This will allow other professional drone operators to take appropriate measures. This feature is only available in SafeAir modules for the OEM and professional markets.

*Four steps to safeguard the  
drone*



- 3) Additionally, SafeAir will give audio visual warning signals (siren and flashing lights) to alert the people below.
- 4) SafeAir will then deploy a parachute to ensure a safe landing and minimize damage to the drone and its payload upon landing.
- 5) Lastly, all collected in-flight data is stored in the on-board Black Box and can be used for post-incident analysis.

### **SafeAir can be fully integrated or mounted on top of a drone**

Similar to an airbag in a car, SafeAir can be fully integrated into the drone from the design stage. For instance, PRZ is working with various drone manufacturers to fully integrate SafeAir into high-end, professional drone models.

There are three options for sales, as follows:

1. Full integration into high end professional drones. The revenue model for this OEM business stream is twofold:
  - a. Unit sales
  - b. Contract revenues
2. After-market sales to commercial end users. (SafeAir can be fitted to the drone in approximately 15 minutes). Revenue are generated from:
  - a. Unit sales
3. After-market sales to consumer / prosumer end users. (SafeAir can be fitted onto the drone almost immediately). Revenue are generated from:
  - a. Unit sales

The OEM model differs from the after-market model in which PRZ sells various versions of SafeAir for the most common off-the-shelf professional drones (DJI drones). These systems are sold to commercial end-users through distributors and PRZ's own online store.

Given that the professional version of SafeAir uses a pyrotechnic trigger to deploy the parachute in the event of a critical malfunction, it will need to be repackaged by a certified repacker. Pilots and users of the consumer version will be able to repack the parachutes themselves.

### **The deployment technology is patented**

By regulation, drone safety systems need to be separate from the operating systems of the drone itself. PRZ's SafeAir solution has three elements;

- SmartAir, which houses all computational aspects of the system, including computer hardware and PRZ's proprietary algorithms;
- TerminateAir, the termination system that stops the power to the rotors, and
- The patented pyrotechnic deployment mechanism plus the parachute (for professional and commercial drones only).

While algorithms are proprietary, they are very difficult to patent. However, PRZ has patented its pyrotechnic deployment mechanism in several regions and has patents pending in others.

This patent essentially revolves around very rapid deployment of a parachute's canopy, i.e. in a fraction of a second, as opposed to traditional parachute deployment, which can take up to 5 seconds. Given that drones typically operate at low altitudes, 5 seconds is extremely long as the drone

*OEM solution opens up the sales avenue to large drone manufacturers*

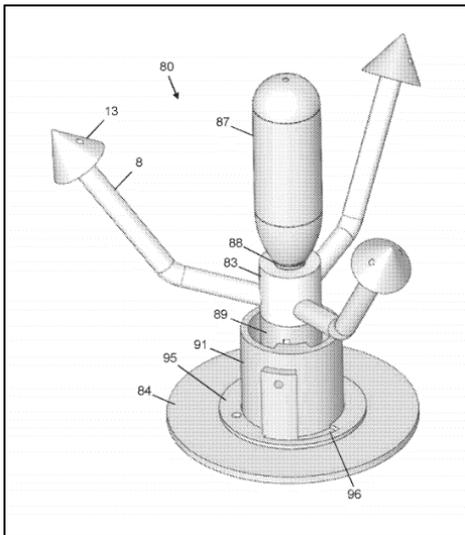
*A very novel way to deploy a parachute*



may lose several tens of meters in altitude during this time, and crash before the canopy is fully deployed.

Propelled by a ballistic reaction, SafeAir fires off multiple projectiles in different, upward, directions (Figure 3). This extends the canopy, allowing ambient air to flow into the canopy much more quickly than traditional deployment.

Figure 3: Patented canopy deployment system (left) and SafeAir deployment demonstration



Source: World Intellectual Property Organization, Company

As illustrated in Figure 4, PRZ has a patent in multiple regions, while two patents are pending in various other regions. The foundation patent application, *Apparatus and method for rapid deployment of a parachute* (WO/2015/059703) has a priority date of 24 October 2013.

Figure 4: Overview of PRZ's patents and applications

| Item | Title   | Official Number   | Status  | Country                                  |
|------|---|-------------------|---------|--|
| 1    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | 229068            | Granted | Israel                                   |
| 2    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | PCT/IL2014/050920 | Lapsed  | World Intellectual Property Organisation |
| 3    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | 16113519.7        | Granted | Hong Kong                                |
| 4    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | 15/030,533        | Pending | United States                            |
| 5    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | 14855086.6        | Pending | Europe                                   |
| 6    | APPARATUS AND METHOD FOR RAPID DEPLOYMENT OF A PARACHUTE                | 201480058600      | Granted | China                                    |
| 7    | METHOD AND SYSTEM FOR DECELERATING AND REDIRECTING AN AIRBORNE PLATFORM | 251342            | Pending | Israel                                   |
| 8    | METHOD AND SYSTEM FOR DECELERATING AND REDIRECTING AN AIRBORNE PLATFORM | PCT/IL2018/050303 | Pending | World Intellectual Property Organisation |

Source: Prospectus



## Key drivers are regulation and drone adoption

PRZ has sold approximately 1,800 units of its UAV recovery systems in the last three years. We expect the company will grow that number quite rapidly on the back of new regulation and fast growth of the number of drones sold worldwide.

*New regulation is proving to be a strong driver of market adoption*

The Federal Aviation Administration (FAA) is the national authority in the United States which regulates all aspects of civil aviation, including drone flights. The FAA's rule 107.39 (b) (formally known as Part 107) restricts all drone flights over unprotected people.

## Parazero enables first waiver to fly drones above crowds with parachutes

The FAA recently issued a waiver to this rule to a professional drone operator in the US, allowing drone flights to take place over unprotected people at a sports event using a drone equipped with PRZ's SafeAir system.

While waivers for rule 107 have been issued by the FAA before, this waiver was the first of its kind allowing drone operation over people outside of a closed-set operational area and with a heavier drone, i.e. DJI's Phantom 4 weighing roughly 1.8 kilograms (including the SafeAir module).

