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# Big Data & Ethiek voor Informatie Professionals

# Big Data





# Converging ICT's

- Cloud Computing
- Social Networking
- Mobile Computing
- Internet of Things
- Sensor Networks

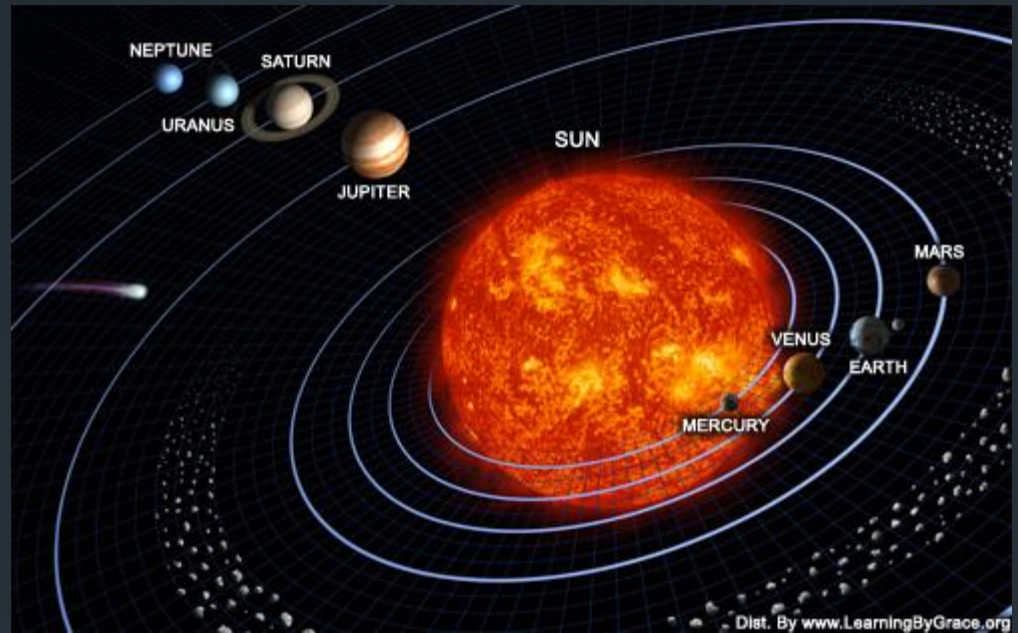
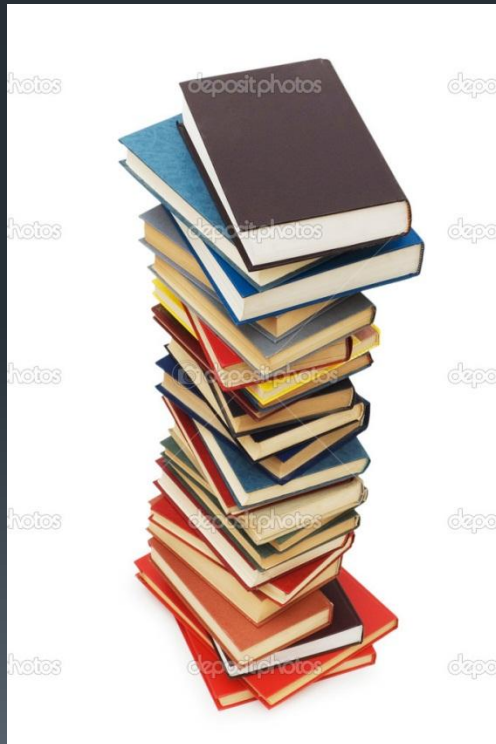


# Age of Big Data

- 90% van de data aangemaakt in de laatste twee jaar
- 3 Peta byte is 100.000 Libraries of Congress
- Elke dag  $2.5 \times 10^{18}$  bytes erbij (2.5 Exabyte)
- 300 Exabyte (400 miljard 730 MB CD's)




# Zettabyte



Zettabyte = stapel boeken  
20 x afstand tot Pluto =  
100 miljard kilometer  
= Internet data volume in  
2015

# Quantum Computers



Quantum computing  
has arrived.

D-Wave offers the first commercial quantum computing system on the market. If you are looking for a next-generation solution to difficult computational problems, we've got a pretty cool option for you.

# INFECTIOUS DISEASES





# UN Crowd sourced crisis maps

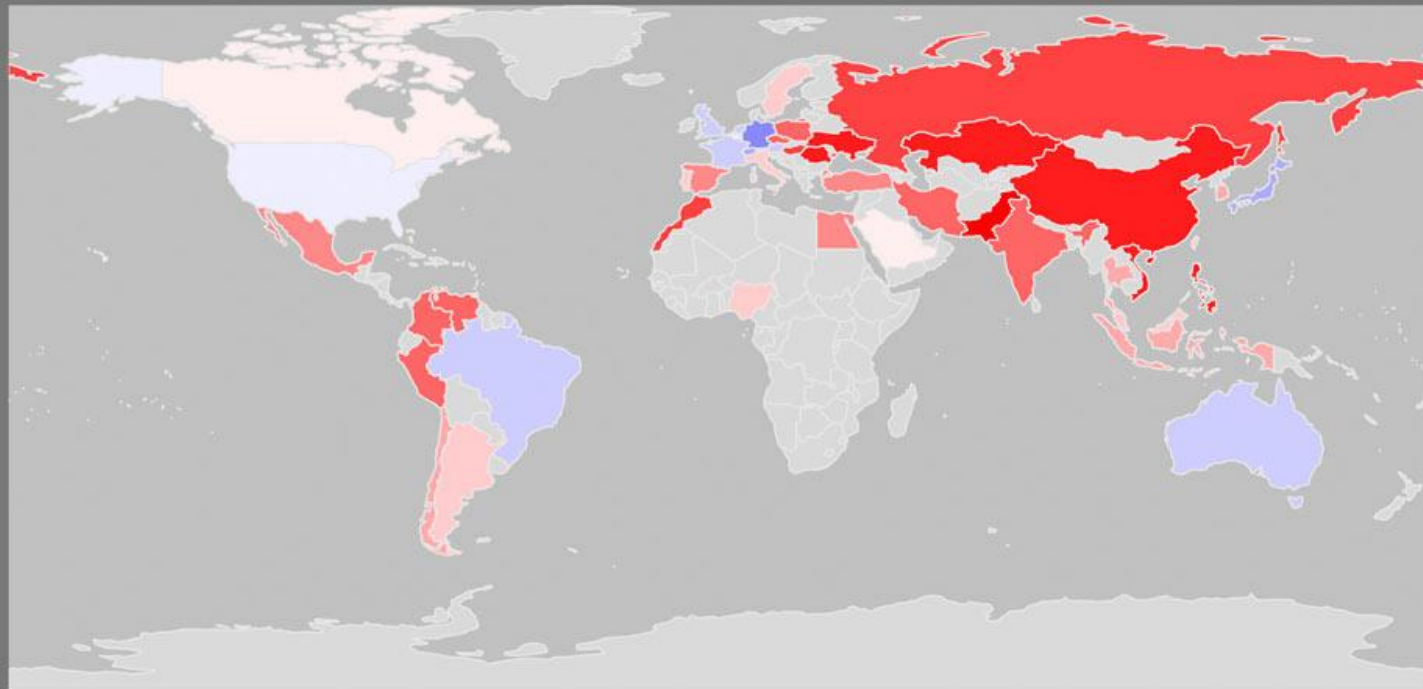




# Future Orientation Index

## Future Orientation Index 2012

Suzy Moat & Tobias Preis  
Based on Preis, Moat, Stanley and Bishop (2012)



Ratio of Google searches for "2013" to searches for "2011" during 2012 for 45 countries

