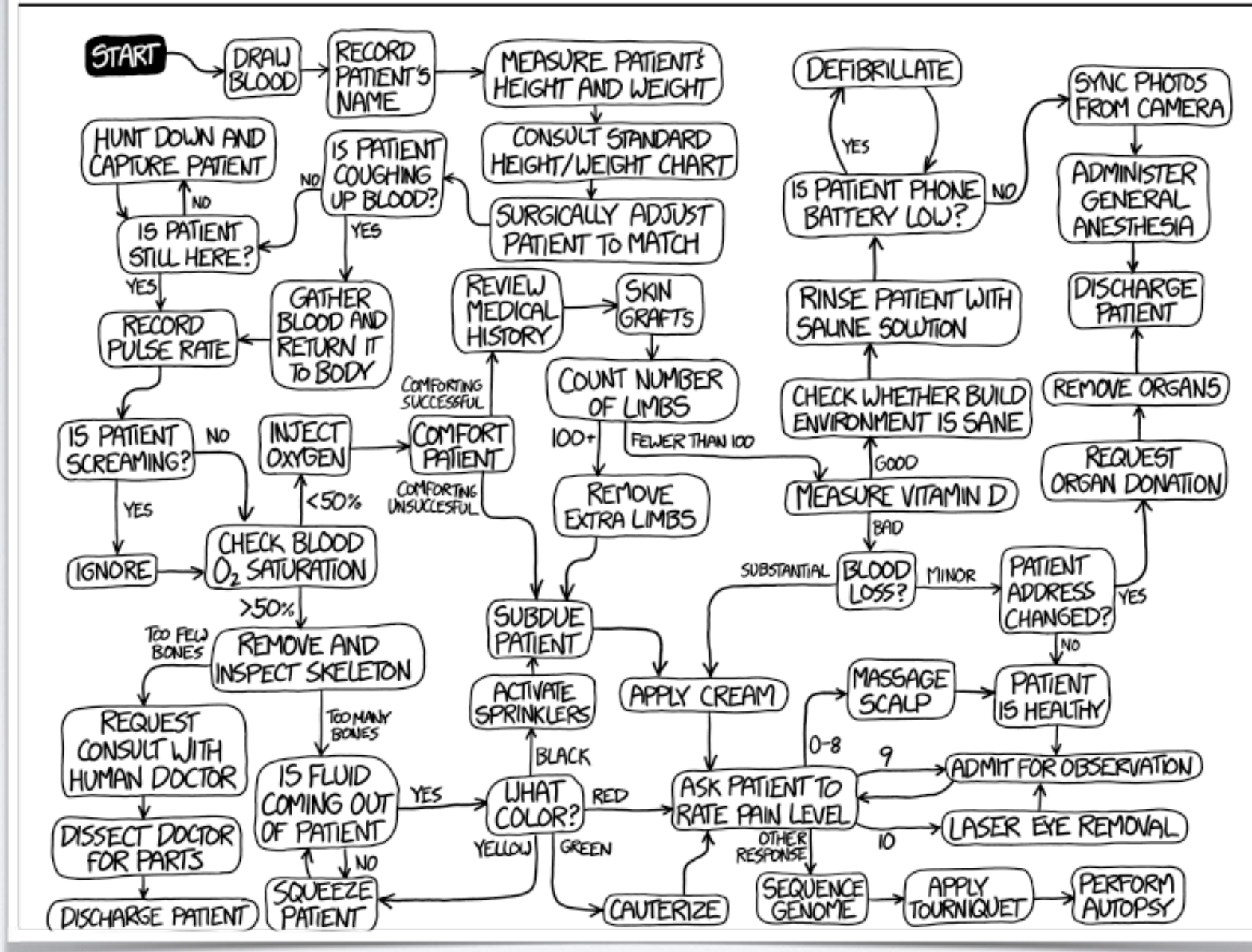


ALGORITHM USED BY IBM'S WATSON COMPUTER SYSTEM



A COMPUTER AT YOUR BED SIDE

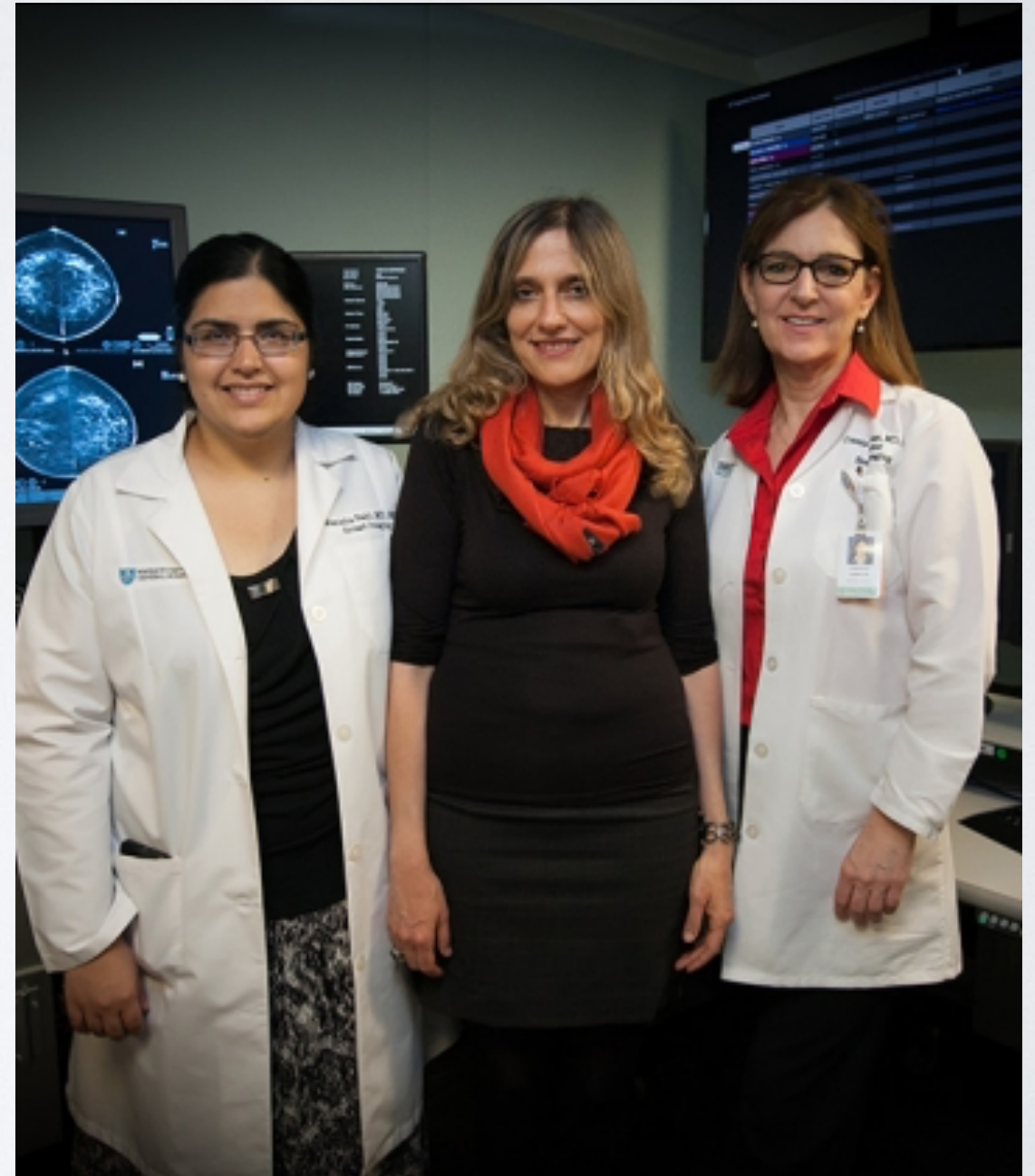
Leilani H Gilpin (MIT), Matias Aranguiz (SJTU)

GOALS

- Finish lecture on finance
- Medicine and AI
 - Image Processing
 - Future of Doctors
 - Fraud Detection
- Privacy of “bed side” devices

GOOD THINGS

- Image processing
- Early diagnostics
- Surgical robots
- Anomaly detection - sometimes