The recent issue of this waiver opens the door for increased drone flight over people, such as for inspection, construction, public safety, law enforcement etc.

## FAA and EASA regulation may serve as a global blueprint

*FAA and EASA leading the regulatory charge*

The European Aviation Safety Agency (EASA) is another large regulatory body that has been very proactive regarding regulation around drone usage. Both agencies are aligned regarding regulation around drone safety and are collaborating on formulating new regulation.

Going forward, we expect most regulation coming out of the FAA and the EASA may serve as a blueprint for drone usage regulation in other countries around the world, which could expedite the adoption of drones quite substantially.

## Growing number of application areas

Application areas for drone usage are very broad and include inspection of large assets (such as planes, oil & energy facilities, infrastructure and cell towers), transportation and final delivery of goods, law enforcement, filming and data capture, for instance for Geographic Information Systems (GIS). PwC estimated the value of this market at US\$ 147BN in 2015. As regulation evolves, we anticipate further strong growth in drone usage, especially in densely populated areas and at public events, such as sporting events. Furthermore, we anticipate strong uptake of drone usage by firefighters, police departments and in search and rescue situations.



### Three product lines sold through various channels

*Different products for different channels*

Given the approximate 70% global market share of Chinese drone manufacturer DJI, so far PRZ has mainly focused its development and sales efforts on drones from DJI, specifically the DJI Matrice 200 (M200) and Matrice 600 (M600) for professional and commercial use. However, the company has a broad range of products available, ranging from OEMs to consumer products (Figure 5). PRZ's product range can be characterized into three groups.

#### 1. An OEM product sold directly to drone manufacturers

PRZ already sells an OEM product to drone manufacturers, which is fully integrated into the drone, like an airbag in a car. PRZ can work with drone manufacturers from the design stage if required to fully integrate these SafeAir modules into the drones while maintaining redundancy, i.e. the safety systems are able to make a shutdown decision independently from the drone. We estimate these OEM systems cost between US\$ 3,000 and US\$ 6,000 per system unit.

In addition to system sales, PRZ occasionally generates revenues from NRE work for large customers who wish to integrate SafeAir into their own design.

Figure 5: ParaZero product portfolio

| OEM  |  | AFTER MARKET   | PROSUMER  |
|--|--|--|---|
| <b>AIROBOTICS</b><br><br>400g, 7 m/s | <b>SA 10</b><br><br>400g, 3-6 m/s | <b>M-200</b><br><br>700g, 3-6 m/s    | <b>PHANTOM</b><br><br>~140g, 5 m/s |
| <b>MARTIN</b><br><br>9kg, 7 m/s      | <b>SA 30</b><br><br>950g, 4-8 m/s | <b>M-600</b><br><br>1.4kg, 4.5-6 m/s | <b>MAVIC</b><br><br>~110g, 5 m/s   |

Source: Company presentation

#### 2. An after-market product sold through distributors

PRZ sells SafeAir as an after-market product to the professional drone market, predominantly through distributors, retailers and online channels. The most common drone types in this market segment are DJI's Matrice models (Figure 6).

Pricing for after-market products, which can be self-assembled by users/drone operators, range from US\$ 2,000 to US\$ 3,000.

PRZ works with some other well-known distributors and retailers, such as CR Kennedy in Australia and B&H in the United States.



Figure 6: DJI's Matrice 200 (left) and Matrice 600 drones with ParaZero's SafeAir mounted on top



Source: Prospectus

### 3. A high-end consumer product sold through distributors and online

PRZ will start sales of a high-end consumer, or prosumer, product in December 2018 through distributors and retailers. Prosumers use drones in "light" commercial work, such as filming weddings, real estate etc. PRZ is aiming for a price tag for this high-end consumer version of SafeAir of below US\$ 300, making it accessible to a broad group of potential customers.

### Driving demand through insurance companies

Apart from the OEM, distributor, retailer and online sales channels, demand will be further generated by PRZ's collaboration with insurers such as Allianz Global Corporate & Specialty. Allianz customers obtain discounts on their insurance premiums if they use PRZ's safety solution with their drones.

Given the inherent risk of drone flight, we anticipate that such collaborations will further drive demand for PRZ's SafeAir products.

### ParaZero aims to become industry's leading drone safety expert

In addition to working with insurance companies to increase drone safety, PRZ aims to become the leading safety expert in the industry. The company has partnered with Fresh Air Educators to provide online safety trainings to new drone operators. Additionally, PRZ will help aspiring operators prepare to meet certification requirements.

The comprehensive training package will include operational training, waiver application services and additional features that will assist drone operators to obtain a waiver to fly over people.

We expect these services will improve PRZ's reputation and its brand awareness while simultaneously creating additional revenue streams for the company, including referral fees from referring new students to Fresh Air Educators.

Fresh Air Educators has certified more than 2M drone operators to date and will be promoting PRZ's SafeAir solution to its trainees in an agreement that will initially run through October 2019.

### Changing product mix will change volumes and margins as well

Once volumes of the consumer product grow, we anticipate PRZ will see its gross margins decline somewhat, given that consumer electronics typically command lower gross margins than similar products for the professional

*Upcoming consumer product  
key to driving sales volumes*



markets. However, sales volumes of the consumer product should be substantially higher than those of professional systems.

### Peers mostly sell simpler UAV rescue systems

We have identified less than 10 competitors/peers for PRZ, including Drone Rescue in Austria, ADSS in Canada and Fruity Chutes and Indemnity in the United States. We regard Drone Rescue as PRZ's closest competitor.

However, even Drone Rescue's product is substantially simpler than PRZ's offering. The key difference with "competing" products, in our view, is PRZ's holistic approach to drone safety, i.e. the solution incorporates everything from a redundant parameter monitoring and analytics module to parachute deployment for various drone models.

Competing products typically comprise just the parachute with manual deployment. Additionally, placement of the parachute module is mostly off-center, i.e. at the side of the drone, which distorts the balance and flying properties.

