



CITY OF CAPE TOWN  
ISIXEKO SASEKAPA  
STAD KAAPSTAD

## DataCon Africa 2019 Cape Town

# MINIMISING BIAS IN DECISION MAKING

Production flow data analytics and intelligent data imaging

Matthew Ferguson 14 March 2019

Making progress possible. **Together.**

# Business context

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An introduction to the City's geospatial image environment



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# Historic context – The burning platform

**1997** Ruling against City for lack of equity in rates

*Justice Denis Davis ruled that if City did not put mechanisms in place that would bring equity in rates the he would rule in favour of Logra*

**2000** General Valuation under Unicity Commission

*Draft Municipal Property Rates Act 6 of 2004  
Full outsourcing of General Valuation under control of Unicity Commission*

# Phases in data processing maturity

## 2000 - 2001

- All data collected in one structured format

## 2002 - 2009

- Focus on structured data
- Associated backlogs and high response times

## 2009 - 2018

- Ground-up approach using unstructured data
- Lean 6 $\sigma$  framework for process improvement

# Meet Matthew the tax collector

## Mandate

Maintain a current property register with market related values for collecting fair and equitable property rates

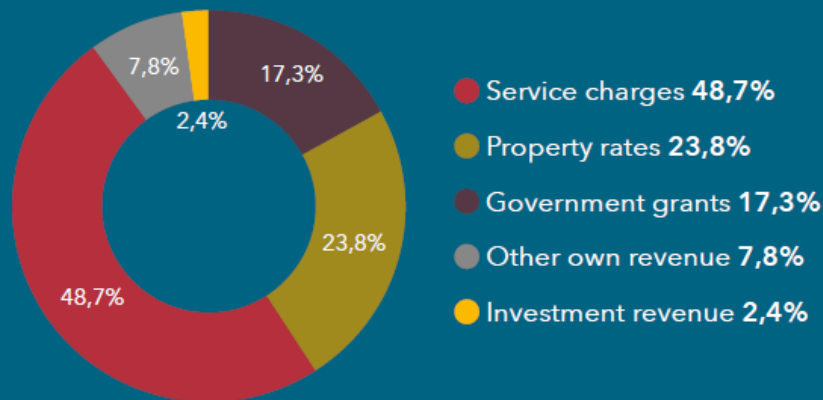
## Challenge

To respond to property changes on the ground within 60 calendar days

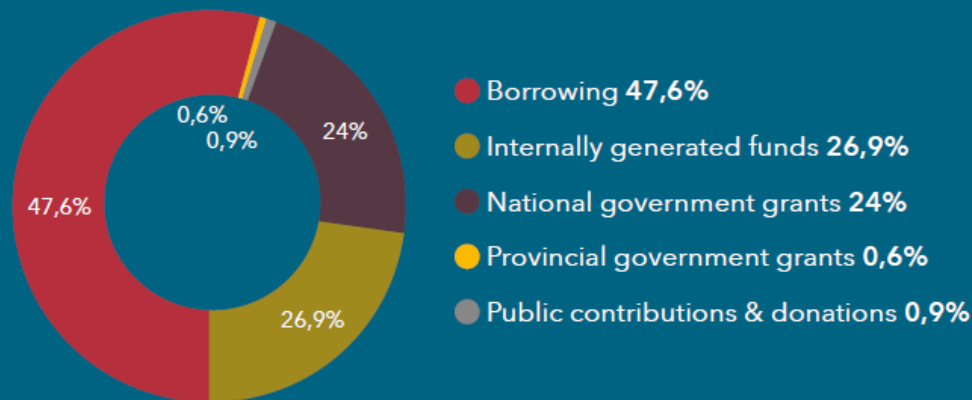
# The City's budget at a glance

*Property rates contribute 24% of R39 billion operating*

**Operating budget:**  
**R39,3 billion**



**Capital budget:**  
**R8,4 billion**



# Aerial imagery & how it matters

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An introduction to the City's geospatial image environment



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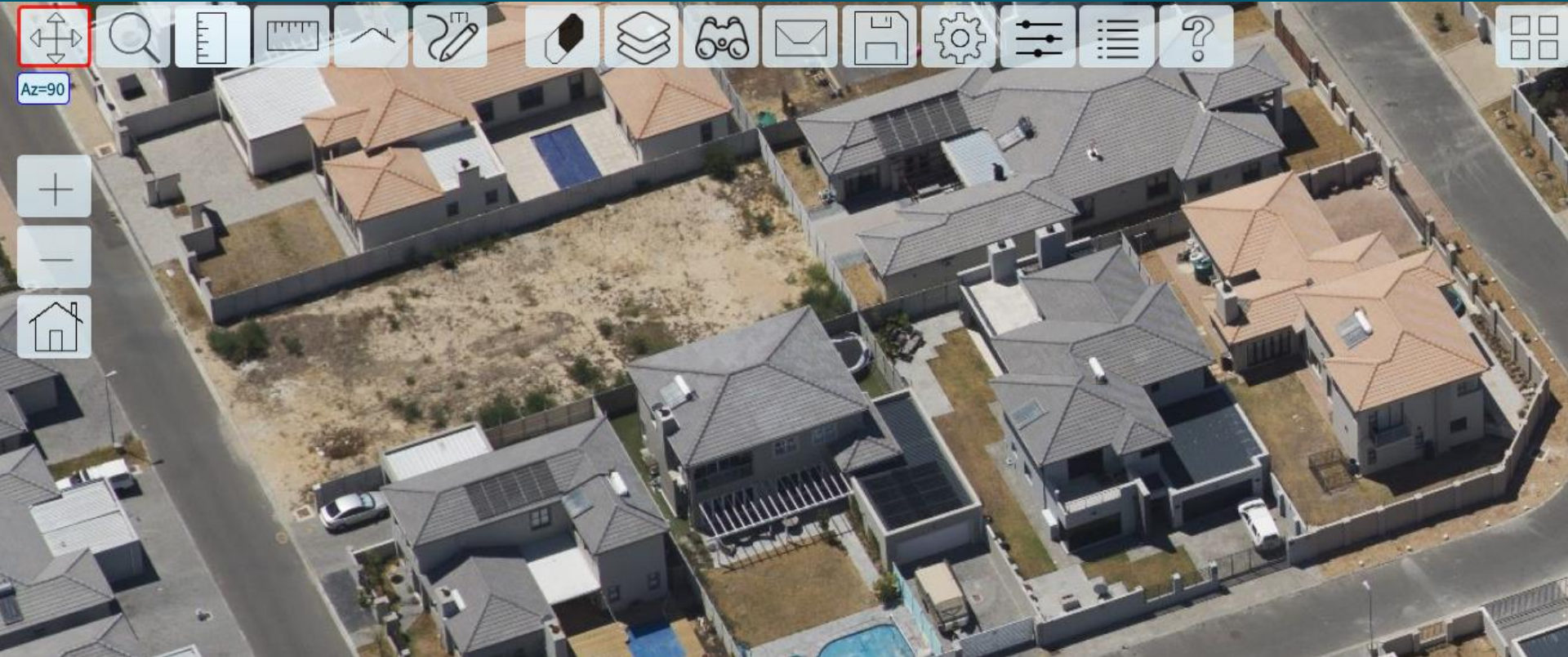
# Aerial image data acquisition

- Aerial Imagery
- Lidar
- Oblique Imagery
- 3D Modelling
- Infra Red Imagery
- Drone Imagery
- Surface Modelling Utility
- Change Detection Utility
- Remote Sensing Utility





# 2018 Parklands – West view



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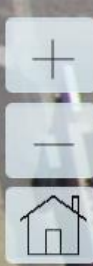
# 2018 Parklands – East view



