



Refining the oil of the 21st century: Next-generation spatial data, precision analytics and the scalable insights that will power smart cities

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ANDITI



Sustainable, responsive, liveable



Smart cities offer the potential to transform economies, governments and communities.

- Many new platforms emerging to plan and manage smart cities infrastructure
- City-scale spatial data and smart analytics underpin our ability to realise this potential
- In order to deliver truly smart cities, our data and analytics must be accurate, scalable and sustainable

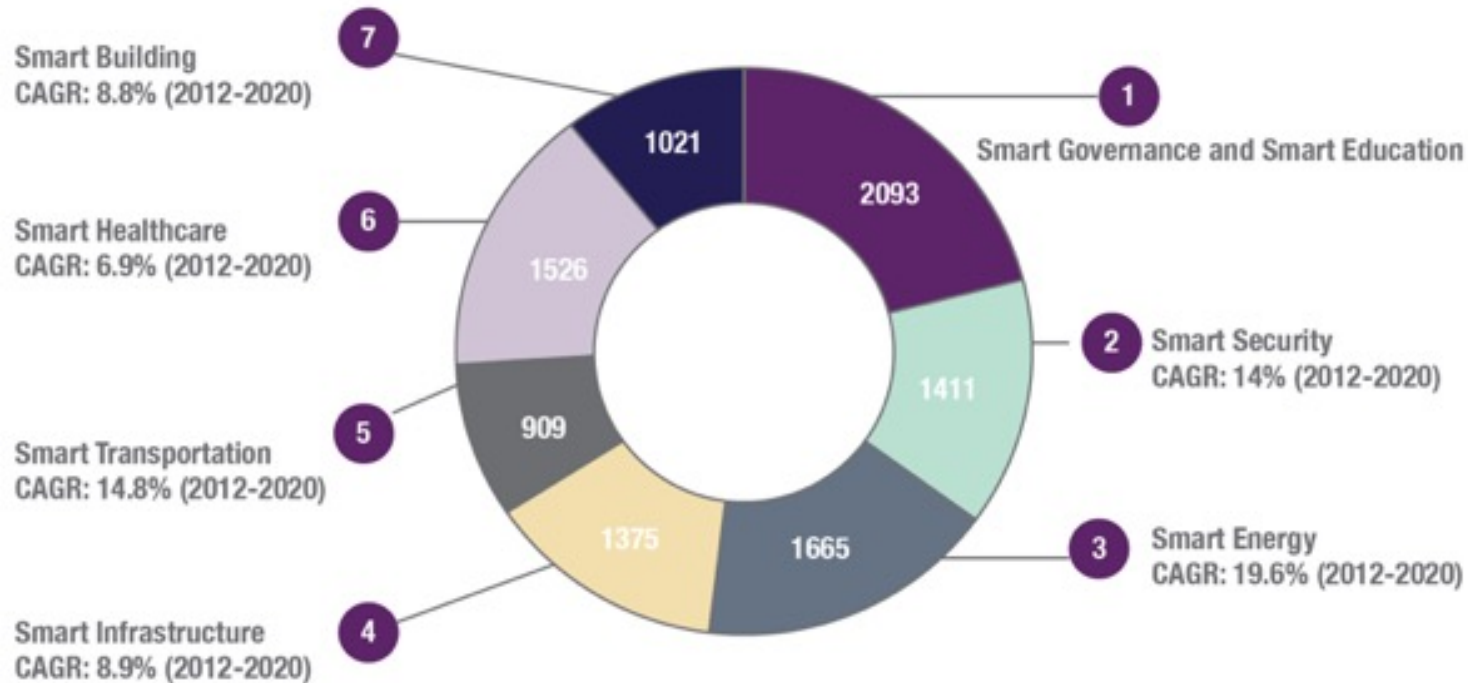
How can we generate the insights that will transform our cities?