For these reasons, we believe PRZ has a substantial development lead over competitors, which explains the strong traction the company is having in the OEM market for drone rescue systems.

Please see a more in-depth analysis of PRZ's competitors when we discuss the competitive landscape.

### Reselling drone data is a potential future revenue opportunity

As PRZ's installed base grows over time, the data collected from drones in operation will become valuable when aggregated. PRZ anticipates revenue streams from sales of aggregated drone monitoring data, e.g. to drone manufacturers and asset owners.

Such data could potentially be used for data analytics, e.g. to gain insights into asset bases and to perform predictive maintenance etc.

### 3Q19 commentary

In its 3Q18 quarterly report, PRZ announced it generated revenues of US\$145k during the quarter. Revenues were mostly driven by service fees and fees for one-off custom projects. PRZ anticipates that products sales will start to significantly contribute to revenues once SafeAir for prosumer drones starts shipping, which is expected in December 2018.

In November, PRZ announced a Framework Agreement with Airobotics, a leading drone manufacturer. The agreement, the terms of which need to be finalized, foresees PRZ's SafeAir system being designed into Airobotics' industrial-grade drones. If commercial sales to Airobotics commence, PRZ anticipates revenues of at least US\$ 250,000.

We expect that successful conclusions of current design-in projects, such as the one with Airobotics, will start to contribute to revenues once these customers start to integrate these designs into their production models.

While it is hard to predict when that will happen, we expect that 2019 may see several of the customers move into production with PRZ's SafeAir.

*PRZ has a multi-year technology lead over its competitors*



## Drone market set for very strong long-term growth

In terms of usage, drones can be classified as consumer drones (used for recreational purposes, fun and sports), commercial drones (used for business purposes such as aerial photography and video recording, terrain inspection, real estate usage, delivery, etc.) and military drones for specific military purposes.

Consumer drones can fly a short distance and for a limited time, typically no more than 5,000 meters and for one hour, with flight height constrained to within 400 meters. They weigh less than 2 kgs and are priced at less than US\$5,000. On the other hand, commercial drones have a higher payload, longer flight times, and redundant sensors and flight controls to make them safer.

However, according to Gartner, recent technological innovations have blurred the lines between consumer and commercial drones, allowing consumer drones to be used in many special-purpose applications such as surveillance, 3D mapping and modeling.

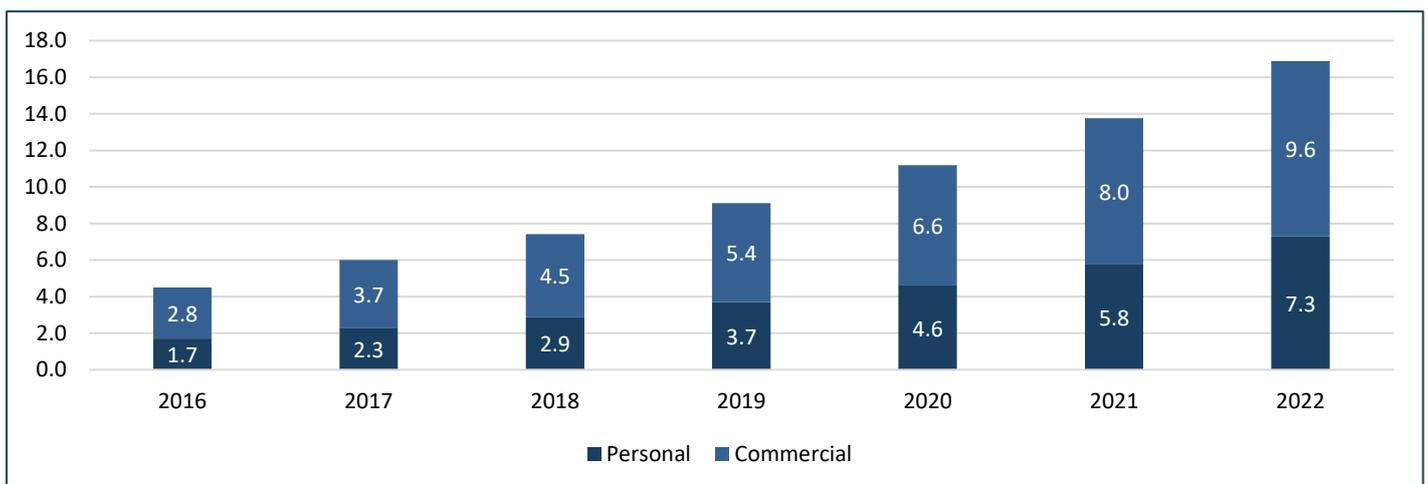
Gartner estimates that the global drone market for personal and commercial use was worth US\$ 6BN in 2017 and is poised to grow at a CAGR of 23% during 2017-2022 to reach approximately US\$ 16.9BN by 2022 (Figure 7).

The consumer drone segment revenues are projected to grow at a CAGR of 26% to reach US\$ 7.3BN in 2022 from US\$ 2.3BN in 2017, primarily driven by emergence of low-cost drones, rising popularity of drones among consumers for taking pictures, and relaxation by the government authorities on the use of drones for recreational and non-recreational purposes.

The commercial drone segment's revenues are forecast to grow at a 21% CAGR to reach US\$ 9.6BN in 2022. The growth in this segment is being driven by falling prices of drones, technological innovations, such as collision avoidance, autonomous flight mode, home return and first-person-view (FPV) and regulatory exemptions enabling use of drones in various industries, especially insurance, construction and agriculture.

