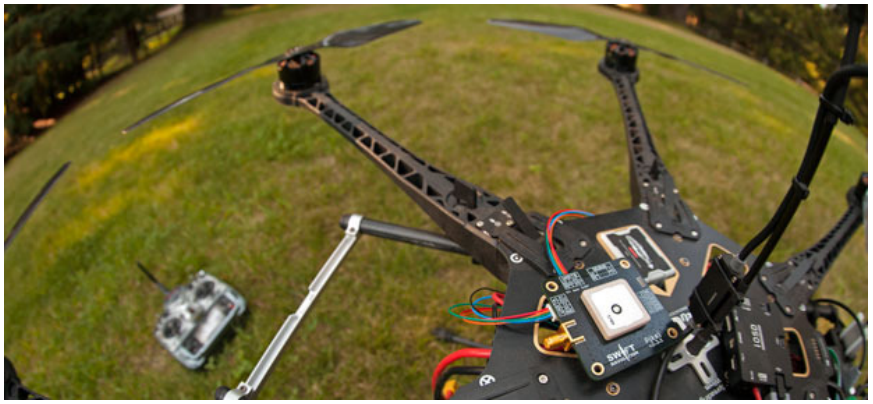

SWIFT
NAVIGATION

Every farmer knows RTK

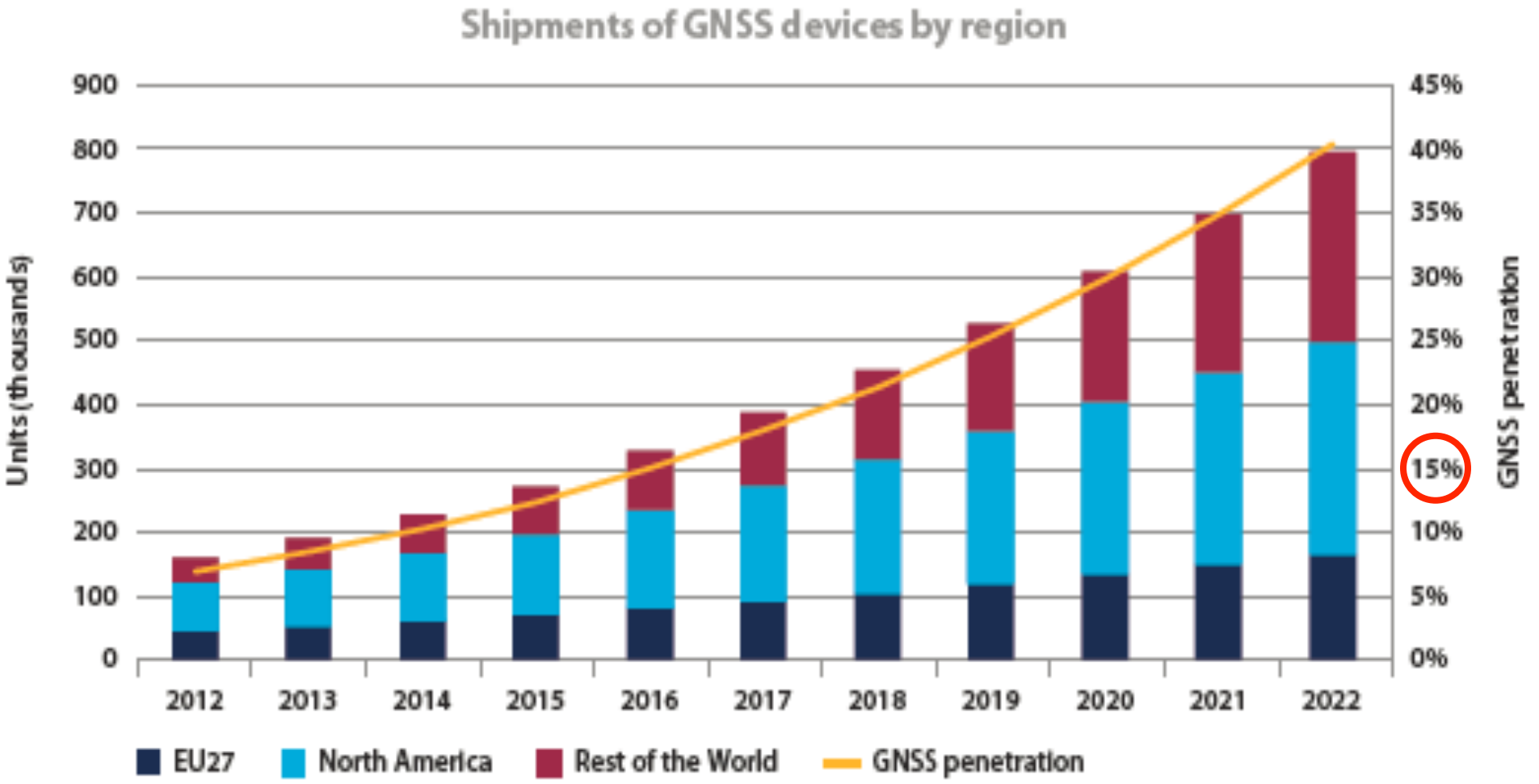
Auto-steer

Data Collection

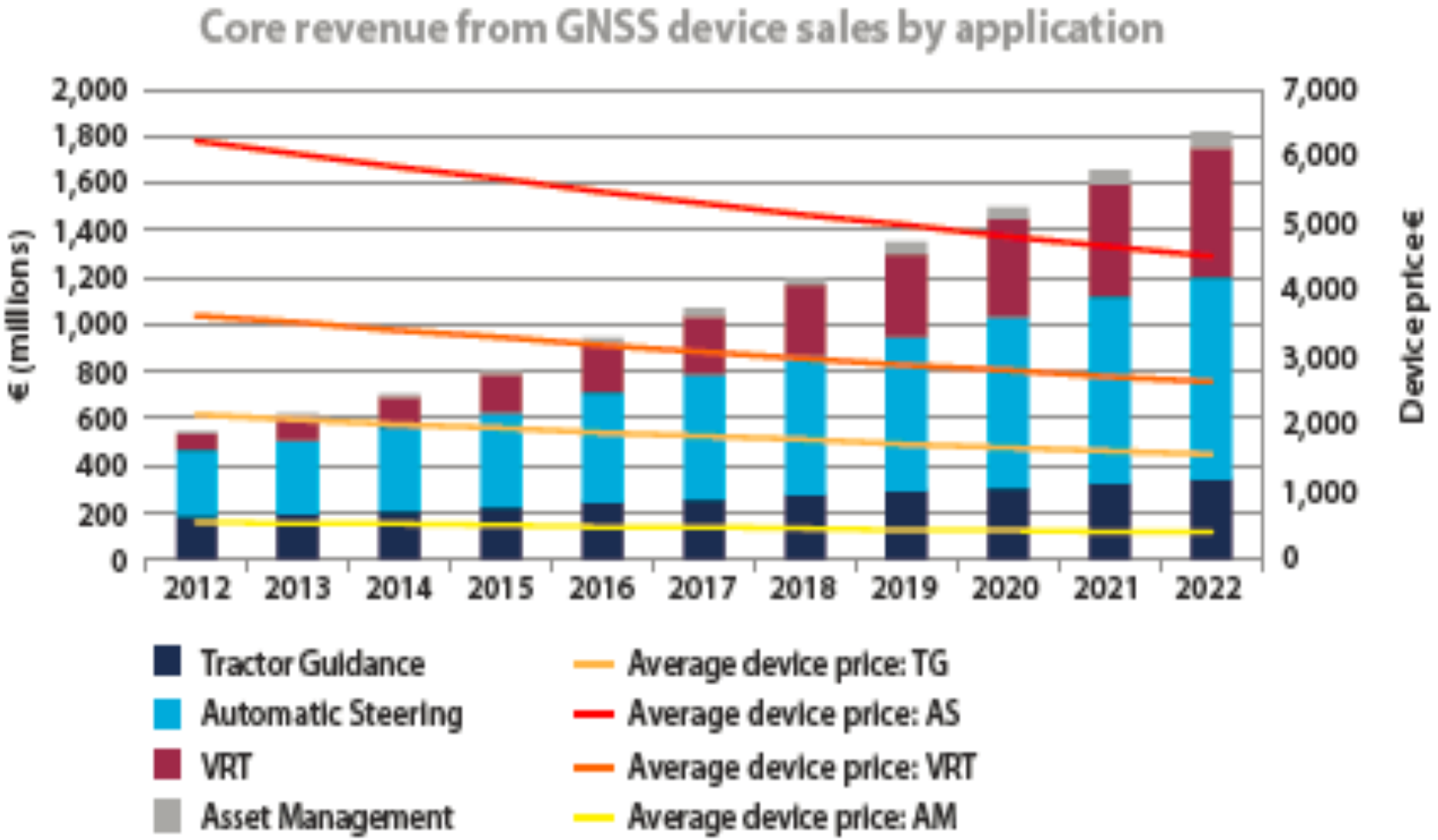


