MEDICAL INFORMATICS FOR HEALTH SERVICES RESEARCH

Opportunities and Challenges for Interdisciplinary Research

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TOPICS AND AIM OF THIS PRESENTATION

- Explain what is *Medical Informatics* and what is not
- Introduce the concept of *Translational Health Informatics* as possible bridge between Health Services Research and Medical Informatics
- Provide examples of current research and elaborate on *opportunities* and *challenges* within Translational Health Informatics
- Identify and discuss *connection points* to your area of research

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A NARROW AND NOT SO NARROW DEFINITION OF MEDICAL INFORMATICS

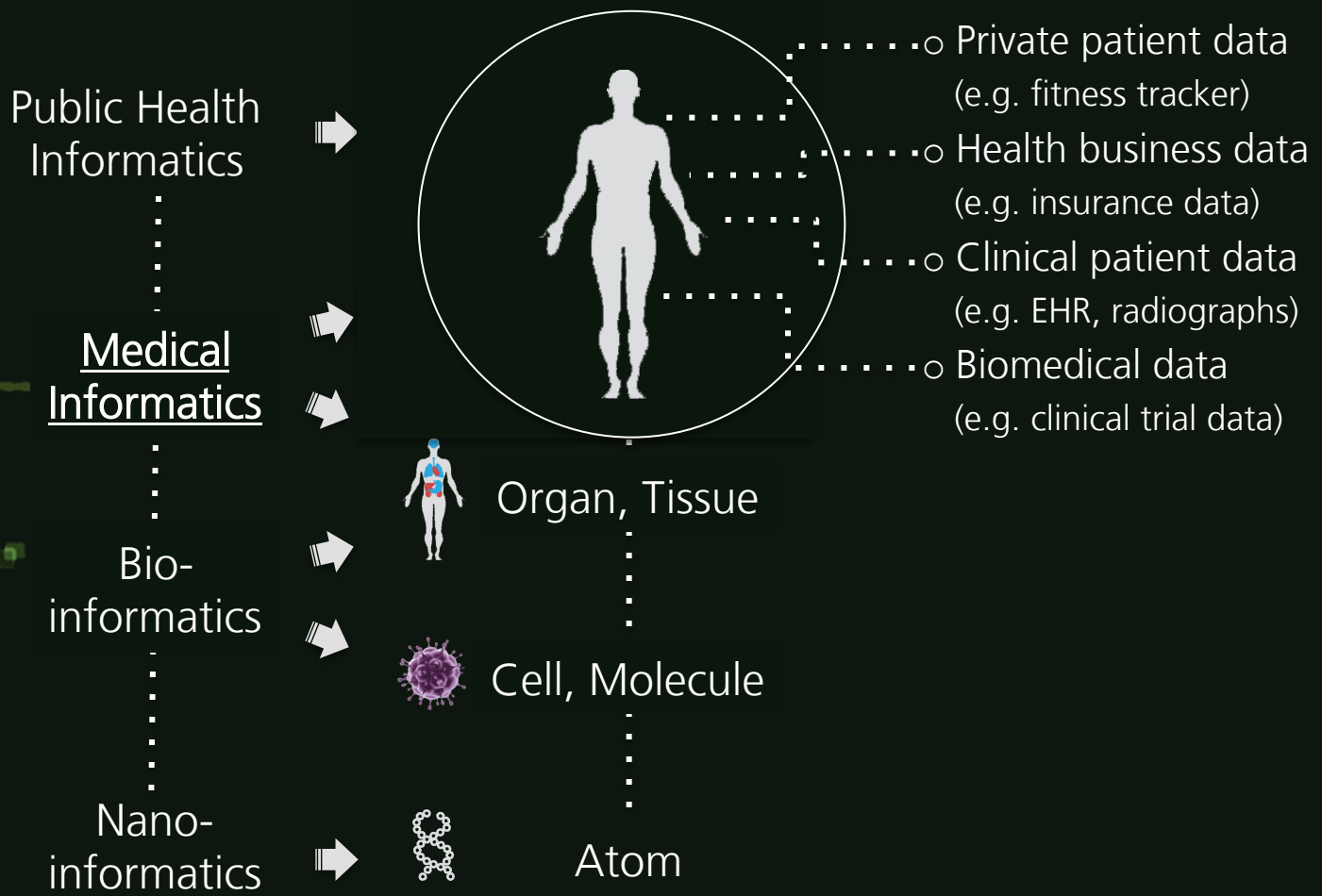
- «[...] scientific field that deals with the storage, retrieval, and optimal use of medical information, data, and knowledge for problem solving and decision making.» [1]
  → context = hospitals
- EFMI Working Groups [2]



[1] Shortliffe EH, Perrault LE, Wiederhold G, Fagan LM (1990) Medical Informatics: Computer Applications in Health Care and Biomedicine. Springer, New York
[2] European Federation for Medical Informatics. http://www.efmi.org/

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TYPES OF MEDICAL INFORMATICS DATA



Based on: Altman RB, Balling R, Brinkley JF, et al. (2008) Commentaries on "Informatics and Medicine: From Molecules to Populations." Methods of Information in Medicine, 47(4): 296-317

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TYPES OF MEDICAL INFORMATICS SYSTEMS

Consumer Health Apps

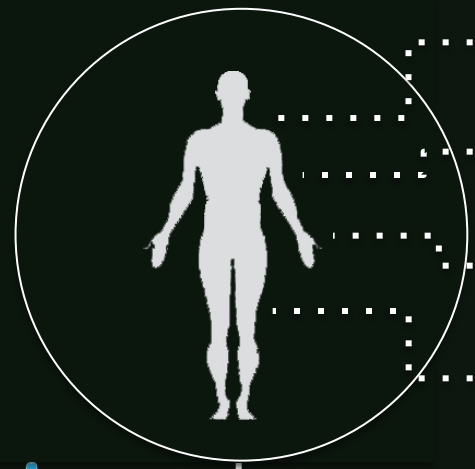


Public Health Informatics

Medical Informatics

Bio-informatics

Nano-informatics



Organ, Tissue

Cell, Molecule

Atom



[1]