**Consumer and commercial drone market to grow 23% p.a. to nearly US\$ 17BN by 2022**

Figure 7: Global personal and commercial drone market (in US\$BN)<sup>1</sup>



<sup>1</sup>Comprises drones that have the capability to connect with the Internet

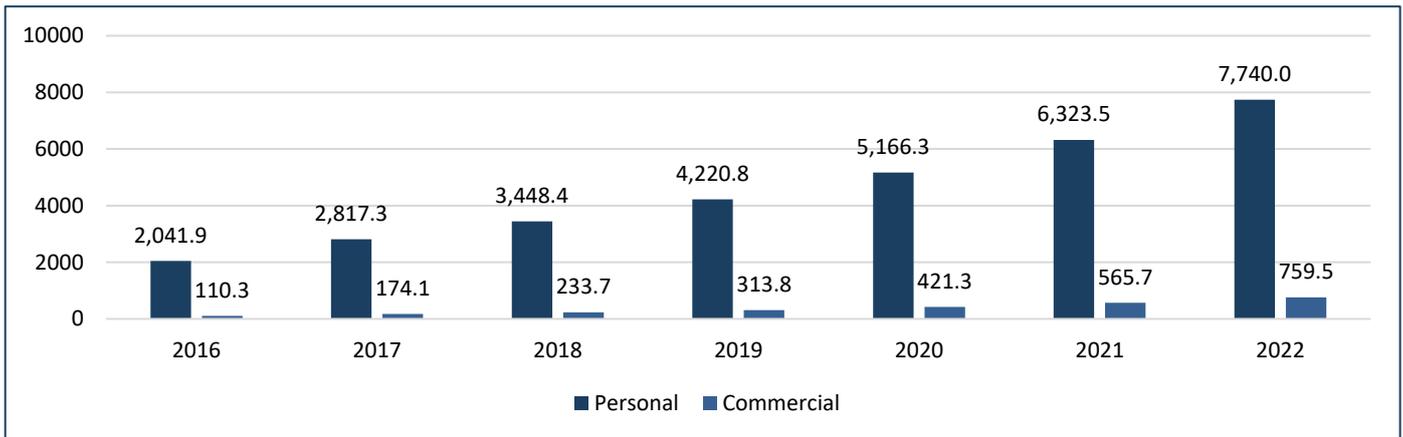
Source: Pitt Street Research, Gartner



**Commercial drone sales account for <10% of sales by volume, but it generates 60% of the revenues due to higher price tags**

According to Gartner, in 2017, consumer drones dominated unit sales with 94% of the market. However, the segment comprised only ~40% of the market's revenue share. The global commercial drone segment represented only 6% of the unit sales and ~60% of the industry's revenue in 2017. The higher revenue share of the commercial drone segment is due to higher price tag of up to US\$ 100,000 per unit. During 2017-2022, commercial drone unit sales are estimated to grow at a CAGR of 34.2% to reach 759,500 units by 2022, while consumer drone unit sales are projected to grow at a 22.4% CAGR to reach 7.74M units (Figure 8).

**Figure 8: Global personal and commercial drone market unit sales (in thousands)**



Source: Pitt Street Research, Gartner

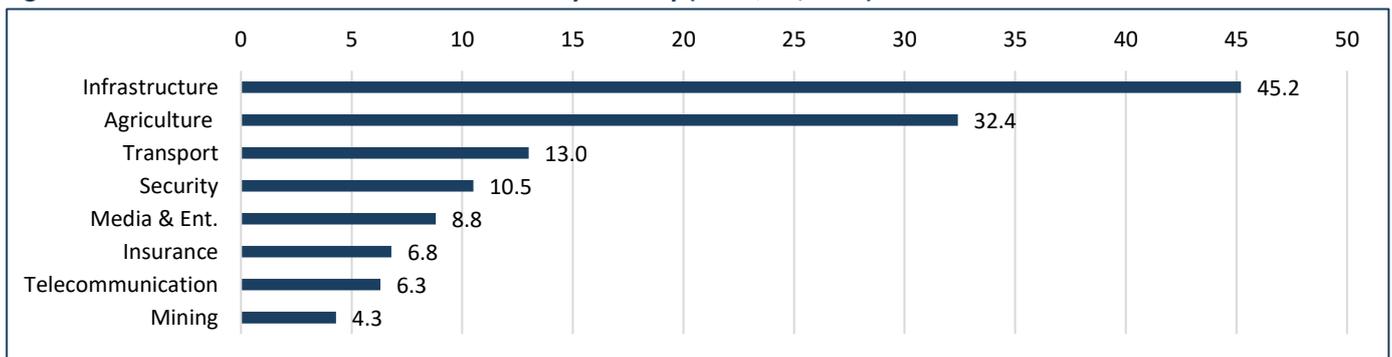
**Infrastructure and agriculture account for more than 60% of the addressable market for commercial drones**

The consumer drone market can be further divided between prosumers (consumers interested in buying high quality technical products) and hobbyists. According to Grand View Research, the prosumer application segment accounts for >50% of the consumer drone market and dominates both in terms of value and volume. However, in the near term, hobbyist application is anticipated to surpass prosumer application segment driven by increasing use of drones for aerial games and recreational activities.

**Commercial drones have an addressable market of US\$127BN**

PwC estimates that the commercial drone segment has a total addressable market of US\$ 127BN globally, i.e. the economic value of the businesses and labourers in the sectors that drone powered solutions can replace. Infrastructure is anticipated to be the most promising industry with a global potential value of US\$ 45.2BN, followed by agriculture and transportation (Figure 9).

**Figure 9: Commercial drones addressable market by industry (in US\$BN, 2015)**



<sup>1</sup>Values presented correspond with the value of businesses and labor in each industry that may be replaced by the drone powered solutions

Source: PwC



Construction, mining and agriculture were the top three sectors in terms of drone adoption in 2017 and are expected to lead among all industries in the near term (Figure 10).