Connected cities require spatial insights

- Pervasive, high quality 2D and 3D spatial data is a fundamental input
- Creating smart cities is an AI problem, requiring automated, accurate analysis at scale
- Solving that AI problem will generate the spatial insights to drive growth in sectors like energy, infrastructure, transport and construction
- These advances will create a new foundation for economic growth, environmental sustainability and social well-being.



US\$1.5 trillion opportunity by 2020



“Information is the oil of the 21st century, and analytics is the combustion engine.”

Peter Sondergaard
Senior Vice-President, Gartner Research

Smart cities business opportunities (US\$m) by market segment, including Compound Annual Growth Rates 2012 – 2020 (CRC-SI, 2016)

Significant delivery challenges remain



We are drowning in data, but insight is limiting

- Proliferation of platforms: terrestrial, UAV, aerial, nano-satellite, satellite.
- Gartner: 8.4 billion connected “things” in 2017, 31% up from 2016.

but...

- Businesses are struggling to capitalise
- Stakeholder expectations are rising

**How can our industry play our part
in ensuring successful delivery on
the promise of smart cities?**

An exercise in compromise

Imagery Trade-offs

Satellite imagery:

Coverage, currency but low resolution & accuracy

UAV imagery:

High resolution & accuracy, but small coverage only

Traditional aerial imagery:

High resolution, quality & accuracy, but slow turnaround and high cost

Analytics Trade-offs

Consumer-grade automated analytics:

Coverage, accessibility, but limited precision

Manual analysis:

Expensive, slow and inconsistent at scale



Next generation aerial imagery

High resolution & accuracy, wide coverage,
fast turnaround, low cost



A N D I T I

Next generation spatial analytics

Professional-grade, accessible and precise,
automated at city scale

What is the impact on the quality of
information available to architects
and operators of Smart Cities?

Building detection: aerial vs satellite

- Two imagery sources + Anditi's automated analytics
- ~50 buildings, 5cm aerial vs 30cm satellite imagery

- Performance metrics: $\text{Completeness} = \frac{|TP|}{|TP| + |FN|}$

$$\text{Correctness} = \frac{|TP|}{|TP| + |FP|}$$

$$\text{Quality} = \frac{|TP|}{|TP| + |FP| + |FN|}$$

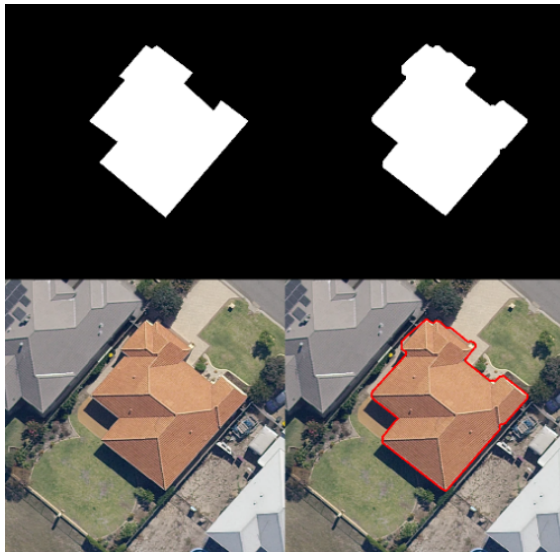
- The error in estimated roof area was also calculated



Building detection: aerial vs satellite

Image Source	Completeness	Correctness	Quality	Roof Area Error
Aerial	0.974	0.965	0.961	3%
Satellite	0.821	0.805	0.786	15%

*Aerial
example*



*Satellite
example*



Urban vegetation: client case study 1

- Third-party analytics and 15cm aerial imagery
- Visual comparison with Spookfish imagery

Results...

