BIG DATA AS INNOVATIVE APPROACH FOR USABILITY EVALUATIONS OF BUILDINGS

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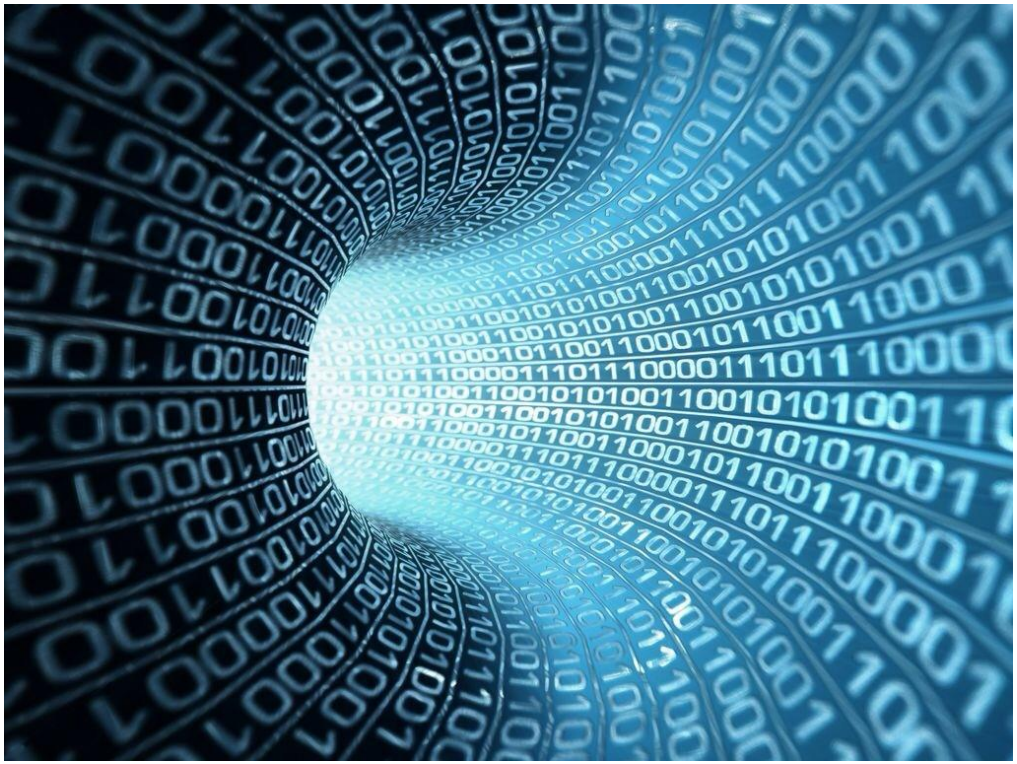

What is Big Data?

- Big Data is datasets that are so large that they are not suitable to collect, store, process or analyse using traditional database tools
- "The three Vs"

  volume, velocity, variety

- We may be interested in "small" og "medium" as well, but principles form Big Data are interesting anyway

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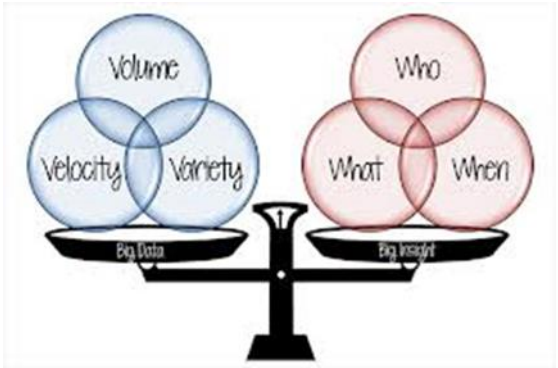
" If you are a large company and you are not involved in analytics, you are not a large company for very much longer."

