Outline

- Introduction
  - Madde
  - Martin
- Drones (UAV)
- Some prel. results from Aitik, Boliden
- End

Martin Andersson

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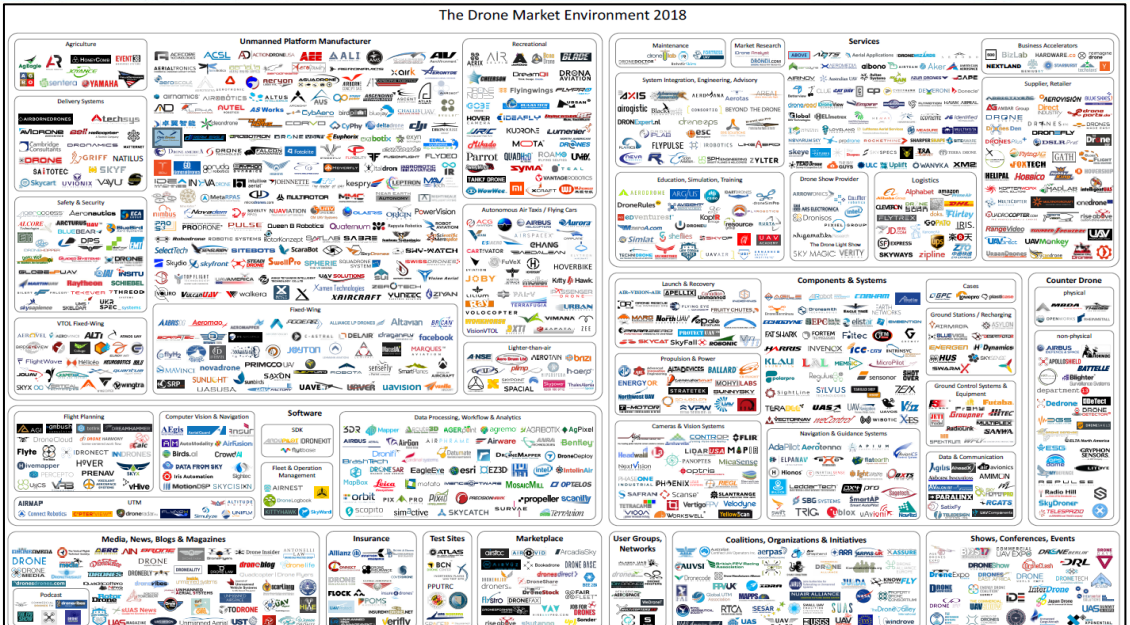
Founder & CEO