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# Resolution of 4cm



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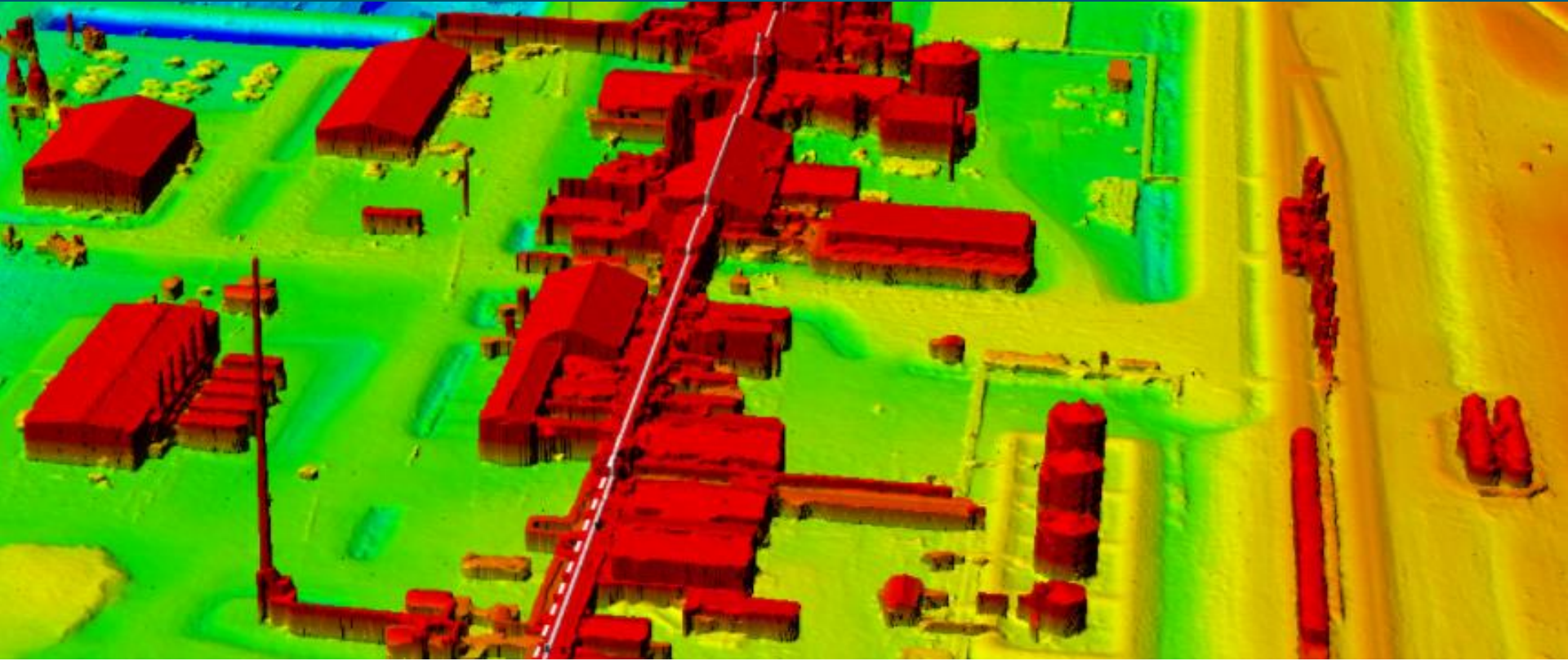
# Multi temporal image analysis



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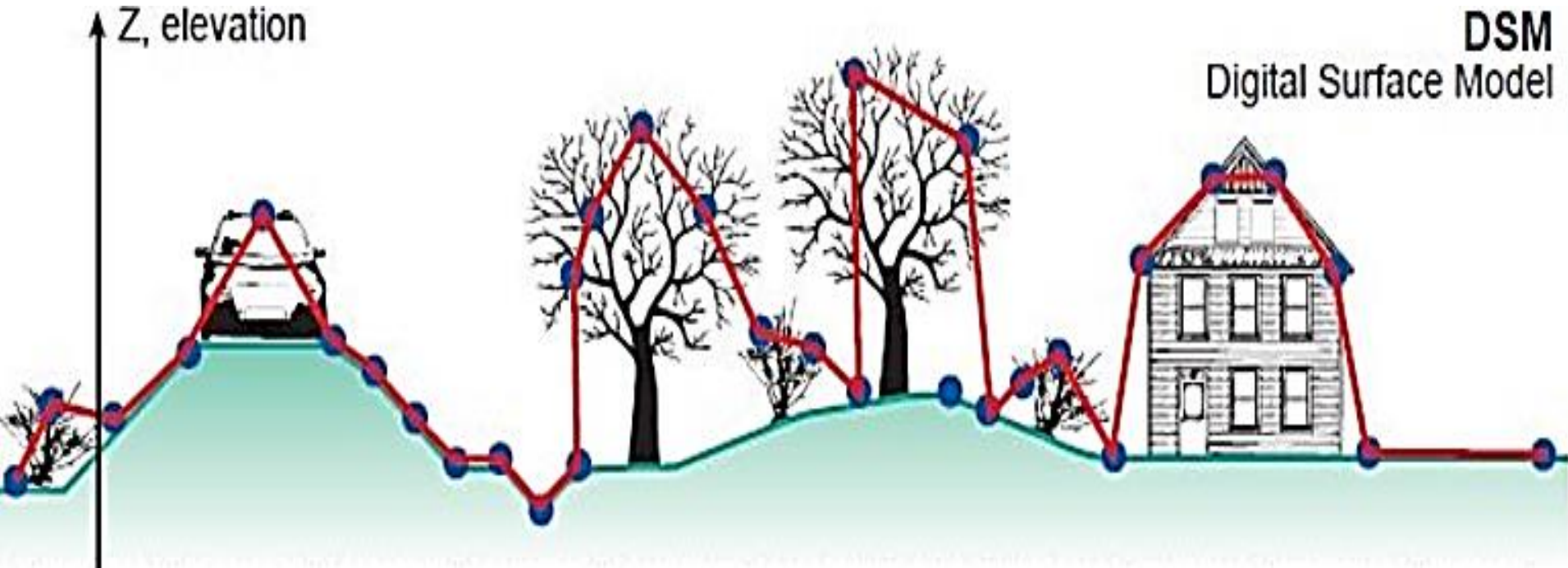