Charles Duhigg, New York Times writer and author of the *The Power of Habit*



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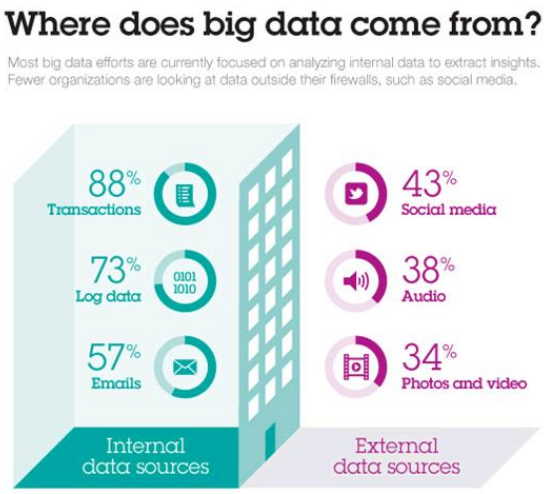
Big data developments

- Large quantities of data become available, including data from the internet and data based on sensor and tracking technology
- Increased pressure for making data available
- Access to storage and analysis capabilities at low cost.
- Access to IT platforms to put data into context, such as digital maps for presentation of position data, or building information models (BIM)



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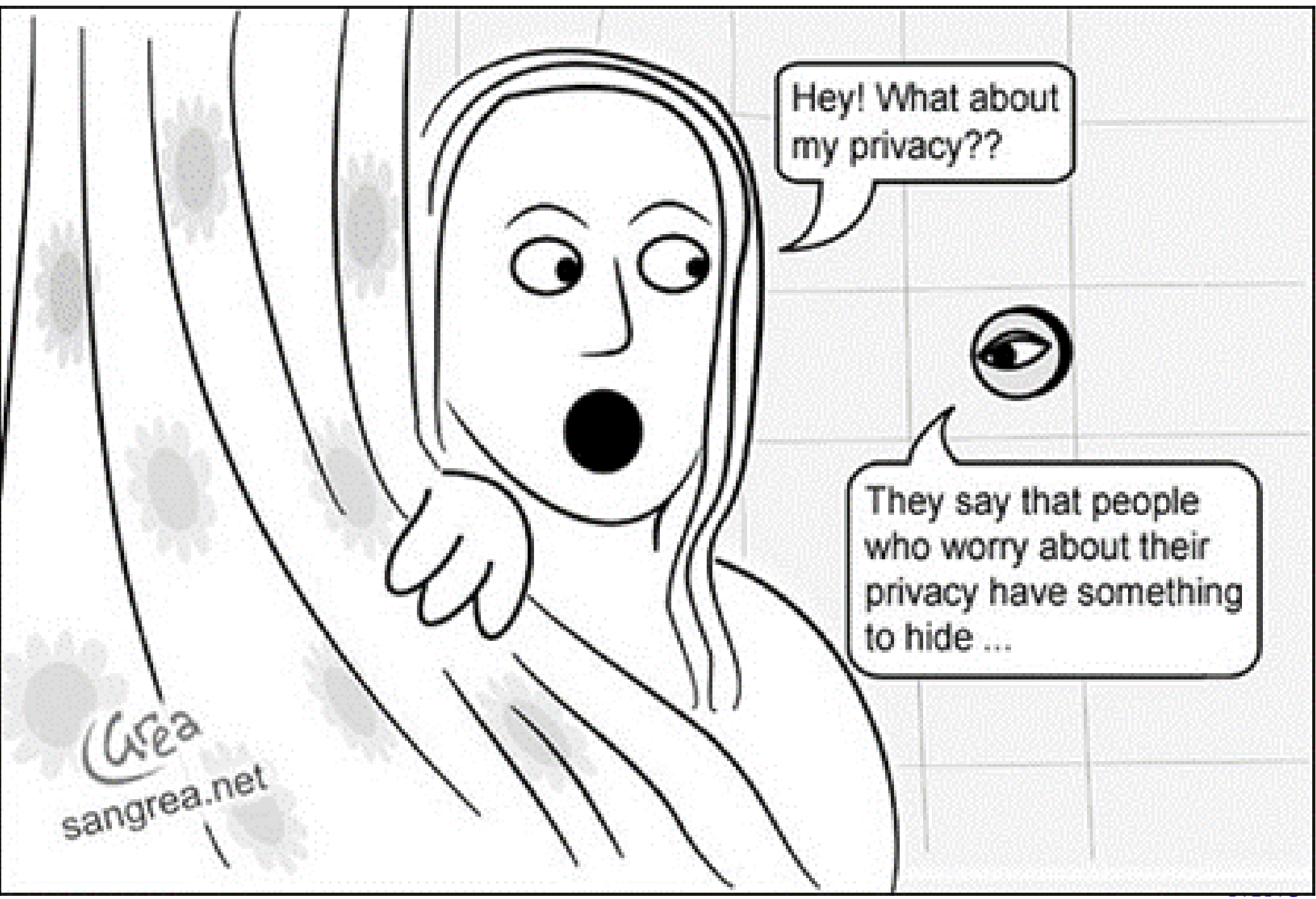
Data categories