# MIT's "Big Data" Sandy Pentland

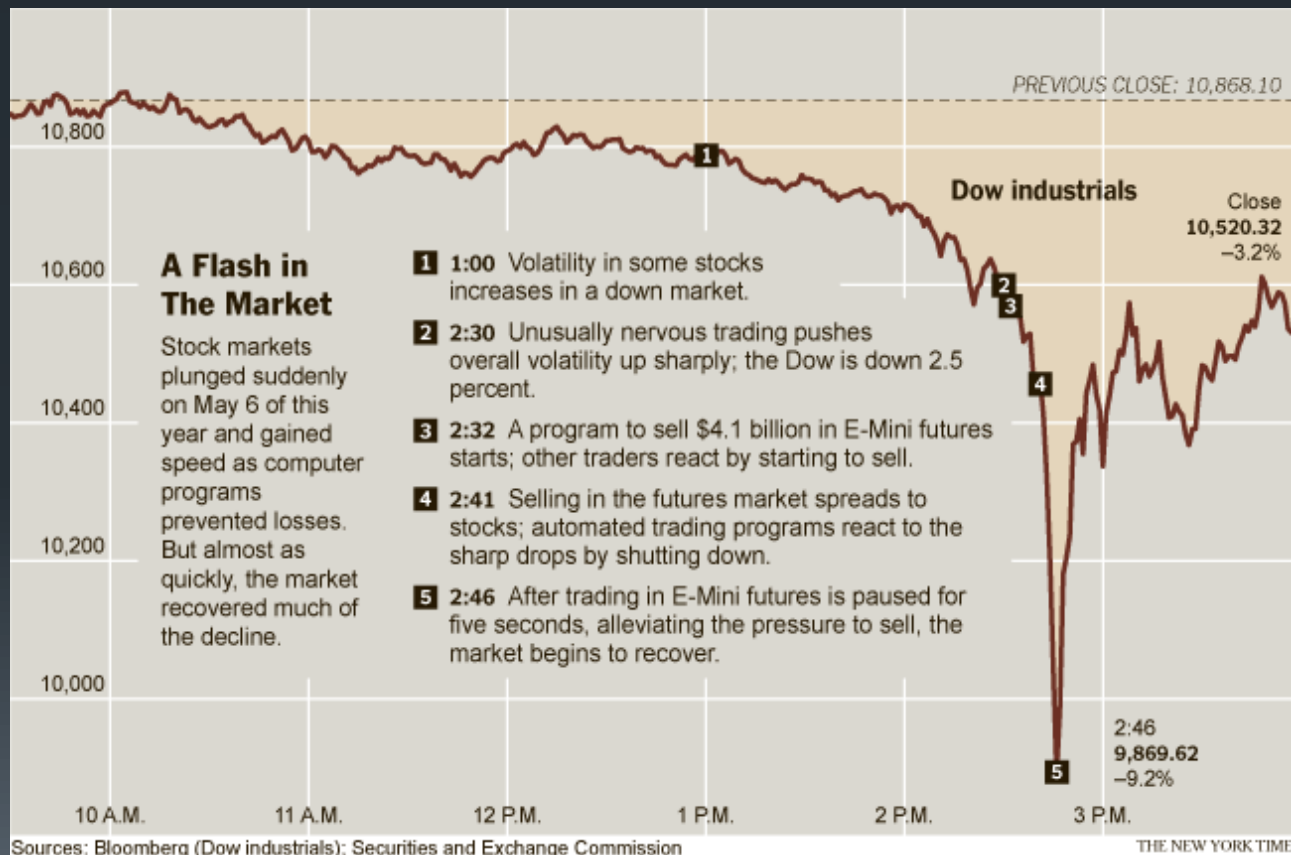


“ WE ARE PART OF A SOCIAL FABRIC,  
AND OUR BASIC HUMAN NATURE IS TO  
PAY ATTENTION TO OTHER PEOPLE AND  
TO SHARE MOOD AND ATTITUDES. ”

# Modeling Social Contagion



# Understanding Tipping Points: Flash Crash



# Life Logging

## Die Waffen der Self-Tracker

Für das SonntagsBlick magazin hat Model Lucia Thalmann fünf Gadgets zur Selbstüberwachung am Körper montiert. Der Sleep Tracker von Zeo misst die Anzahl und Dauer von Tiefstschlaf-, Traum- und Wachphasen. Wer schlecht schläft, kann damit überprüfen, welche Verhaltensänderung ihn besser schlafen lässt.

Das iPhone ist so etwas wie die zentrale Stauerinheit der Selbstvermesser. Es kommuniziert mit anderen Geräten, erstellt Bewegungsprofile und schiebt die Daten anschließend in die Cloud. Auf Plattformen wie Quantifox lassen sich alle Daten zusammen – dort vernetzen sich die Nutzer und tracken sich gegenseitig. [www.quantifox.com](http://www.quantifox.com)

Das Gerätchen am Schuh ist ein Schrittzähler von Fitbit. Er überwacht die betretenen Distanzen und gibt Auskunft über die verbrannten Kalorien. Mit eigenen, im Schuh eingebauten Monitoring-Systemen schließen auch die Sport-Giganten Nike und Adidas

Der Pulsmesser von Withings kommuniziert direkt mit dem iPhone. Dieses schiebt die Daten in die Cloud – Nutzer von Quantifox können die Werte direkt in ihr Profil einfließen lassen. Gerade für Sport-Anfänger ist die Pulskontrolle laut Experten sehr wichtig, weil sich die meisten Menschen überschätzen.

Zur Pulsuhr von Garmin gehört ein Einstanzband, das die Pulsrate am Handgelenk fängt. Die Daten lädt die Uhr anschließend in die Datenwolke hoch. Dank eingebauten GPS-Empfänger erstellt sie auch Bewegungsprofile. Gebauene Strecken sind also gespeichert. Das erleichtert die Planung und das Überprüfen von Fortschritten.



1



2



3



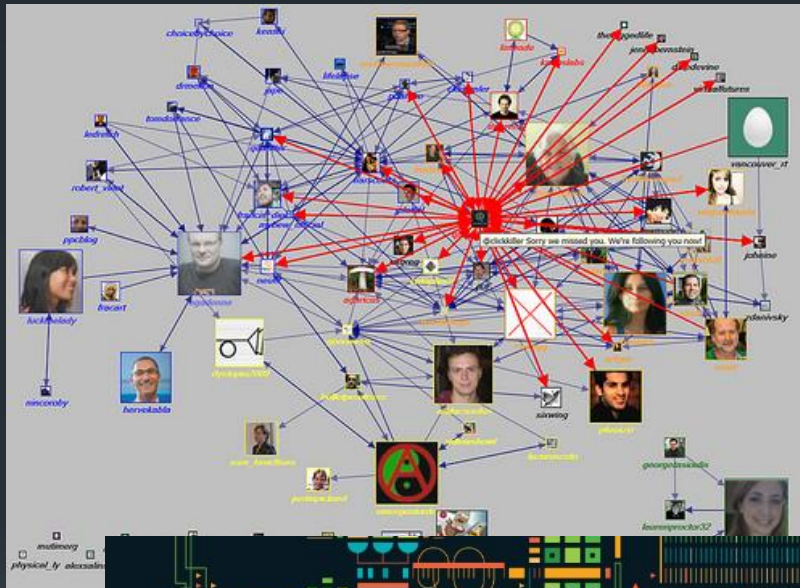
4

## Körper unter der Lupe

1 Der Glucose-Meter von Bayer mit USB-Anschluss misst den Blutzuckerspiegel. 2 Der Schrittzähler von Fitbit hält fest, wie viel man sich bewegt. 3 Das Blutdruckmessgerät von Withings lässt sich ins iPhone anschließen. 4 Die Withings-Waage misst Gewicht, Körperfett und Muskelmasse und schiebt die Daten via WLAN ins Internet.



# Quantified Self



# Internet of Everything

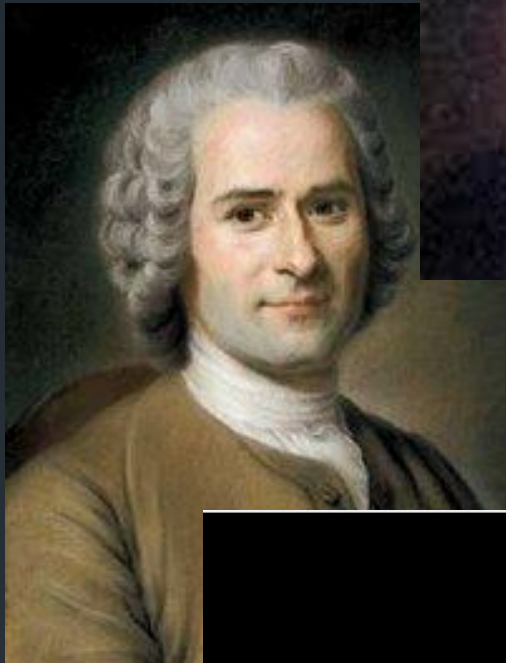


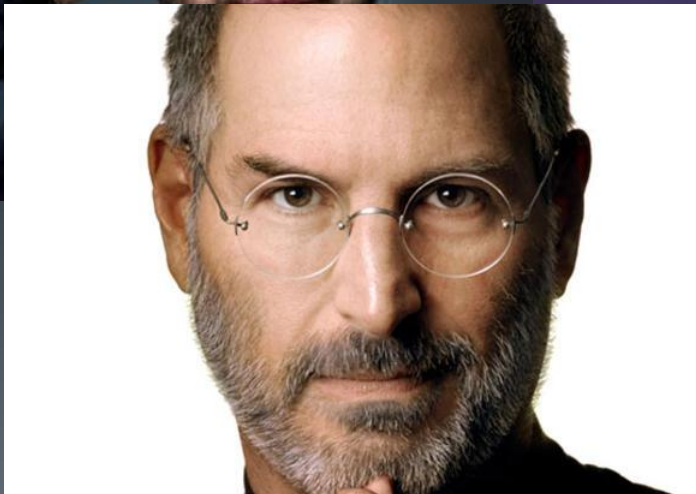


# Big Data Samenleving Waarheen?



- Privacy
- Open Data, Open Access, Open Source
- Net Neutrality
- Het democratische potentieel van Internet
- Digitale Kloof
- Cybercrime
- Opvoeding en educatie