1) Accuracy
2) Reliability
3) Expensive
4) Usability

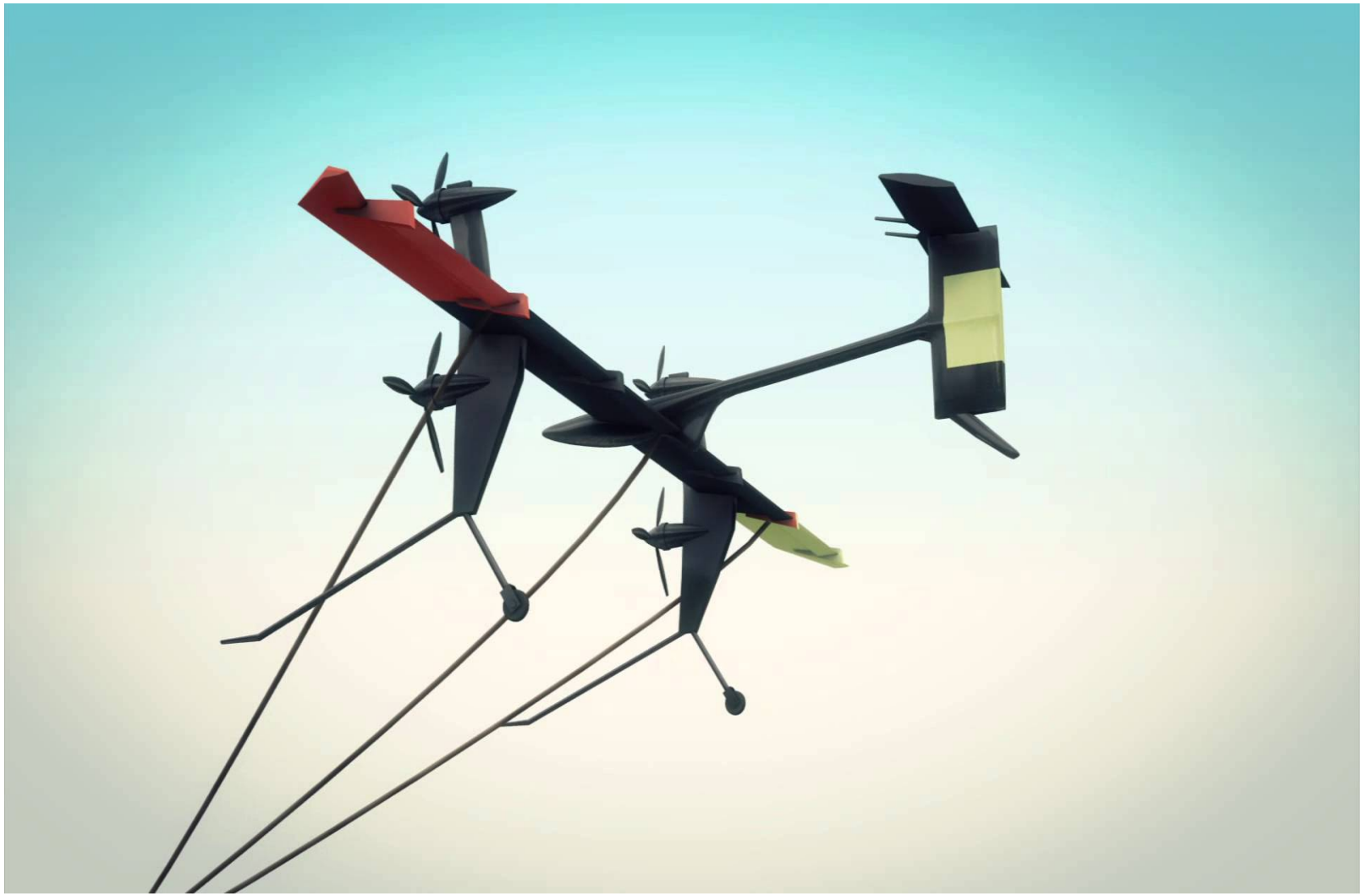
Limited RTK


Shipments of GNSS devices by region
Units (thousands)
900
800
700
600
500
400
300
200
100
0
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
GNSS penetration
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
EU27
North America
Rest of the World
GNSS penetration

