



Presented at the FIG Congress 2018,
May 6-11, 2018 in Istanbul, Turkey

6-11 May 2018

ISTANBUL



FIG Congress 2018

Mobile Mapping System For Cadastral Surveying

Stefan & Adin

EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:
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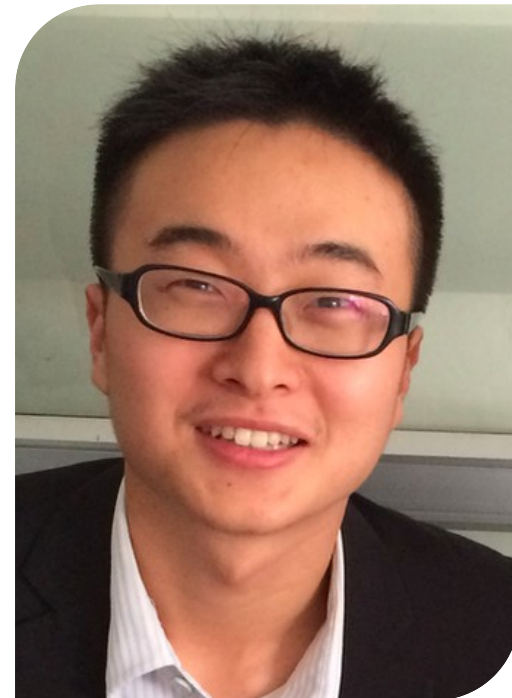
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The challenges of Cadastral Surveying

The Challenges of Cadastral Surveying



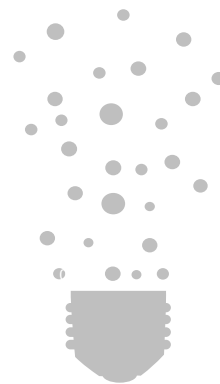
Efficiency

In addition to traditional measurement methods, there is no other more efficient means of measurement



Environ-
-ment

The environment of cadastral survey is harsh and complicated, which increases the difficulty and cost of implementation;



Resource



A large number of skilled surveyors are required and the cost of implementation is high

