

健康界
CN-HEALTHCARE



医享库

关于 医疗大数据 与 精准医学

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2017.6

BIG DATA

Big Data is data that is too large, complex and dynamic for any conventional data tools to capture, store, manage and analyze.

The right use of Big Data allows analysts to spot trends and gives niche insights that help create value and innovation much faster than conventional methods.

The "three Vs", i.e the Volume, Variety and Velocity of the data coming in is what creates the challenge.

VOLUME



Amount of Big Data stored across the world (in petabytes)

VARIETY



PEOPLE TO PEOPLE

NETIZENS, VIRTUAL COMMUNITIES, SOCIAL NETWORKS, WEB LOGS...



PEOPLE TO MACHINE

ARCHIVES, MEDICAL DEVICES, DIGITAL TV, E-COMMERCE, SMART CARDS, BANK CARDS, COMPUTERS, MOBILES...



MACHINE TO MACHINE

SENSORS, GPS DEVICES, BAR CODE SCANNERS, SURVEILLANCE CAMERAS, SCIENTIFIC RESEARCH...



VELOCITY

2.9 MILLION EMAILS SENT EVERY SECOND



You Tube

20 HOURS OF VIDEO UPLOADED EVERY MIN



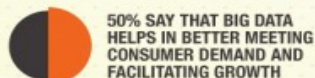
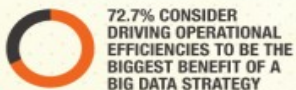
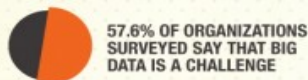
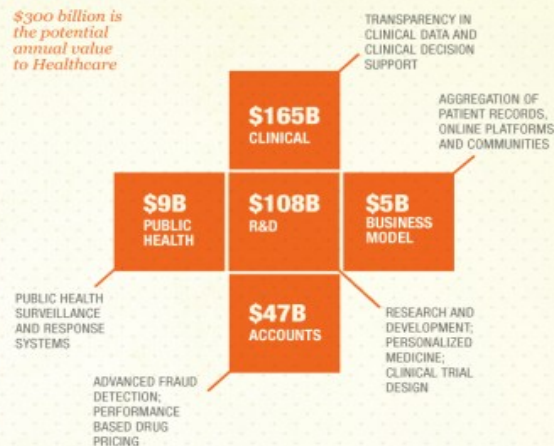
50 MILLION TWEETS PER DAY

VALUE



CASE STUDY - Healthcare

\$300 billion is the potential annual value to Healthcare



40% PROJECTED GROWTH IN GLOBAL DATA CREATED PER YEAR



5% PROJECTED GROWTH IN GLOBAL IT SPENDING PER YEAR

The estimated size of the digital universe in 2011 was 1.8 zettabytes. It is predicted that between 2009 and 2020, this will grow 44 fold to 35 zettabytes per year. A well defined data management strategy is essential to successfully utilize Big Data.


Sources - 1) Mapping the Rewards of Big Data - Wipro Report 2) Big Data: The Next Frontier for Innovation, Competition and Productivity - McKinsey Global Institute Report 3) SmartScore, Strategic Group 4) Measuring the Business Impact of Effective Data - study by University of Texas, Austin 5) IIS Department of Labour.