SCANDINAVIAN DRONE

TJÄNSTER DRÖNARE NYTTOLASTER PROGRAMVARA BLI KUND

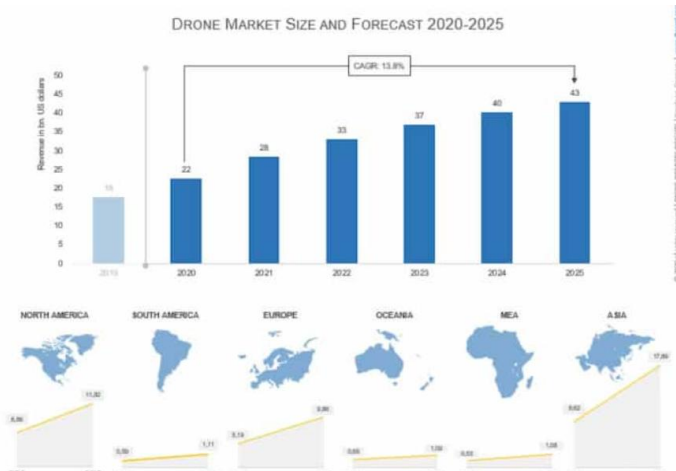
Drone Market 2015

Drone Market 2018

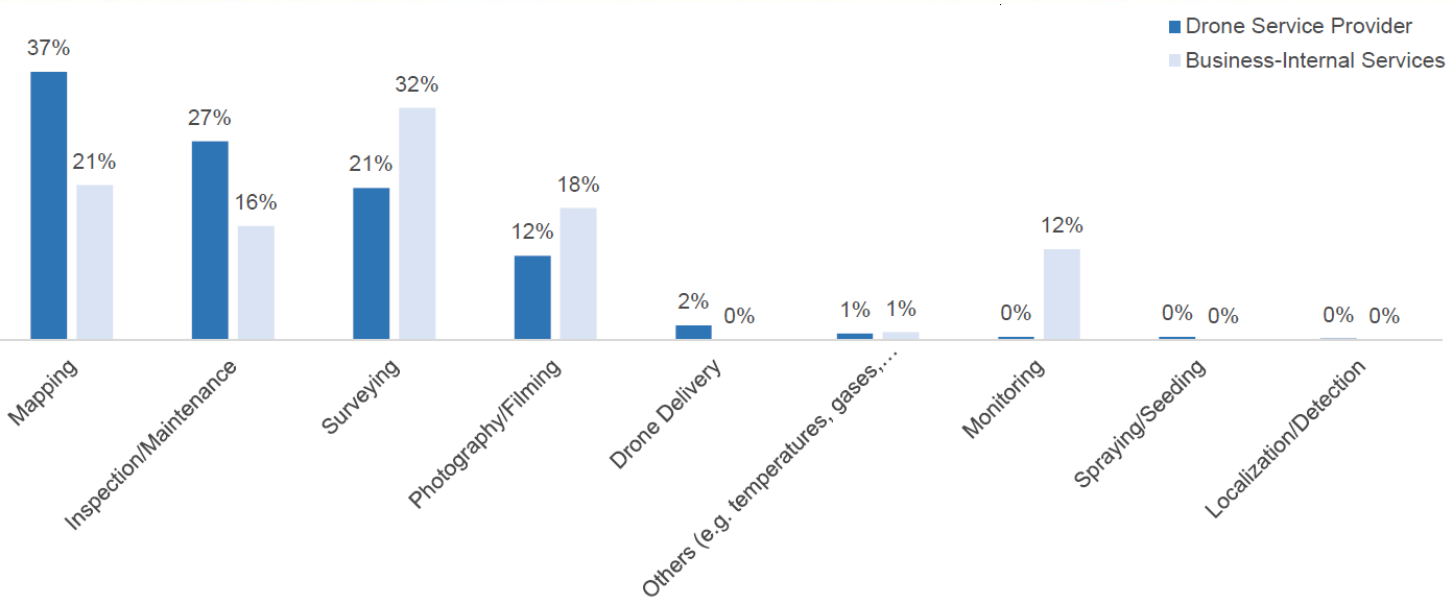


Snapshot of insights from the global drone market report

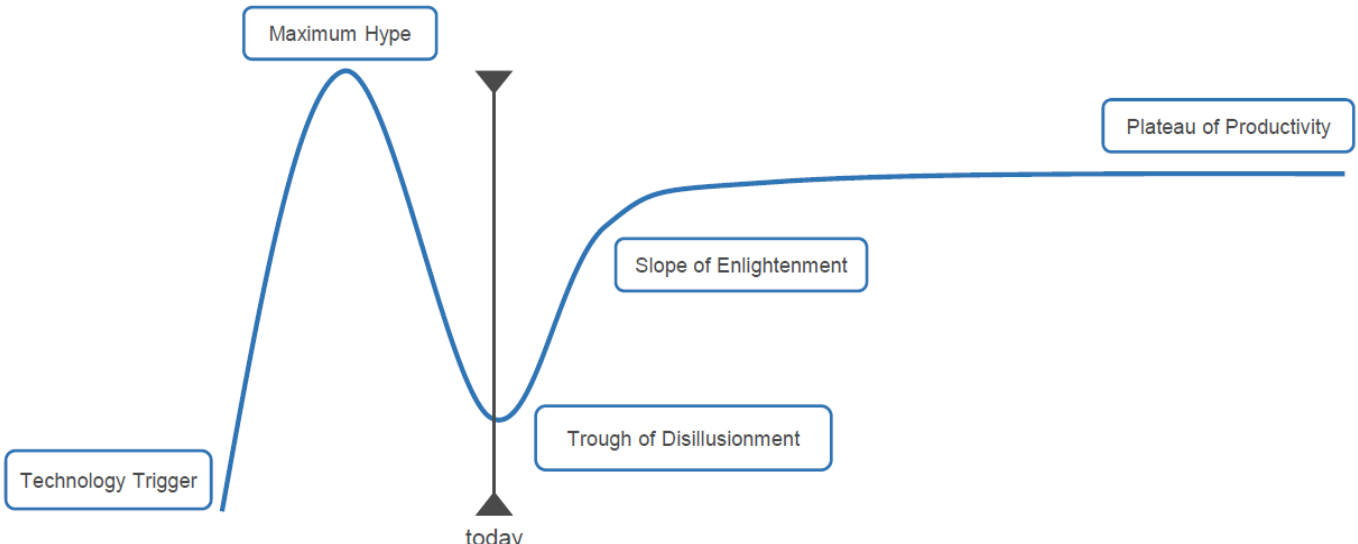
- Drone market is forecast to grow to $42.8 billion by 2025 at 13.8% CAGR
- Inspection is top application of drones with drone deliveries growing fast
- Asia to remain the biggest drone market driven by China and Japan
- India is expected to be the third-largest drone market in the world by 2025