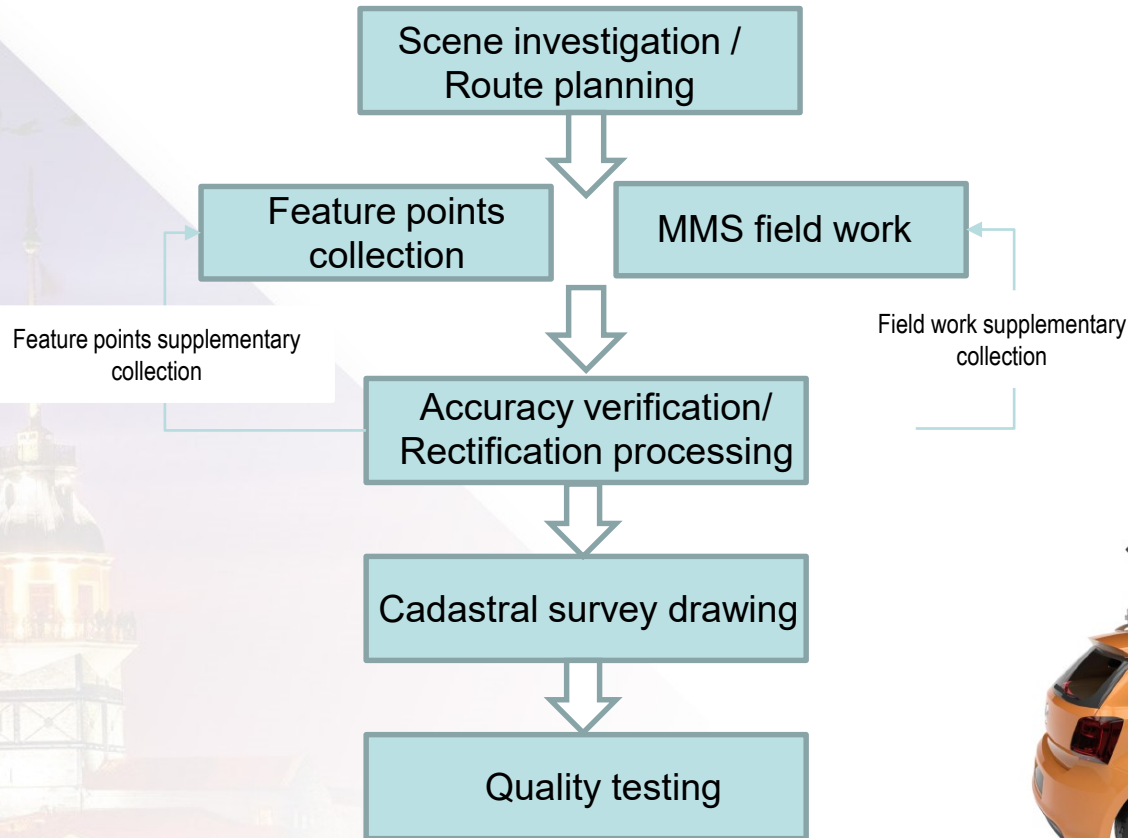
Accuracy



The accuracy of the results is high - the mean square error 5cm

Projects overview + MMS workflow

3D Laser Efficient Cadastral Survey Scheme



Project Overview



Name: Cadastration project in GuangXi province

Time: July 2017

Location: WangXi village and LiuZhan village. (Total 0.12 square meters)

Topography of survey area: The GPS signal is good in the survey area, and the road traffic is good. The survey area is mostly double or 1 layer of building, the housing density is not high. The height difference is larger in the survey area, there are many slope road

Preparation before Collection

Scene investigation / Route planning



1

Determine the traffic condition, including recording some special roads

2

Determine the initialization position and mark the map to identify the orientation of the house

3

Understand the GPS signal, determine the location of the obvious feature points

4

Output acquisition route and layout of feature points

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Field work Collection/Feature points collection



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Field work Collection/Feature points collection



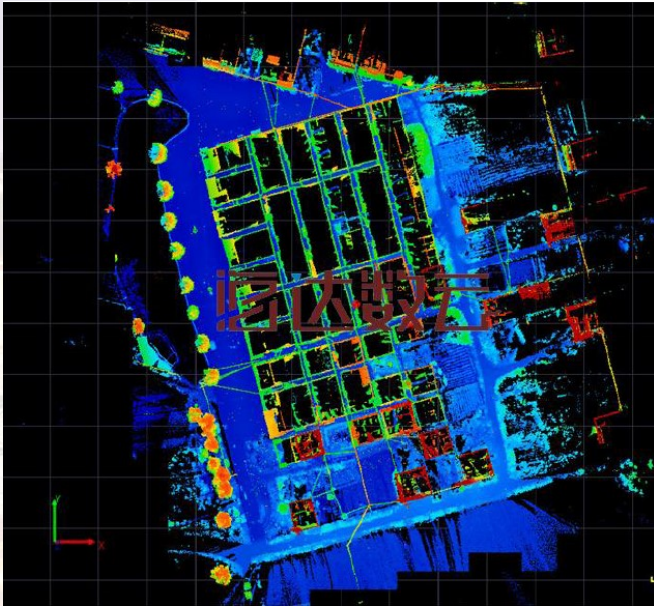
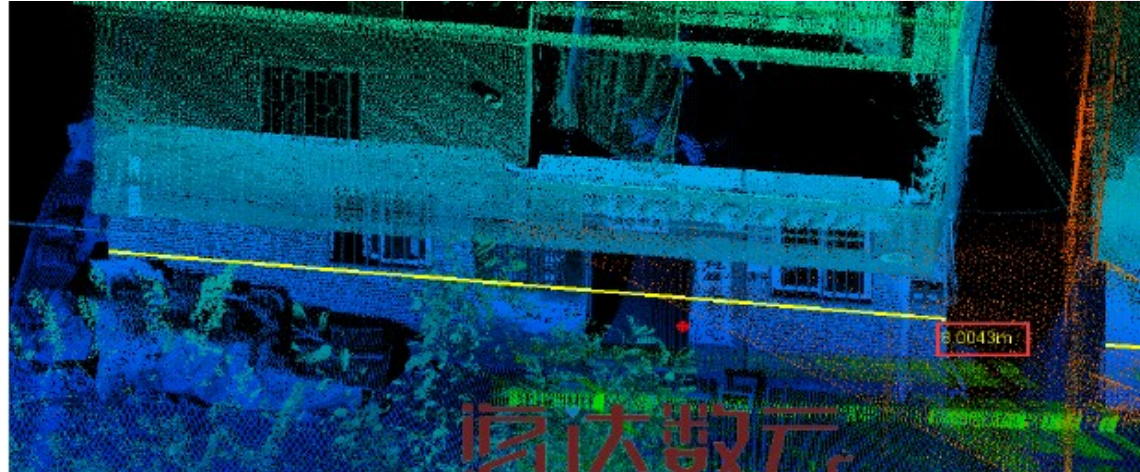
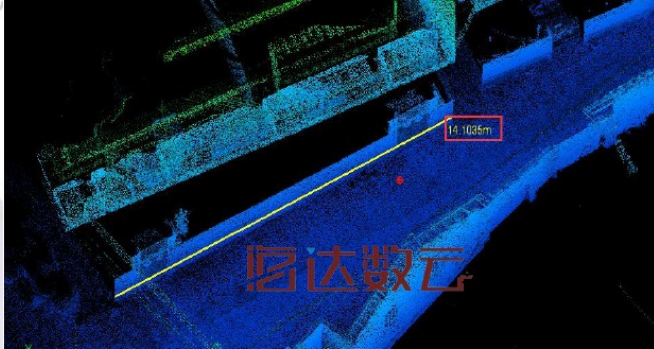
According to the environment of the survey area, RTK/ total station is used to collect feature point coordinates at a certain distance or road intersection, which is mainly used for accuracy verification and deviation correction optimization.