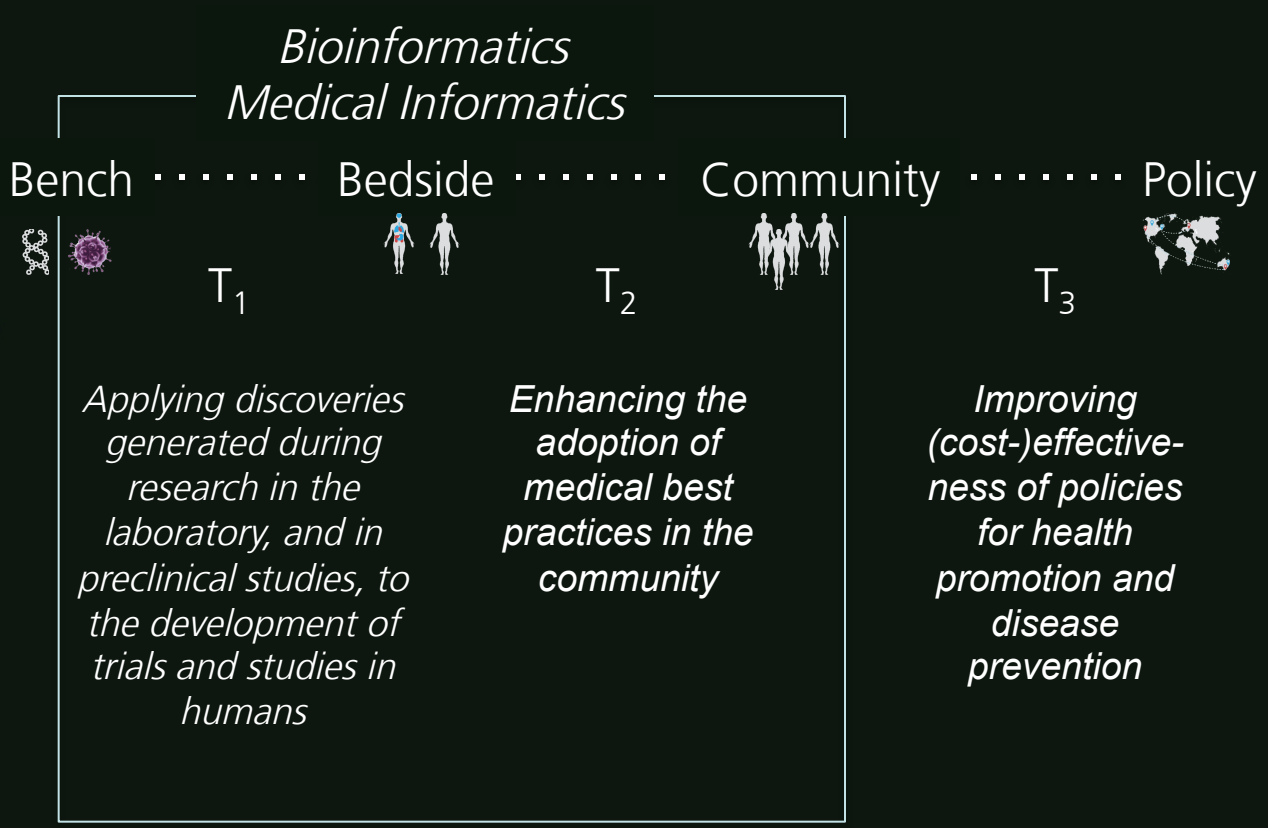
A novel open-source web-based platform promoting collaboration of healthcare professionals and biostatisticians: A design science approach

Clinical Systems

[1] Raptis DA, Mettler T, Fischer M, et al. (2014) Managing Multicentre Clinical Trails with Open Source. Informatics for Health and Social Care, 39(2): 67-80

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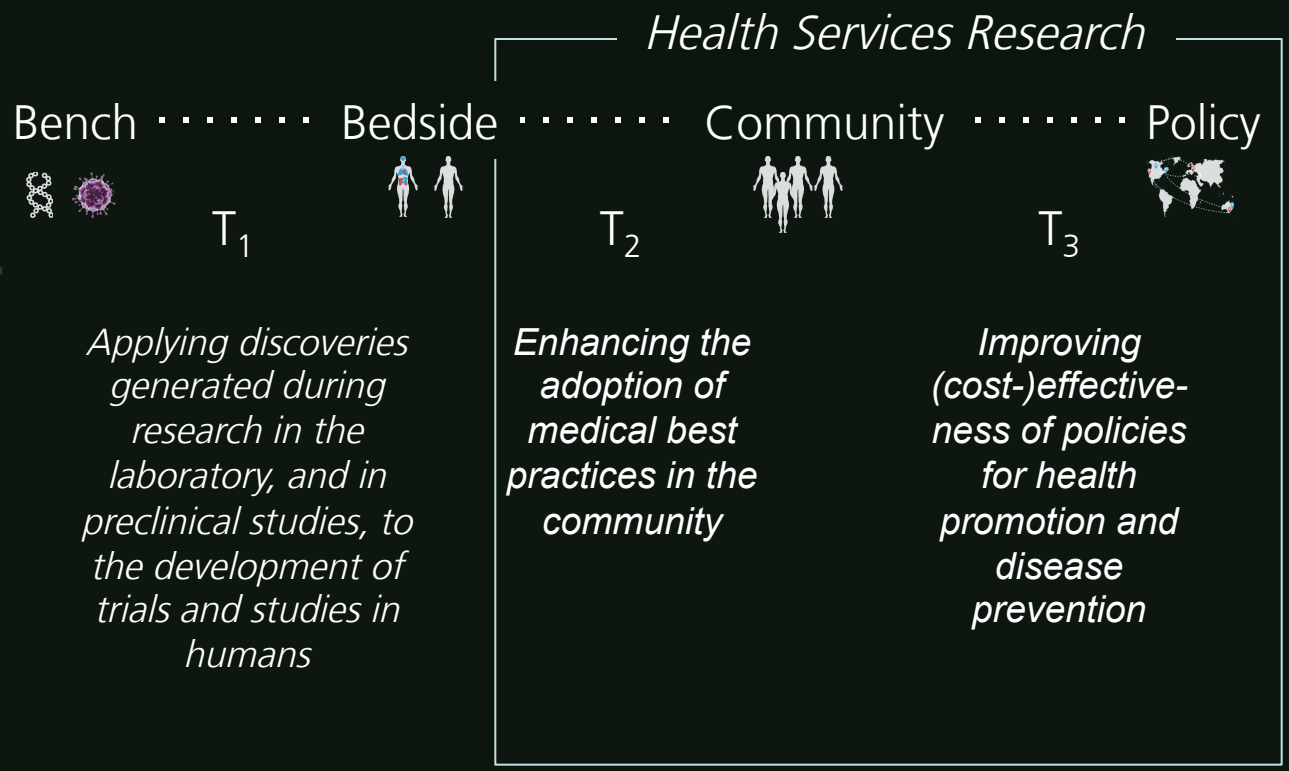
TRANSLATIONAL HEALTH INFORMATICS AS BRIDGE TO HEALTH SERVICES RESEARCH



Based on: Sarkar I (2010) Biomedical Informatics and Translational Medicine. Journal of Translational Medicine, 8(1): 2-12