Figure 10: Commercial drone growth trends in top five sectors

| Sector       | Y-o-Y Growth in Industry Adoption of Drones in 2017 | Drivers  |
|--------------|---|--|
| Construction | 239%  | Builders deploying drones on job sites around the world to increase safety, and document and analyze site progress, and identify potential issues.   |
| Mining       | 198%  | Mining companies are adopting drones for increased precision in measuring stockpiles and extraction pits.  |
| Agriculture  | 172%  | Higher productivity through drone deployment for a variety of agriculture applications including soil & field analysis, crop monitoring, crop health assessment, irrigation, etc. However, as per Gartner, cost and issues related to potential RoI are expected to slow down drone adoption rate to some extent in the near term. |
| Surveying    | 171%  | Drones are increasingly being deployed for increased efficiency and reduction in man-hours; Skylogic Research's 2017 Drone Market Sector Report projects surveying & mapping industry as the most lucrative segment for drone deployment.  |
| Real Estate  | 118%  | Drones are being used for property marketing, property maintenance and to identify opportunities for renovation and upgrading to comply with minimum energy efficiency standards (through capturing of aerial videos and images)   |

Source: Pitt Street Research, DroneDeploy

Furthermore, according to Gartner, drones for industrial inspections, primarily in oil & gas, energy, infrastructure and transportation, could make up to 30% of the overall commercial market for drones by 2020. Delivery drones, which were once anticipated to provide a significant impetus to the market, are anticipated to be mired in logistics issues, and will amount to <1% of the commercial market by 2020.

**Americas to account for 2/3 of global drone market by 2021**

**US to drive sales of both commercial and consumer drones**

PwC estimates that the Americas, led by the US, accounted for the highest (60%) market share in the commercial drone segment in 2016 followed by EMEA (25%) and Asia Pacific (15%). The dominance of the Americas region in this segment is anticipated to grow, driven by introduction of highly market-focused and advanced regulation, primarily in the US (Figure 11).

Figure 11: Geographic breakdown of revenues in the commercial drone segment (2016, 2021)

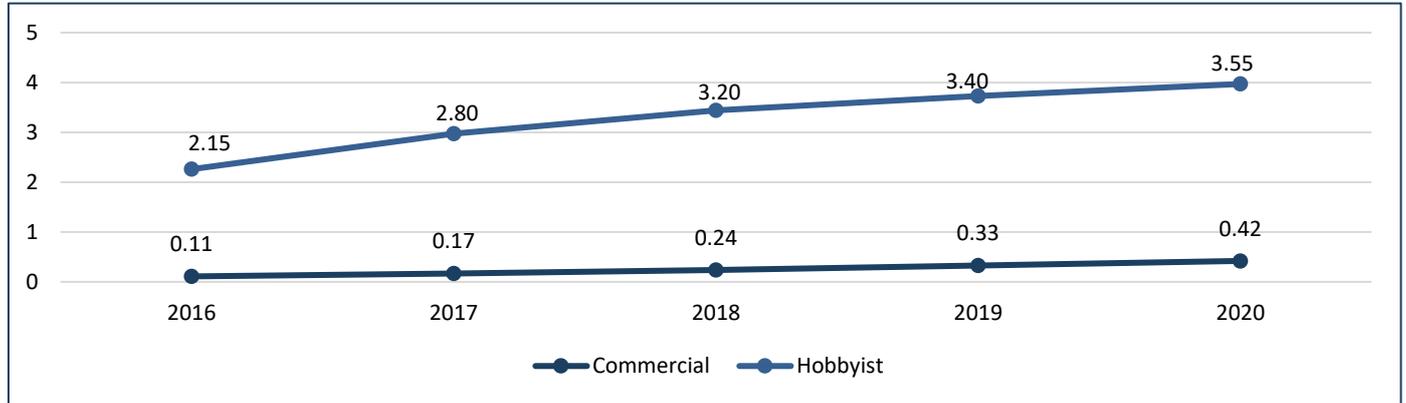


Source: PwC



The FAA in the US, forecasts the total US fleet of hobbyist drones to grow at a CAGR of 6.7% to about 3.55M by 2020 from 2.8M in 2017, while the commercial drone fleet is projected to more than double from 0.17M in 2017 to 0.42M in 2020 (Figure 12).

Figure 12: US hobbyist and commercial drone fleet (in M)<sup>1</sup>



<sup>1</sup>Also includes very small drones weighing under 250 grams, which do not necessarily process data or are registered with the FAA; after excluding such drones, an estimated 825,000 hobbyist drones were sold in the US in 2016

Source: FAA

**DJI accounts for >70% of the drone market share and leads other manufacturers in almost all price and geographic segments**

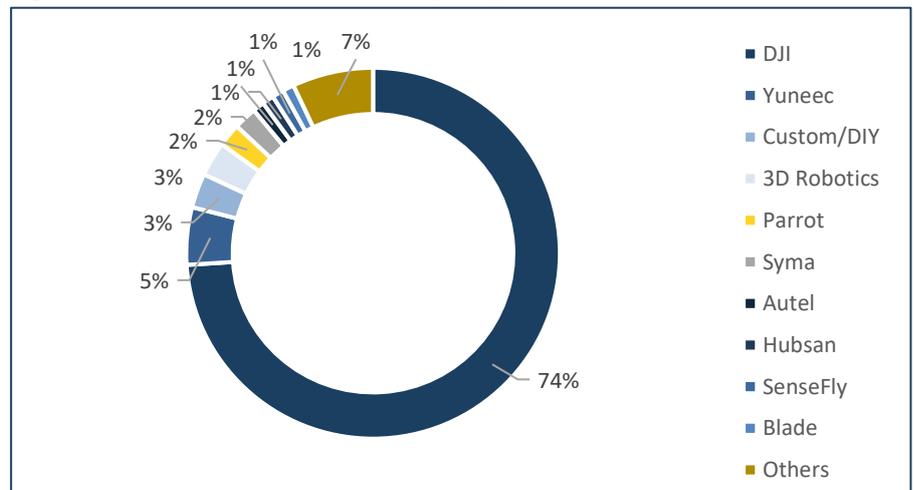
### Dajiang Innovations (DJI) is the clear market leader

According to the Association of Unmanned Vehicle System International (AUSSI), the drone market has more than 500 manufacturers globally, with US alone home to >200 manufacturers. However, the market is highly consolidated at the top with DJI accounting for ~74% of the market.