- ~40% of visible vegetation missed
- Buildings misclassified as vegetation
- Large variations in quality of vegetation identification over time



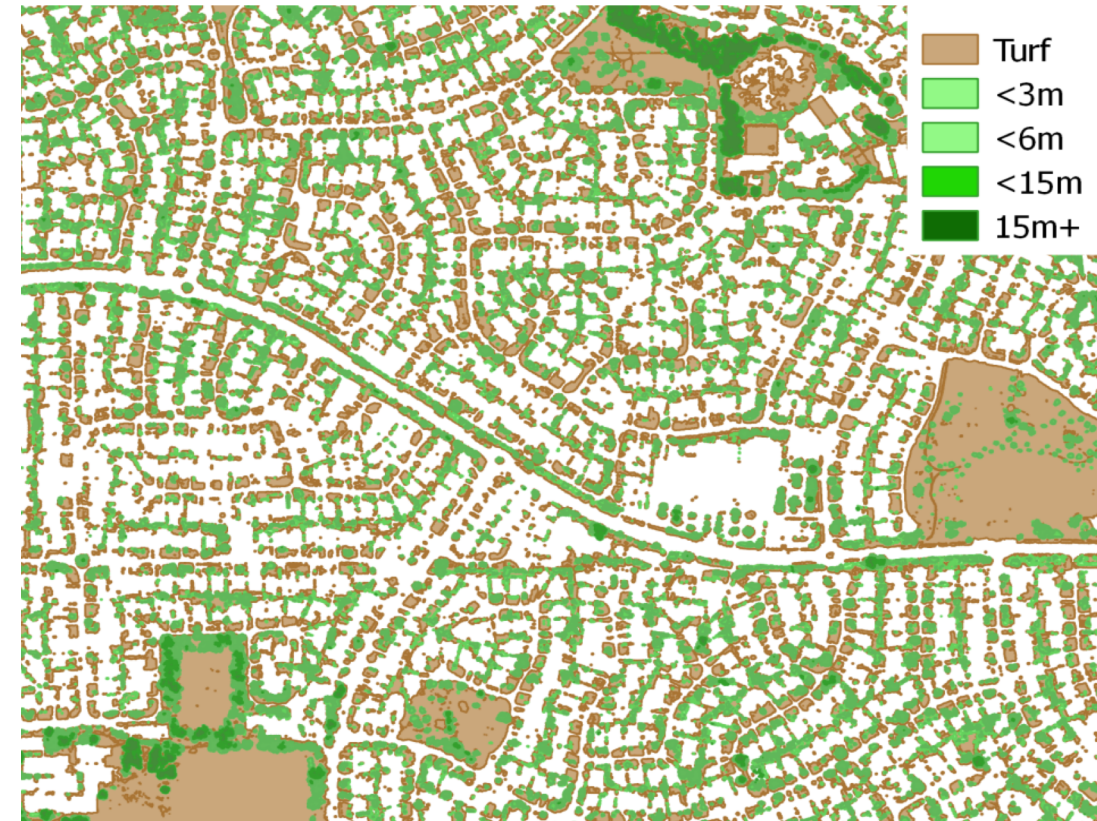
Urban vegetation: client case study 2

Local government client:

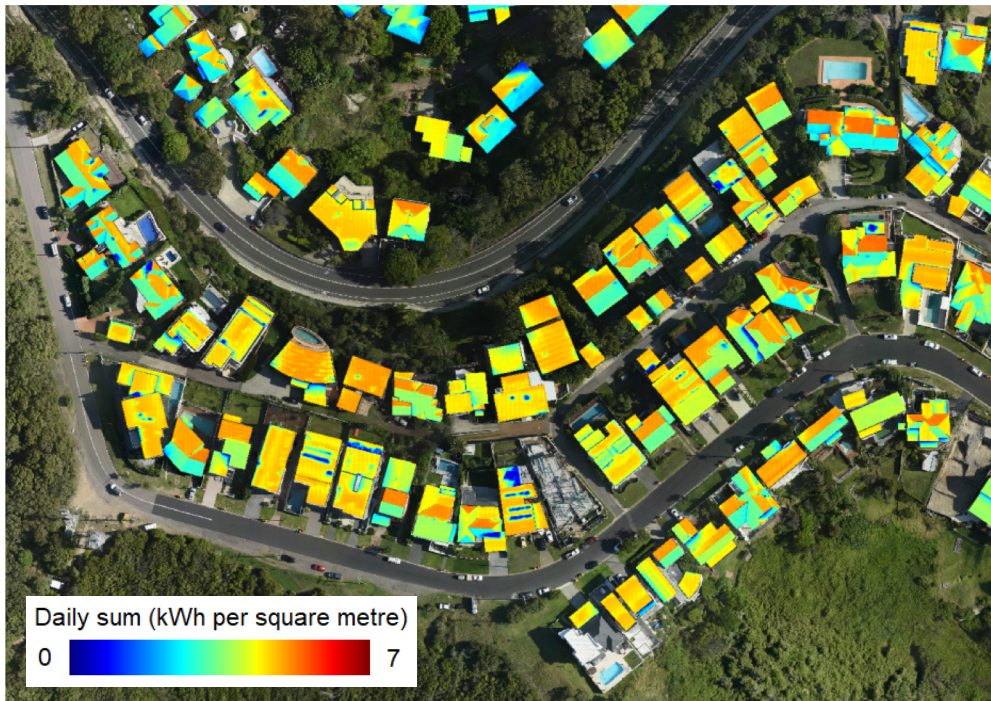
- Lacked information baseline required for analysis
- Sought an alternative to slow, costly manual approach