For What Purpose Do you Operate Drones?



The Gartner Hype Cycle



Drones count koalas faster and cheaper than manual spotting

Dr Ryan Witt hopes drone-spotting will revolutionise the field of biodiversity monitoring. *(Supplied: University Of Newcastle)*

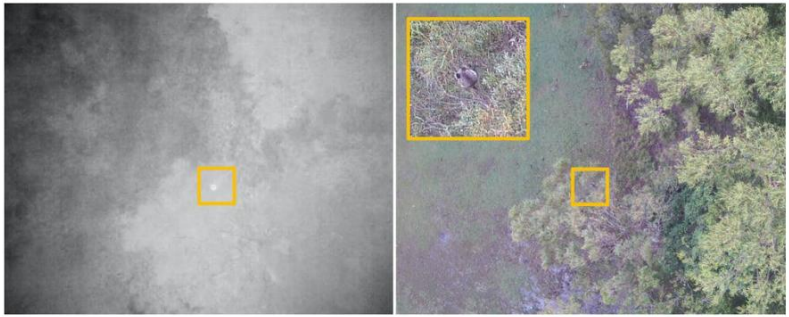
Even so, Dr Witt believes drone-mounted AI systems are the future of biodiversity monitoring.

"The greatest challenge will be to get this drone system working in real time so that you don't have to rely on someone looking at a screen and going that could be a koala that might not be," he said.

And this fine-tuning, he said, will require old-fashioned boots on the ground.

"You can start to teach the AI to decide that's a koala, that's a rock, that's a possum, that's a wallaby, and so on," he said.

Drones found koalas 'every two hours'



An infra-red image of a koala in a tree canopy (left) and the same koala snapped with a standard camera in daylight (right). *(Supplied: Dr Ryan Witt)*

Smarter site engineering with drones and asset digitalization

The need for greater agility in the planning and deployment of 5G networks has led to Ericsson pairing with TDC NET to implement a more efficient methodology for site visits and preparations: Intelligent Site Engineering.

About the customer
TDC NET has a history of connecting Denmark dating back to 1882. A subsidiary of TDC Group, it is the largest telecommunications company in Denmark, connecting over 6 million customers. TDC NET delivers the best mobile network and the fastest fixed connections in the country – and is shaping Denmark's digital future by rolling out fiber and 5G.

Mobile subscriptions in Denmark have a

Together, Ericsson and TDC NET have used Intelligent Site Engineering to complete over 200 site surveys across Denmark. In the past, each survey would have taken a full team several hours of on-site surveying at each location, often with the deployment of a crane due to Danish health and safety regulations, along with several hours of post-survey analysis to complete the appropriate engineering decisions. Thanks to the new methodology, a survey can now be completed in under an hour by one engineer equipped with a drone. 3D models can be created efficiently

The challenge
Designing and maintaining network sites has traditionally been one of the bigger hurdles when delivering mobile networks, requiring a large amount of resources, manpower and time, and potentially slowing down roll-outs. As the number and density of radio sites increases with 5G, a roll-out that is fast, efficient, accurate and that causes [illegible] disruption to existing services becomes increasingly important.