The next largest player, Yuneec, has just 5% market share (Figure 13). Furthermore, DJI has maintained its dominance across price ranges and geographies for high-end consumer drones and commercial drones.

According to NPD Group, a market research company, DJI has captured 66% of the market for drones priced between \$ 1,000 and \$ 2,000, and 67% of the market in the \$ 2,000-4,000 range. Across all drone price categories, DJI has captured > 50% of the North American market.

Figure 13: Global drone market share (2018)



Source: Skylogic Research



DJI not only dominates the drone hardware market but also the payloads wherein DJI's Zenmuse RGB camera / sensor / gimbal combination accounted for 31% of all purchased payloads through September 2018—a substantial increase from 2017, when it represented only 4%. In drone software also, DJI is the market leader in flight logging and operations, and automated mission planning.

*PRZ's decision to strategically align itself with DJI for the manufacture and integration of UAV rescue systems specifically for DJI models, should be seen in the light of this dominance in the global drone market.*

## Investments shifting to drone software/services

According to IDTechEx Research, substantial investment in drone hardware has ended due to the commoditization of the sector led by DJI. The dominance of DJI in the drone hardware market has led other manufacturers to shift focus to drone software, services and analytics. For instance, 3D Robotics, which once was the second largest drone company, has exited the drone manufacturing market and has recreated itself as a drone software provider for construction, engineering and mining firms. PrecisionHawk and Agribotix are similar cases, with these companies now mostly focused on software.

In addition, there is a growing number of software companies that enhance standard drones (largely produced by DJI) for B2B sales and industry-specific applications. Furthermore, the trend is also being driven by commercial customers demanding complete drone solutions and not just hardware.

According to Drone Industry Insights (DRONEII), most software investments are seen in mapping and navigation as well as flight management applications. However, the trend is expected to move to beyond visual line of sight (BVLOS) and delivery software as well.

An increase in drone landing-related security concerns is anticipated to further drive the drone safety market. Japan's UAV association is anticipated to launch a drone safety certification system which includes a function that enables the operator to forcibly implement an emergency landing if the drone malfunctions. Such regulations are expected to drive the demand for drone safety solutions offered by PRZ.

Despite all these positive indicators, the growth in the drone software and services market is largely dependent on the commercial drone market, which may face some slow down due to the lower than expected decline in regulatory barriers globally and companies only adopting drone technology cautiously.

## Increasing partnerships and M&A in drone market

With drone hardware getting increasingly commoditized, the drone manufacturers are acquiring or partnering with companies offering specialized services to extend their capabilities and achieve scale in order to compete with DJI.

For instance, Microdrones, a Germany-based drone manufacturer, has merged with Avyon, an Unmanned Aerial Service (UAS) provider, to handle the payload and post processing part of the business. Microdrones has also formed an alliance with Delair-Tech and Trimble Navigation to expand its North American presence.

*Forced by DJI's prominence in drone hardware segment, companies are increasingly investing in drone software and service solutions to gain market share*

*Tier II drone manufacturers are resorting to partnerships and M&A to expand their service offerings*



*Tech giants moving into the drone space as well*

Other manufacturers have resorted to M&A for strengthening their service offerings. For instance, in the past five years Parrot acquired full or partial stakes in companies, such as DiBcom (specializing in high-performance integrated chipsets), PiX4D (a drone software manufacturer), Sensefly and Delair-tech (platform manufacturers) as well as MicaSense (remote sensing specialist), to extend its service offerings.

Sensing the growth opportunities in the industry, tech-giants such as Intel, Google and Facebook have also entered the drone industry. In 2016, Intel acquired German drone company Ascending Technologies to combine Ascending Technologies' sense-and-avoid algorithms with Intel RealSense's real-time depth-sensing capability. In 2017, Facebook acquired Ascenta (a UK-based drone manufacturer) to set up flying relay stations, and Google acquired Titan Aerospace (an American drone maker) to deliver mainly real-time earth images by using solar powered UAVs.

### **Drones used for parcel delivery**

Back in 2013, Amazon initiated its Prime Air project, which revolves around 30-minute delivery of Amazon's parcels using fully autonomous drones. It took until 2016 for Amazon to deliver its first package using a drone, in the United Kingdom. In 2017, Amazon delivered its first drone-delivered package in the US, flying over public places. While US regulation still doesn't allow for fully autonomous drone operations over the general public, it is expected that regulatory bodies will move forward, enabling the likes of Amazon to offer their customers 30-minute delivery times in the not too distant future.

Chinese online retailer JD.com is already using drones to deliver parcels in rural areas and expects approximately 1% to 2% of its future deliveries may be undertaken by drones.

### **China, Israel and US – top destinations for drone investments**

According to Toptal, a drone market research company, the majority of investments and well-funded start-ups are concentrated in China, Israel and the US. However, each country has a different focus within the market – China dominates the consumer market and hardware solutions, US is focused on developing specific commercial hardware solutions or end-to-end software for commercial applications, and Israel is leading in the military application development. Israel's Tel-Aviv Airobotics has also started making headway in developing the autonomous solutions for enterprises.

In the near future, Chinese companies are expected to acquire a stronger foothold in the commercial market, leveraging their competencies in manufacturing, hardware solutions, and the development of their internal market. DJI started producing commercial drones and software applications in 2016 and has already attained the leadership position.