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High precision and high density point cloud data

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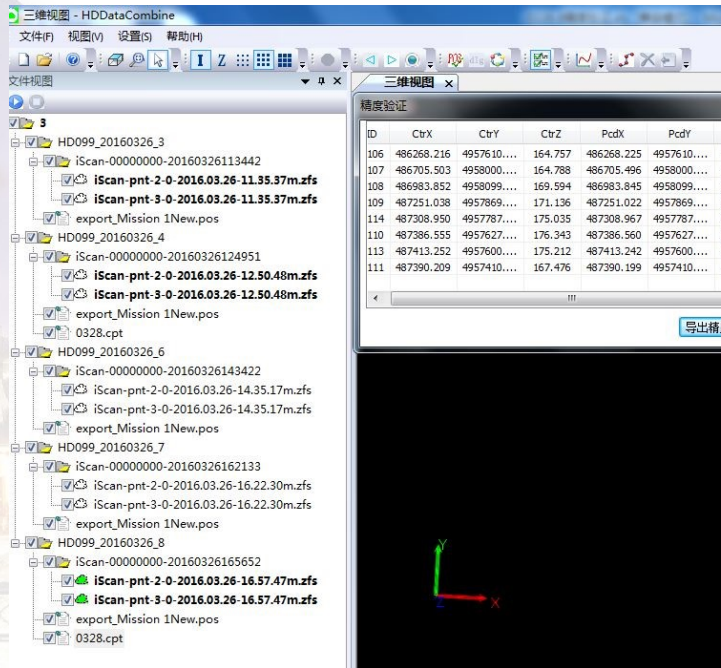