# Digital surface modelling

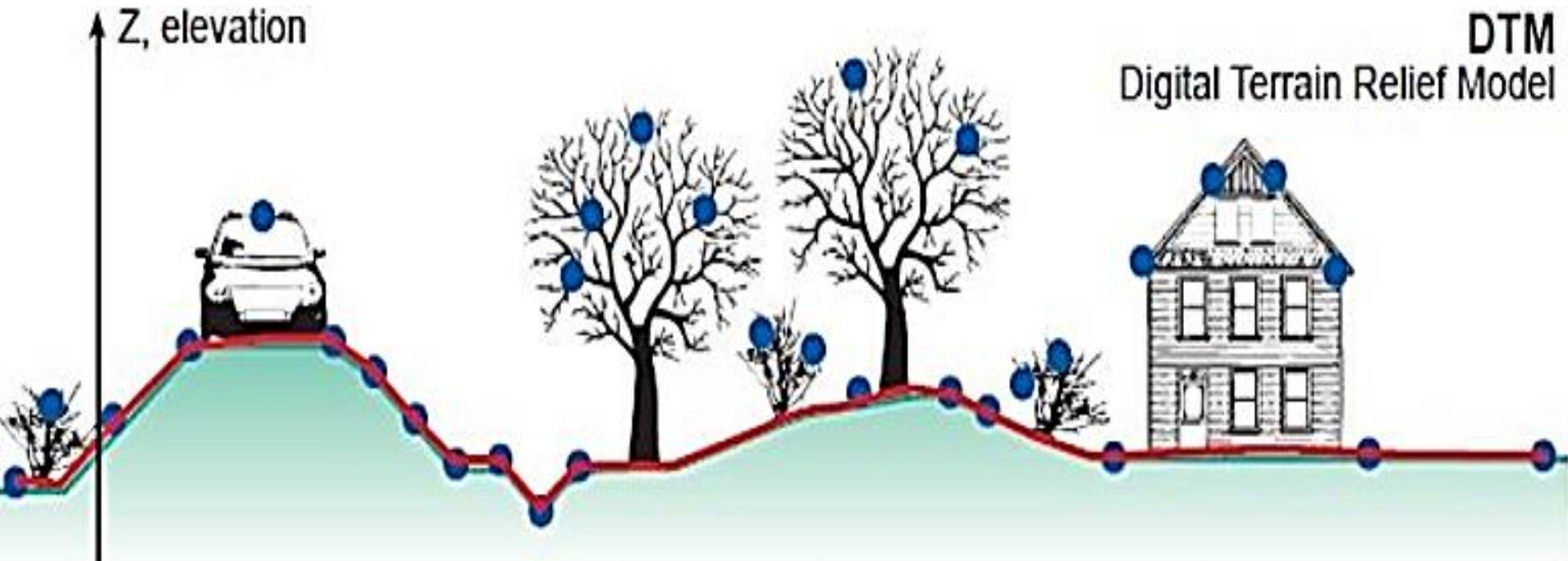


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# Digital surface modelling explained

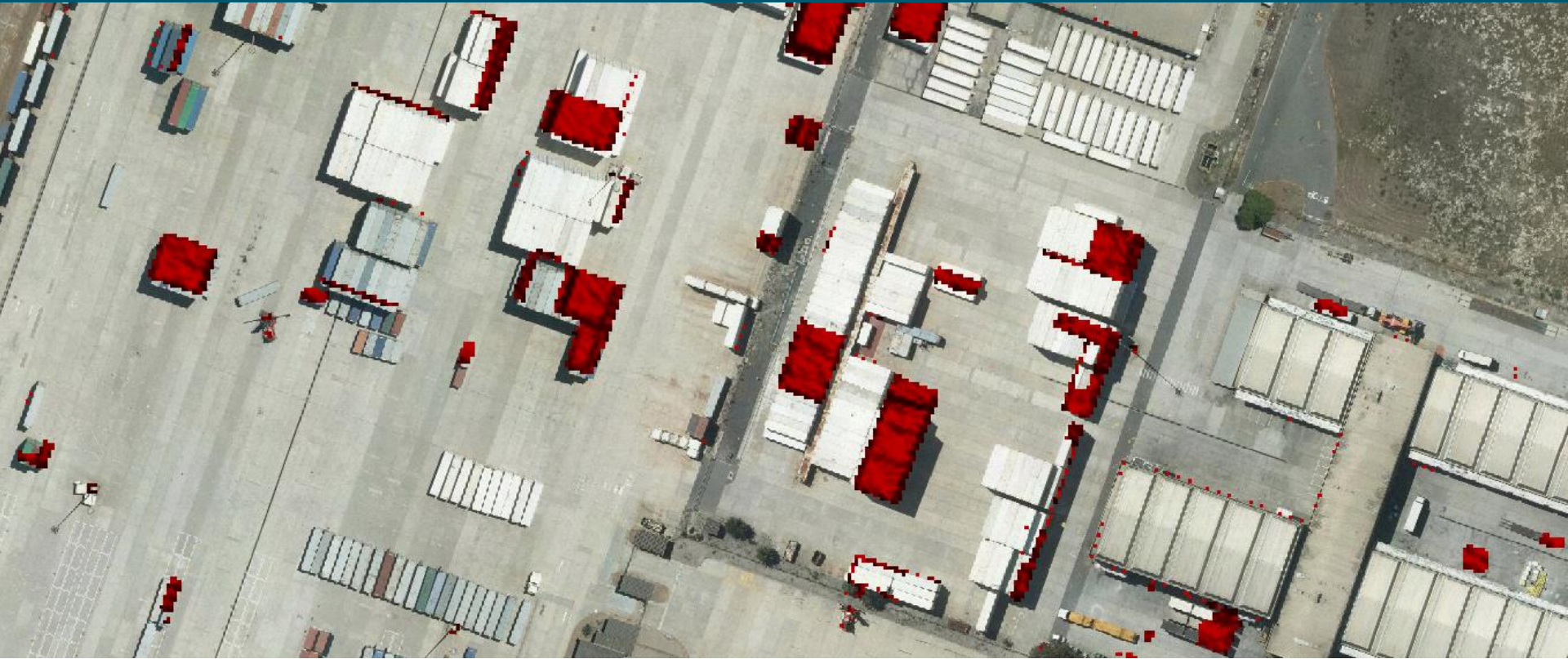


# Digital surface modelling explained





# Building height change detection



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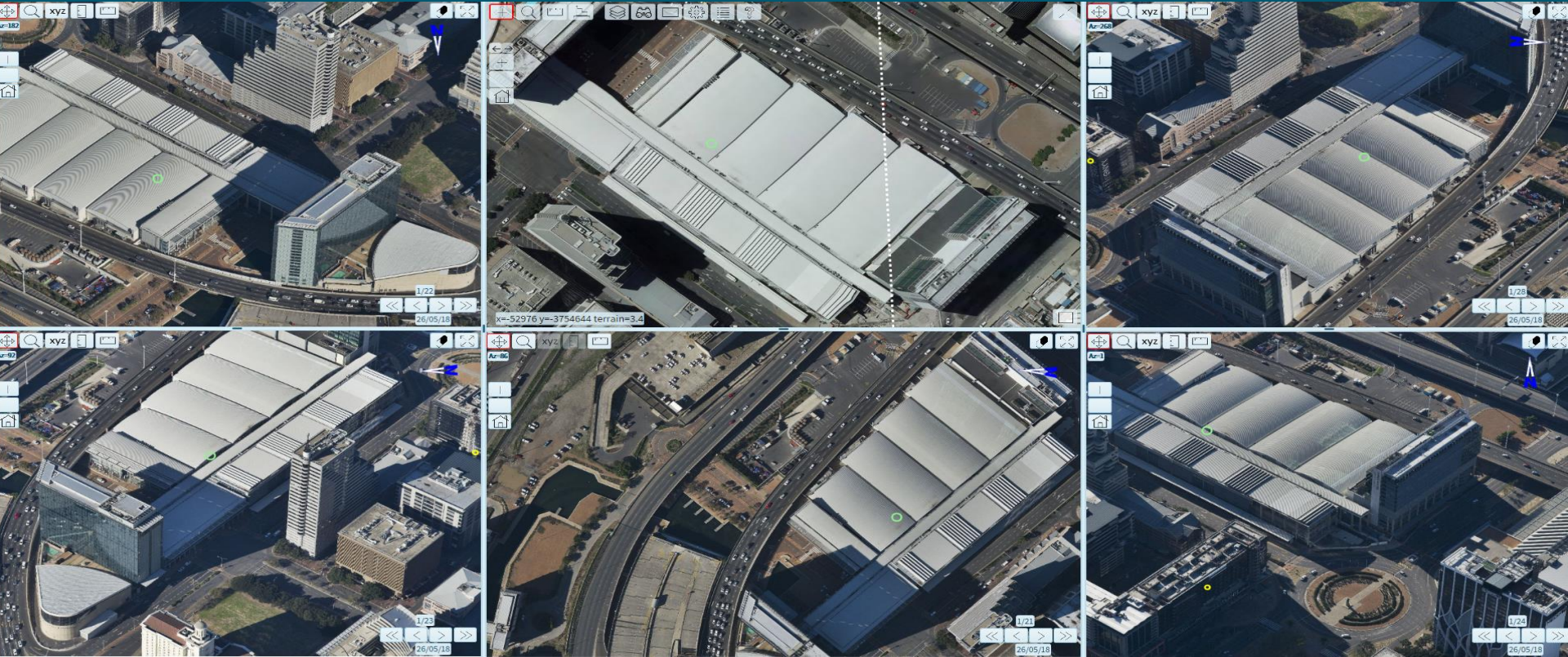
# 2009 Introduced Oblique Imagery



