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# FIG WORKING WEEK 2023

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## Evolving Computational and Data Collection Needs in Geomatics: Requirements and Capabilities

WU Yitong, P.R. China, and Bill HAZELTON, USA



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## Surveying Revolutions

- The previous surveying revolution was between about 1550 and 1650
- Technology from the previous 200 years started to come together
- The previous methods could be done better, faster and/or cheaper and some new methods were introduced
- The introduction of triangulation baseline extension, logarithms and calculating machines, along with analytical geometry, in 1612-1620, were what triggered the real revolution

## The 1550-1650 Revolution

- This revolution shifted surveying from local operations with largely orthogonal measurements, to global measurements to determine the shape of the planet
- Cartography shifted from being pictorial to being mathematical
- The shifts in thinking were huge
- Outside of revolutions, change tends to be better, faster and/or cheaper, but doing much the same things

## The 1950 → Revolution

- The first half of the revolution saw a lot of new technology, but it was still mostly better, faster and/or cheaper ways to do the same things
- Some new technologies create major changes in how people think
  - **Consequently they re-think approaches and methodologies**
- The two critical technologies in the current revolution are the internet and the iPhone, because they have changed how people think about geospatial data acquisition

## The 1950 → Revolution

- The big change this revolution has brought:
  - **Anyone can collect geospatial data and disseminate it globally**
- What is the role of the surveying in this situation?
  - The cadastral monopoly will probably continue in most jurisdictions
  - As data quality is the big issue with data integration, assessing and certifying the quality of data is critical
  - With disparate and disconnected data sources, data management and integration will be key capabilities

## A Simple Taxonomy

- This taxonomy allows simple analysis of data collection processes:
  - Temporal data
  - Spatial data
  - Meaning data
  - Intelligence data
- Many modern systems, e.g., LiDAR, collect massive amounts of spatial data, but almost nothing about meaning and intelligence
- We can gather spatial data better, faster and cheaper, but what does it represent?

## Field Computational Needs

- As we collect more data by indirect means, we need to be able to do initial checking in the field to detect gaps, etc.
- This means having enough computational power to undertake *at least* basic processing of the data
- If we process most of the data in the field, why do we need an office?
- With sufficient storage in the field, why do we need an office?
- 'One-person' parties mean that all the processing can be done by the surveyor in the field, so why do we need an office?

## Field Codes

- Field codes were developed to allow electronic collection of meaning and intelligence data
- Originally numerical, they soon evolved to alphanumeric codes of indeterminate length and no standards between organizations
- GIS data collection can involve large amounts of attribute data, often entered into a copy of the GIS attribute database
- We have competing interests here: spatial data without meaning and intelligence gathered at high speed and slow attribute data collection



## Conclusions

- Geospatial data management, data quality analysis and data integration are the key growth areas for surveyors in the future
- 'Everyone' is a geospatial data producer and a data consumer: Alvin Toffler's 'prosumer'
- 'Everyone' is involved, a major recruitment opportunity
- Seriously big data will be the norm for surveyors
- 'One-person' parties mean more processing in the field



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# Thank you!

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