LIMITATIONS

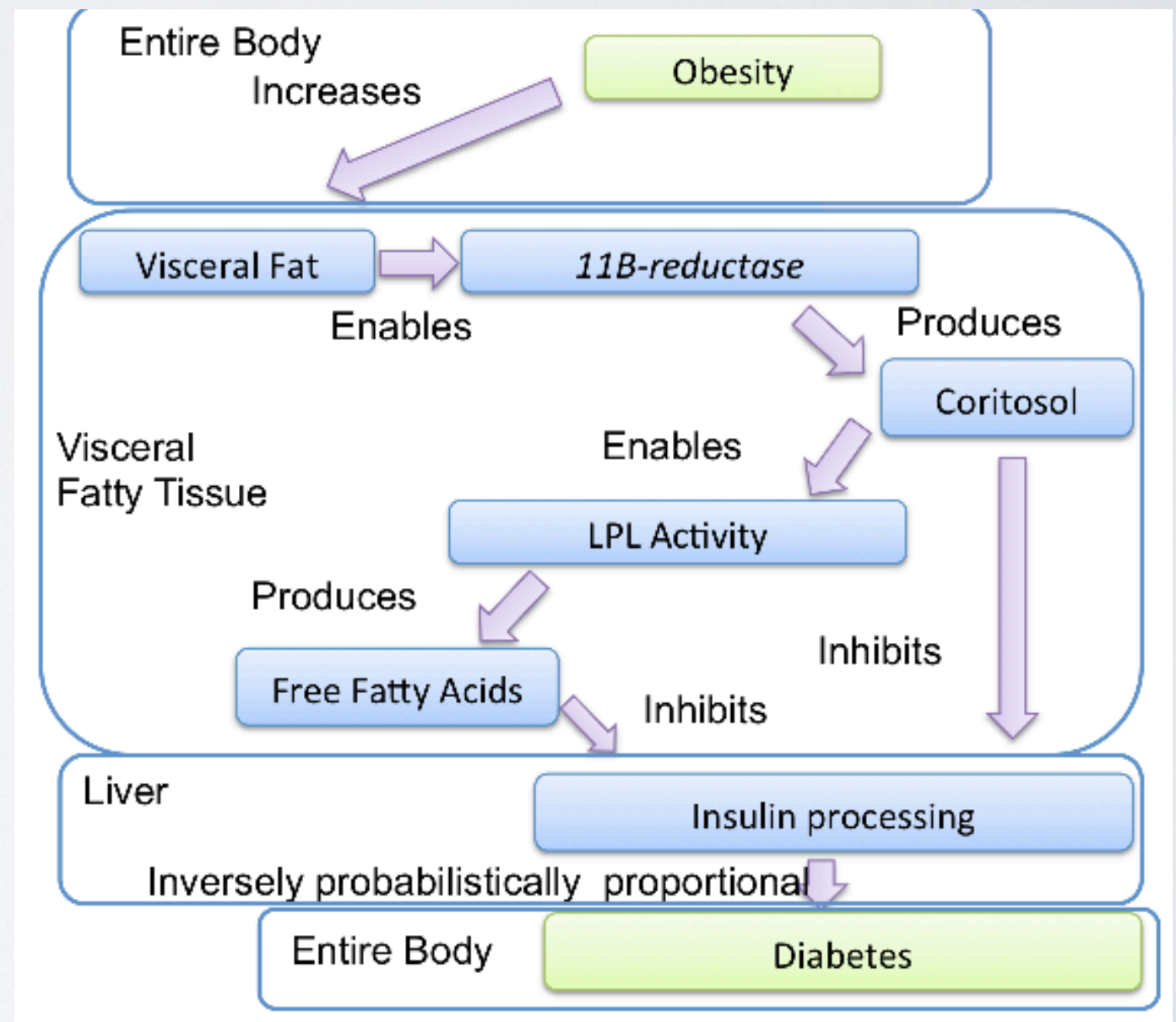
- Access to data - HIPAA
- Compliance

WHO WOULD YOU FEEL
MORE COMFORTABLE WITH?

Robot surgeon, or robot primary care doctor?