# Ethische Problemen

- 1. Kennis
- 2. Gelijkheid
- 3. Privacy
- 4. Security
- 5. Democratie



# 1. Kennis & Big Data

# Complexity



|      |      |         |      |      |        |      |     |          |        |       |
|------|------|---------|------|------|--------|------|-----|----------|--------|-------|
| 1056 | -19  | 1887    | 952  | -21  | 加藤製    | 496  | -17 | 神戸FT     | 3400   | -40   |
| 2430 | -15  | トヨタ     | 354  | -22  | 油研工    | 379  | -17 | ABILIT   | 1924   | -38   |
| 1400 | -14  | 東田工     | 2415 | -45  | タダノ    | 1088 | -39 | ABILIT N |        |       |
| 867  | +2   | 株本チ     | 883  | -15  | フナチ    | 695  | -8  | E-K'1    | 1068   | -20   |
| 734  | -26  | 大同工     | 428  | -15  | CKD    | 1783 | +68 | F'CS電    | 3660   | -118  |
| 405  | -17  | T CM    | 424  | -8   | 平和     | 1732 | +11 | アマノ      | 2230   | -90   |
| 717  | +1   | 日コパ     | 212  | -6   | SANKYO | 7520 | -60 | KUKI     |        |       |
| 422  | -11  | 木村化     | 505  | -22  | 金銀業    | 2200 | -5  | 物ナ       | 532    | -1    |
| 865  | 0    | 大崎電     | 1370 | -38  |        |      |     |          |        |       |
| 1841 | -64  | オムロン    | 2940 | +15  |        |      |     |          |        |       |
| 2255 | -15  | 日東工     | 2190 | -75  |        |      |     |          |        |       |
| 619  | -11  | I D E C | 2005 | -95  |        |      |     |          |        |       |
| 1354 | -26  | エビ      | 4680 | -160 |        |      |     |          |        |       |
| 6170 | -50  | GSJ79   | 333  | -13  |        |      |     |          |        |       |
| 9180 | -190 | 徳村大興    | 669  | -26  |        |      |     |          | 136.00 | -0.41 |
| 298  | -10  | メルコ     | 3250 | -10  |        |      |     |          | 135.00 | -0.15 |
| 646  | -21  | N E C   | 689  | -22  |        |      |     |          | 1.754  | +0.03 |
| 689  | -28  | 富士通     | 933  | -35  |        |      |     |          | 1.824  | +0.01 |

# Bias in Search Engines



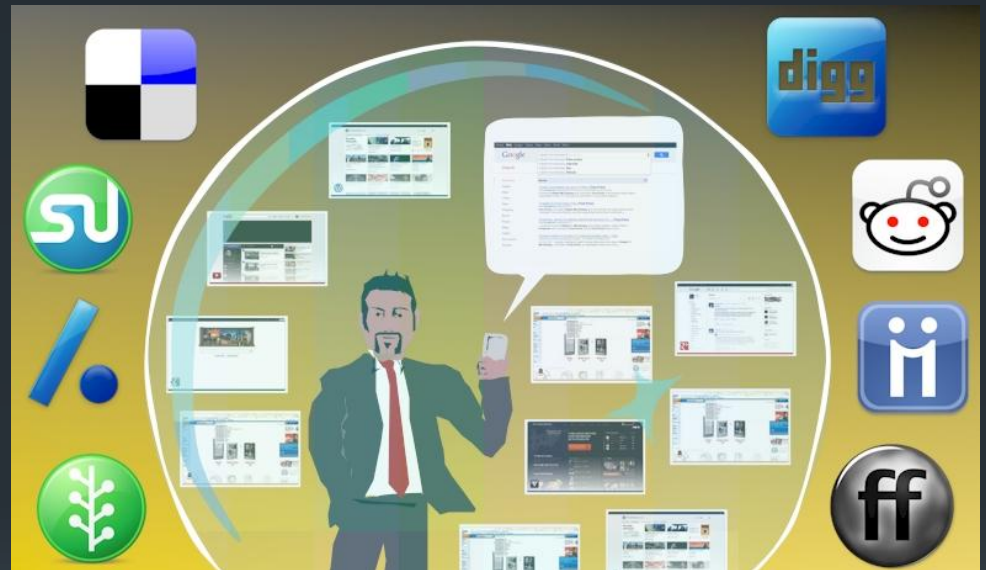
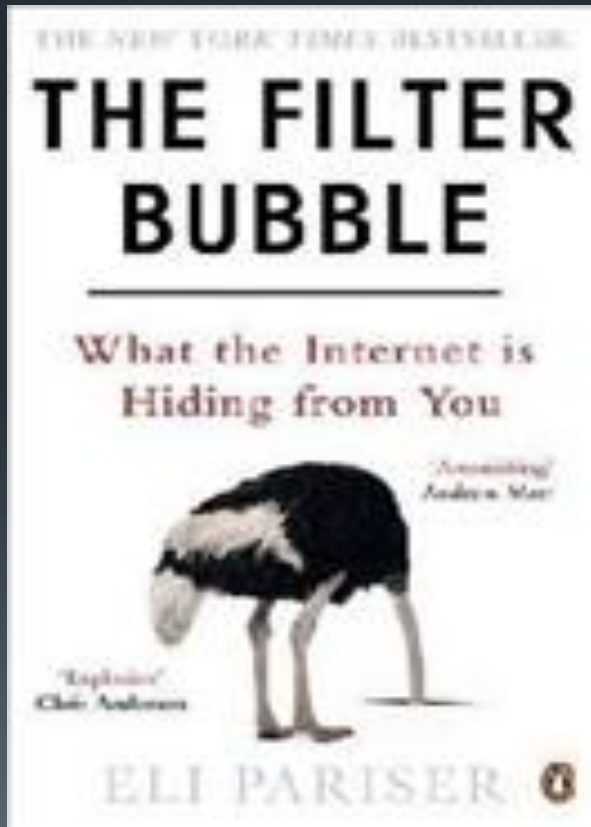
# Mistakes in Algo's