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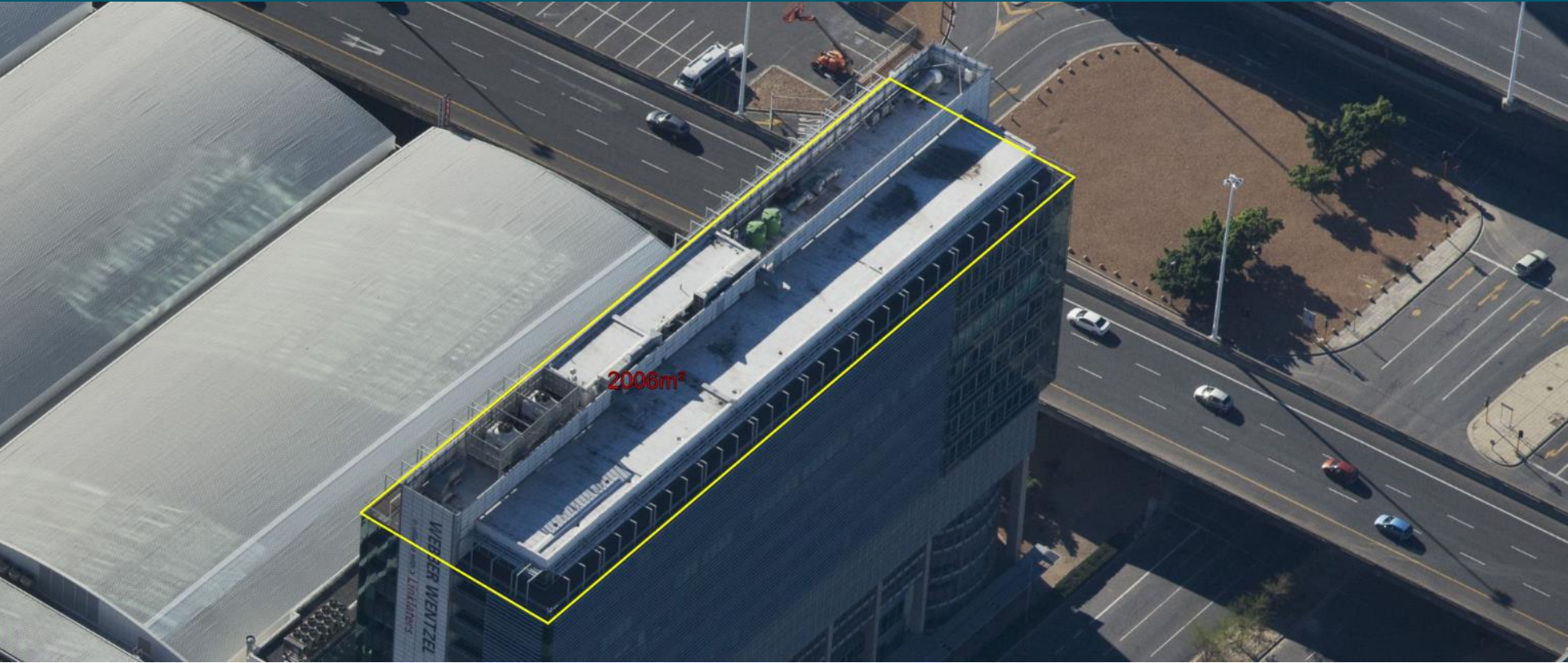
# 2018 May Oblique Image All



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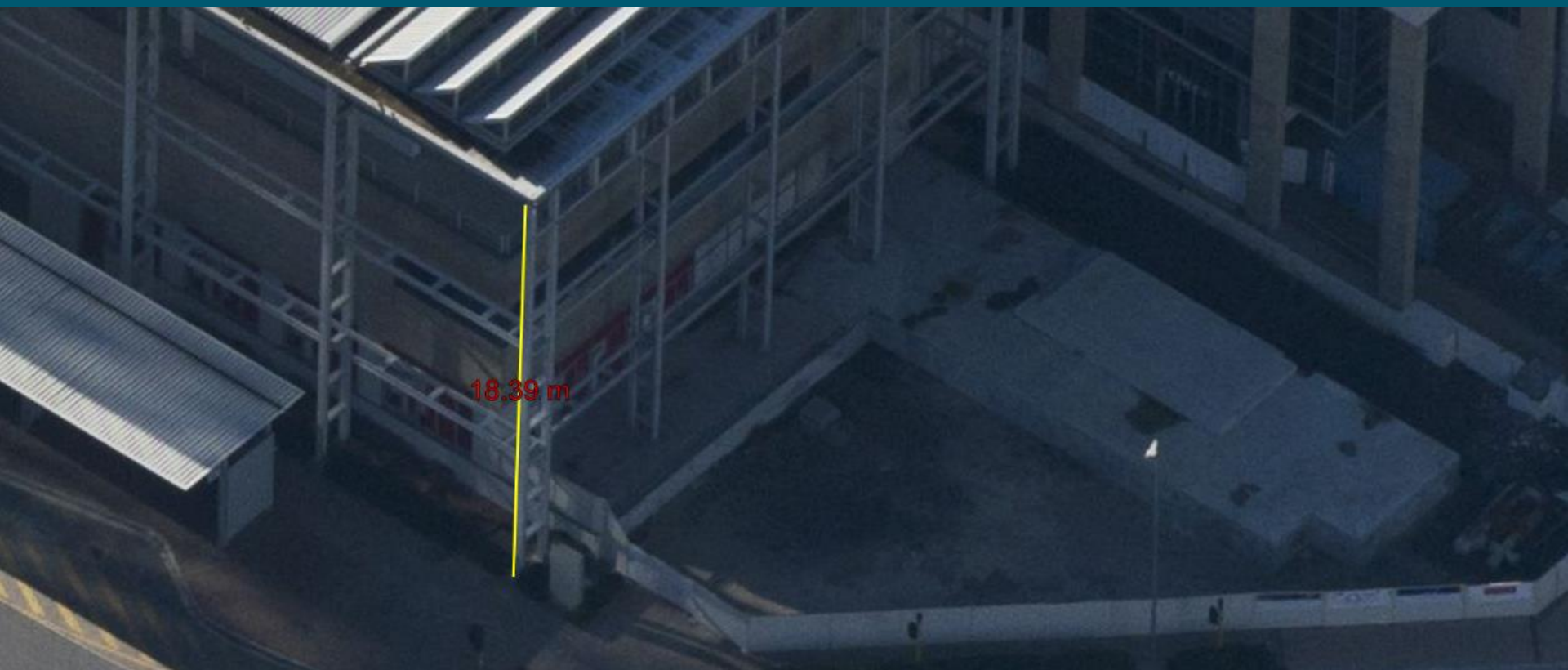


# 2018 May Oblique Image Measure Area



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# 2018 May Oblique Image Measure Height