Automated analysis using quality data:

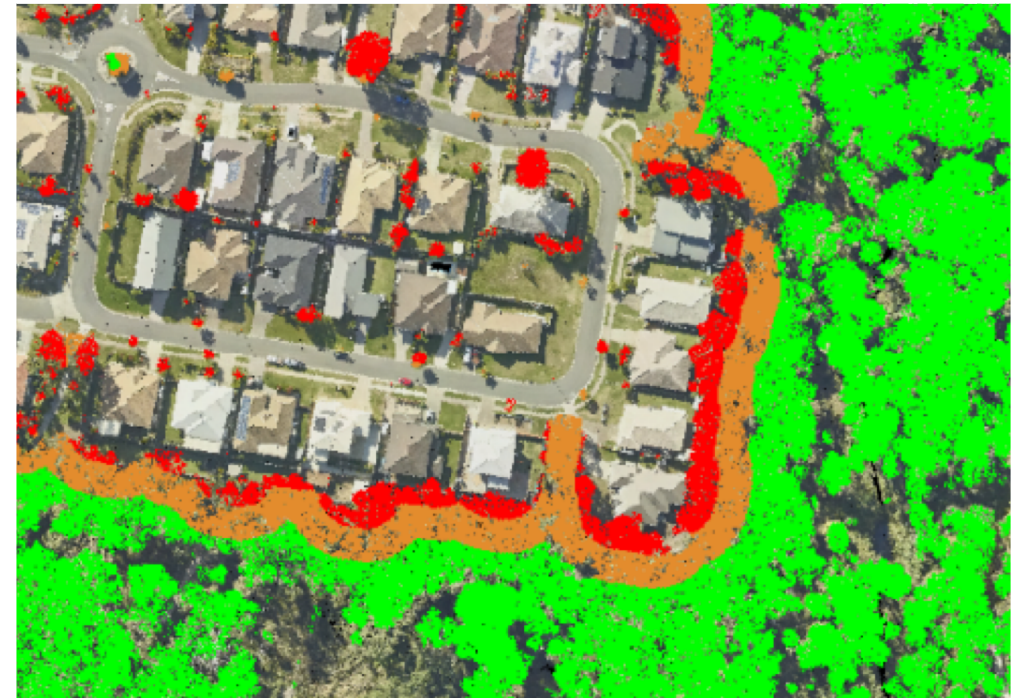
- Successfully delivered requested outcomes
- ~20x faster and an order of magnitude cheaper
- Data-driven insights informed subsequent policy



Implications for next generation use cases



Solar potential



Vegetation proximity

Opportunities for smart cities

- Informed decision-making at scale
- Reliably translatable models
- Affordable with strong ROI
- Superior outcomes with lower energy use

Quality data and smart analytics will fuel cities that are:

- Sustainable
- Responsive
- Liveable