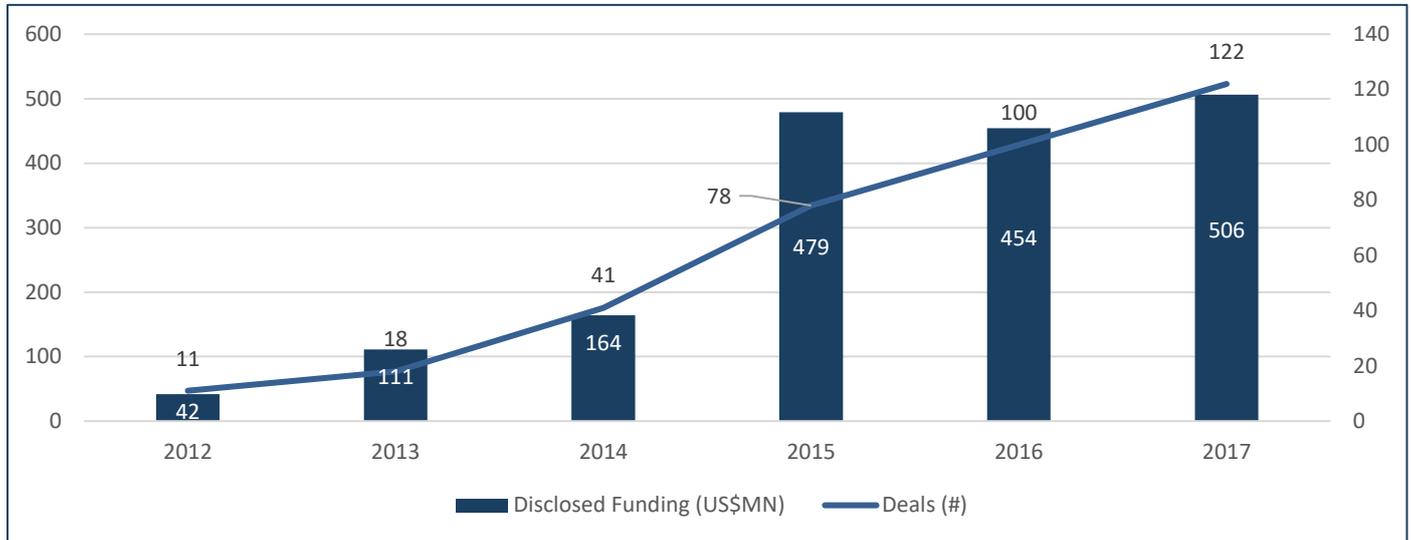
The investments in the drone market have totalled close to US\$ 1.5BN since 2012. The investments drivers include decreasing prices of drone components (sensors, batteries, etc.), huge commercial market potential, and technological developments in AI and analytics. In 2017, the market witnessed 122 deals, worth US\$ 0.5BN in funding, which was 22% higher than number of deals seen in 2016 (Figure 14).

According to CB Insights, between 2012 and 2017, US-based drone companies received approximately 65% of the global drone investments. China was in second place with 5%, followed by Australia, Canada, and the UK with 4% each France followed close behind with 3%.

*Between 2012 and 2017, US companies accounted for ~65% of funding in the drone sector*



Figure 14: Annual drone investments



Source: CB Insights

Autonomous solutions and business intelligence & analytics software are top areas which attracted most of the investments in 2017. Top companies receiving investments in 2017 included 3D Robotics (US\$ 53MN), Swift Navigation (US\$ 34MN), Airobotics (US\$ 32MN) and Echodyne (US\$ 29MN).



## Competitive Landscape

*Competitive rivalry in drone safety segment is low with only a few players currently present in this space*

Despite the drone software and services market being highly fragmented, not many players have forayed into the drone safety market. There are only a few players that offer parachute-based drone safety solutions (Figure 15). However, with the FAA making efforts to make BVLOS a reality, more players are expected to enter the drone safety market, which may lead to increasing competition for PRZ going forward.

Figure 15: Key competitors

| Company              | Description  | Product Portfolio  |
|----------------------|--|--|
| Drone Rescue Systems | <ul style="list-style-type: none"> <li>An Austria-based provider of parachute safety solution for drones</li> <li>Offers Blackbox function to record all sensor signals</li> </ul>   | <ul style="list-style-type: none"> <li>DRS-M600: 420g payload; covers drones from 5 to 16Kg</li> <li>DRS-5 Series: 300g payload; covers drones from 2 to 7Kg</li> <li>DRS-10 Series: 390g payload; covers drones from 5 to 20Kg</li> </ul>   |
| Fruity Chutes        | <ul style="list-style-type: none"> <li>Founded in 2007, a US-based provider of parachutes for use in unmanned applications</li> <li>Over 4,000 customers in 50 countries</li> </ul>  | <ul style="list-style-type: none"> <li>Parachutes specifically designed for DJI drones</li> <li>Harrier Drone Parachute Launchers for drones up to 6.2Kg</li> <li>Skycat Parachute Launchers for drones from 1 to 103Kg</li> </ul>   |
| Mars Parachutes      | <ul style="list-style-type: none"> <li>Established in 2013, a US-based provider of parachutes for a wide range of drones from DJI and 3D Robotics, and custom-made drones</li> </ul> | <ul style="list-style-type: none"> <li>Mars Solo Lite and Mars 3DR X8 Pro for 3D Robotics line of drones</li> <li>Mars Inspire Lite and Pro models for DJI Inspire, Matrice and Phantom series</li> <li>Mars Mini V2 (supports 1-4lb drones) and Mars 58 V2 series (supports 4-10lb drones) for custom drones</li> </ul> |
| Opale Parachutes     | <ul style="list-style-type: none"> <li>Founded in 2012, a France-based manufacturer of rescue parachutes for drones and aircrafts</li> </ul>   | <ul style="list-style-type: none"> <li>Offers 7 parachute models that cover drones from 1.5 to 40Kg</li> </ul>   |

Source: Pitt Street Research

Apart from these specialized players, large players such as Microsoft and Amazon are making efforts to enter the drone safety space, though not specifically launching any parachute-based safety systems.

Amazon is exploring an innovative solution that would cause an airborne drone that malfunctions to disintegrate mid-air, minimizing the potential impact on the ground. The company has already been granted the patent by the US Patent and Trademark Office for this innovative technology.

Microsoft is working with DroneWorks, a Japan-based provider of drone design consulting and software services, for building a standardized industrial drone management system that can predict maintenance needs and malfunctions.



*Addressing a high growth market with a well-balanced product portfolio*

## Conclusion: tapping in to a very high-growth market

PRZ is well positioned to meet the demands of a very high-growth market in which the competition appears to be lagging and does not share PRZ's holistic approach to drone safety systems. OEM contracts are testament to the quality of PRZ's product offering.