The Formula that Killed Wallstreet

$$\Pr[T_A < 1, T_B < 1] = \Phi_2(\Phi^{-1}(F_A(1)), \Phi^{-1}(F_B(1)), \gamma)$$

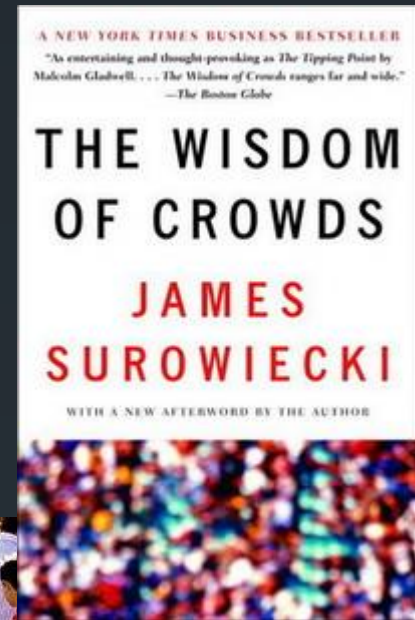


# Filter Bubbles

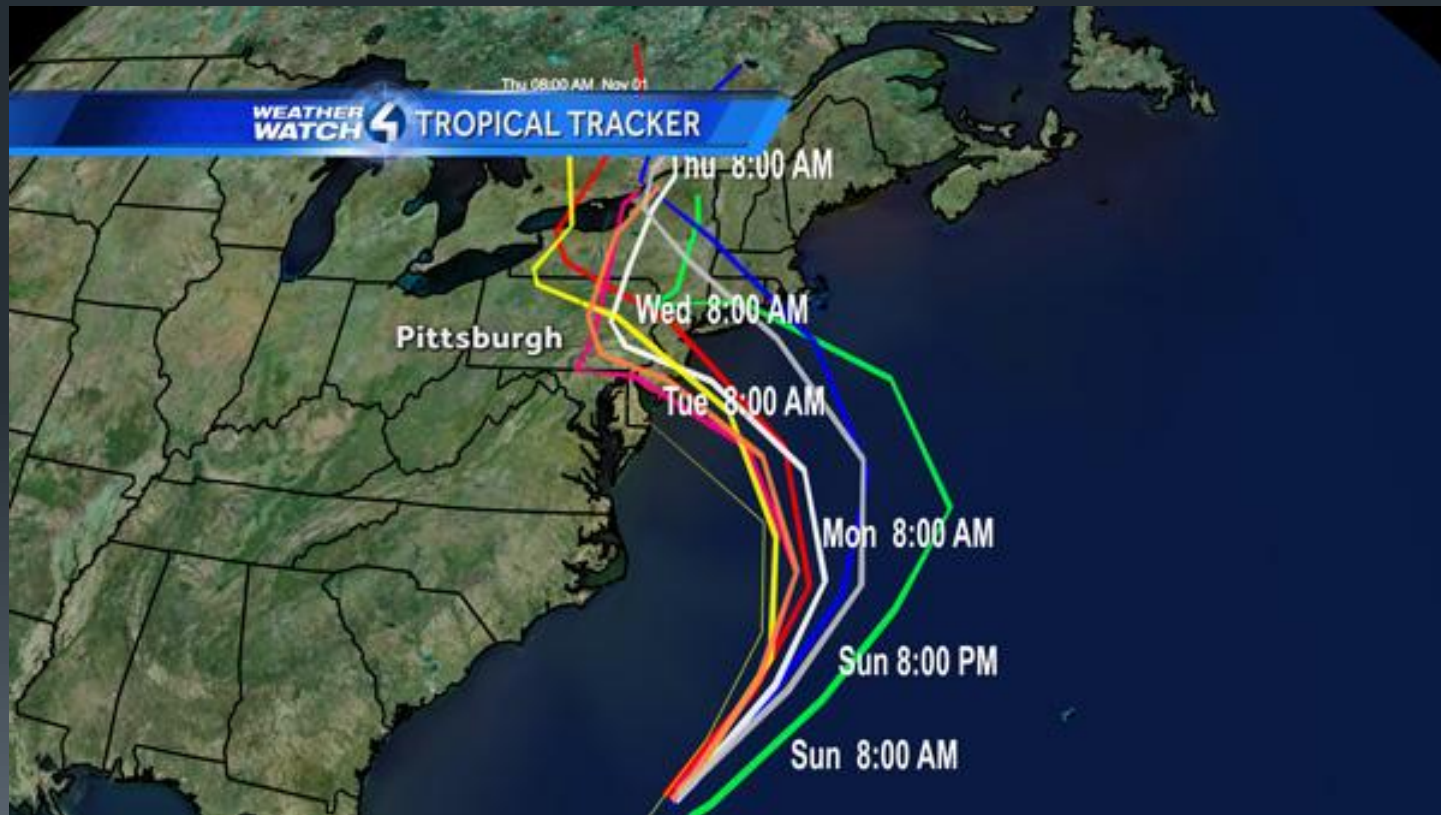


Likes  
Recommender Systems  
Customization  
Daily Me

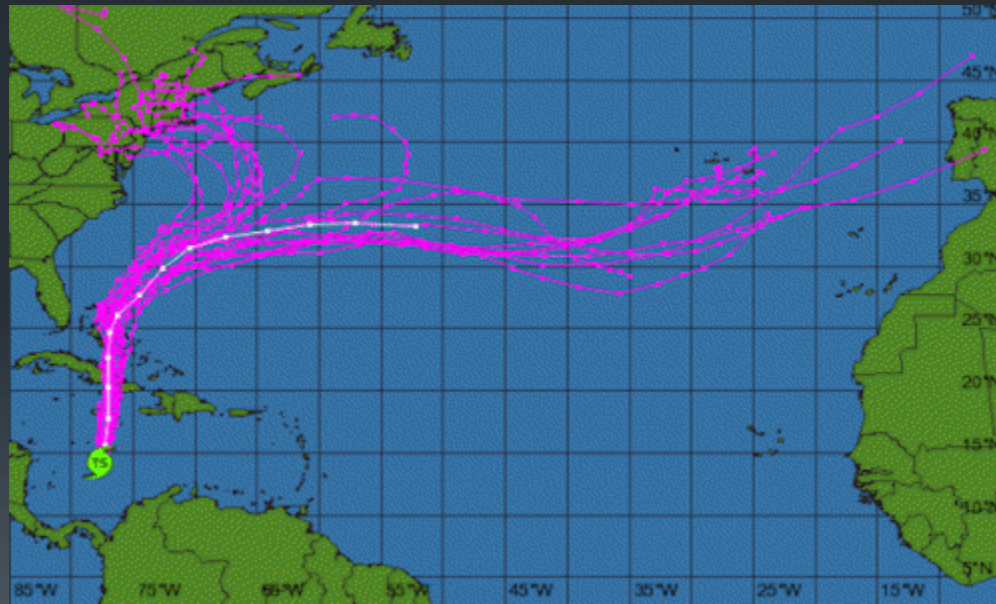
# “Wisdom” of the Crowd



# Probabilities: Sandy hits the Coast



# More Models





# Kennis Afhankelijkheid

- Mensen zijn kennis-afhankelijk van hun kennis omgeving
- Kwetsbaar voor fouten, beperkingen en bias
- Voor hun beslissingen, plannen en ideeën geldt:
- **Garbage in, Garbage out**



# Information Professional Ethics

- Honest Broker and Trusted Custodian
- Betrouwbare Informatie
- Diversiteit aan open data, modellen, simulations & serious games
- Betrouwbare omgeving voor Reflectie & Sense Making



## 2. Gelijkheid & Big Data



# Equal Access

- UN Human Right
- Primary Social Good
  
- Mens kan niet zonder Informatie
- Capabilities en reosurces om informatie om te zetten in kansen





# Positionality

- Information
  - 
  - non rivalous
  - positional good
- 
- Horizontal Positionality
  - Vertical Positionality



# High Frequency Trading

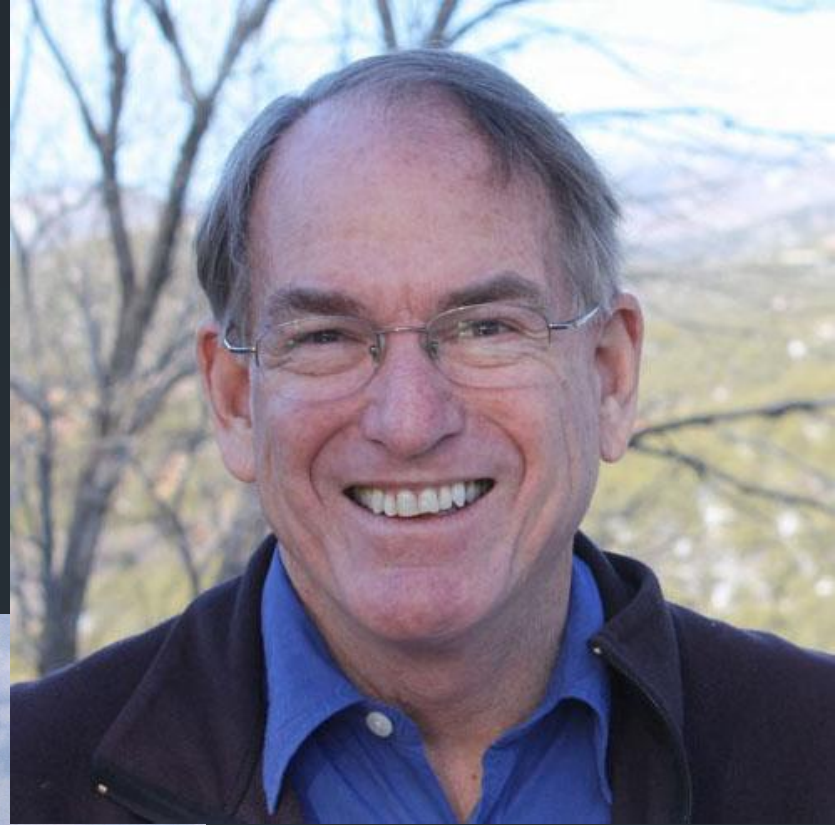
- 2012 IT industry investments in HFT
- Chips die in 0.000000074 seconde transacties kunnen verwerken
- 300 Miljoen USD Transatlantische kabel: 0.006 sec snellere signaal transmissie



# High Frequency Trading

- 2013
- Supersnelle Microwave transmission tussen Washington DC & New Jersey
- Sept 18: FED besluit om 2 p.m.
- 600 miljoen USD transacties in mili seconde voor Chicago handelaren weten van het FED besluit
-