# 2018 February – Let us travel back in time



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# 2017 January



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# 2016 January



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# 2015 February



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# 2013 December



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# 2012 December



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# 2011 March



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# 2009 November



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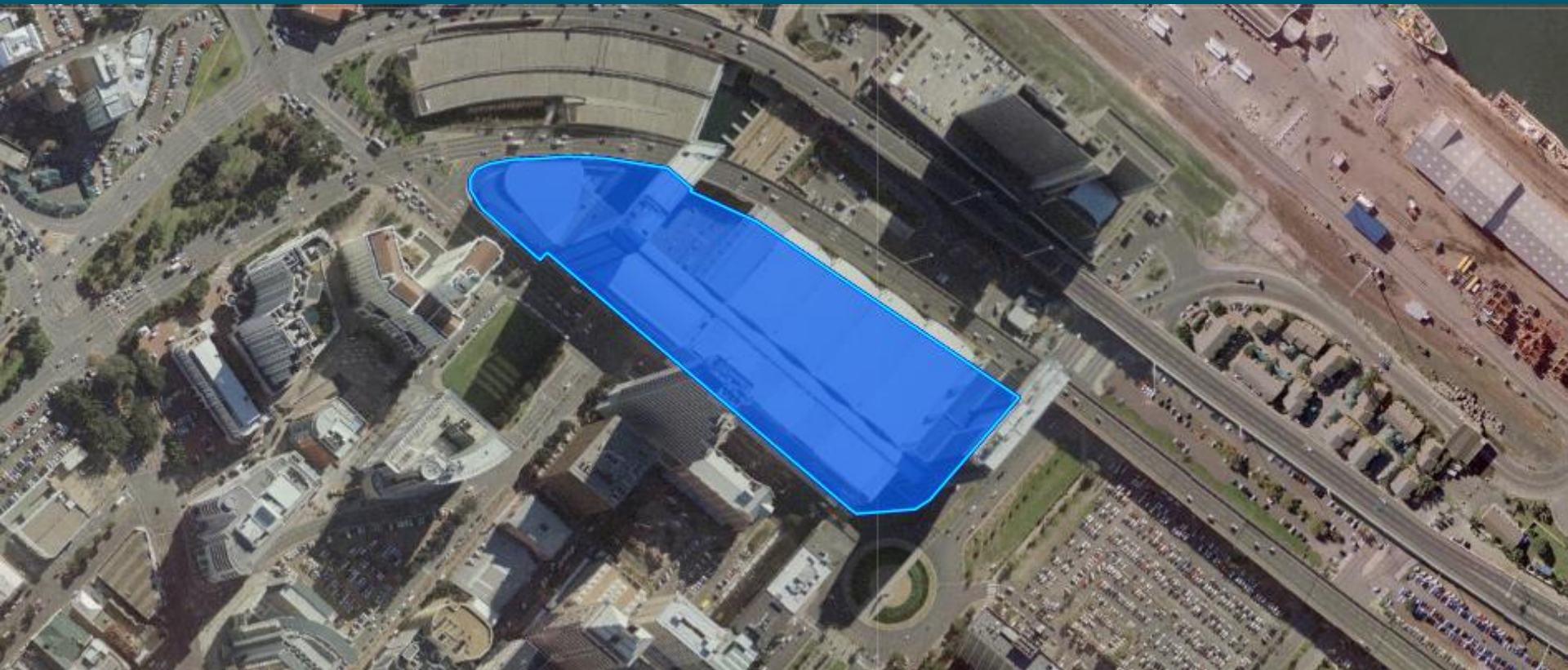
# 2009 March



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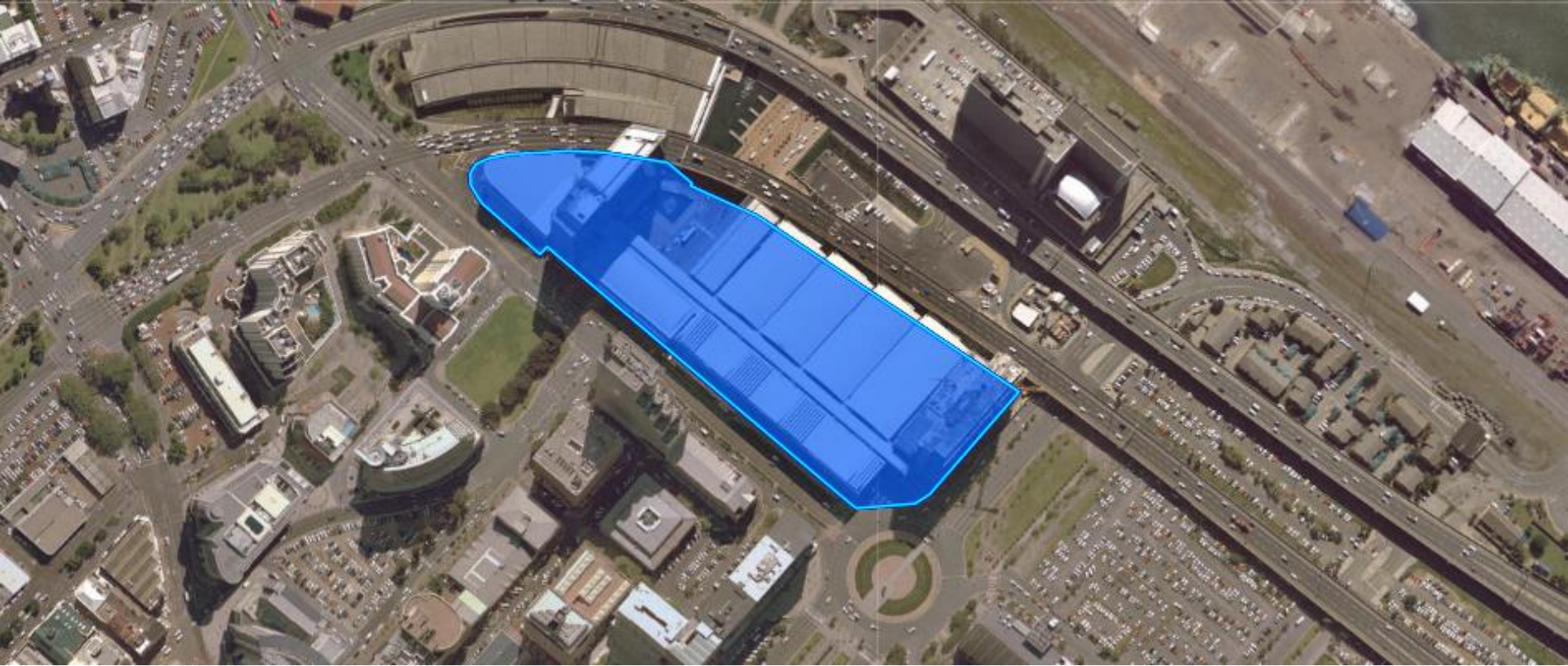
# 2008 June



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# 2007 September



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# 2007 January



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# 2006 May



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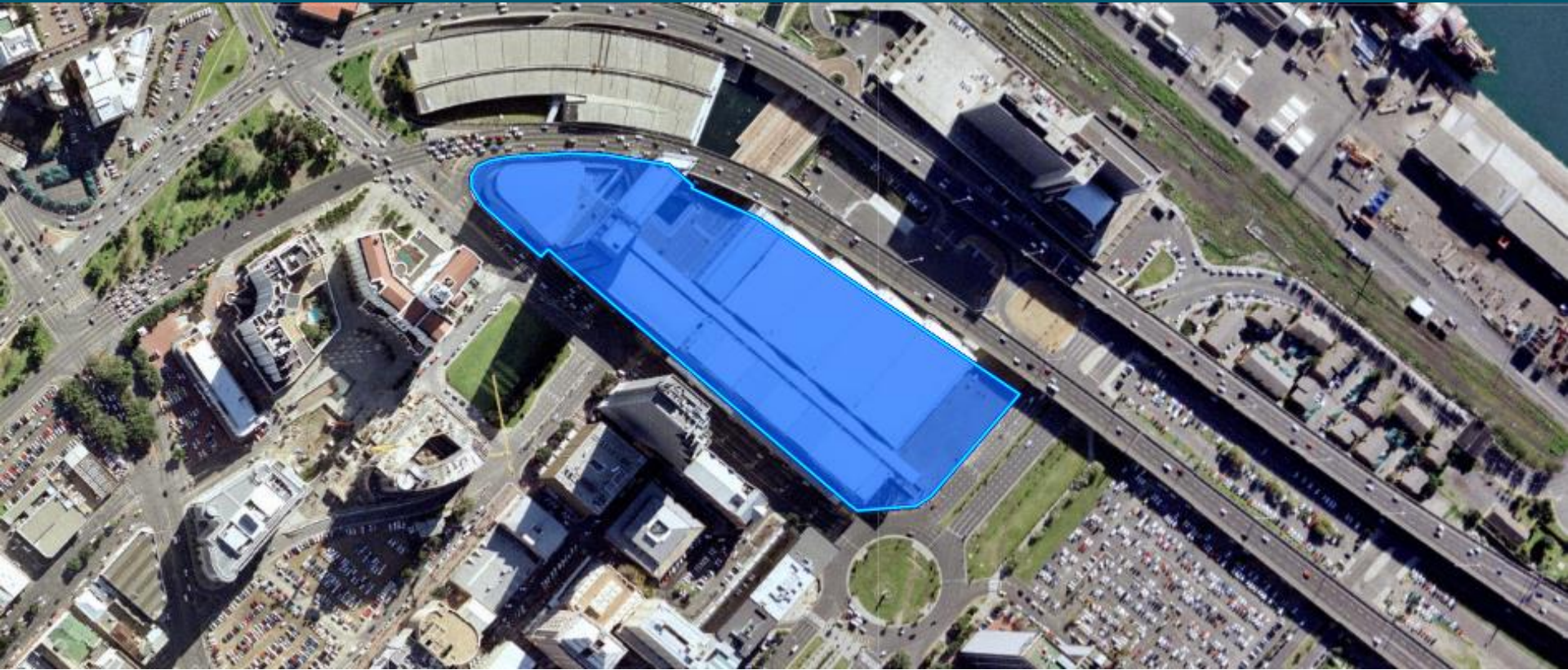
# 2005 February