DO BUSINESS BETTER


NYSE:WIP | OVER 130,000 EMPLOYEES | 54 COUNTRIES | CONSULTING | SYSTEM INTEGRATION | OUTSOURCING





系统分类


 循环系统


 呼吸系统


 泌尿生殖

 神经系统

 消化系统

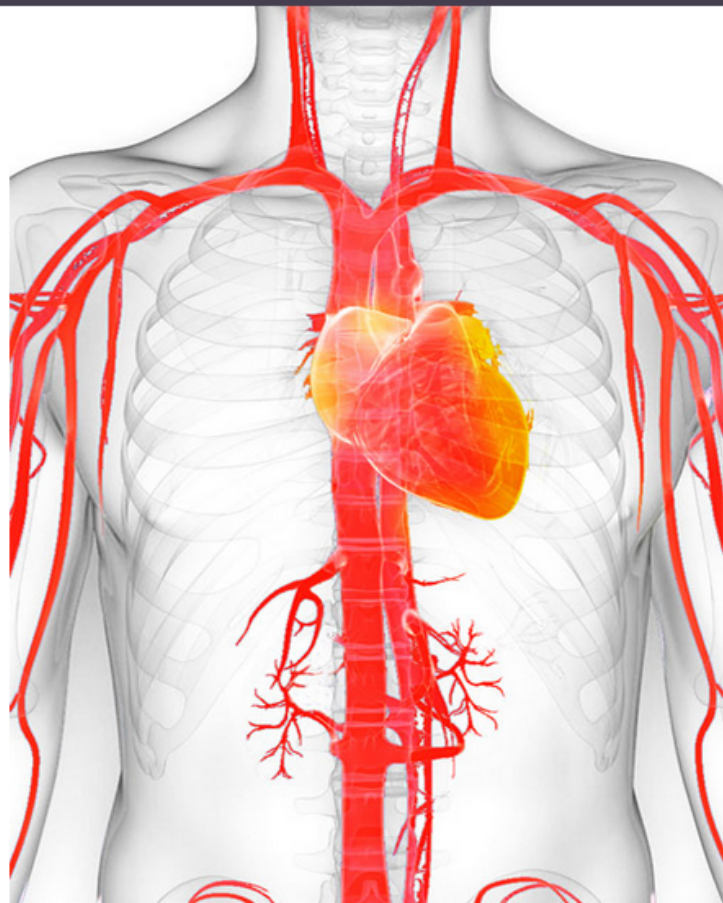
 体表肌肉

 分泌代谢

 免疫系统


 其他系统


图片示意





风险评估


低风险


大肠癌 


静脉血栓 


癫痫病 


丛集性头痛 


血脂过高症 


慢性阻塞性 


枫糖尿症 

爱迪生氏病 

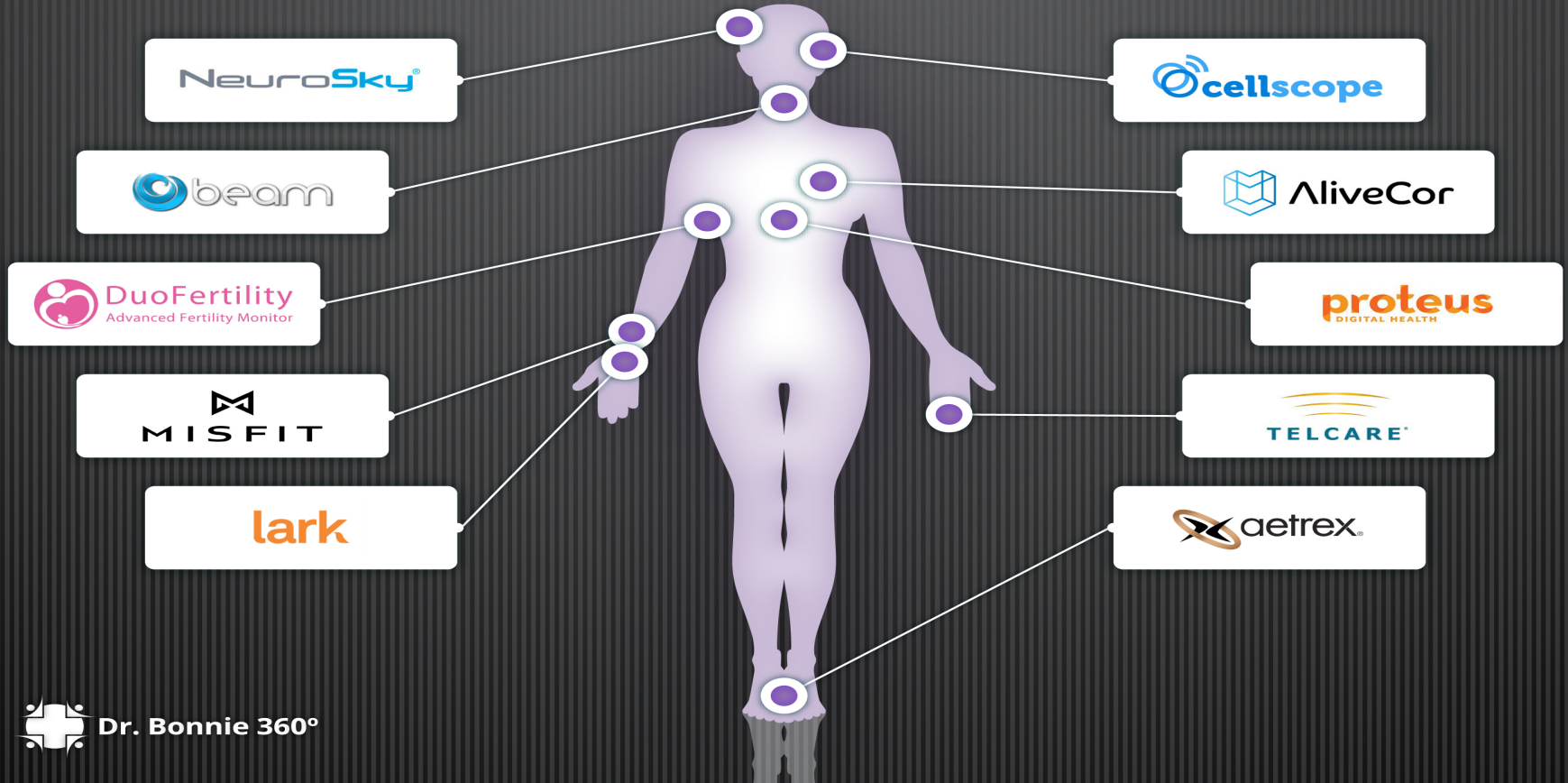
耳垢 

甲状腺癌 

弥漫性甲状 

高胱氨酸尿 

Sensors Give Us Personal Feedback



Quantified Self

Jan Feb. Mar Apr May Jun Jul Aug Sept Oct Nov Dec



280

56512

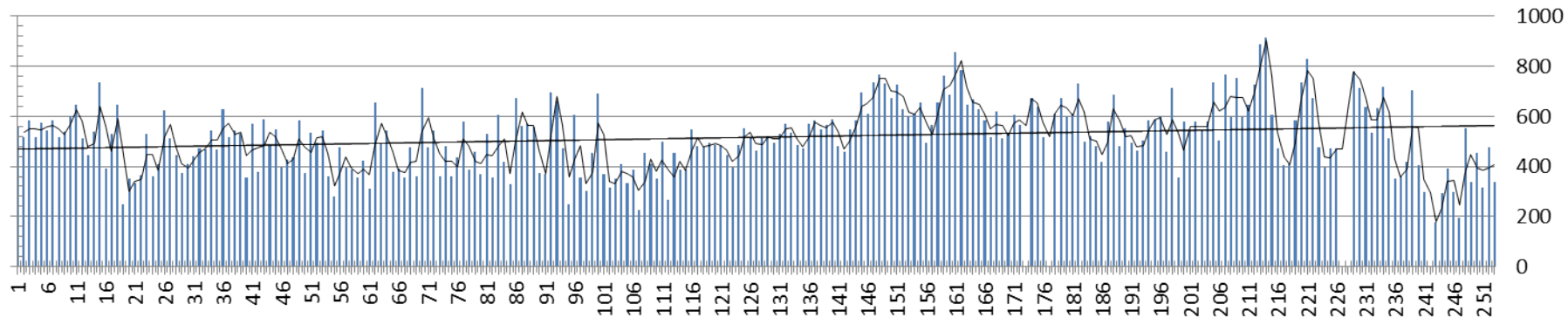
15632



20
15
10
5
0



十年的自我记录者



10年尿酸值波动图
The Change of UA in ten years

ENERGY MEDICINE

THE ESSENTIAL TECHNIQUES

A Companion to the Book *Energy Medicine* or an Independent Program to Optimize Your Health



A 3-DVD Program

DONNA EDEN

GDO Energy Field

Энергетическое поле

Энергетическая палитра

Шаги

Сравнить всех испытуемых

Страница Действие Программа

большой палец правой руки

Церебральная зона (кора)

Правый глаз

Левый глаз

Правое ухо, Нос, Гайморова пазуха

Левое ухо, Нос, Гайморова пазуха

Челюсти, Зубы правой стороны

Челюсти, Зубы левой стороны

Горло, Глотка, Трахея, Щитовидная железа

Площадь=15400
Симметрия=92%

Площадь=22997
Симметрия=97%

Вращение: 0°

Пациент, 13.10.2006 Спб (без фильтра)

Пациент, 13.10.2006 Спб (с фильтром)

Перейти к списку испытуемых

Сохранить изображение...