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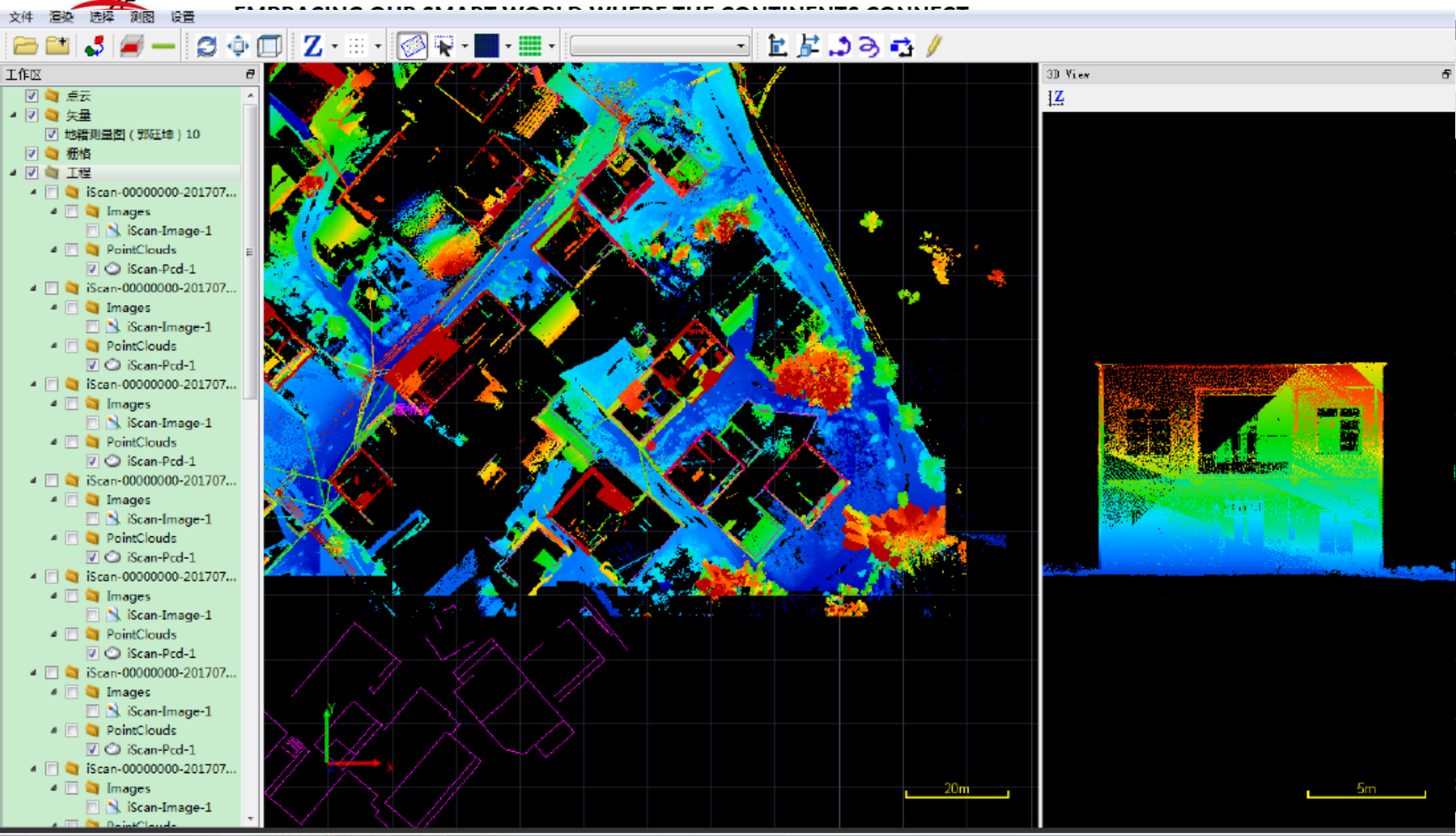
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Accur



Pt	验证点坐标		控制点坐标		残差	
	pX(m)	pY(m)	cX(m)	cY(m)	dX(m)	dY(m)
1	569464.59	2592353.79	569464.55	2592353.82	-0.04	0.03
3	569511.88	2592245.98	569511.89	2592246.00	0.01	0.03
5	569462.13	2592211.66	569462.12	2592211.68	-0.02	0.02
7-1	569437.68	2592191.60	569437.68	2592191.67	0.01	0.06
7-2	569437.70	2592191.68	569437.68	2592191.67	-0.02	-0.01
9	569398.03	2592179.35	569398.03	2592179.32	0.00	-0.03
13-1	569280.77	2592142.58	569280.73	2592142.60	-0.03	0.02
13-2	569280.77	2592142.58	569280.73	2592142.60	-0.03	0.02
19-1	569343.90	2592253.54	569343.89	2592253.60	-0.01	0.06
19-2	569343.90	2592253.54	569343.89	2592253.60	-0.01	0.06
21-1	569387.96	2592300.31	569387.99	2592300.28	0.03	-0.02
21-2	569387.96	2592300.31	569387.99	2592300.28	0.03	-0.02
25-1	569398.76	2592253.20	569398.76	2592253.17	0.00	-0.03
25-2	569398.77	2592253.16	569398.76	2592253.17	-0.01	0.01
27-1	569403.17	2592240.43	569403.19	2592240.43	0.02	0.01
27-2	569403.15	2592240.41	569403.19	2592240.43	0.04	0.02
29	569357.13	2592209.14	569357.14	2592209.17	0.01	0.03
33	569485.24	2592266.98	569485.23	2592266.99	-0.02	0.02
35	569428.49	2592504.79	569428.49	2592504.82	0.00	0.04
37	569447.98	2592416.81	569447.94	2592416.89	-0.05	0.08
39	569402.07	2592343.75	569402.03	2592343.78	0.05	0.03
Avg					0.00	0.01
RMS					0.02	0.03