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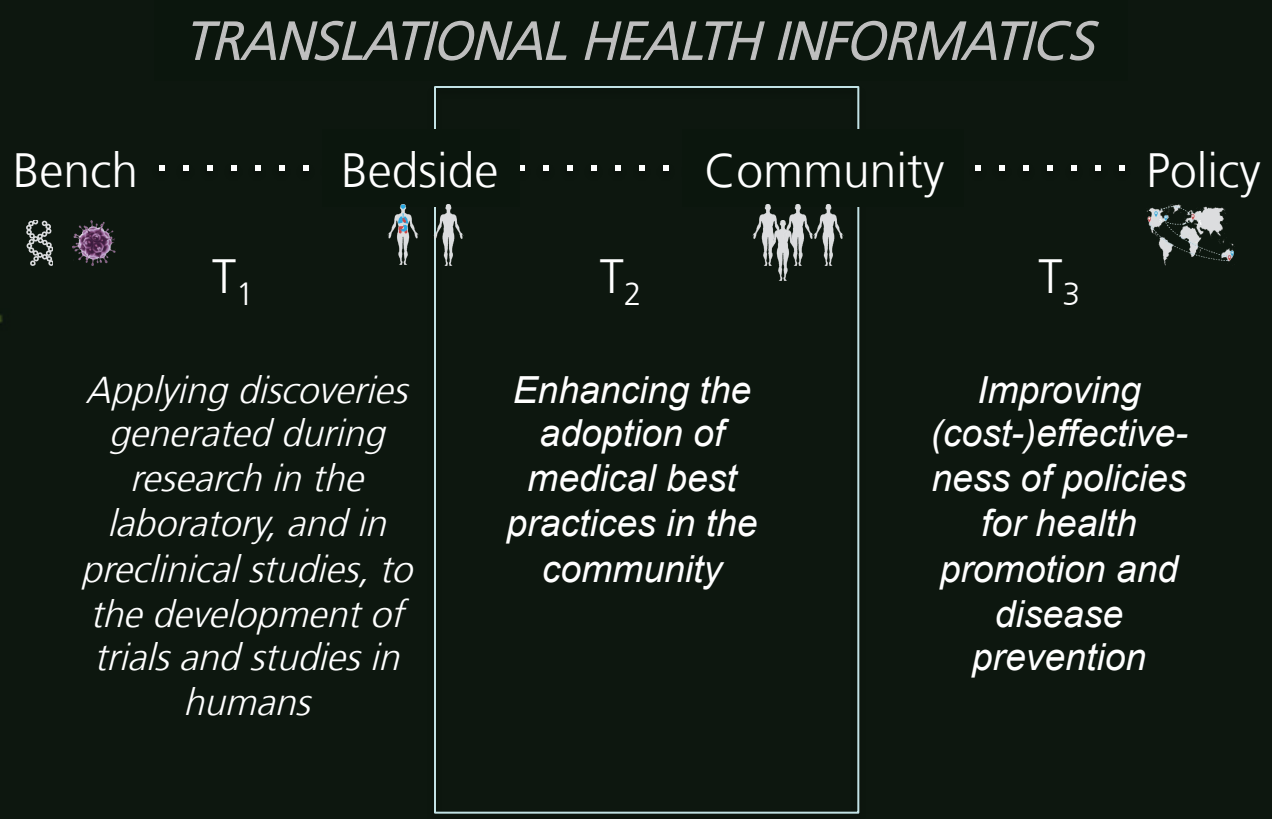
TRANSLATIONAL HEALTH INFORMATICS AS BRIDGE TO HEALTH SERVICES RESEARCH



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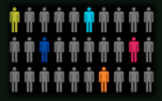
TRANSLATIONAL HEALTH INFORMATICS AS BRIDGE TO HEALTH SERVICES RESEARCH



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OPPORTUNITIES AND CHALLENGES OF TRANSLATIONAL HEALTH INFORMATICS



PERSONALIZING PREVENTION AND TREATMENT

1 NON-CLINICAL WORLD



- Aim: increase wellbeing, happiness, and personal health
- Issues: motivation, trust, effectiveness
- Design principle: simple & understandable
- Enabler: sensor-based systems, persuasive computing



CONFLICTS

HARNESSING NEW INFORMATION FOR BETTER RESEARCH AND PRACTICE



CLINICAL WORLD

- Aim: improve efficacy of treatments and prevention
- Issues: availability & interpretability of data
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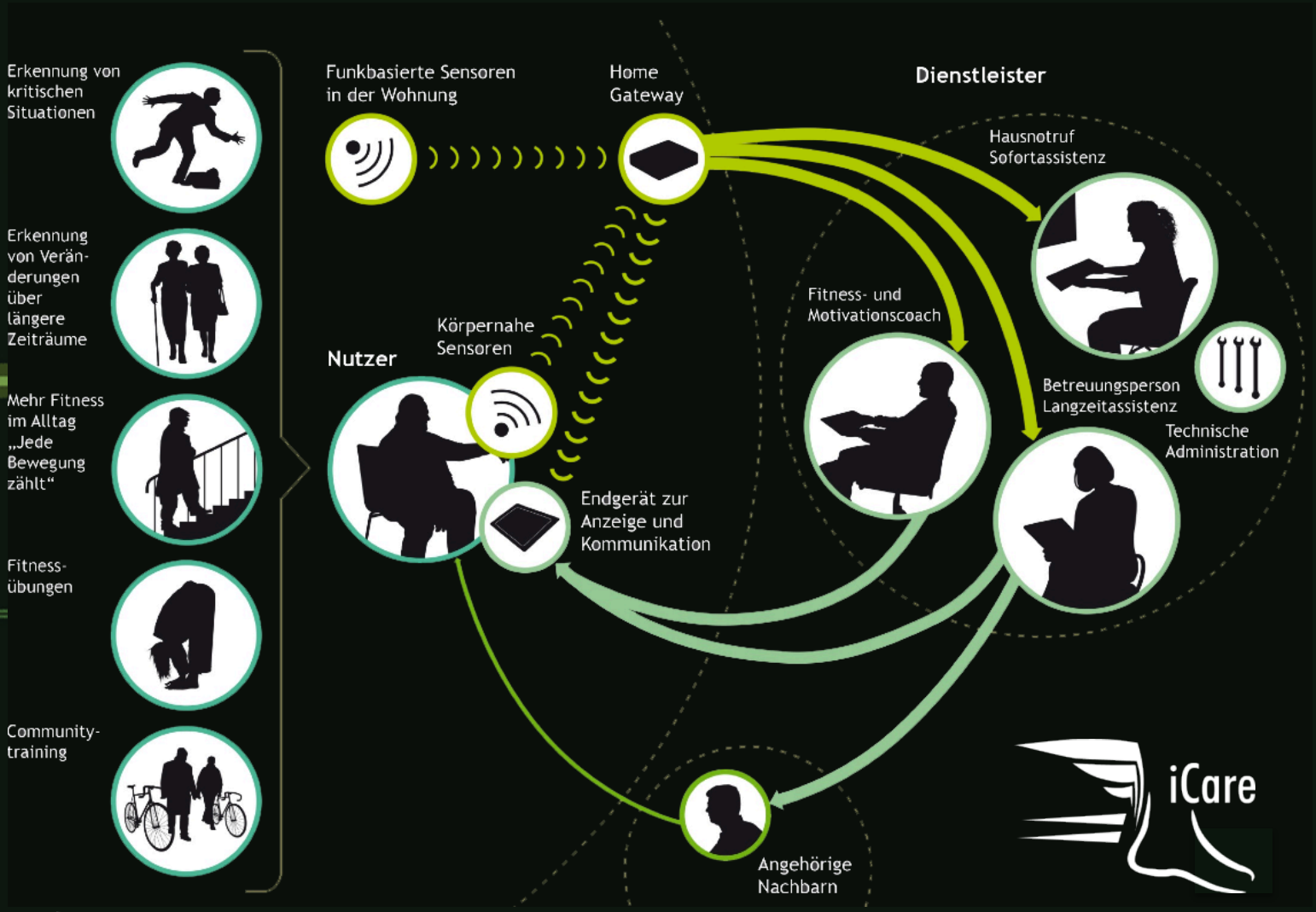


