Drone Solutions for Construction and Geospatial Applications

Benjamin Pinguet

Product Manager

Zurich, 27.02.2018

senseFly
a Parrot company

senseFly pioneered professional drones in 2009 and is world leader in fixed-wing drones

Founded in 2009

#1 used mapping drone

Lightest in class

20,000,000 ha mapped to date

Our surveying solutions allow high precision mapping and support a wide range of payloads

eBee
senseFly

- High Precision on Demand (upgradeable RTK/PPK)
- Up to 59 min. flight time
- senseFly S.O.D.A. for photogrammetry
- eMotion 3
- Multiple camera options

thermoMAP

Parrot Sequoia

senseFly S.O.D.A.

eMotion
senseFly

With the albris we offer a professional grade inspection drone

albris
senseFly

- Close object operation
- Advanced situational awareness
- Automatic, interactive & manual flight modes
- Look up/forward/down
- 1 flight, 3 types of imagery
- 38 MP RGB still, HD video & thermal

Flight planning

Image processing

PIX4D

Our simple E2E workflow seamlessly integrates with best in class software

eMotion

- Mission block flight planning
- Full 3D environment
- Shapefile import
- 1 mission, multiple flights
- Export to cloud

- Hand launched
- Fully autonomous
- Highly precise landing
- No accessories required