# KUDUnomics



SAM BOWLES



# Information Professional Ethics

- Bewaker van transparantie en gelijke kansen
- Meta informatie, meta kennis, meta meta...
- Weergave van positionaliteit

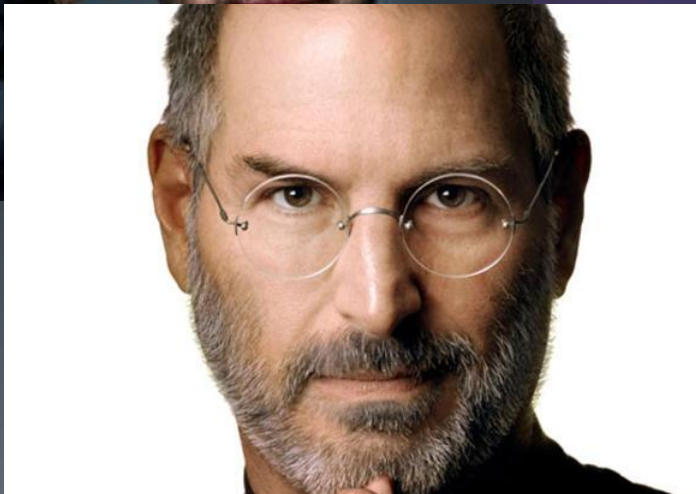


# 3. Privacy & Big Data

# Persoons gegevens

- Het nieuwe goud
- De nieuwe olie

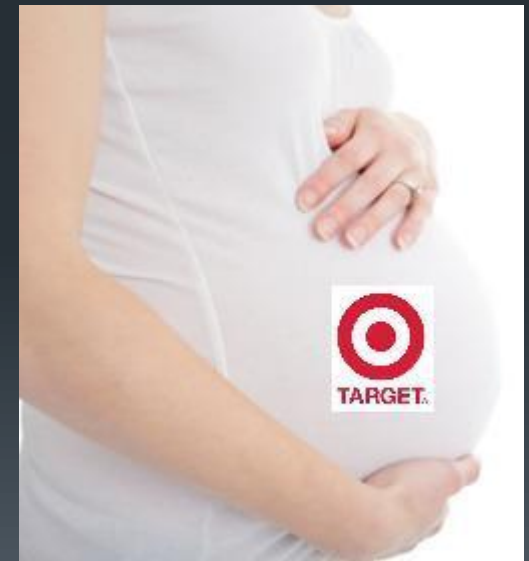









# Wall Mart: Are you Pregnant?





**Constrain**  
generating  
Acquiring  
accessing  
processing  
Disseminating  
**Personal Data**

**Data Protection**

- 
1. Preventing harm
  2. Fairness in markets for personal data
  3. Prevention of Discrimination and Contextual Integrity
  4. Respect moral autonomy

Privacy: Data Protection for Moral Reasons



# Information Professional Ethics

- Assistent Gegevens Beschermer
- Vrijwaring van commerciële profiling
  
- Tracking,
- Tracing,
- Monitoring,
- Categorisering,
- Classificatie
- Price Targetting