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Based on: Mettler T, Raptis T (2012) What Constitutes the Field of Health Information Systems? Fostering a Systematic Framework and Research Agenda. Health Informatics Journal 18(2): 147-156

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OPPORTUNITY: SENSORS-BASED HEALTH SERVICES [1,2]



[1] Telekom Innovation Laboratories
[2] iCare Project Website: http://www.dhbw-ravensburg.de/de/duale-partner/fakultaet-studiengang/technik/wirtschaftsinformatik/forschungsprojekt-icare/

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USING SENSORS FOR STRESS DETECTION AND INITIATION OF BEHAVIOR CHANGE ACTIVITIES

THE WALL STREET JOURNAL. ≡ [1]

MANAGEMENT

Tracking Sensors Invade the Workplace

Devices on Workers, Furniture Offer Clues for Boosting Productivity

By RACHEL EMMA SILVERMAN
Updated March 7, 2013 11:42 a.m. ET

A few years ago when Bank of America Corp. wanted to study whether face time mattered among its call-center teams, the big bank asked about 90 workers to wear badges for a few weeks with tiny sensors to record their movements and the tone of their conversations.

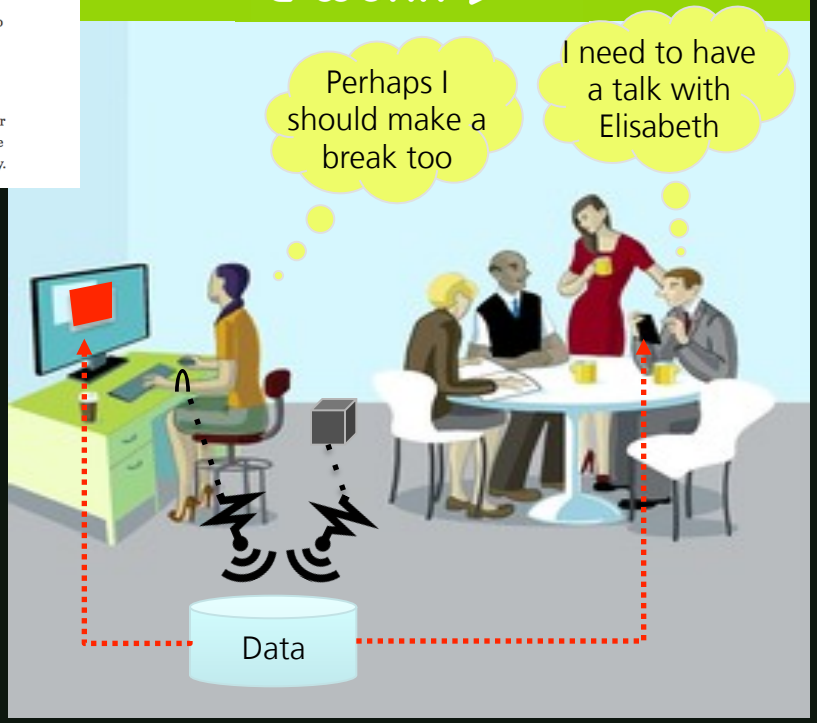


As Big Data becomes a fixture of office life, companies are turning to tracking devices to gather real-time information on how teams of employees work and interact. Rachel Emma Silverman reports on Markets Hub.

The data showed that the most productive workers belonged to close-knit teams and spoke frequently with their colleagues. So, to get more employees mingling, the bank scheduled workers for group breaks, rather than solo ones.

Productivity rose by at least 10%, says former Bank of America human-resources executive Michael Arena, who helped conduct its study.

[2] ACTIVE @ WORK



1. Health Monitoring
2. Behavioral Change Support

[1] Wall Street Journal: http://www.wsj.com/articles/SB10001424127887324034804578344303429080678
[2] EU-AAL Project Active@Work: http://www.activeatwork.eu

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RESEARCH CHALLENGE: HOW CAN YOU INCREASE TRUST?


Bloomberg Business

News Markets Insights

Data

Your Medical Records Are for Sale

By Jordan Robertson | August 08, 2013


The Telegraph

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Politics | Election 2015 | Investigations | Obits | Education | Science | Earth | Weather | Health

HOME » NEWS » HEALTH

NHS legally barred from selling patient data for commercial use

Jeremy Hunt will next week announce a new drive to protect patient privacy under which the NHS will be barred from selling medical records for commercial use


ft.com > uk >

Politics & Policy

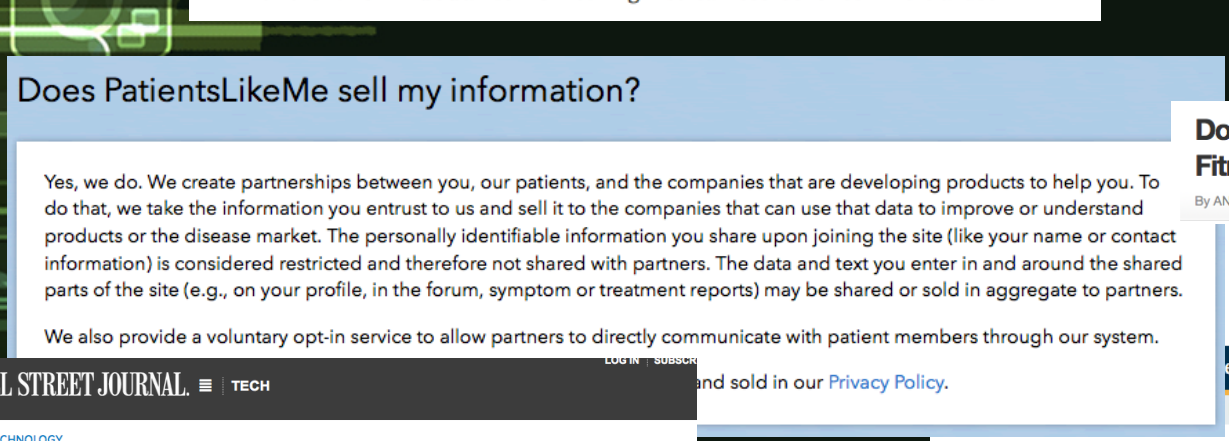
Home UK World Companies Markets Global Economy Lex

Africa Asia-Pacific Europe Latin America & Caribbean Middle East & North Africa UK

February 3, 2015 12:01 am

Health advances using 'big data' at risk, ministers warned

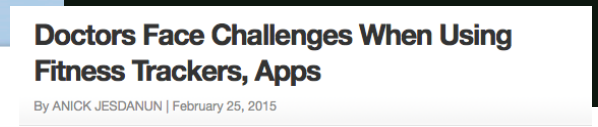
Andrew Ward, Pharmaceuticals Correspondent


Does PatientsLikeMe sell my information?