Pix4D
AutoCAD
Agisoft
Airware
MicaSense
ArcGIS
& many more

Geospatial Applications

Land surveying

Urban planning & land management

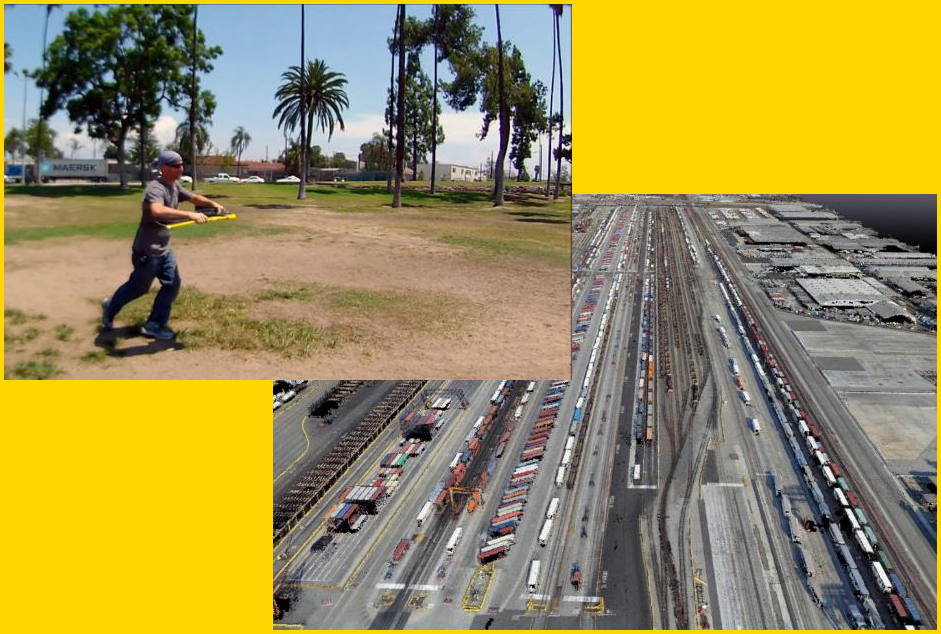
Mining, quarries & aggregates

Construction & earthworks

Surveying a US high-speed rail route

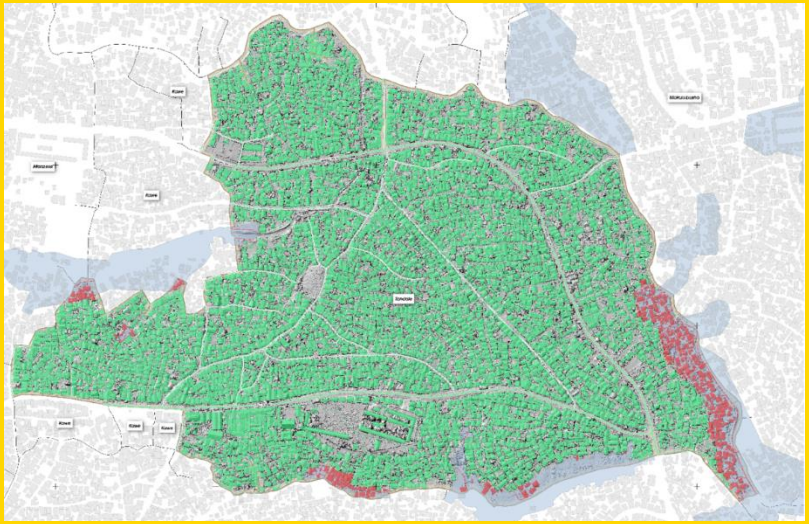
- Customer: Jacobs, USA
- Challenge: pre-survey for Burbank-Los Angeles-Anaheim section
- Solution: use an eBee RTK
- Results: data collected **4x faster** than traditional surveying, at **half the cost** of aerial surveying with manned aircraft

"The **quality and accuracy** of the data that the eBee RTK produced was **phenomenal**"
Marc A. Cañas GISP, Vice President National Freight Rail, Jacobs Engineering



Urban mapping in Dar es Salaam
Flood prevention

- Customer: The World Bank, Tanzania
- Challenge: Map 88 km^2 in high resolution, find a replacement solution form satellite imagery
  Solution: a fleet of 3 eBee
- Results: generate accurate 3D elevation models—used, to run flood simulations that help identify at-risk areas



Monitoring quarries in Ireland

- Customer: ASM Ireland
- Challenge: provide clients with cost-effective quarry data deliverables
- Solution: replace quarry owners' terrestrial survey methods with aerial drone surveys
- Results: **4-5 hr** data collection vs. 2-3 weeks (terrestrial), virtual copy of client quarries in under **24 hrs**, "**30x higher resolution**" than next available option

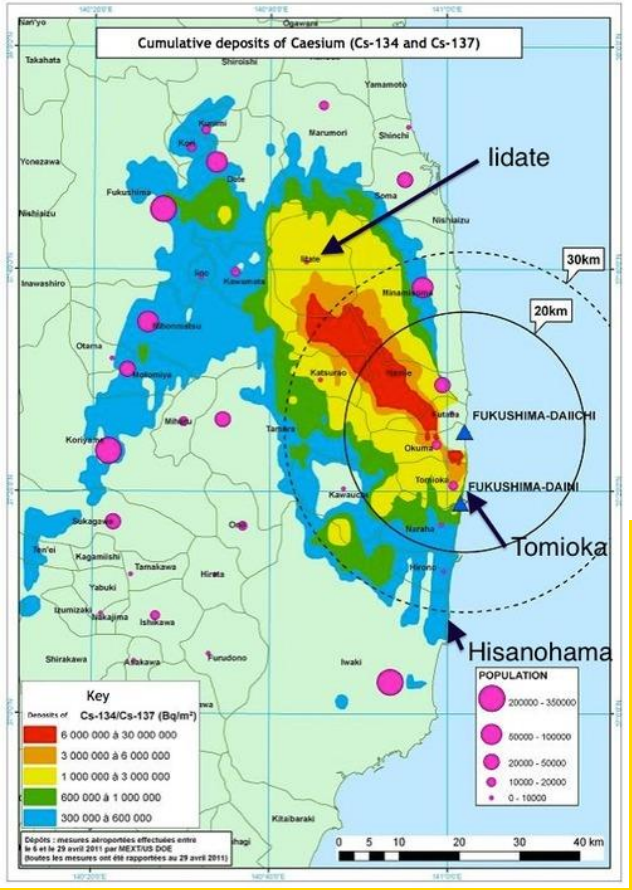
"For them to get even close to the **same level of detail** as the drone, using terrestrial methods, it would probably take that single surveyor **upwards of two to three weeks**"
Aidan O'Connor, Managing Director, ASM Ireland