## 4. Security



# security



# security

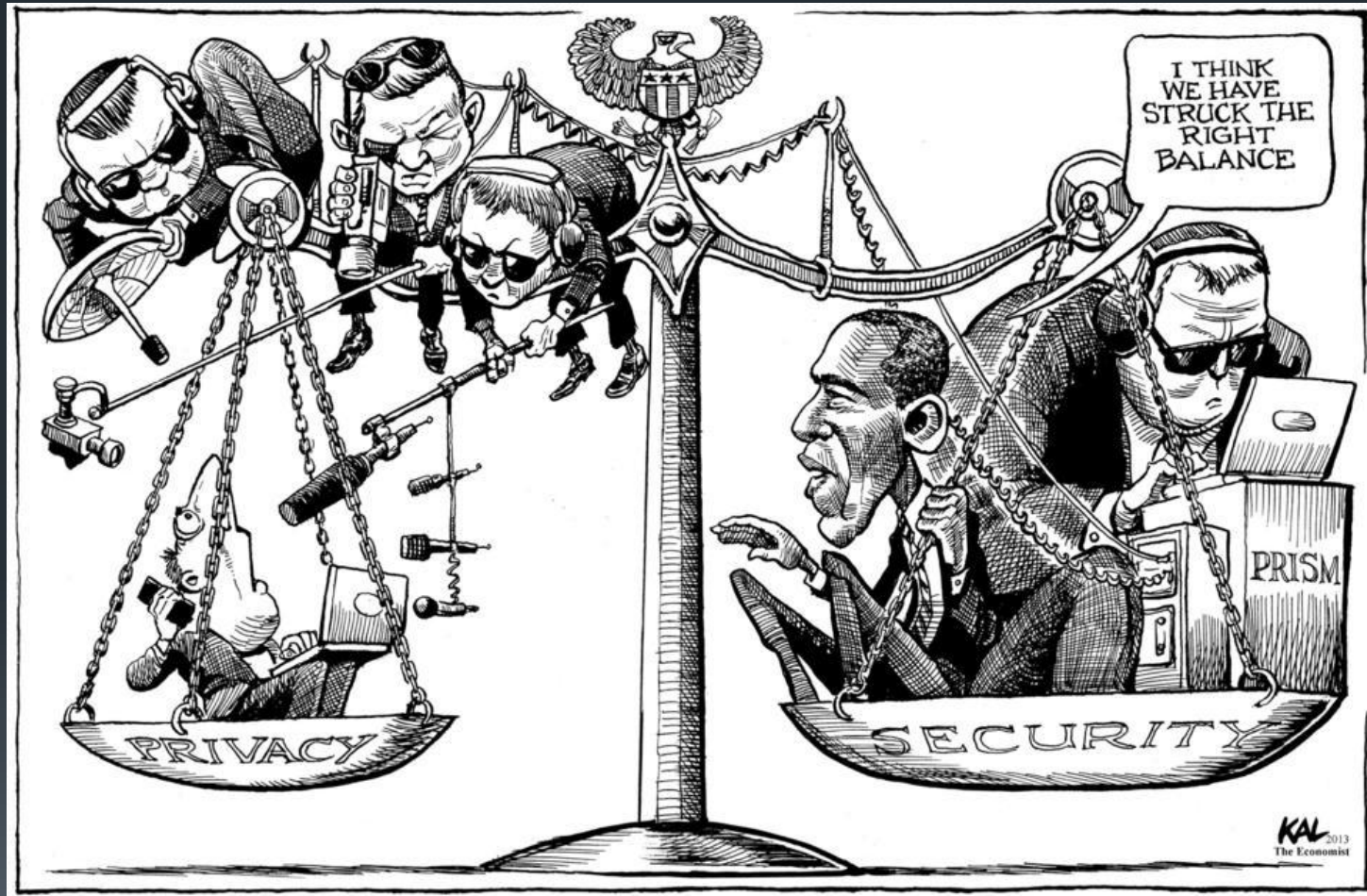


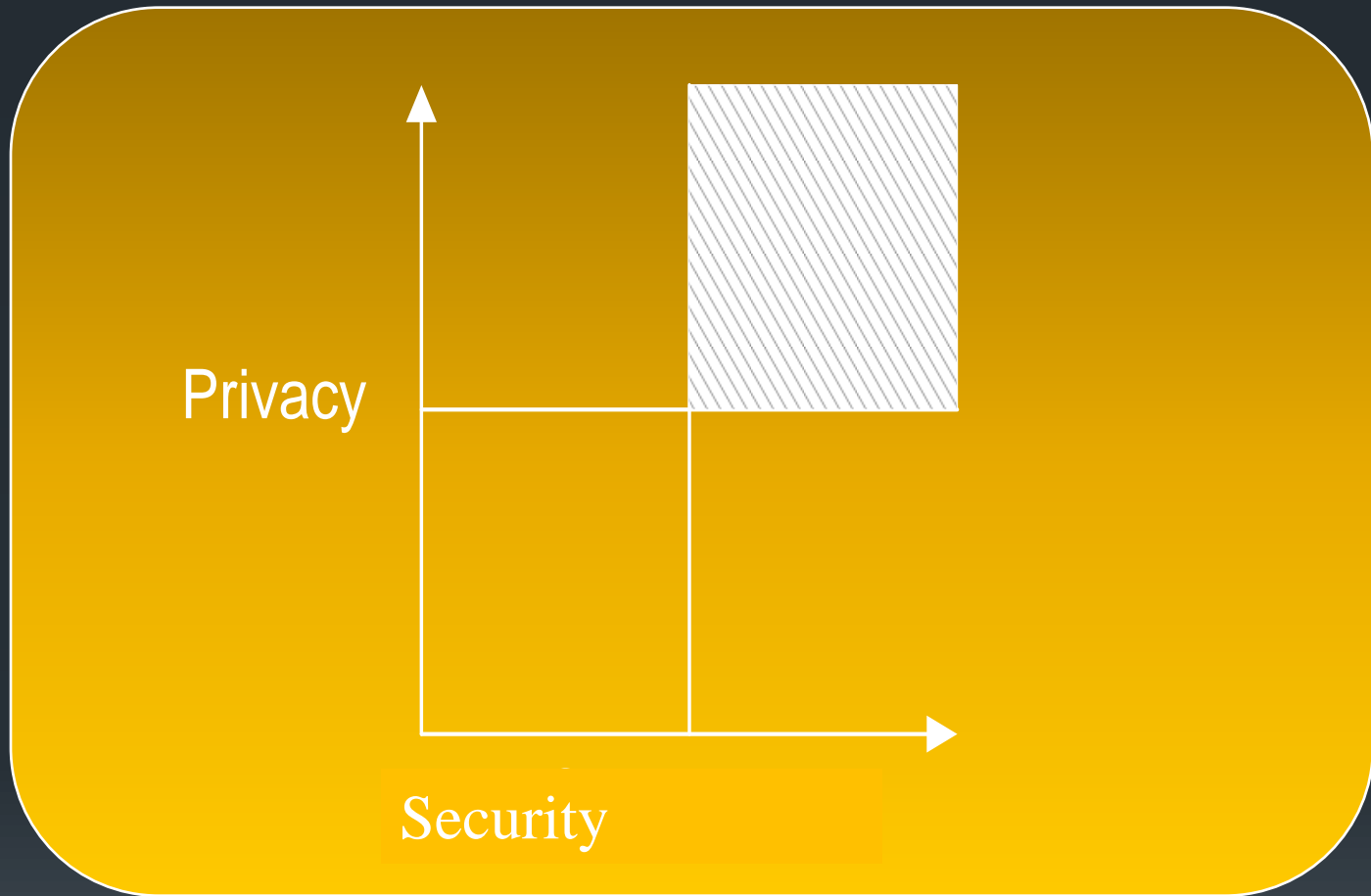


We also want Privacy

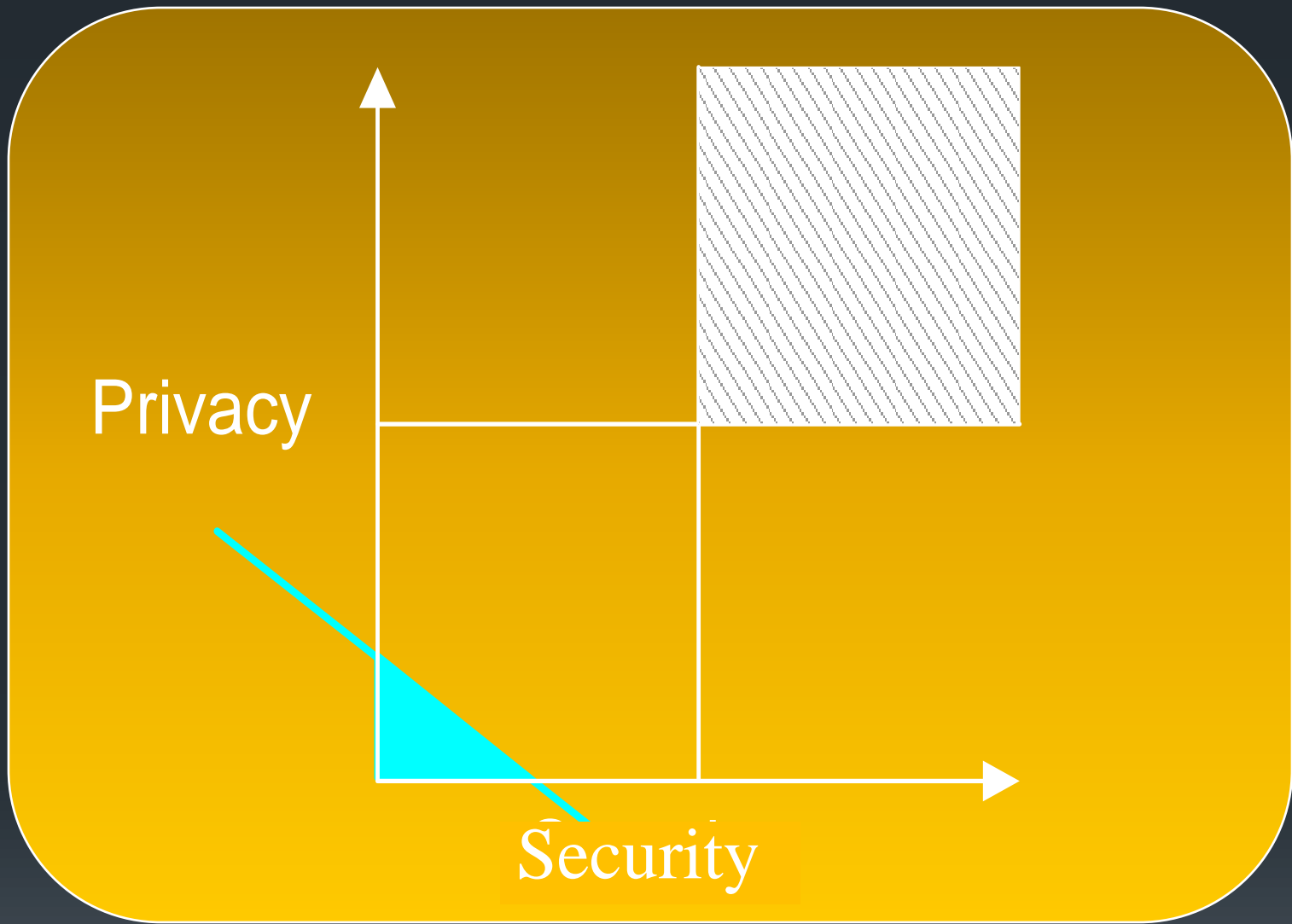


# Balans?

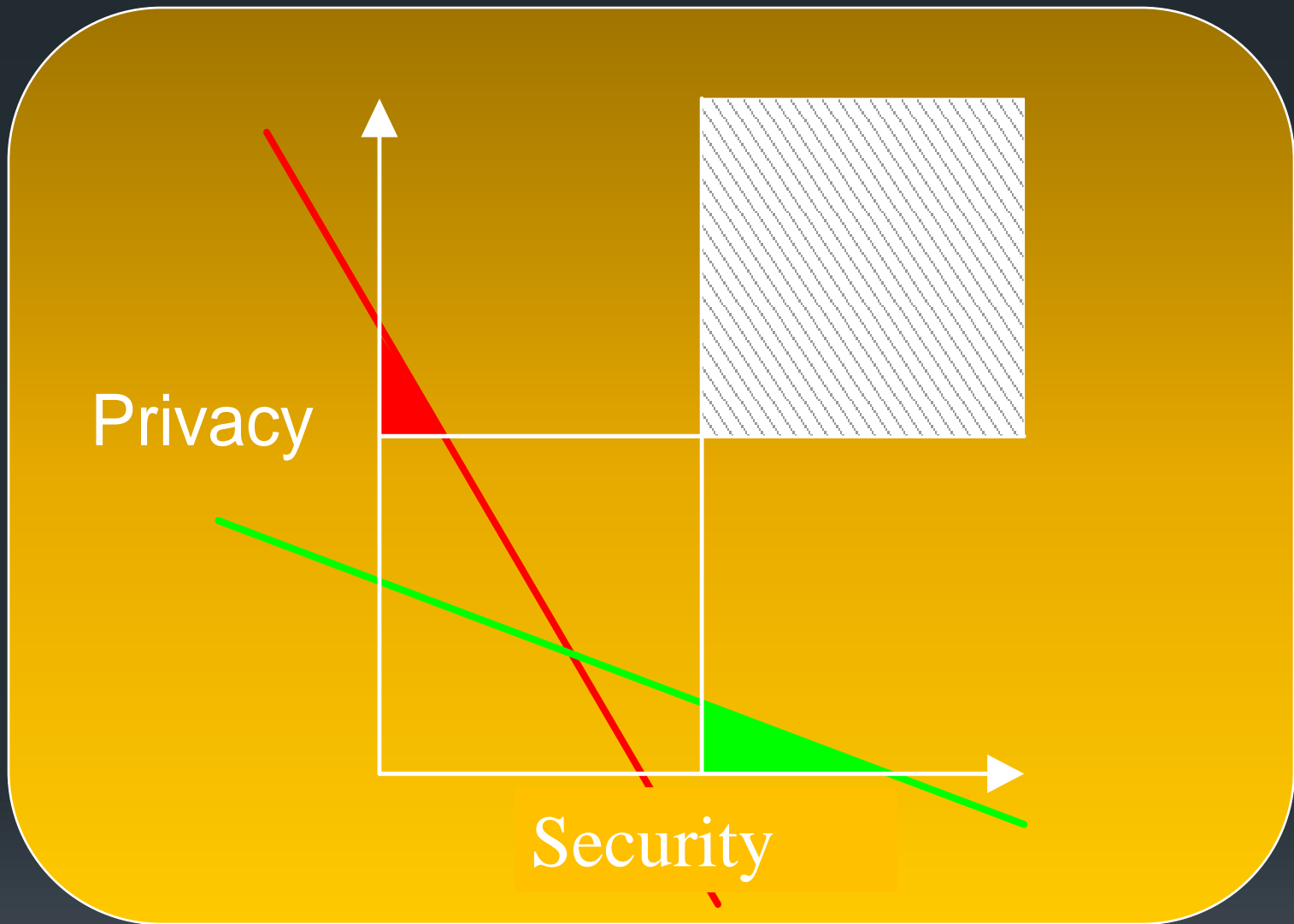




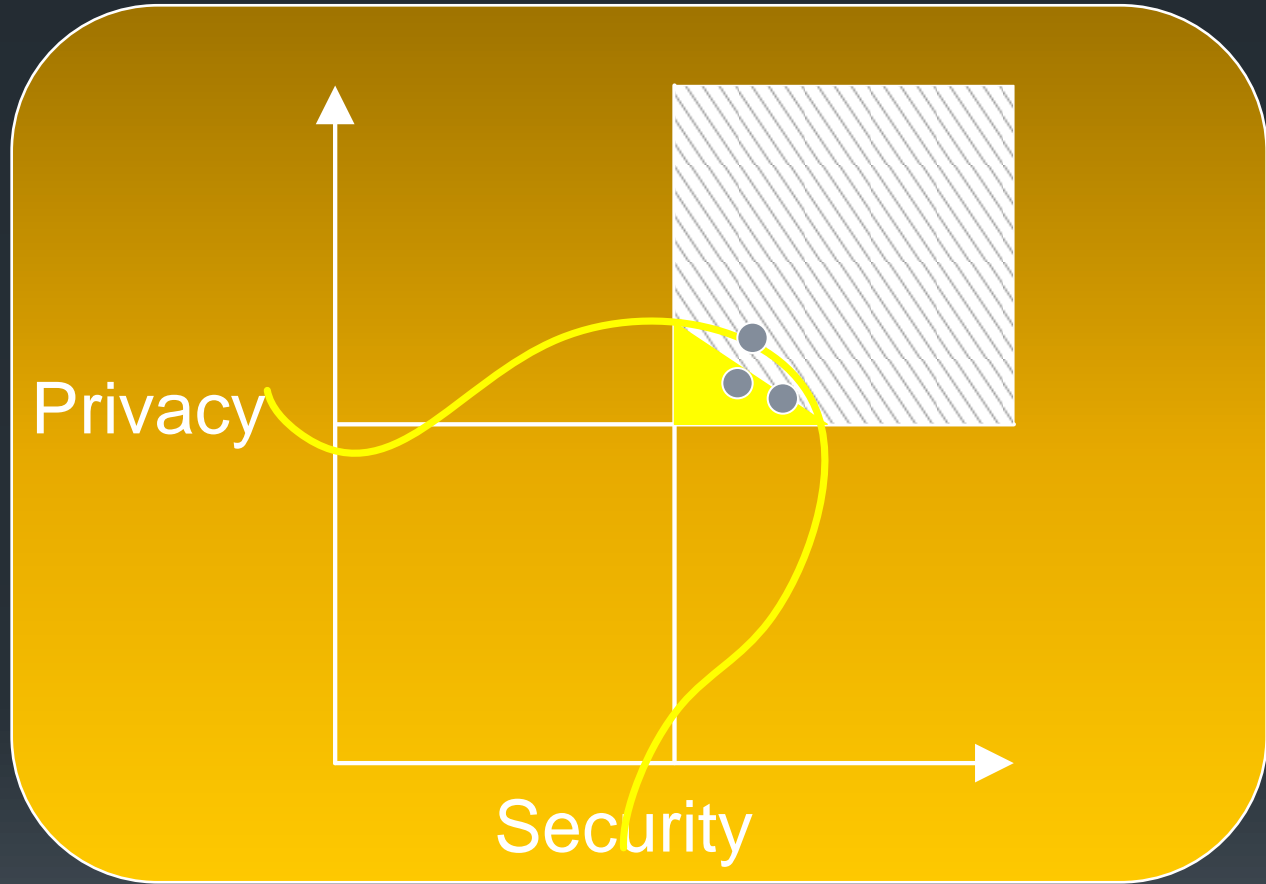
## Moral Overload



No Privacy, no Security (1.0)