The solution

ERICSSON

in collaboration with

tdc net

Tools

Hardware	Suitable for UGM	Suitable for Open pit operations	Range (min)	Range (km)	Battery mAh	Temp	Weight gr	Max takeoff weight gr	payload capacity gr	Sensors (avoidance)	Video transfer	Communication	Weather
Kespry	NO	YES				-10			0				
DJI Mavic Pro 2	YES	YES	31	18	3950	-10	-297	907	???	Omnidirectional	5,1-5,85 Ghz	2,4-2,4835 Ghz	29–38 kph
DJI Mavic Pro Platinum	NO	YES	30	up to 7	3830	0	-734	1050	316	Forward	5,1-5,85 Ghz	2,4-2,4835 Ghz	
DJI Phantom 4 PRO	YES	YES	30	up to 7	5870	0	-1375	1800	425	Forward(x2), backward and sides(IR)	5,1-5,825 Ghz	2,4-2,4835 Ghz	
DJI Inspire 2	?	YES	27	up to 7	4280 x 2	-20	-3440	4250	810	Forward, up and down			
DJI Matrice 200	?	YES	38*	7		-20	-3800	6140	2340	Forward, up and down		2,4 or 5 GHz	
Aerialtronics Zenith ATX8	NO	YES	17-40	1	20000	?	-6650	9650	3000	-	5,1-5,8 Ghz	2,4 Ghz	Light rain or snowfall (IP55)
Sensefly Albris	?	YES	22	2					0		5,8 Ghz	2,4 Ghz	
Trimble ZX5	?	YES	20	2	2x6600	?	-2700	5000	2300	?	5,8 Ghz	2,4 Ghz	Stable in winds up to 36 km/h (22 mph)

Figure 4. Flyability Elios 2

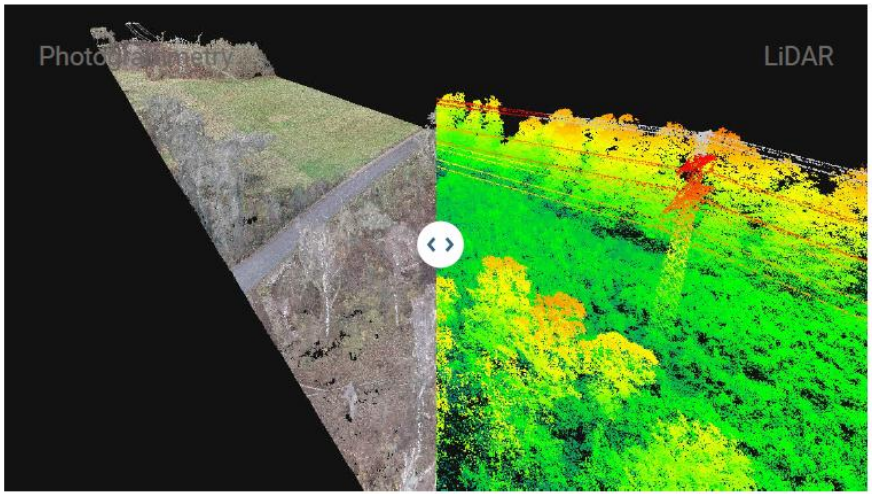
Figure 5. DJI Matrice 210 XT2

Figure 6. DJI Matrice 210 Z30

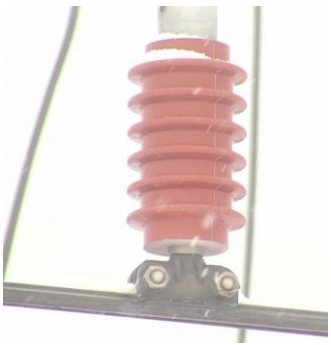
Figure 7. DJI Mavic 2 Zoom

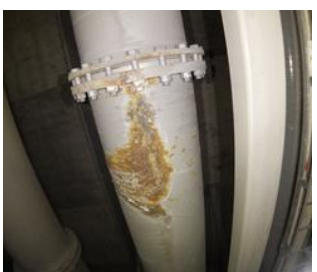
Payloads

- Camera
- IR Camera
- Sensors, gas measurement
- Photogrammetry vs LiDAR
- Gas sensors



Creating opportunities for autonomous mining is like putting the pieces of the puzzle together





Summary: Benefits with drones

- Time savings
- Fulfillment of the productivity demands
- Supporting the industry in their digitization strategy
- Possibility to increase revenue
- Enhancing the control and supervision
- Inspect objects and areas where no human has been before
- Replacing manually duties in the hazard environment and thereby contributes to an increased safety
- A number of inspection trips with “mining vehicles” can be replaced by drones and thus contribute to a reduction in CO_2 emissions