The large sales volumes expected in the consumer segment, combined with the high margin professional drone market, are likely to provide a balanced revenue mix longer term.

We have refrained from providing a full financial model, and hence a valuation range, given PRZ is still in the early stages of commercialization. We will endeavour to publish a full model and valuation range when further sales materialize.

## SWOT Analysis

### Strengths:

- Due to its proprietary technology, PRZ is among the most advanced, if not *the* most advanced, providers of UAV rescue systems, giving the company strong inroads into tier 1 drone manufacturers.
- PRZ has a multi-year development lead over its competitors.
- The company's senior management and advisory board members have extensive networks, extending as far as the relevant regulatory bodies.

### Weaknesses:

- PRZ is a small company with relatively limited balance sheet strength. This may inhibit growth as tier 1 drone manufacturers may prefer to work with more established players or with companies that have a stronger financial backing.

### Opportunities:

- Growth of both the consumer and the professional drone segments is expected to be in excess of 17% through 2025.
- The market for UAV rescue systems is largely undeveloped as most drones are shipped without any safety modules.
- Tightening regulation around drone safety is expected to drive the uptake of separate UAV safety systems. It seems the logical next step for the regulatory bodies to mandate usage of drone safety systems for drones that fly over populated areas.
- Drone manufacturers typically source parts and modules for drones, including UAV safety systems, from OEMs, much like car manufacturers source from OEMs. This presents large commercial opportunities for companies such as PRZ.

### Threats:

- Should drone manufacturers insource development and integration of drone safety systems, this could substantially limit PRZ's market upside.
- Adverse regulatory developments, e.g. around flying restrictions, could affect the market uptake of drones, limiting PRZ's addressable market.
- Potential future drone safety systems from large, deep-pocketed consumer electronics companies may inhibit PRZ's growth in the consumer segment.



## Appendices

### Board and Advisory Board Members

**Brig. Gen. (Ret.) Eden Attias (CEO and Managing Director):** Brigadier General, 30+ years' experience in the Israeli Air Force. During his tenure, he oversaw the move of the IAF's airlift base from Lod to the Nevatim air base and commanded the airbase, He was the Israeli Defense Attaché in Canada.

**Amir Tsaliah (CTO & Co-founder):** Founded the world's first certified commercial drone company. Expert in electronics, mechanics, materials. 8 years' experience in developing innovative technologies. Co-inventor of WO/2015/059703.

**Stephen Gorenstein (Non-executive Director):** Head of Jindalee Partners Melbourne with vast experience in the capital markets including equity analyst roles at both Goldman Sachs and Merrill Lynch. Formerly the Regional Head of Asia Pacific Metals and Mining at Bank of America Merrill Lynch.

**Charis Law (Non-executive Director):** Australian Chartered Accountant with significant experience in commercialization and global expansion of industrial technology, leading finance and corporate development teams at Orbital Corporation Limited (ASX: OEC) and Austal Limited (ASX: ASB)

**Dan Arazi (Non-executive Director):** Serial entrepreneur Israeli Chapter at 100+ Angels Club. Co-founder and executive (EVR) at Orckit Communications. Co-founder and member of the board of the ADSL Forum.

**Maj. Gen. (Ret.) James Poss (Advisory Board):** CEO of ISR Ideas. Founder and former Executive Director of the Alliance for System Safety of UAS (ASSURE) Federal Aviation Administration (FAA) Unmanned Aerial Systems (UAS) Center of Excellence Team. He is a 30-year US Air Force veteran with combat experience.

### Major shareholders

| Holder name                                 | Holding           | % of total issued capital |
|---|-------------------|---------------------------|
| 010 Yazamut Ltd                             | 22,539,727        | 25.7%                     |
| Ran Kraus                                   | 10,493,383        | 11.9%                     |
| Meah Plus Maarchot Betichot Le'Rachfanim LP | 7,000,460         | 8.0%                      |
| Amir Tsaliah                                | 3,523,386         | 4.0%                      |
| Ronald Zelazo                               | 3,238,622         | 3.7%                      |
| The Trust Company Ltd                       | 2,500,000         | 2.8%                      |
| Carjay Investments Pty Ltd                  | 2,500,000         | 2.8%                      |
| Adfect APS                                  | 2,107,396         | 2.4%                      |
| Jetmax Trading Pty Ltd                      | 1,456,250         | 1.7%                      |
| Dumanis Investments Ltd                     | 1,295,449         | 1.5%                      |
| Ajava Holdings Pty Ltd                      | 1,250,000         | 1.4%                      |
| John Andrew Rodgers                         | 1,250,000         | 1.4%                      |
| Carjay Investments Pty Ltd                  | 1,093,750         | 1.2%                      |
| Rob Rubin                                   | 900,368           | 1.0%                      |
| IBI Trust Management                        | 844,100           | 1.0%                      |
| Intervest HK Ltd                            | 831,250           | 0.95%                     |
| Chemic Engineering and Safety Ltd           | 803,205           | 0.91%                     |
| Uri Golani                                  | 654,535           | 0.75%                     |
| Dead Knick Pty Ltd                          | 562,500           | 0.64%                     |
| Janakan Krishnarajah                        | 562,500           | 0.64%                     |
| Auto Management Pty Ltd                     | 500,000           | 0.57%                     |
| 18 Knot Ventures Pty Ltd                    | 500,000           | 0.57%                     |
| Joyress Pty Ltd                             | 500,000           | 0.57%                     |
| Lonhro (WA) Pty Ltd                         | 468,750           | 0.53%                     |
| Greansea Investments Pty Ltd                | 450,000           | 0.51%                     |
| Vynben Pty Ltd                              | 450,000           | 0.51%                     |
| <b>Total Top 20 holdings</b>                | <b>68,275,631</b> | <b>77.7%</b>              |
| <b>Total issued capital</b>                 | <b>87,830,391</b> | <b>100%</b>               |

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