- Internet traffic, including activity on social media and data from search engines
- Movement-related data, including GPS, RFID
- Physical environment, typically from different types of sensors
- Commercial activity, the use of payment services and consumption patterns

- In addition, there are growing numbers of organisational internal data in IT systems, which is of interest even though the volume does not yet qualify as Big Data.

Possible problematic issues related to Big Data

- availability
- applicability
- relevance
- Privacy


Hey! What about my privacy??
They say that people who worry about their privacy have something to hide ...
Grea
sangrea.net

Possible problematic issues related to Big Data

- availability
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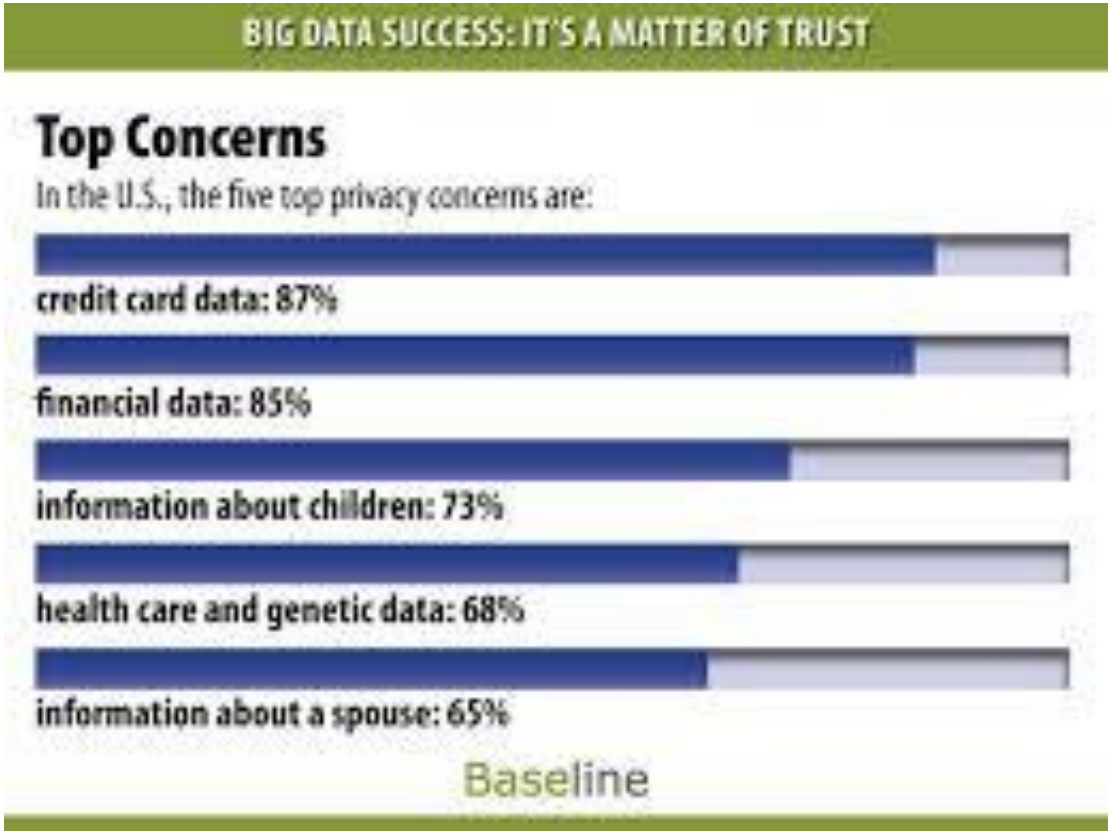
- ownership
- Competence