Печать...

<< Назад

Далее >>

Anxiety



Love



Depression



Contempt



Pride

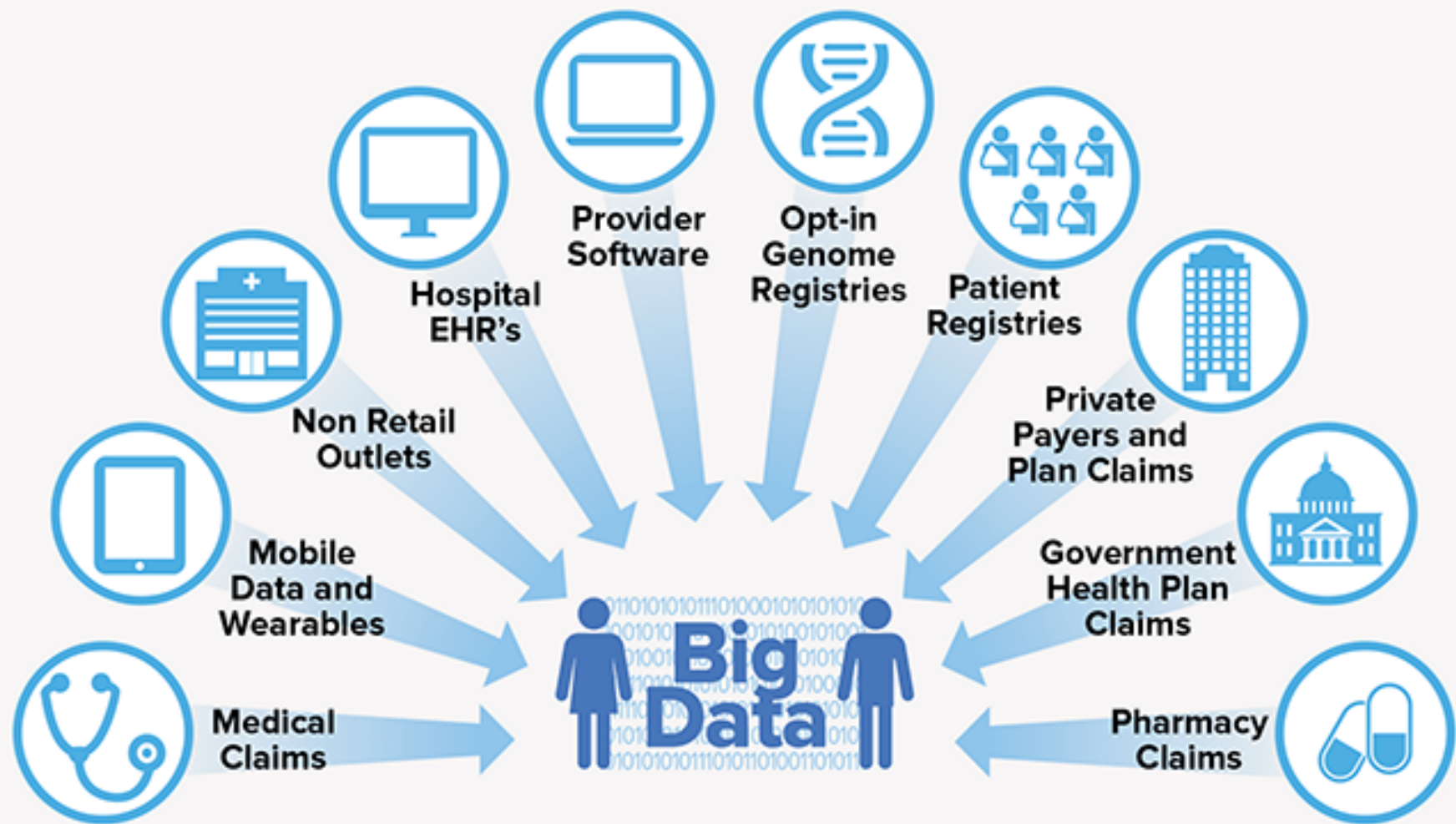


Shame



Envy

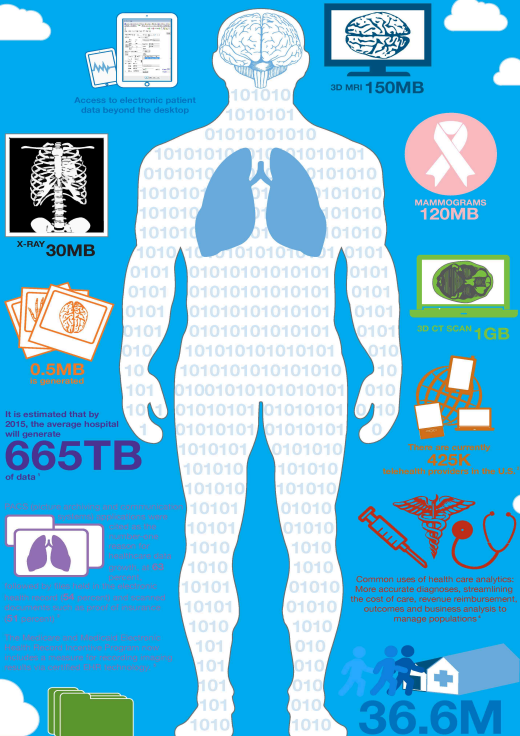




The Power of Healthcare Data

The Body as a Source of Big Data

Today data storage is essential for healthcare providers to see a patient's complete story of care, make the most informed decisions and enhance treatment and outcomes.



by 2016, 4.9 billion patients worldwide will use remote health monitoring devices

data at the heart of healthcare

Hosting, transfer, storage, security: data is and always will be a key subject in healthcare. Whether it be control care facilities, for clinical trials, to improve patient compliance or to enhance the reimbursement process for medical services, data is at the heart of our healthcare systems.