# Privacy or Security (2.0)



# Privacy & Security (3.0)



## Plicht te innoveren

If you can change the world by innovation today so that you can satisfy more of your obligations tomorrow, you have a moral obligation to innovate today.

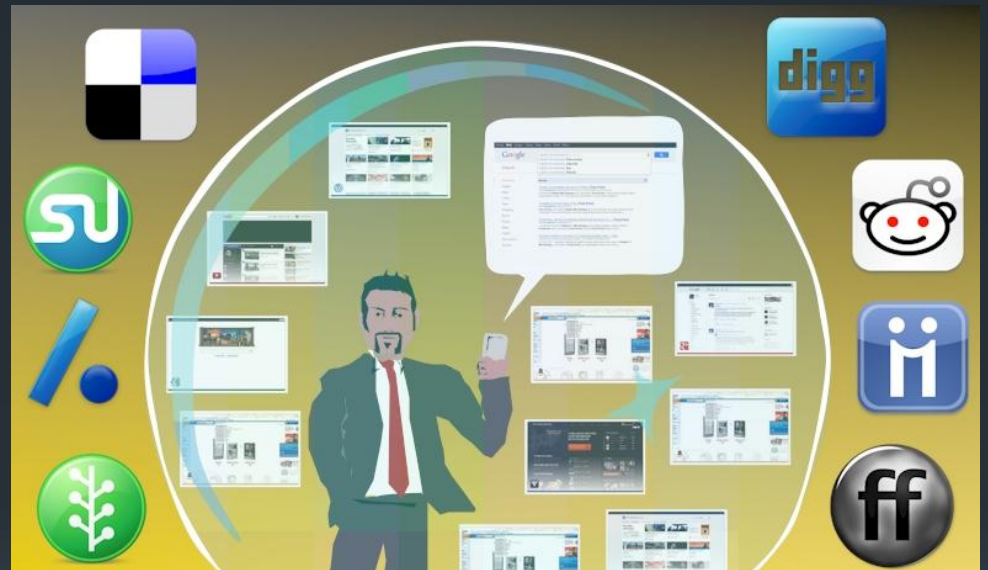
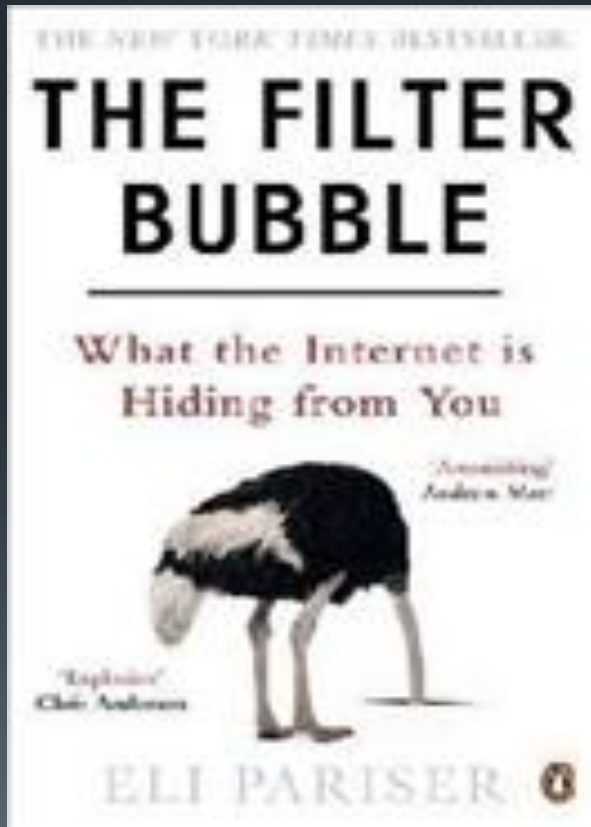
## 5. Democratie