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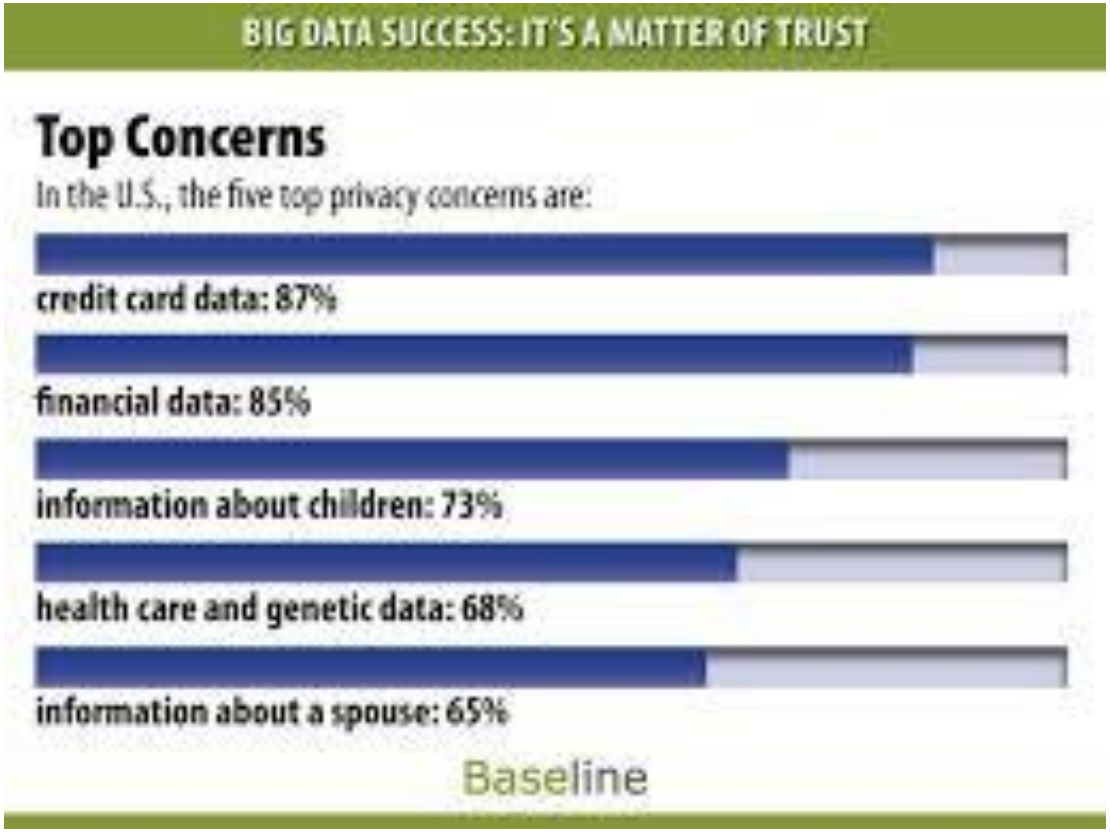

- None of the challenges need to hinder use of Big Data, provided that the issues are properly managed.

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New types of data that may be relevant to the evaluation of buildings

- Internet activity: Examples include how the current buildings are discussed on the Internet, Facebook, Twitter etc, how many Google searches are made on the building?
- Location data: how many are in an area in or near the building, time of day/week, where they come from and where they go. Can be based on GPS, mobile phones, access control systems, video cameras, or else.
- Sensors: Logging temperature in the building, the use of different automation systems (lighting, climate, energy), sensors that count the number of passages (into a room, for example)
- Behaviour: What do people do, such as which websites accessed from wireless networks in the building. Login on computers can be used to log the utilization of office jobs.
- Economic activity: Registrations with credit card - when, how people use money