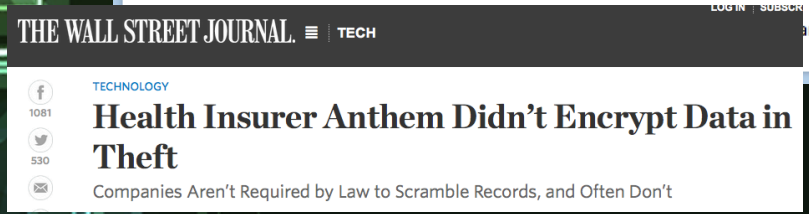
Yes, we do. We create partnerships between you, our patients, and the companies that are developing products to help you. To do that, we take the information you entrust to us and sell it to the companies that can use that data to improve or understand products or the disease market. The personally identifiable information you share upon joining the site (like your name or contact information) is considered restricted and therefore not shared with partners. The data and text you enter in and around the shared parts of the site (e.g., on your profile, in the forum, symptom or treatment reports) may be shared or sold in aggregate to partners.

We also provide a voluntary opt-in service to allow partners to directly communicate with patient members through our system.

...nd sold in our Privacy Policy.


Doctors Face Challenges When Using Fitness Trackers, Apps

By ANICK JESDANUN | February 25, 2015


THE WALL STREET JOURNAL. | TECH

LOG IN | SUBSCR

TECHNOLOGY

Health Insurer Anthem Didn't Encrypt Data in Theft

Companies Aren't Required by Law to Scramble Records, and Often Don't


...erver Networking Cloud Strategy Public Sector Stora

Events Tutorials

Home » Security » News » US health insurer Anthem hit by massive data breach

US health insurer Anthem hit by massive data breach

NEWS | 5 Feb, 2015 | Caroline Donnelly

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RESEARCH CHALLENGE: HOW CAN YOU EFFECTIVELY PERSUADE PEOPLE TO CHANGE THEIR BEHAVIOR?



app for prevention of dehydration

app for promotion of active lifestyle

app for monitoring smoking cessation

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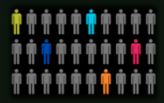
OPPORTUNITIES AND CHALLENGES OF TRANSLATIONAL HEALTH INFORMATICS

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PERSONALIZING PREVENTION AND TREATMENT

CONFLICTS

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[1]

The Economist

World politics | Business & finance | Economics | Science & technology | Culture

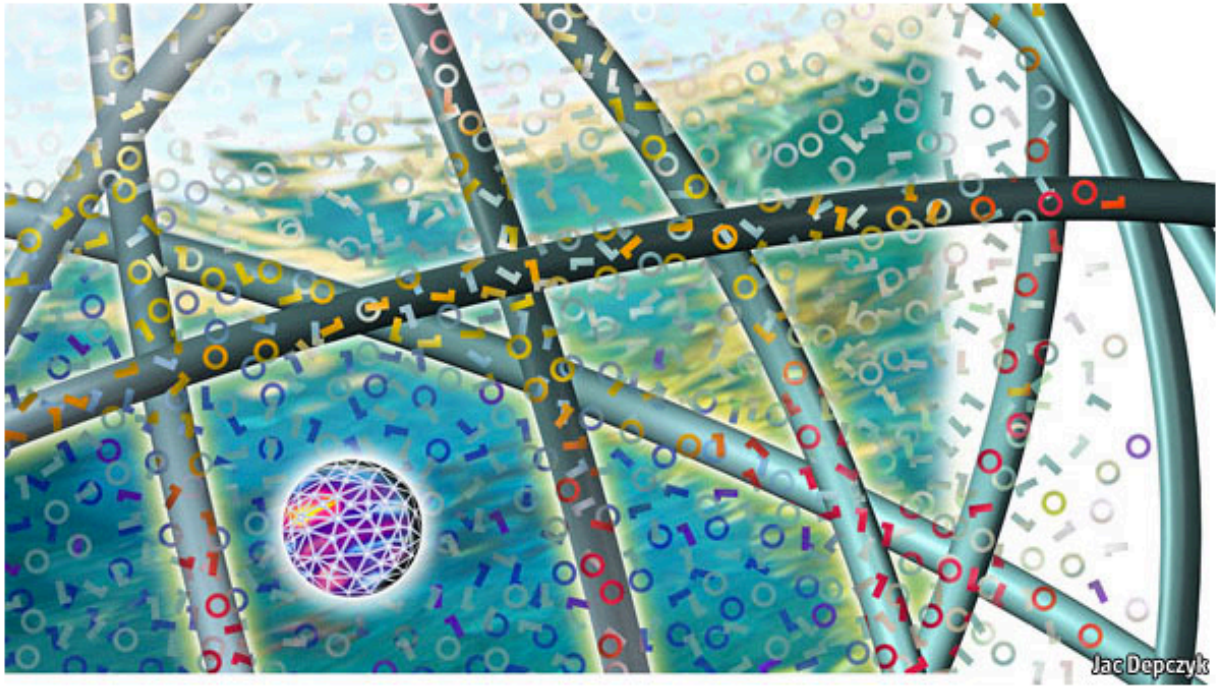
Special report: Managing information

Data, data everywhere

Information has gone from scarce to superabundant. That brings huge new benefits, says Kenneth Cukier (interviewed here)—but also big headaches