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# 2004 July



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# 2003 July



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# 2002 January



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# 2000 April



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# 1998 May



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# 1997



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# 1988



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# 1980



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# 1953



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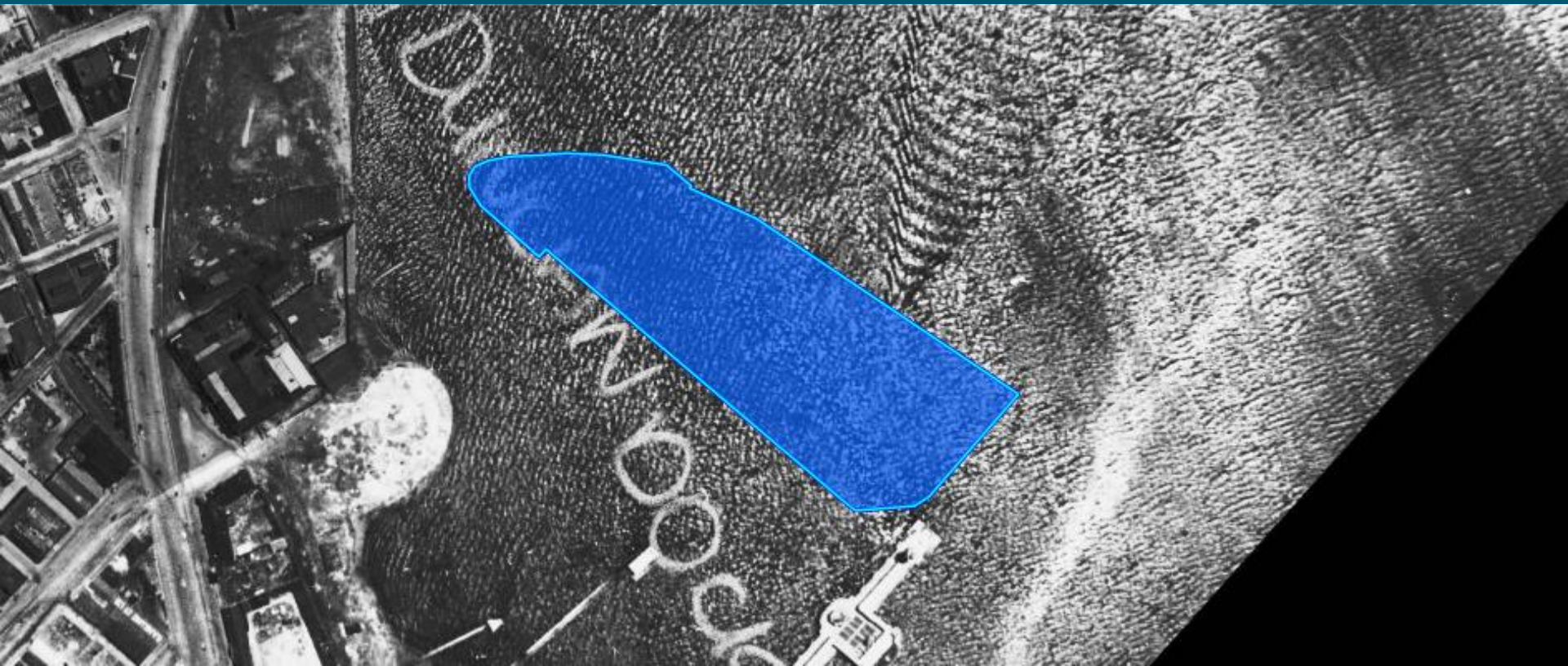
# 1945



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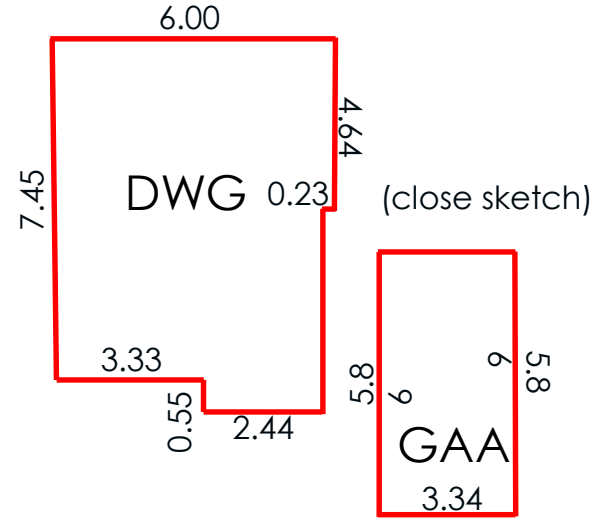


# 1926



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# Building extent capture from desktop





# Production flow analytics

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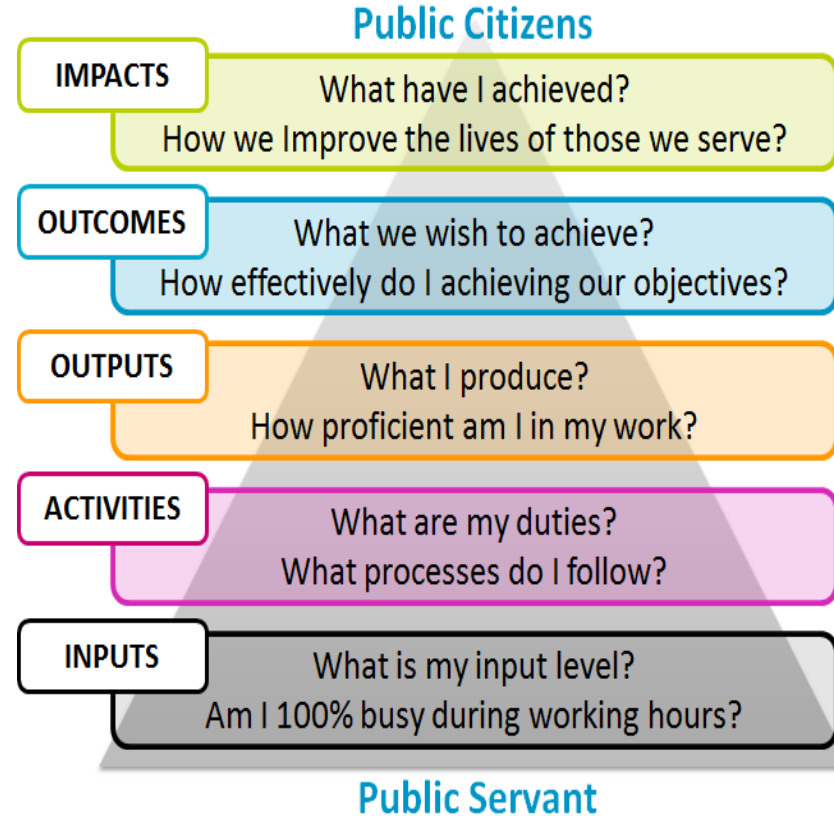
Real-time ground-up performance management