Category	Effect	Indicator	Data source	Availability	Applicability and relevance	Privacy and property rights
Internet activity	Usability	The experience of the building	Mention of the building on the Internet	No access	Relevance of high-profile buildings like the Opera	Not Personal Data
	Efficiency in operations	Type of Use	Websites that sought from the local network	Could be logged. Administrator for wifi system has access	Displays the type of internet activity to building users	Can not be linked to the device (PC, phone, etc.) used
Movements	Efficiency in business, usability	Where people are, their retention	Login at the local wifi network	Could be logged. Administrator for wifi system has access	Showing equipment using wifi / internet	Must be anonymised and / or aggregated
	Efficiency in business, usability	Movements, retention	Access cards	Not a tradition of handing out	Only applicable for areas with access control	Must be anonymised and / or aggregated
	Efficiency in business, usability	Where people are, movements	Video camera	Requires analysis of video	Showing activity where there is a camera	Depending on type of analysis
Physical Environment	Efficiency in business, usability	Use of the building	Light switches, motion sensors in rooms	Not a tradition of storing or handing out	Depends on the type and location of sensors	No personal data for public premises
	Operating Cost	Energy	Energy Management Systems	Store in part for mapping energy	Important cost	No personal data for public premises
	Efficiency in business, usability	Use of the building	Energy Management Systems	Store partially	The focus on energy consumption, but also illustrates the use	No personal data for public premises
	Usability	Indoor air	Air conditioning, CO measuring		Part of usability	No personal data for public premises
Commercial activity	Efficiency in operations	Number of users, type of use, revenue	Use of payment cards	Not a tradition of handing out	Important information for commercial premises	Privacy
Internal records / data	Operating Cost	Maintenance Activity	Operating and maintenance systems	Related info with the building manager	Shows the level of usage and kindness in technical solutions	Not Personal Data
	Operating Cost	Cost of operation and maintenance	Accounting system	Facilities manager may have this	Displaying cost, life cycle cost	Not Personal Data
	Operating Cost	Scope of modification	Area registry and accounting	Facilities manager may have this	Showing adaptability	Not Personal Data

Possible use of Big Data in FM research

- Support triangulation and quality assurance of data
- Complement and enhance
  existing evaluation parameters
- Provide new evaluation parameters

- Provide quantitative data on the conditions previously been based on qualitative assessments
- Illustrate effects that have not been possible to visualize previously

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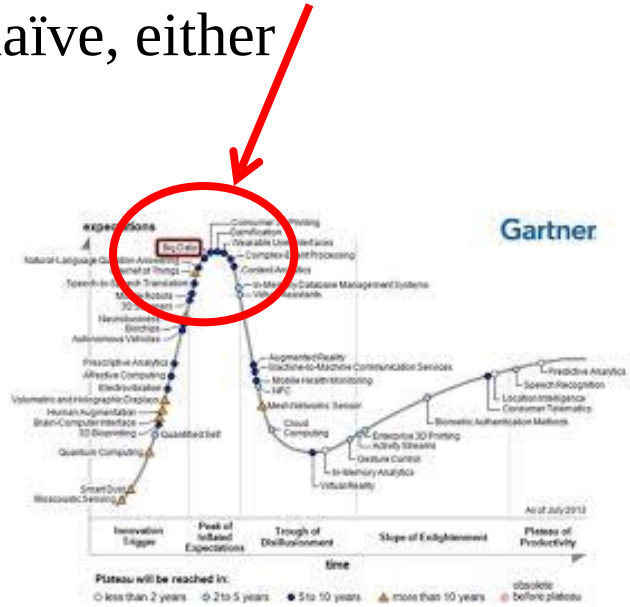
Reflections

- It published a lot on the topic in general, and both practitioners and academics see opportunities.
- It seems to be great opportunities for using new (large) data in FM research
- Methods can be used on not so big data
- We recommend pilot studies
- It is likely that FM researchers need assistance related to data acquisition and analytics

We do not want to be the last to notice Big Data
But we shall not be naïve, either



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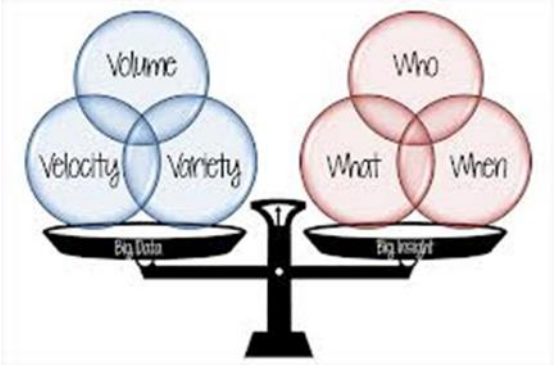

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