High price tag

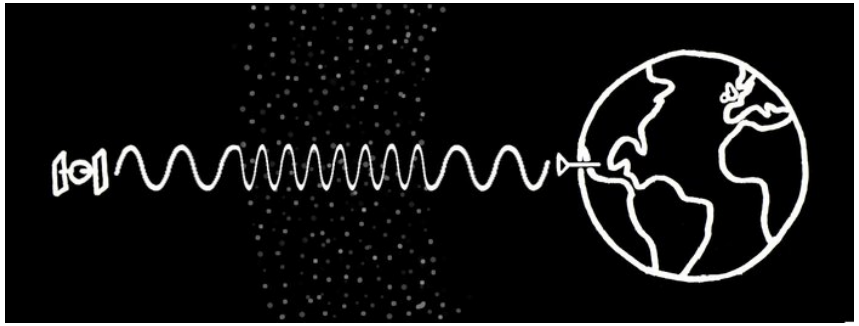


Roots in the sky



Real time kinematics

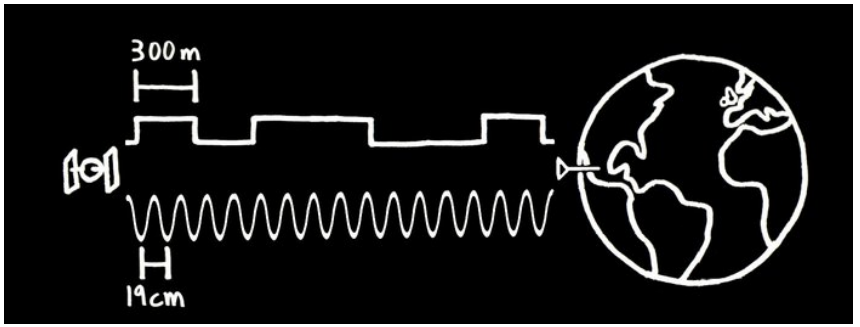
Normal GPS



Accurate to a few meters

- **Several sources of error**
  - **Signal measurement**: "code" can only be measured to several meters.
  - **Ionospheric delay**: slowing of GPS signals.

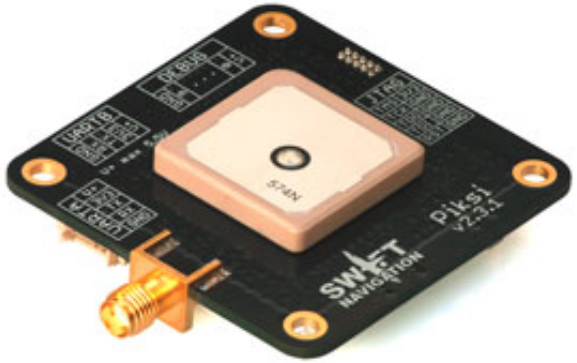
RTK GPS



Accurate to a few centimeters - 100x precision

- **Mitigates errors via two methods**
  - **Signal measurement** : "carrier" phase to under a centimeter. Solve for "integer ambiguity" in number of carrier cycles.
  - **Ionospheric delay**: A base station broadcasts corrections to the roving to cancel out ionospheric delays.

Anywhere on earth, to the centimeter



Introducing Piksi

Proprietary Real Time Kinematics (RTK) GPS software
Centimeter accurate positioning

10x Cheaper
($500 vs. $5000+)

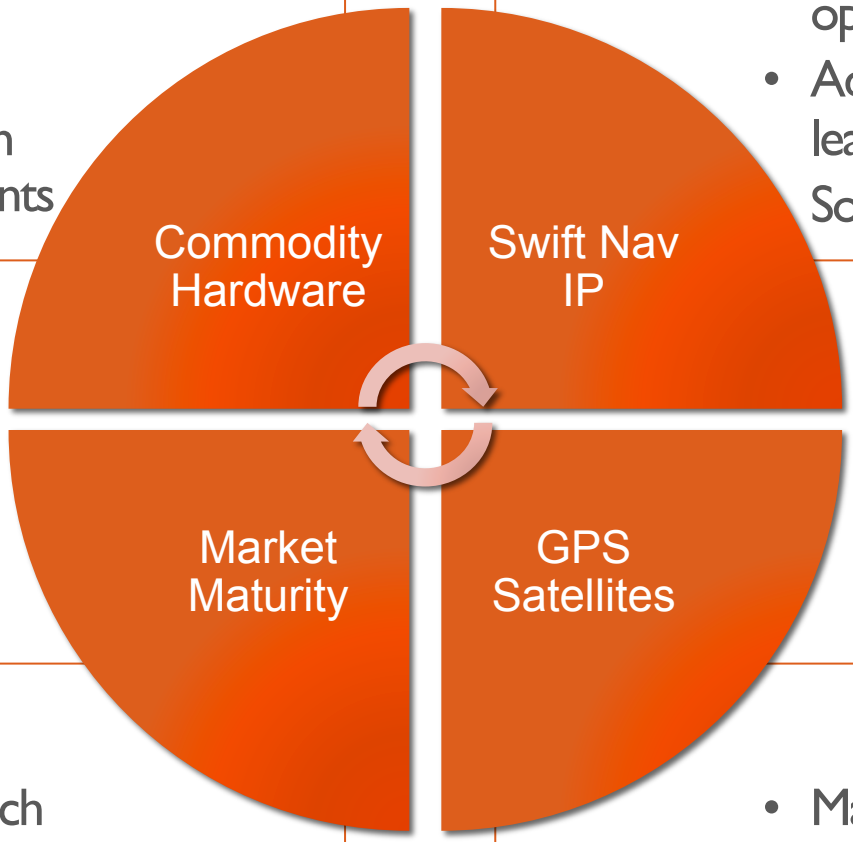
An open stack for easy integration
Easy to use library and API