SOME PROBLEMS

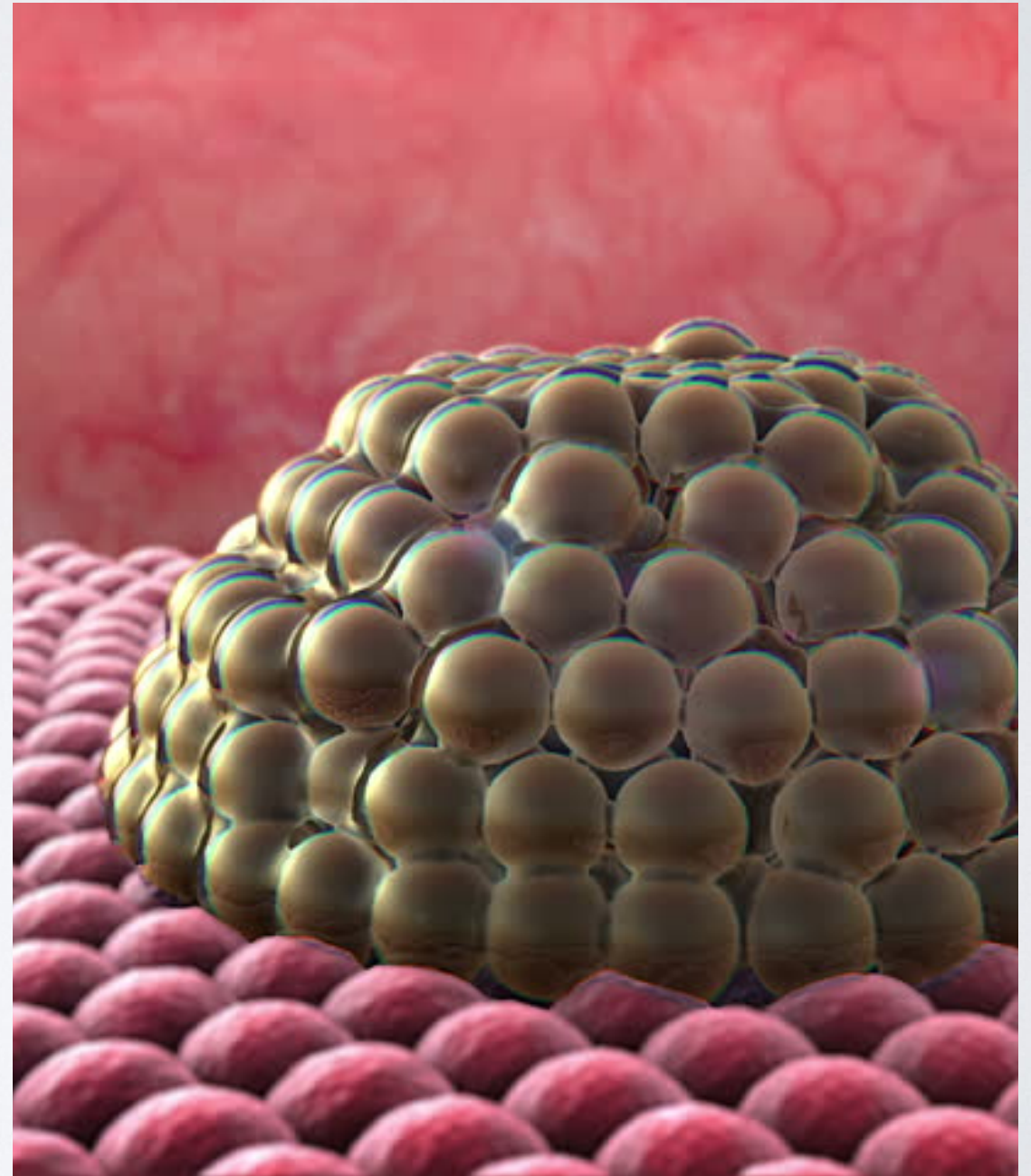
- Different human perceptions
- Self-diagnosis
- Data records
- Liability issues
- Co-morbidities



Source - Klenk et al *Challenges in Formulating Explanatory Models for Co-morbidities*

TOUGH PROBLEMS IN COMPUTATIONAL GEOMETRY

- Cancer doesn't grow "normally"
- Images and samples may be invasive to get
- Use AI and geometry to fill in the gaps