Assessing flood damage at one of Europe's largest mines

- Customer: Serbian government, Kolubara pit
- Challenge: Find the best way to drain the flooded area
- Solution : eBee with GCP
- Results: area mapped in 6 flights, result delivered in **6 days, 7 cm GSD**

"Using classical surveying methods, such as lidar or total stations, would have been slow and expensive, so that was out of the question"
Aleksandar Milosavljevic, geodetic engineer,GeoGIS consultants

Post disaster response



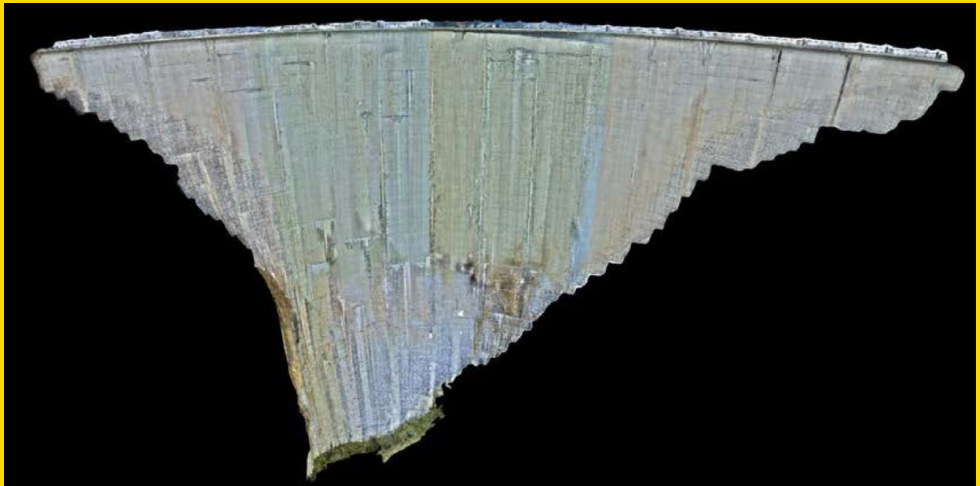
Fukushima

Typhoon Haiyan

Hurricane Matthew

Inspecting the Tseuzier dam
Switzerland

- Customer: Energies Sion Région
- Challenge: Inspect 20 000 m^2 with submillimetric resolution
- Solution : albris
- Results: 4 high resolution orthomosaic and 1 complete defect map

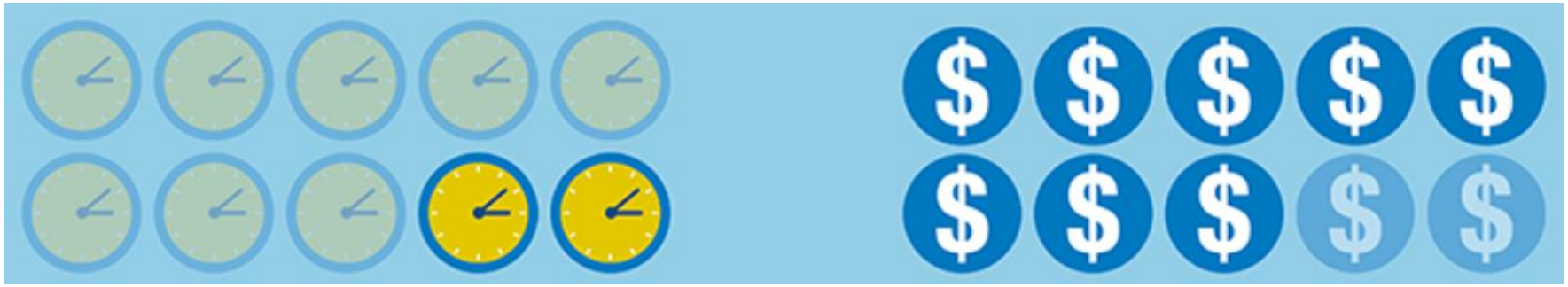


"It gives us a record of the dam's condition at a given instant and enables work to continue in the office afterwards—re-examining and refining the record—something that cannot be done today."
Maurice Perraudin,
Director of Production, ESR