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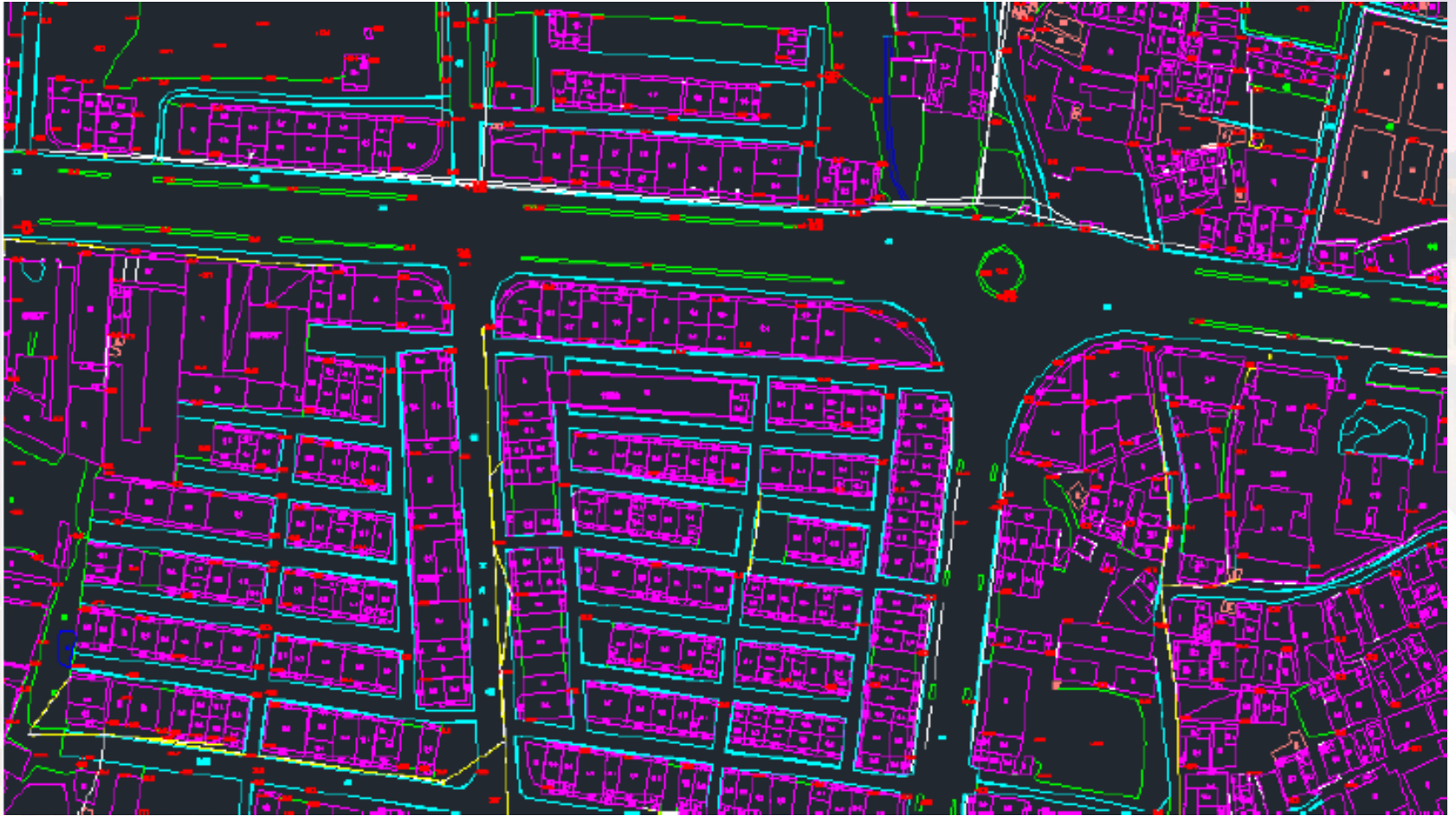
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Efficiency Analysis

No.	Task	Time	Area
1	Scene investigation	2h/1p	0.12km ²
2	Route planning	1h/1p	
3	Field work collection	4h/2p	
4	Feature points collection	4h/2p	
5	Pre-processing	4h/1p	
6	Drawing	1.5d/2p	
Total		3d/2p	