Feb 25th 2010 | From the print edition

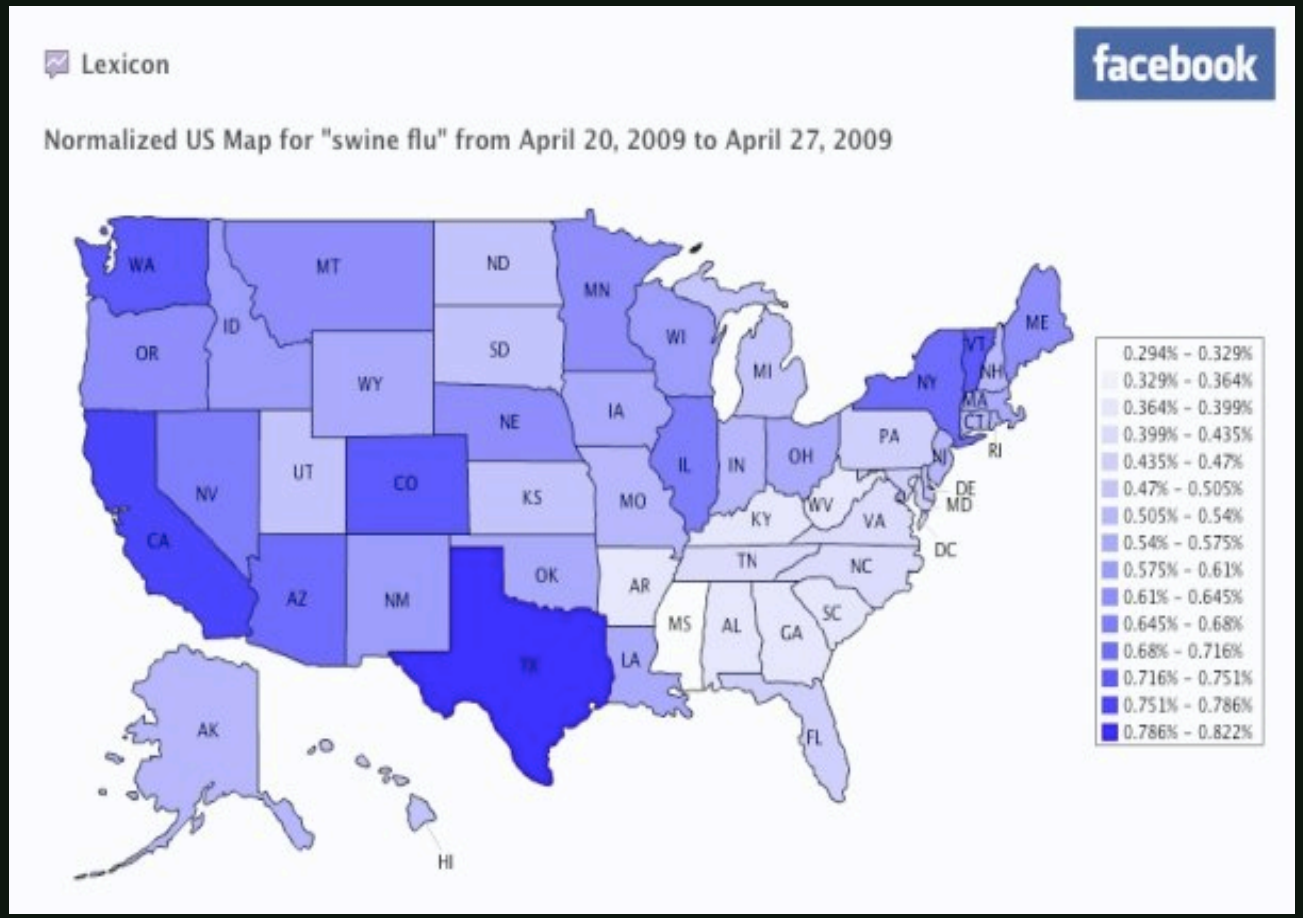
Timekeeper | Like 532 | Tweet 298



[1] The Economist: http://www.economist.com/node/15557443

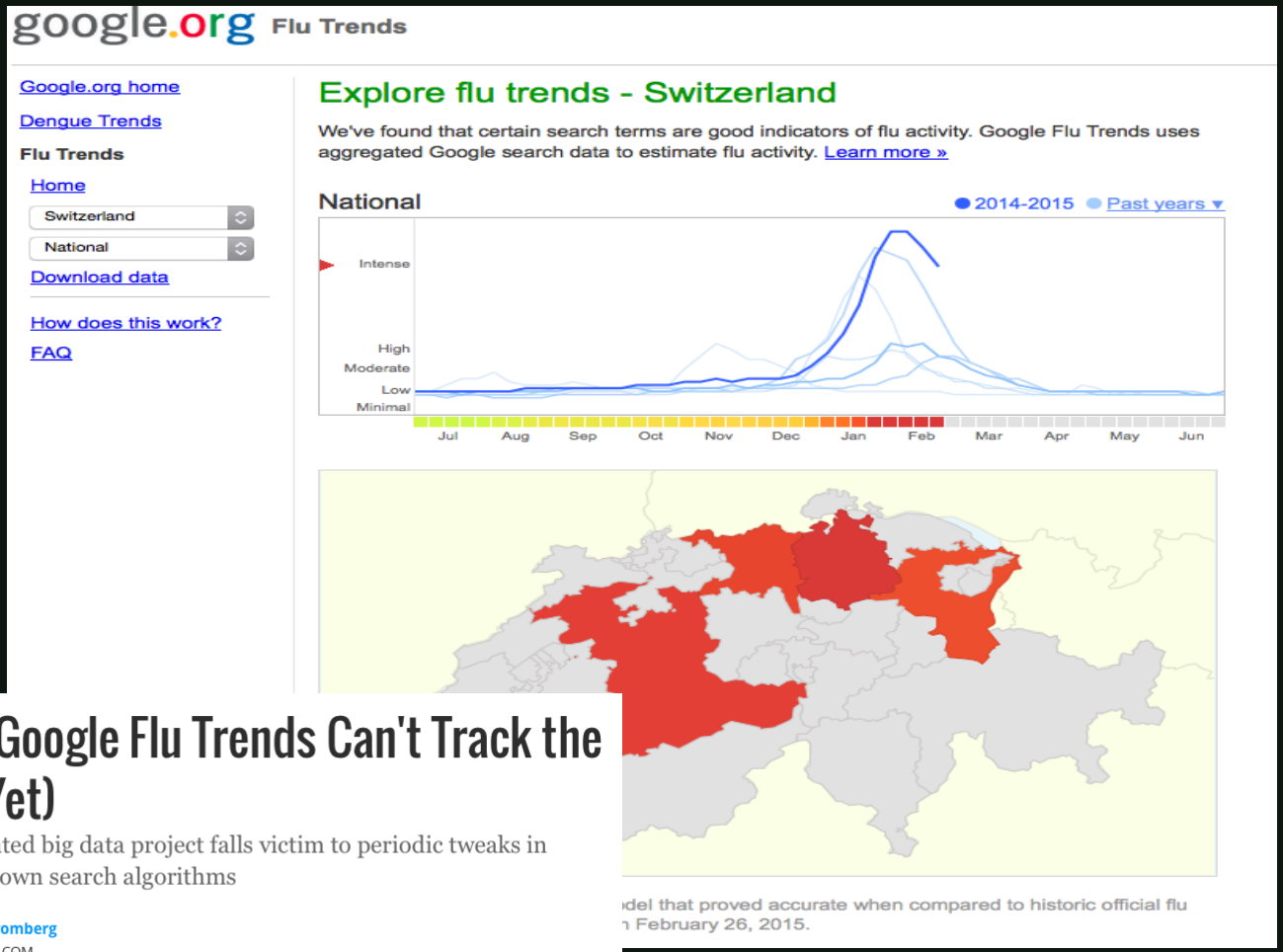
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OPPORTUNITY: USING POSTINGS ON SOCIAL NETWORKS AS INFORMATION SOURCE