- Monitorial Citizen
- Contestatory Democracy





# Filter Bubbles



Likes  
Recommender Systems  
Customization  
Daily Me



# Information Professional Ethics

- Ondersteuner van democratisch processen en curator van diversiteit en pluriformiteit in de 21e eeuw
- Facilitator van Burgers die zich verenigen om hun belangen te behartigen en publiek zaak te dienen



# Oplossingen 'by design'



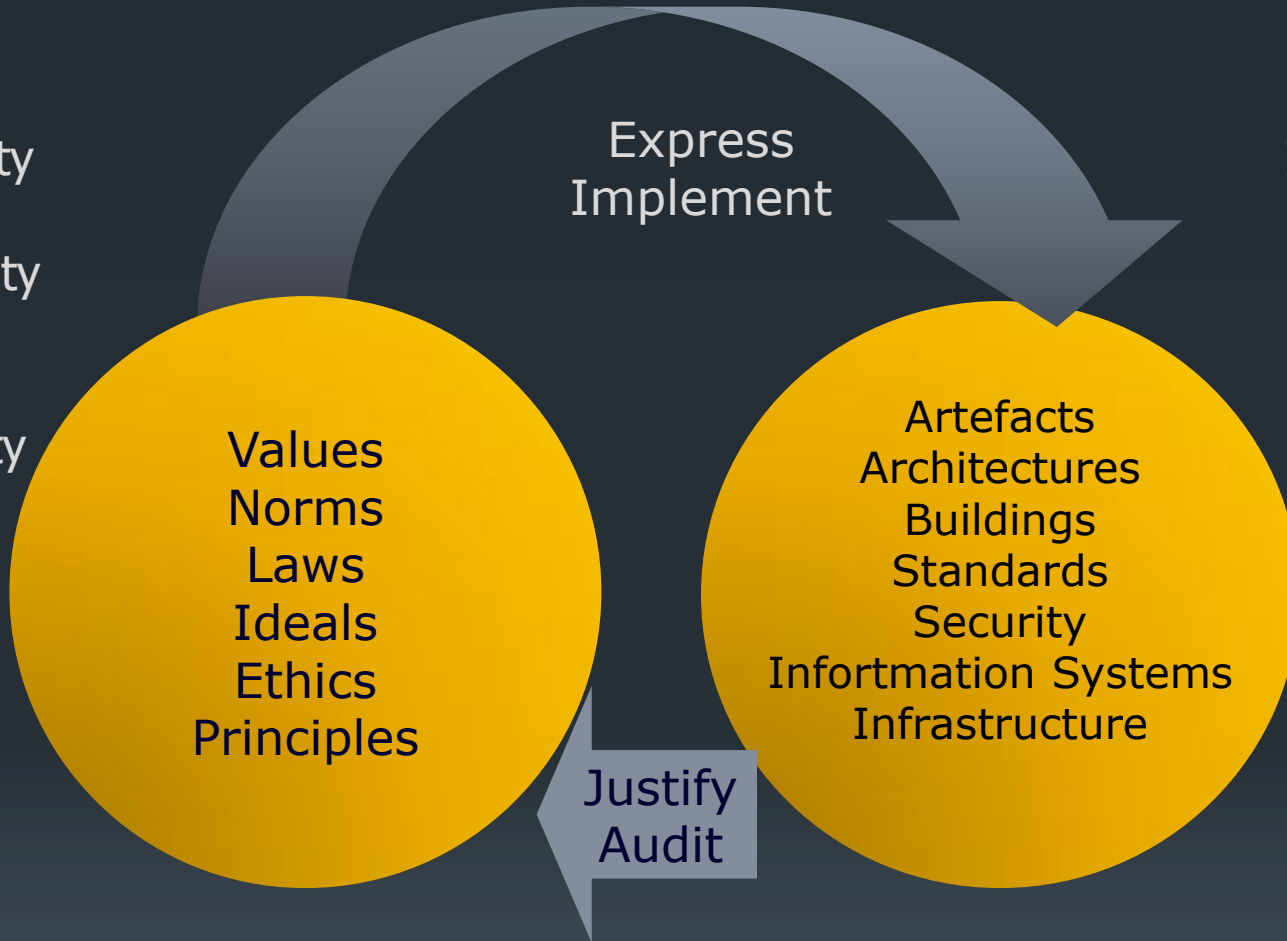
# Design for X

- Design for privacy
- Design for security
- Design for inclusion
- Design for sustainability
- Design for democracy
- Design for safety
- Design for transparency
- Design for accountability
- Design for human capabilities

Values as design requirements



Responsibility  
Privacy  
Accountability  
Agency  
Autonomy  
Sustainability  
Safety  
Security



Epistemic  
Institutions:  
**Universities**  
**Libraries**  
**Parliaments**

Key Problem

21st Century: **Value Sensitive Design**

# Refugium Libertatis



# Refugium Libertatis



- Informatie
- Reflectie
- Keuze
- Verbonden
- Betrokken
- Verantwoordelijk
- Vrij
- Open
- Pluriform
- Innovatie
- Creativiteit
- Betekenis

# 'Bookless' library at Stanford looks to the future



Stanford Huang  
Engineering Centre



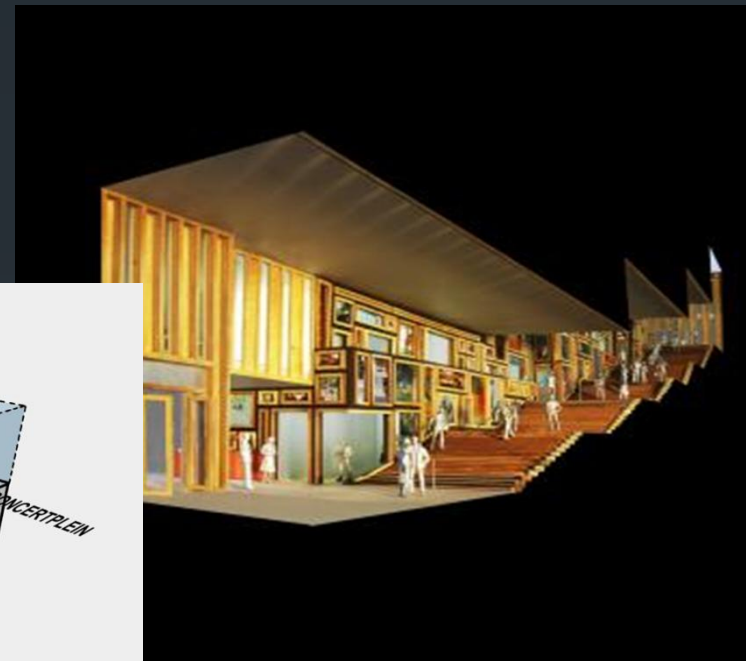
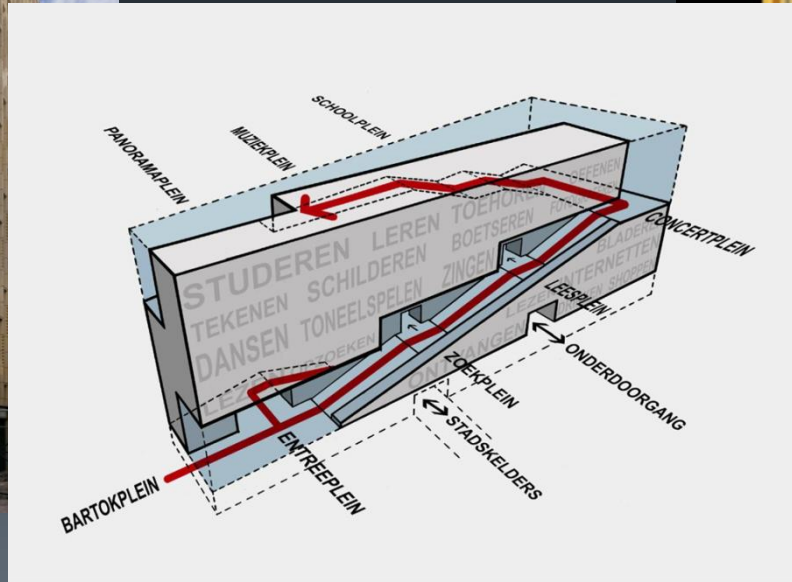
# Coffee shop Madison Ave



# Delft University of Technology



# Arnhem: Riedijk & Neutelings





# Mecooco, Birmingham





# Future of the Library & Information Professional

- Nieuwe Epistemische Instituties,
- Nieuwe Rollen
- Met Morele Kennisdoelstellingen
  - Honest knowledge broker
  - Trusted Third Party in Big Data Samenleving
  - Custodian van Pluriforme & Open Data en Modellen