Traditional way:
80 days/1 square kilometers

25p/day/1 square kilometers

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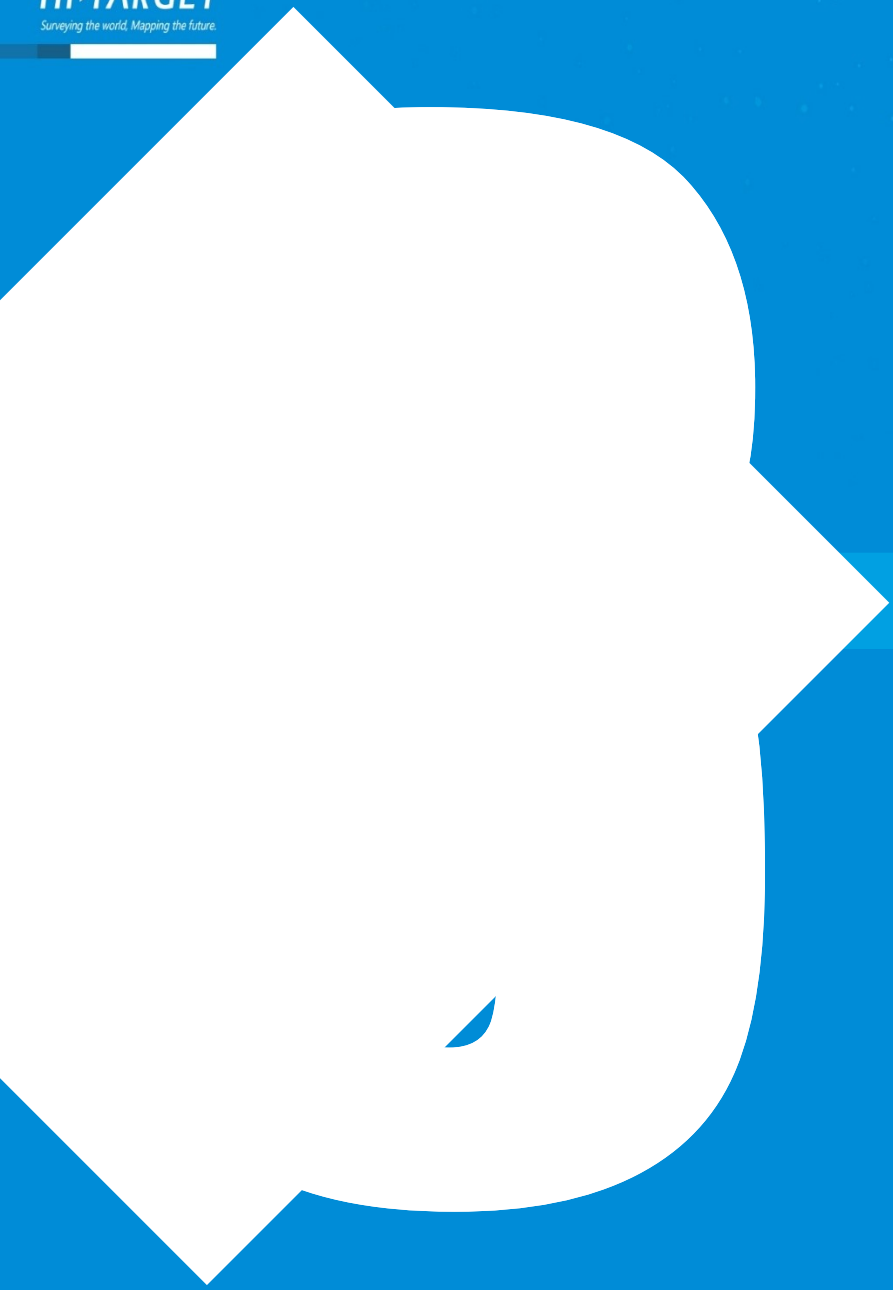


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Conclusion

Tradition VS New Tech



Traditional survey	Normal region	Complex region	More complex region
1 square kilometers	30days	60 days	80 days

MMS survey	Normal region	Complex region	More complex region
Route planning	1 day	2 days	3 days
Feature points survey (together with field work)	3 days	8 days	12 days
MMS field work	3 days	4 days	5 days
Data processing and Drawing	4 days	10 days	15 days
Total	8 days	19 days	30 days



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01

Greatly reduce the field work surveyors, reduce the cost of implementation;

02

Little dependence on weather and climate.