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# Ground-up data work flow

- Focused on BIG picture
- Be aware of cause & effect relationships
- React to facts not perceptions
- Keep everything in context





# Ground-up real-time dashboards

- Finger on pulse
- Know before they know
- Addictive like “candy crush”

MONTH	Out	Lower control limit	Upper control limit
2015-07	14	120	240
2015-06	104	120	240
2015-05	153	120	240
2015-04	46	120	240
2015-03	195	120	240
2015-02	11	120	240
2015-01	12	120	240
2014-12	23	120	240
2014-11	19	120	240
2014-10	25	120	240
2014-09	23	120	240
2014-08	6	120	240
2014-07	41	120	240

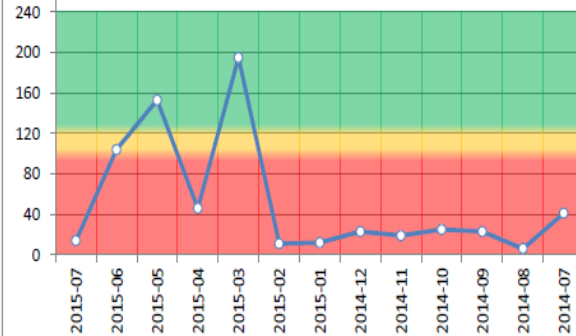
Output last 12 months			
Average:	52	43%	
Unit Cost:	340		

Output last 3 months			
Average:	101	84%	
Unit Cost:	174		

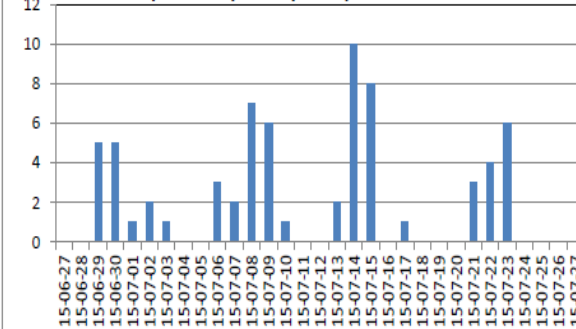
Output last month			
Total:	104	87%	
Unit Cost:	169		

Past 31 days			
Captured:	67	56%	
Submitted:	72	60%	
Rework:	148	206%	

OUTPUT: Properties inspected per month



INPUT: Properties captured per day



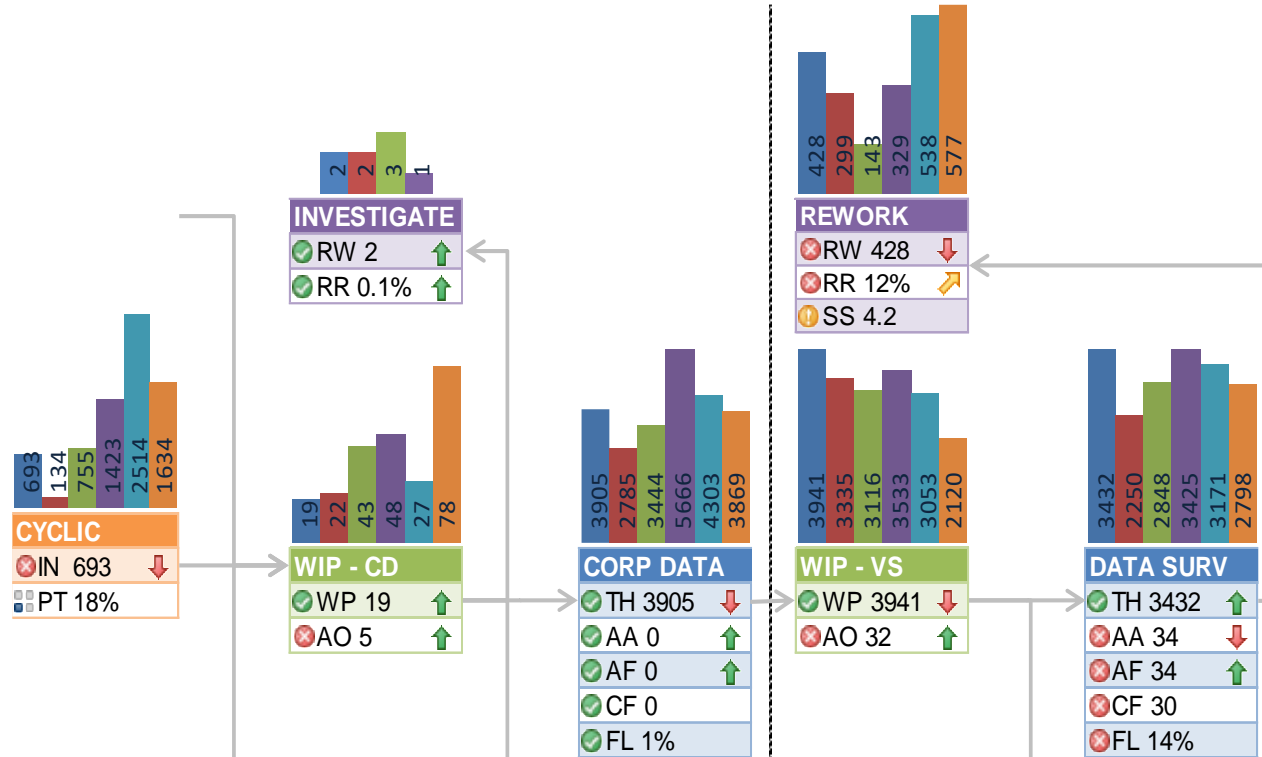
Date	Captured	Submitted
2015/07/27 M	0	6
2015/07/26 S	0	0
2015/07/25 S	0	0
2015/07/24 F	0	0
2015/07/23 T	6	7
2015/07/22 W	4	3
2015/07/21 T	3	4
2015/07/20 M	0	0
2015/07/19 S	0	0
2015/07/18 S	0	0
2015/07/17 F	1	0
2015/07/16 T	0	0
2015/07/15 W	8	6
2015/07/14 T	10	14
2015/07/13 M	2	3
2015/07/12 S	0	0
2015/07/11 S	0	0
2015/07/10 F	1	1
2015/07/09 T	6	7
2015/07/08 W	7	9
2015/07/07 T	2	3
2015/07/06 M	3	4
2015/07/05 S	0	0
2015/07/04 S	0	0
2015/07/03 F	1	0
2015/07/02 T	2	0
2015/07/01 W	1	1
2015/06/30 T	5	5
2015/06/29 M	5	5
2015/06/28 S	0	0
2015/06/27 S	0	0

"Experience is NOT what happens to you - Experience is what you DO with what happens to you." - A Huxley

# Real-time flow analytics – 28 days rolling

Code	Metric
WP	Work in process
AO	Average time open
TH	Throughput
IN	Input
AA	Process flow time (age)
AF	Sub-process time (actual)
CF	Sub-process time (calculated)
FL	Conservation of flow
RW	Rework
RR	Rework rate
PT	Pecent of total
TR	Termination rate
TM	Terminated
FE	Flow exception
SS	Sigma Score