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OPPORTUNITY: USING SEARCH ENGINE QUERIES AS INFORMATION SOURCE



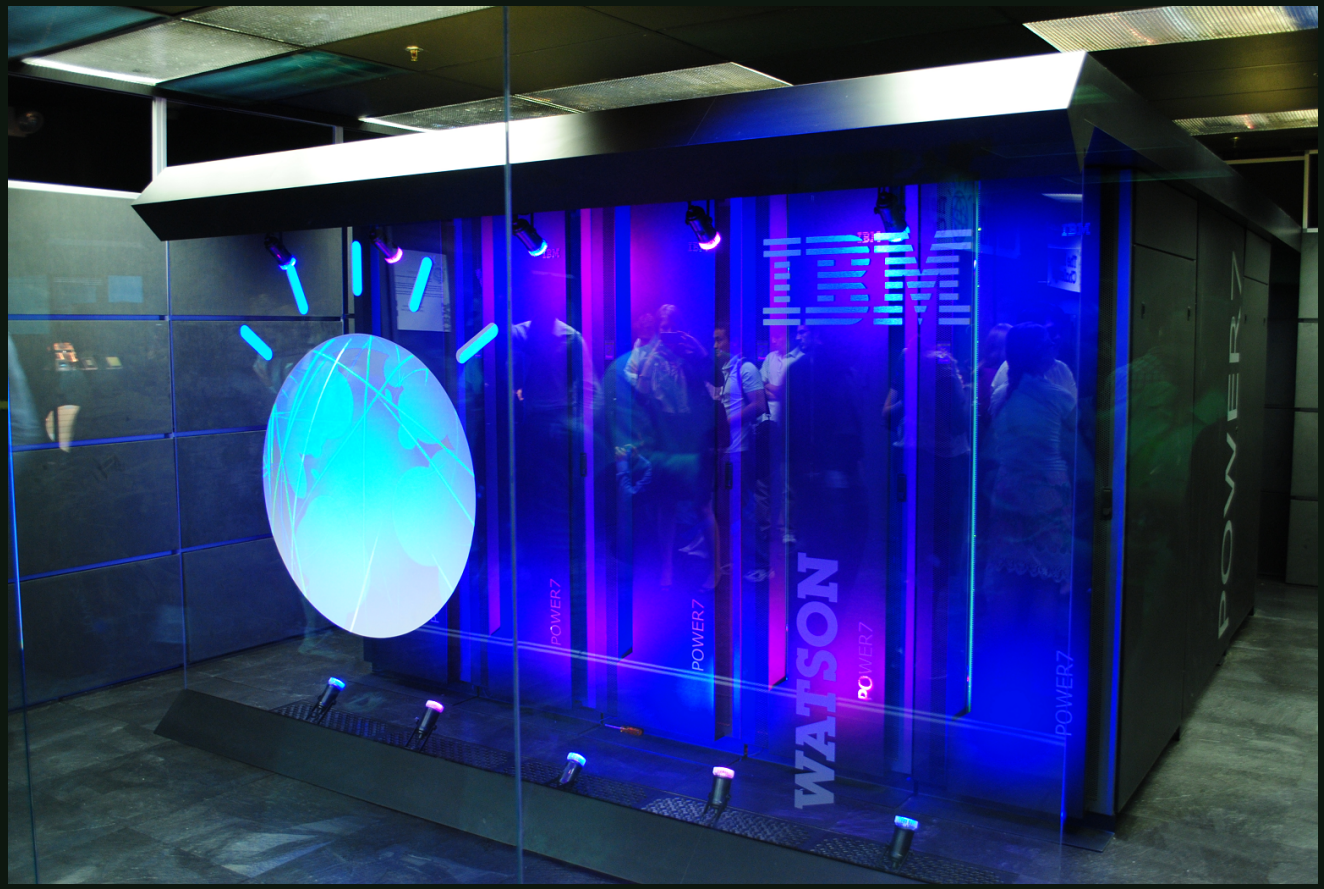
Why Google Flu Trends Can't Track the Flu (Yet)

The vaunted big data project falls victim to periodic tweaks in Google's own search algorithms

By Joseph Stromberg
SMITHSONIAN.COM
MARCH 13, 2014

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OPPORTUNITY: USING SUPERCOMPUTERS FOR ANALYZING BIG DATA



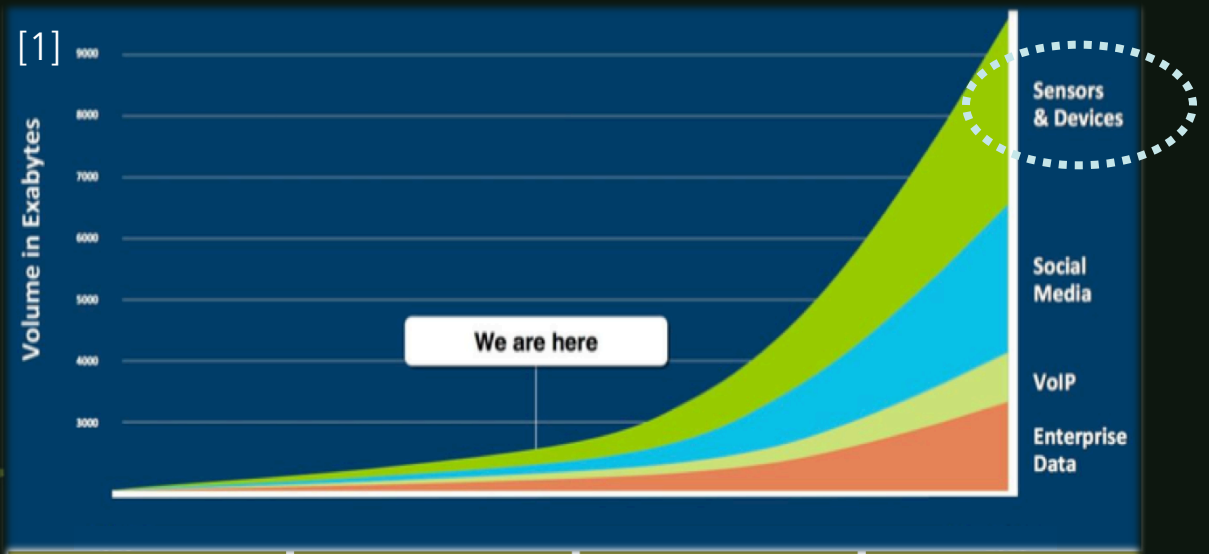
[1]

[1] IBM: http://www.ibm.com/smarterplanet/us/en/ibmwatson/

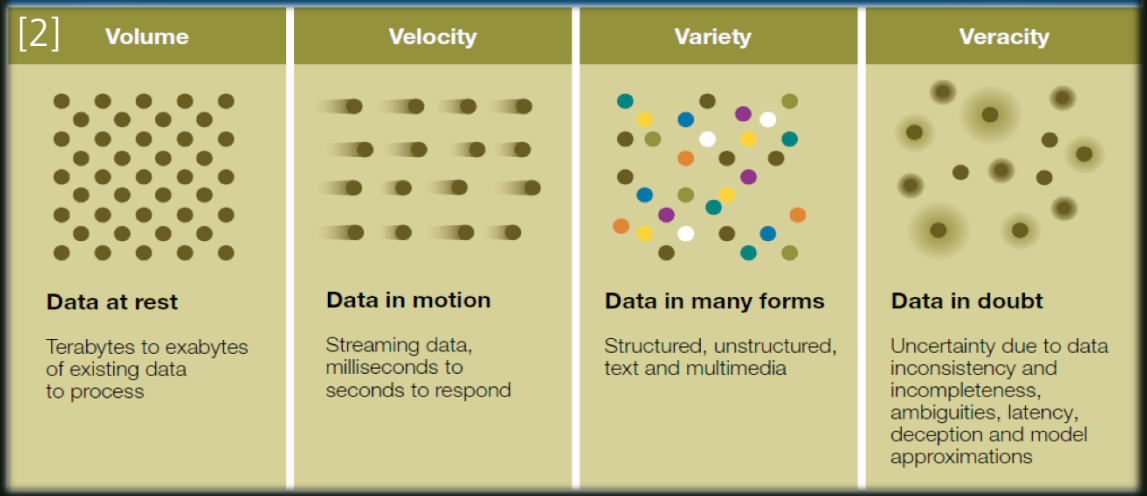
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RESEARCH CHALLENGE: MANAGING AND MAKING SENSE OF BIG DATA