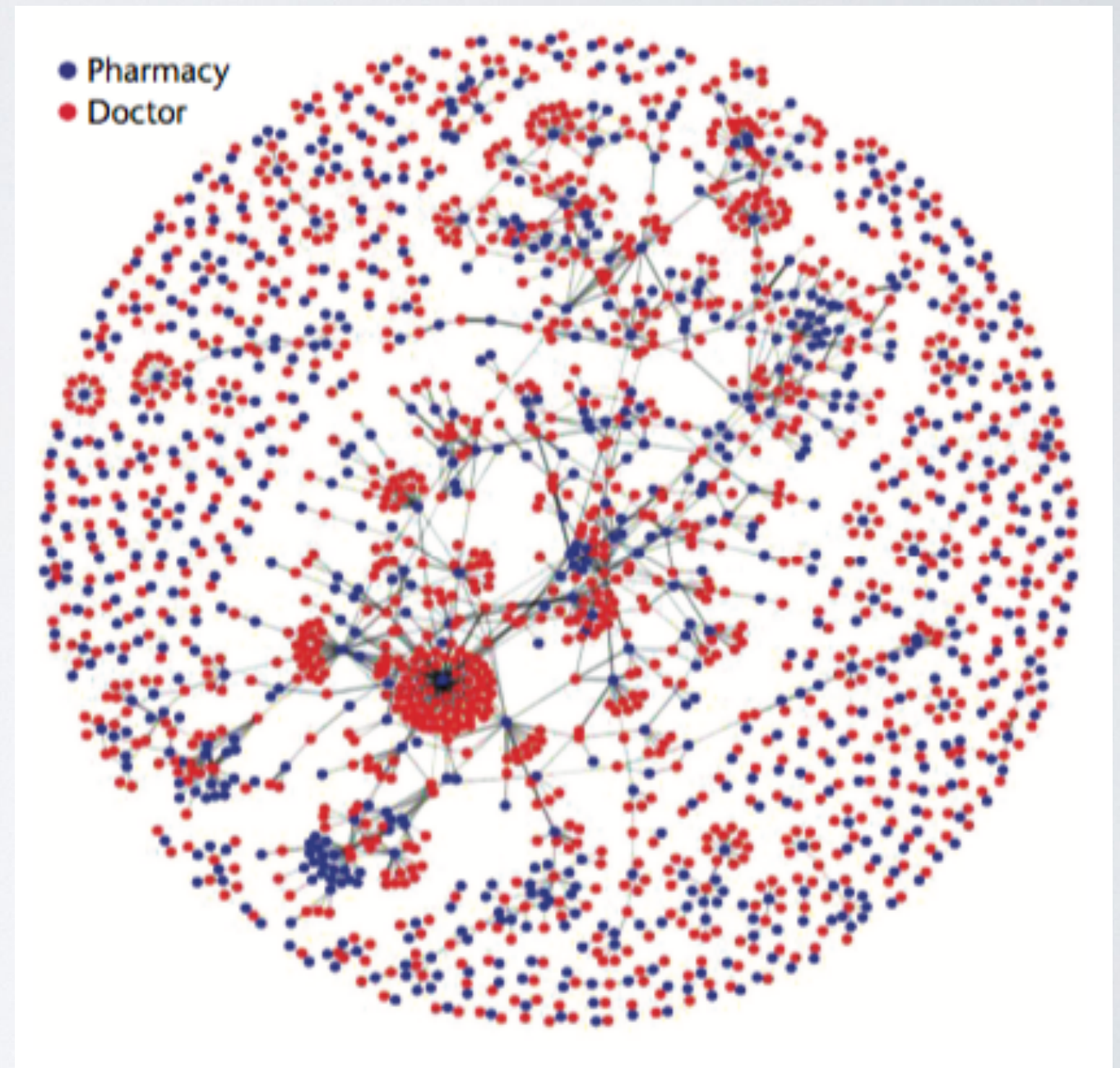


TOUGH PROBLEMS IN ANOMALY DETECTION

- Healthcare fraud - estimated \$80 billion a year
 - 2.5 billion typically received