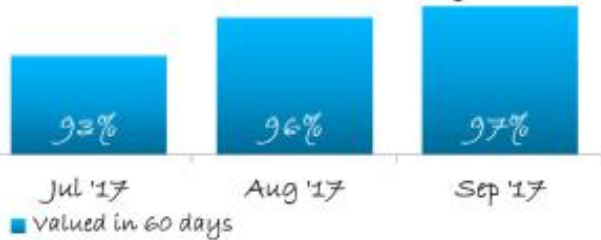
To Do → Doing → Done → Doing → Done



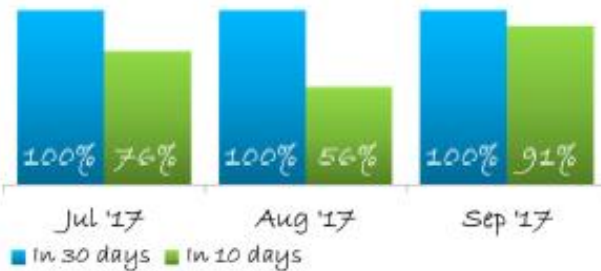


# Performance rolled up to “C” level

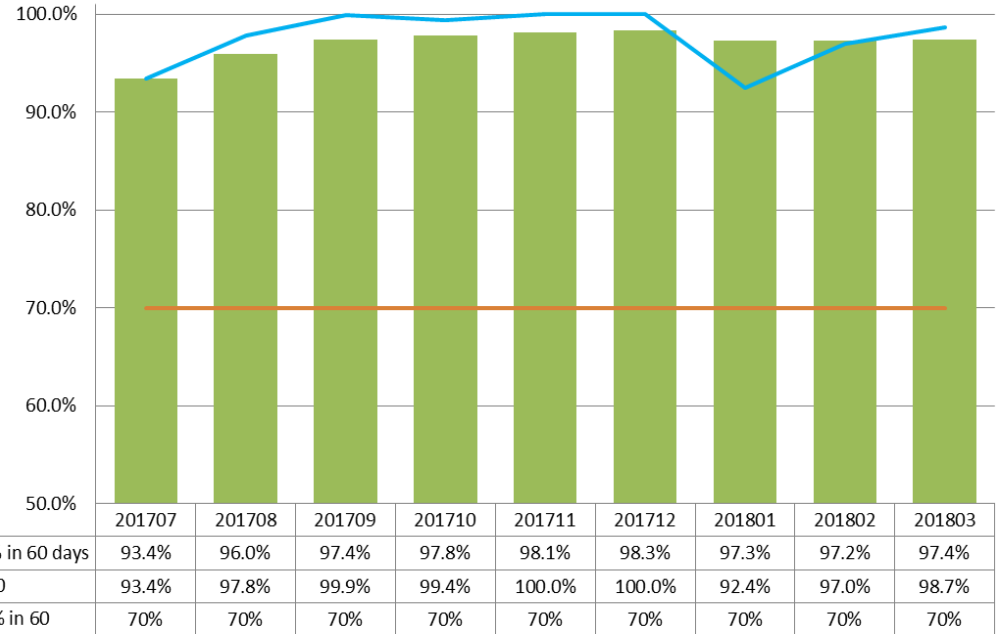
SDBIPs Branch performance  
tasks valued in 60 days



Task performance for asalie10

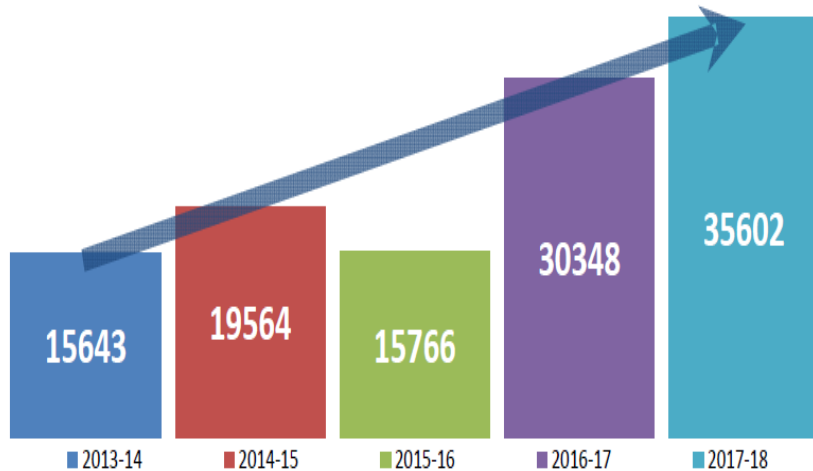


Customer responsiveness: % of improvements valued within 60 days

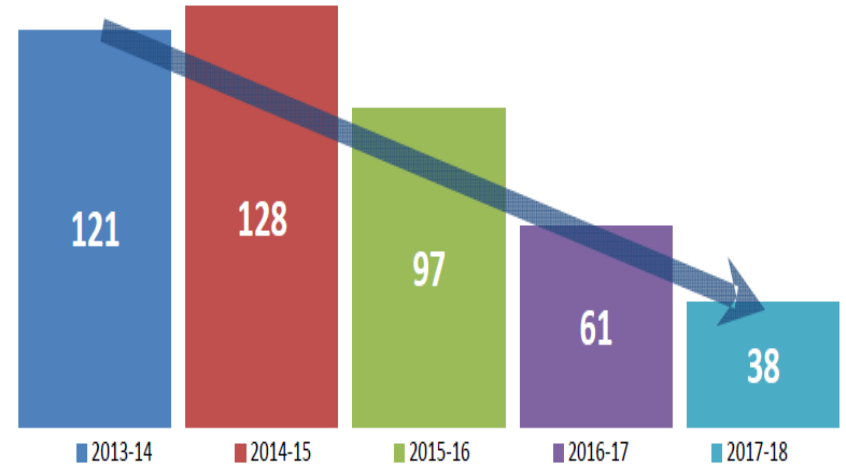


# RESULTS: 5 year performance trends

Valuation Data Survey Output by Year



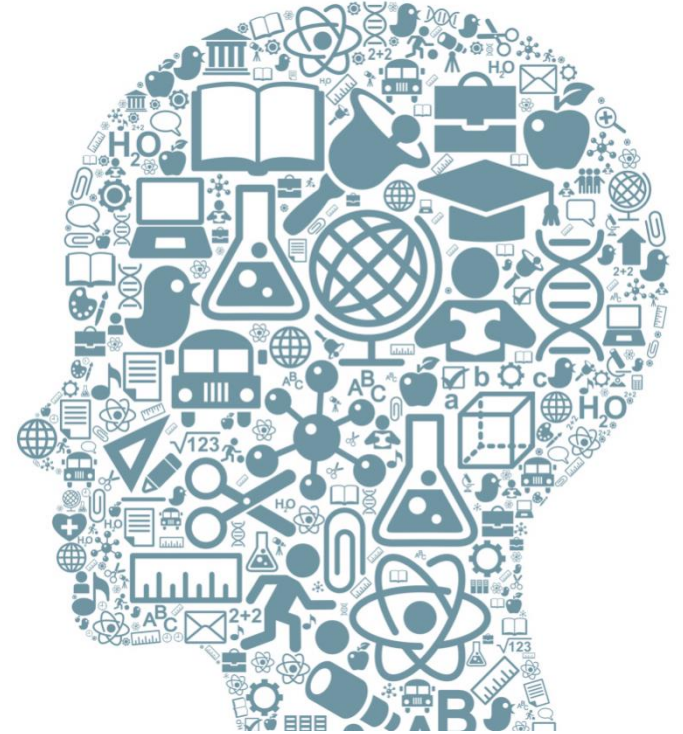
Average Service Days by Year





## Edward Deming`

- Meta Praxis, creating paths of change



2013




2017





# TOGETHER WE CAN AVOID DAY ZERO



- Level 6b water restrictions from 1 February 2018
- Limit of 50 litres pp/day for all residents and visitors

[www.capetown.gov.za/thinkwater](http://www.capetown.gov.za/thinkwater)



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**THANK YOU | ENKOSI | DANKIE**

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082 373 7373

Making progress possible. **Together.**