[1]



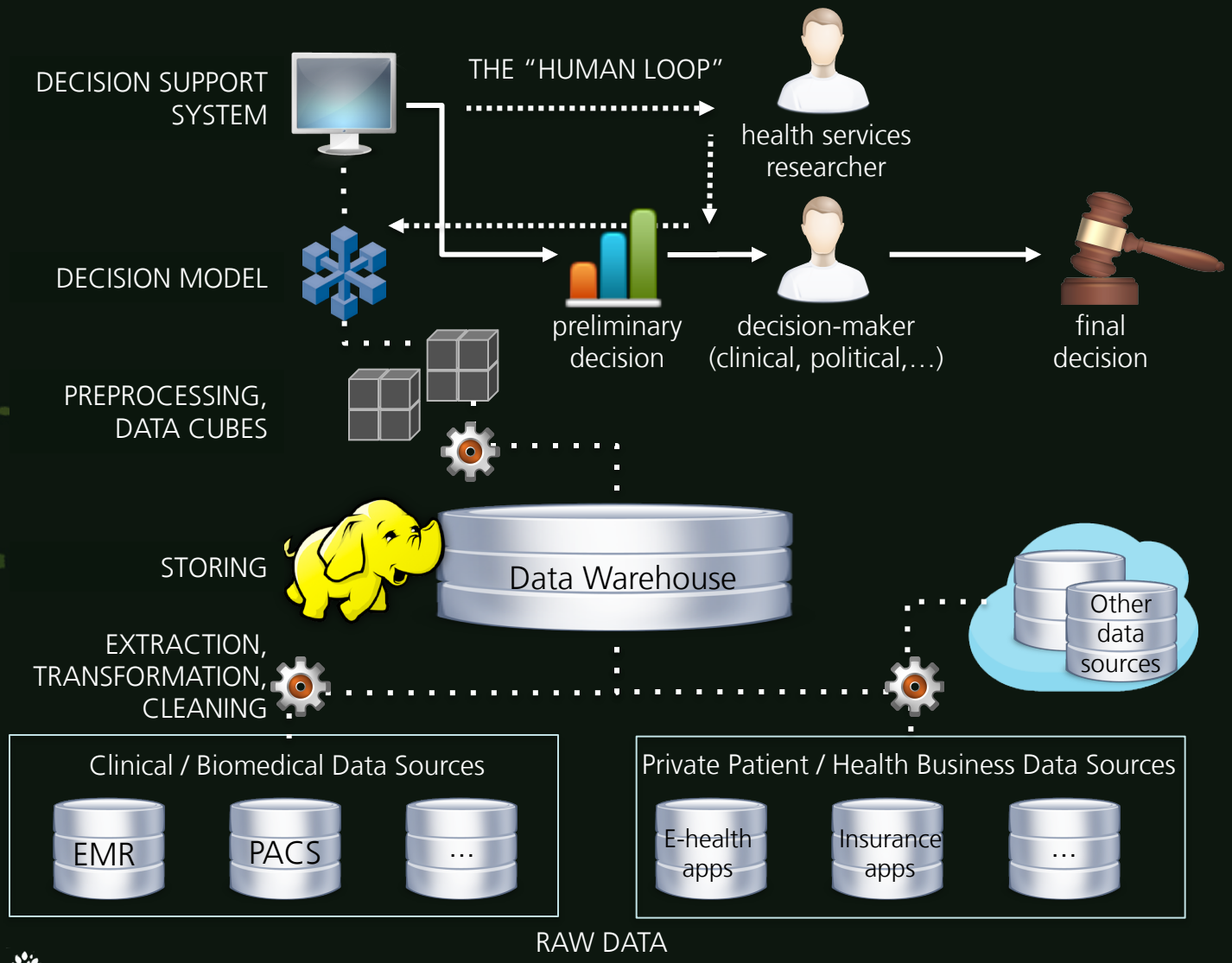
[2]



[1] Palfreyman J (2013) Big Data – Vexed by Veracity? http://insights-on-business.com/government/big-data- vexed-by-veracity/
[2] http://www.ibmbigdatahub.com/blog/how-big-data-and-cognitive-computing-are-transforming-insurance-part-2

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HEALTH SERVICES PLAY A PIVOTAL ROLE IN THE DESIGN OF HUMAN-IN-THE-LOOP DSS



Based on: Pinto R, Mettler T, Taisch M (2013) Managing Supplier Delivery Reliability Risk under Limited Information: Foundations for a Human-in-the-Loop DSS. Decision Support Systems, 54(2):1076-1084 and Mettler T, Vimarlund V (2009) Understanding business intelligence in the context of healthcare. Health Informatics Journal,15(3): 254-264

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RESEARCH CHALLENGE: THERE IS NOT ALWAYS RIGHT OR WRONG…HOW CAN YOU RESOLVE AMBIGUITY AND UNCERTAINTY?

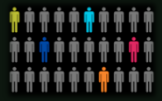


«Citizens contribute knowledge and perspectives that scientists and experts might miss» [1]

[1] Science, Technology and Science in Europe. http://volta.pacitaproject.eu/2-consensus-conferencing/

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3 CONFLICTS

HARNESSING NEW INFORMATION FOR BETTER RESEARCH AND PRACTICE



CLINICAL WORLD 2

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Based on: Mettler T, Raptis T (2012) What Constitutes the Field of Health Information Systems? Fostering a Systematic Framework and Research Agenda. Health Informatics Journal 18(2): 147-156

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RESEARCH CHALLENGE: CONFLICTING VALUES AND END-USER NEEDS

Hedonic value vs. utilitarian value

Monetary vs. non-monetary value



Individual vs. organi-zational vs. societal value

Informational vs. transactional vs. strategic value

Based on: Mettler T, Wortmann F, Fluechter K (2014) How do hedonic design features influence an application's usage. Proceedings of the 22nd European Conference on Information Systems, pp. 1-15, Yassaee M, Mettler T (2015) The Current State of and Possible Future Avenues for IT Value Research: A Review of the Past 10 Years. Proceedings of the 23nd European Conference on Information Systems, pp. 1-18 (forthcoming)

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MANY EXAMPLES EXIST SHOWING THAT UNBALANCED DESIGNS LEAD TO FAILURE…



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CONCLUDING REMARKS

- New, *information-intensive* health services require need to be designed carefully, having in mind the whole «*cycle*» of translational health informatics and possible value conflicts
- These new services need to focus on value creation for *all* participating stakeholders
- Interdisciplinary research is the key to improve the understanding of value conflicts of direct and indirect «users» of technologies and health services

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THANKS FOR YOUR ATTENTION!



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