Processing this data efficiently was impossible a few years ago as the computing power needed was huge. Possible today, it opens up new prospects. By processing and cross-referencing this data, new statistics can be created to identify certain phenomena and even predict them. That is called -Big Data-



by 2016, 4.9 billion patients worldwide will use remote health monitoring devices

x50 by 2020

by 2015, the average hospital will generate **665 Terabytes** of data

\$300 to 450 billion could be saved by the US healthcare system

90% it is Watson's successful diagnosis rate for lung cancer, compared to 50% for human doctors.

Big Data + health = new perspectives

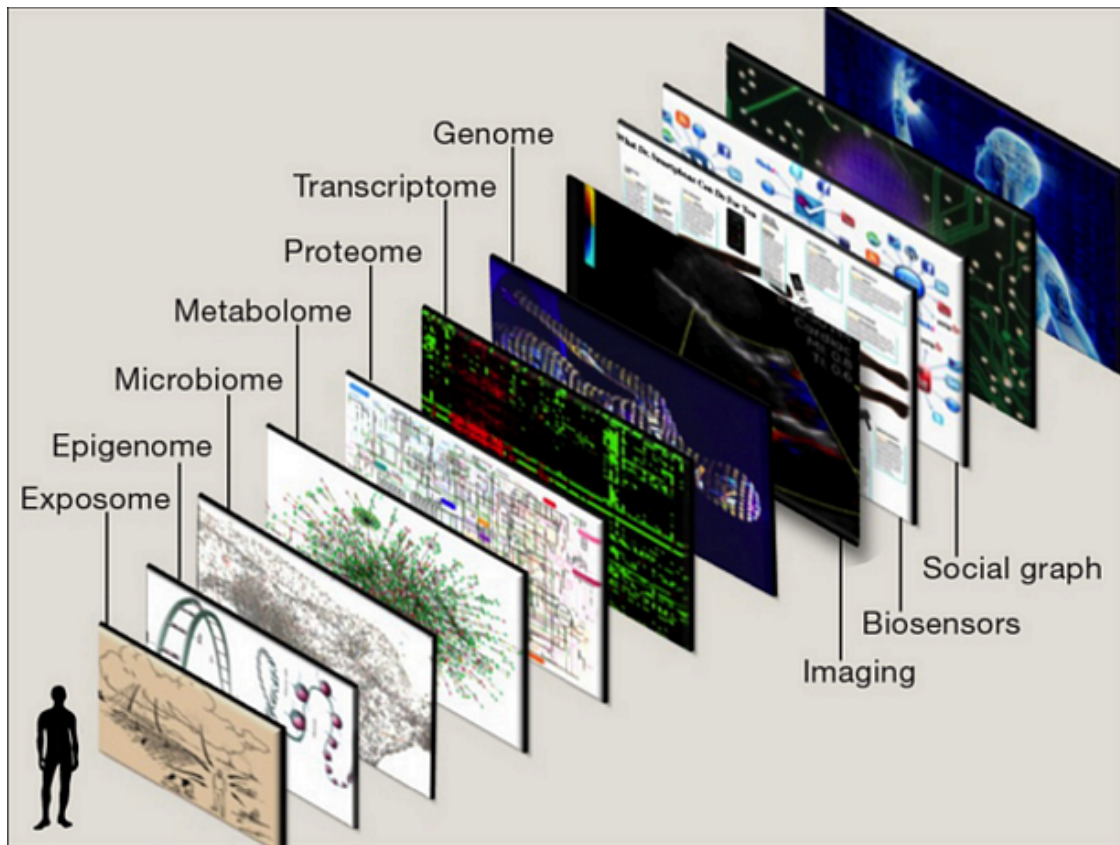
20% decrease in patient mortality by analyzing streaming patient data