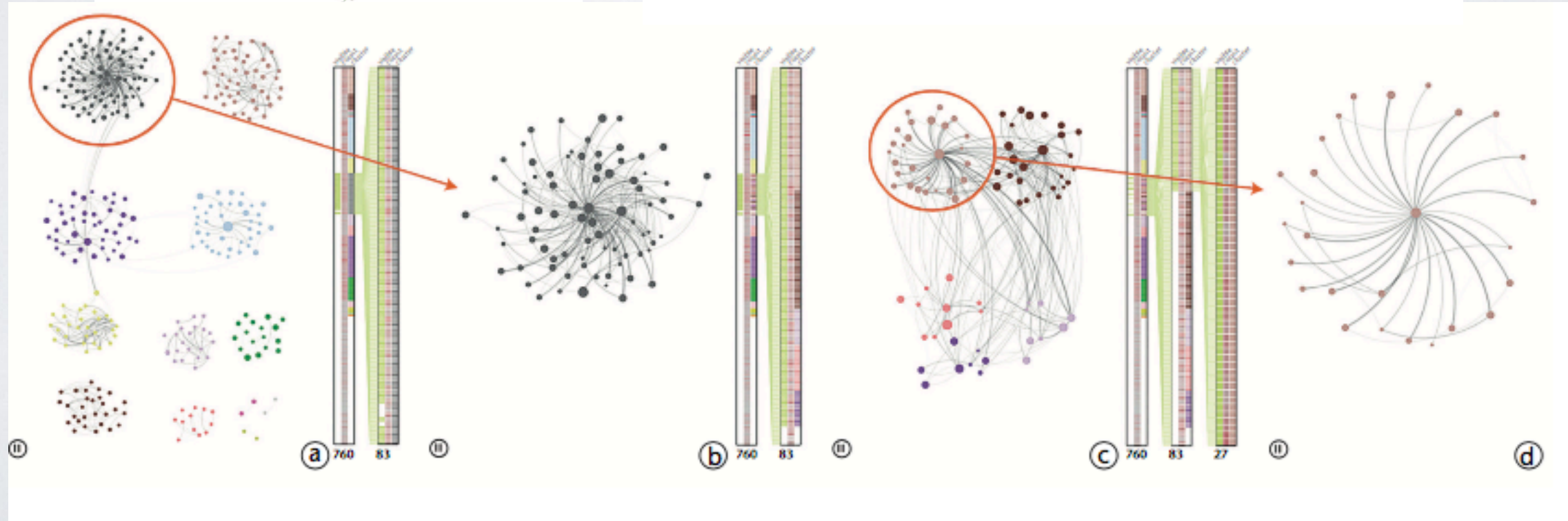
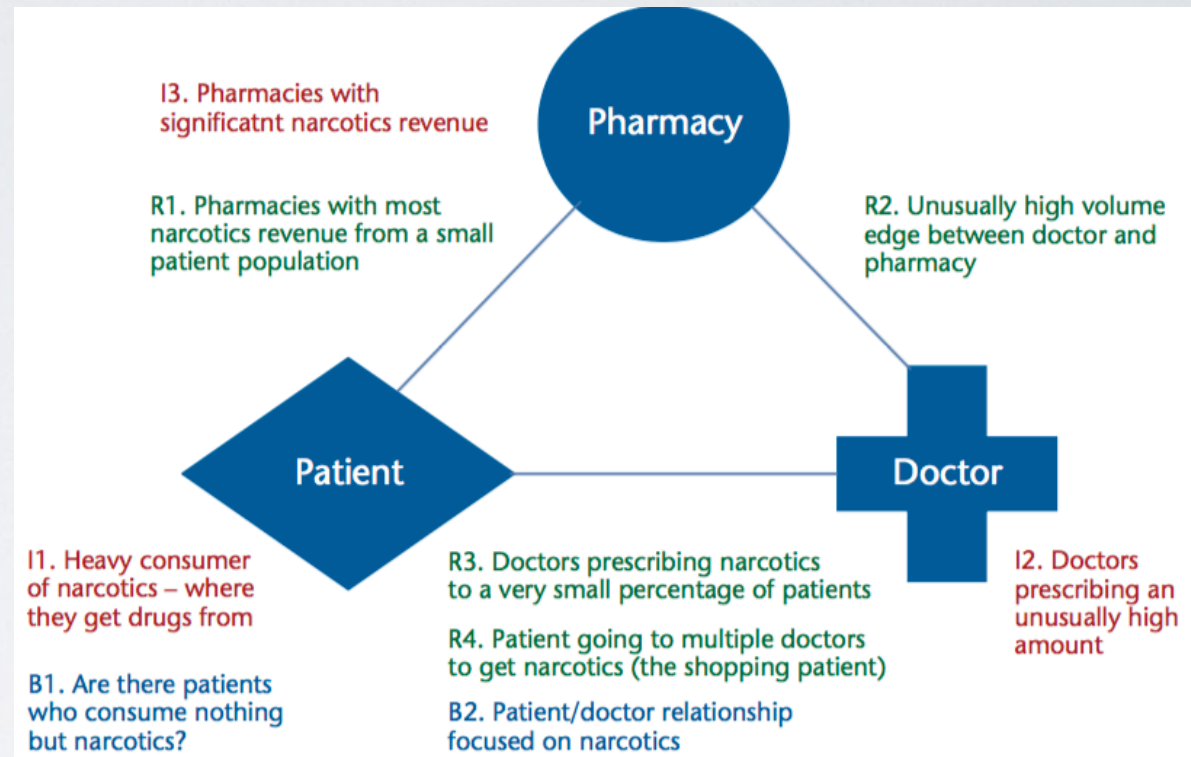
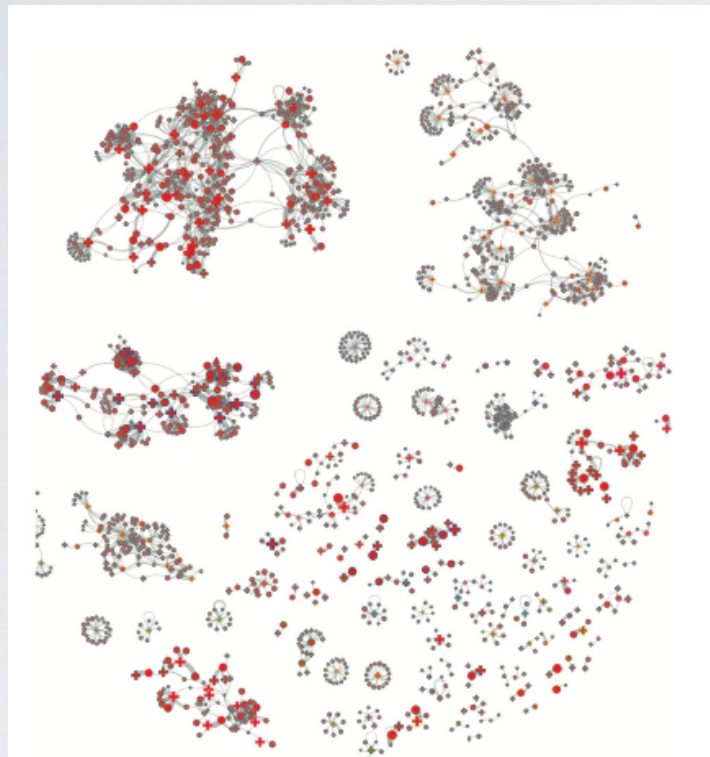
TYPES OF FRAUD