Why now?

- Powerful off-the-shelf components (no custom silicon)
- Cost structures from cell phone components

- Expired RTK patent opens up technology
- Advances in machine learning

Software processing



- "First wave" of Ag Tech proven
- Big data , & Automation

- Many international Satellite constellations coming online

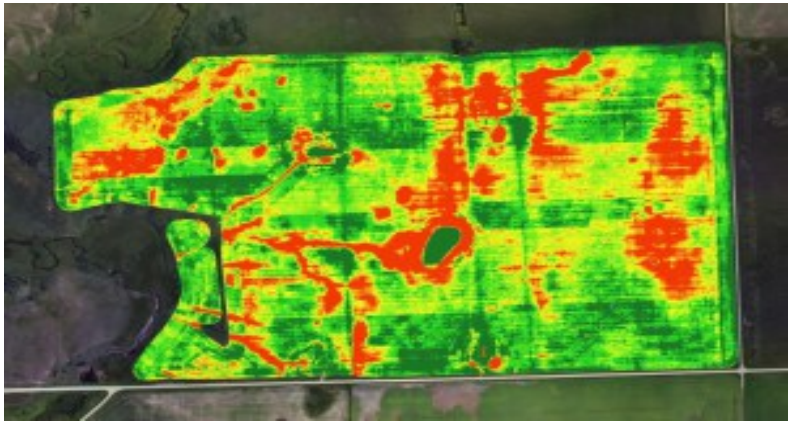
Precision agriculture

More Automation

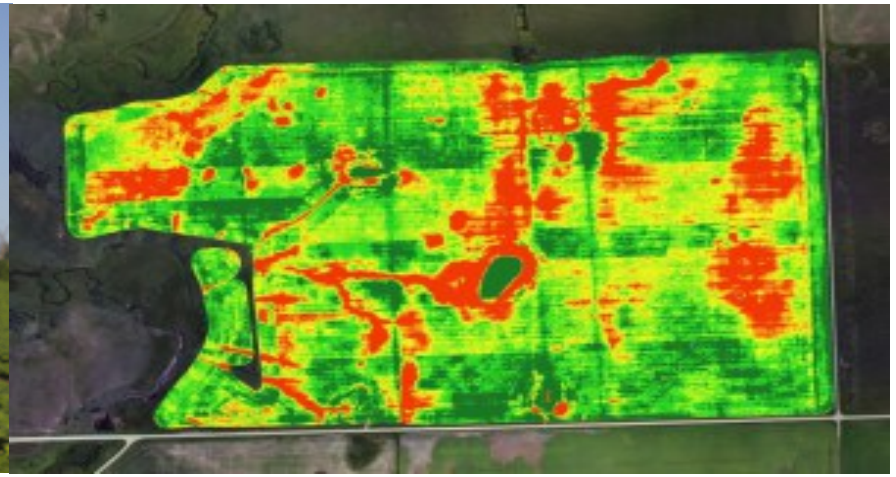
Unsolved Problems

New Technology

Data Driven



Case study: UAV imagery



The Problem

- Low Resolution
- Ground Control points

Our Solution

- Geo-tagging imagery with higher accuracy GPS improve image stitching to deliver higher quality imagery
- High accuracy GPS allows "ground truthing" with few or no ground control points

Thank you