The challenges in the construction industry

- Almost no productivity improvements over the past 50 years
  - Lack of innovation
  - Bad knowledge transfer
  - Weak project monitoring
  - Conservative company culture

- The construction industry has some inherent characteristics that make it a structurally difficult business
  - Multiple stakeholders with diverse interests/needs
  - High industry fragmentation
  - Over-preference for lowest price bid



20% longer to finish

Up to **80%** over budget

The construction industry ready for disruption

- Innovative new players and technologies
  - Collaborative tools
  - New material and equipment
  - New construction technology (3D printing)

- Public authorities are pushing for change
  - BIM compulsory
  - Budget cuts push towards project optimization

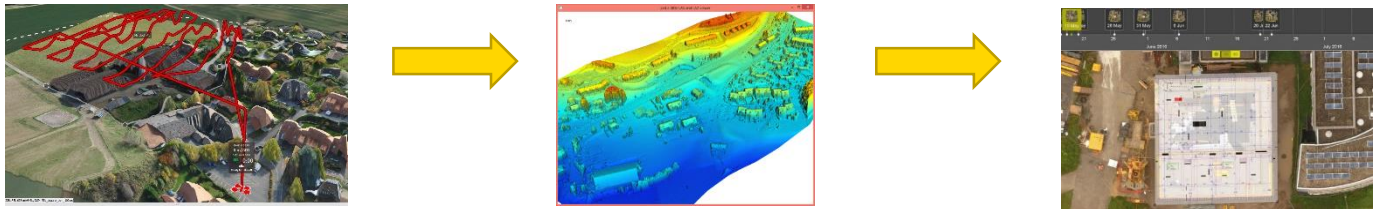
- Environmental
  - Use less material
  - Building must be energy efficient

Hardware and software ready to handle data

Drone
Easy to use
Autonomous
High precision
Connected

Software
Fast processing
Cloud service
Collaborative tools
Artificial intelligence

Simplified workflow
From data collection to sharing online results, the workflow has never being faster



Drone application across project life-cycle

Conceptualization & Design	Construction	Operation
Capture existing condition Identify risk Environmental impact Asses and plan site preparation	Progress monitoring Asset management of stock and material Safety check and quality inspection Document site progress As build / as designed comparison	Performance check (thermal analytics) Periodical inspection Rehabilitation / transformation projects

Biggest advantages :