- Billing services not rendered - forcing signature
- Upcoming of services / items
- Duplicate claims
- Unbundling
- Excessive services
- Unnecessary services
- Kickbacks - rewards



Source - Liu, Bier et al *Graph Analysis for Detecting Fraud, Waste, and Abuse in Health-care Data*

WHAT DOES IT LOOK LIKE?



Source - Liu, Bier et al *Graph Analysis for Detecting Fraud, Waste, and Abuse in Health-care Data*

PROBLEMS

- Pre-pay analytics
- Different state laws

PRIVACY OF HOME DEVICES

WHAT ARE WE TALKING ABOUT?

- Alexa
- Amazon Echo
- Google assistant



AMAZON ECHO MURDER CASE

- “Wake word”
- “The heart of the First Amendment protection is the right to browse and purchase expensive materials anomalously, without fear of government discover.”
- Listen not recoding

FACTS

Police discovered a man named Victor Collins dead in the back yard.

Collins' body had been floating face up in a hot tub, and his left eye and lips were dark and swollen, police records stated.

Bates, who had been the one to call 911 that morning, had told police that he and a few work buddies, including Collins, had stayed up the night before watching football and drinking. Bates agreed to let two of them crash at his house, he told police, then went to bed. Shortly after he awoke, Bates said he spotted Collins' lifeless body in the spa.

Upon further investigation, however, police began suspecting foul play: Broken knobs and bottles, as well as blood spots around the tub, suggested that there had been a struggle. A few days later, the Arkansas chief medical examiner ruled Collins' death a homicide — and police obtained a search warrant for Bates' home.

QUESTIONS

- Is it a problem of privacy of the user or liability of the company?
- Should assistants record? Have a “black box”
- Should they call the police in case of a crime?
- Should they testify?

GOODBYES

WE HAD FUN

- Hoping to teach this course (or a similar one again)
- Aggregating and organizing material
- Please provide suggestions

WHAT TO DO NEXT?



**AAAI / ACM conference on
ARTIFICIAL INTELLIGENCE,
ETHICS, AND SOCIETY**