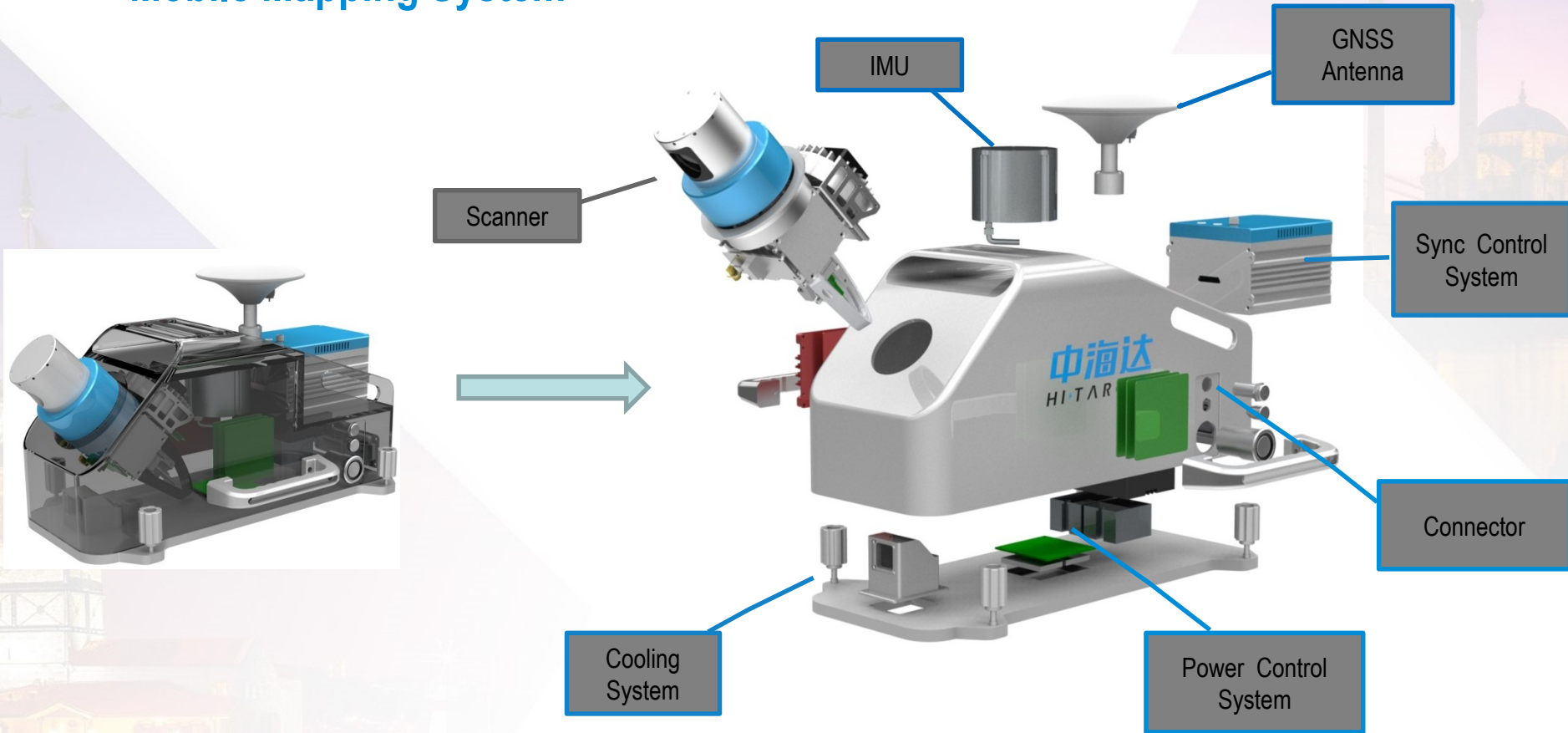
03

The operation efficiency will be increased by more than 2-4 times

04

Whole process solution

▶▶ Mobile Mapping System



Application



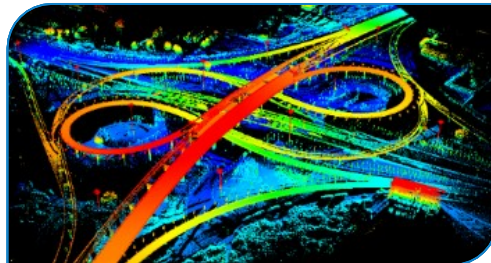
Internet
Panorama



Digital landscape



Digital city management



Digital transportation



Digital waterway and Coastal

THANKS

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