- Improve quality
- Minimize rework
- Improve safety
- Mitigate litigation

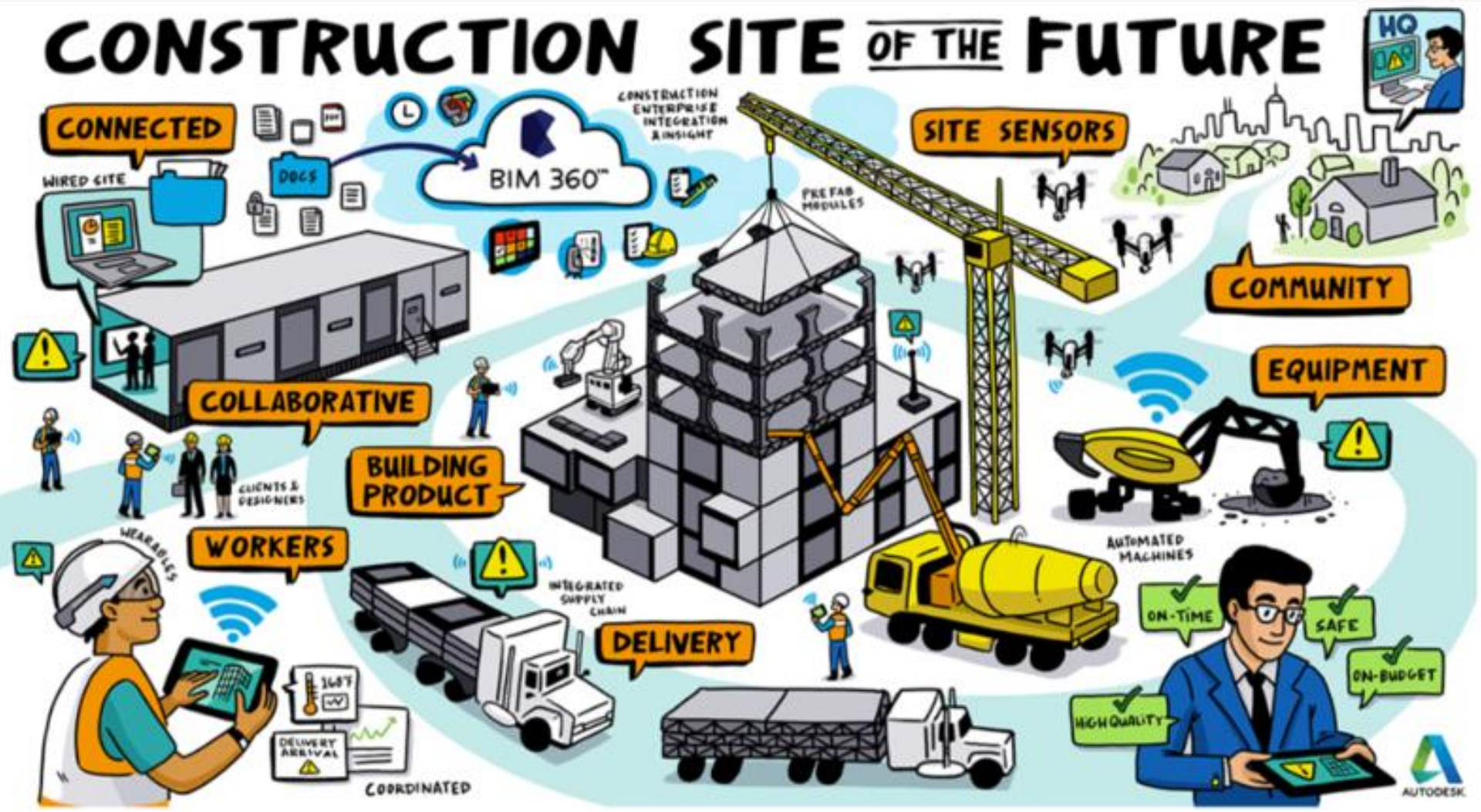
Save time
Save money
Improve quality

Low and easily controlled risk

- Operator
  - Create safety protocol
  - Invest in a training program
  - Understand regulation
- Risk management
  - Work with your team
  - Get a third part insurance
  - Consider hull insurance
- Drone
  - Light weight UAV
  - Safety record
  - Follow maintenance procedure

What can be done today on a construction site with a drone?

- 3D modeling
- Volume calculation
- Position check
- Progress monitoring
- BIM integration for collaboration
- AI
- Clash detection


CONSTRUCTION SITE OF THE FUTURE
CONNECTED
WIRED SITE
DOCS
BIM 360™
CONSTRUCTION ENTERPRISE INTEGRATION & INSIGHT
SITE SENSORS
PRE FAB MODULES
HQ
COMMUNITY
EQUIPMENT
COLLABORATIVE
CLIENTS & DESIGNERS
BUILDING PRODUCT
WORKERS
WEARABLES
AUTOMATED MACHINES
INTEGRATED SUPPLY CHAIN
DELIVERY
ON-TIME
SAFE
ON-BUDGET
HIGH QUALITY
DELIVERY ARRIVAL
COORDINATED
AUTODESK.

Basic Copyright Notice & Disclaimer

This presentation is for information purposes only and contains non-binding indications. Any opinions or views expressed are of the author and do not necessarily represent those of Swiss Re. Swiss Re makes no warranties or representations as to the accuracy, comprehensiveness, timeliness or suitability of this presentation for a particular purpose. Anyone shall at its own risk interpret and employ this presentation without relying on it in isolation. In no event will Swiss Re be liable for any loss or damages of any kind, including any direct, indirect or consequential damages, arising out of or in connection with the use of this presentation.