sources: IDC Health Insights, Netapp, Berg Insights 2012, IBM, McKinsey&Company, Apple Computer, New York Times, Amazon.com, Puma board.com, The Official Website of the Empire State Building



西医视角的 **人体系统 GIS** (Geographic Information System) : 多维度的信息嵌合体，定义数字化的个体医学本质



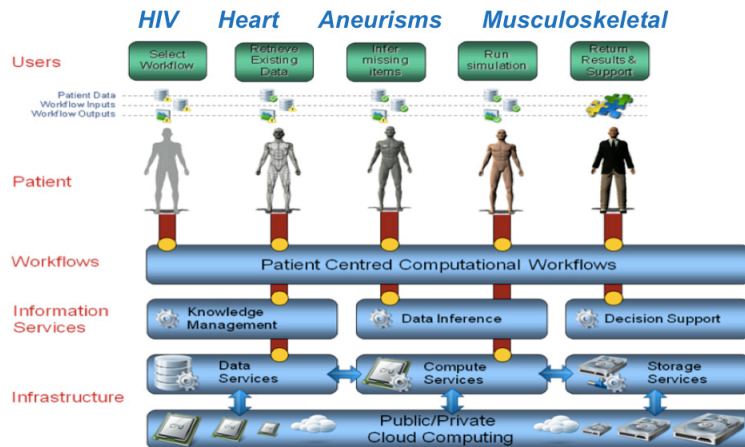
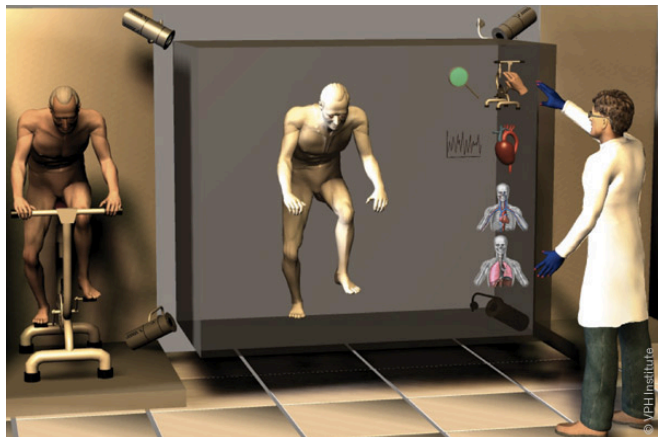
- 表型组
- 生理组
- 解剖组
- 基因组
- 转录组
- 蛋白质组
- 代谢物组
- 微生物组
- 表观基因组
- 环境组

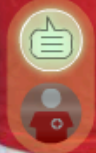
个人生命云 – PLC 的背后：BIM + AI

人体信息模型 **BIM** – **B**ody **I**nformation **M**odeling

欧盟：虚拟生理人 **VPH** – **V**irtual **P**hysiological **H**uman

中国：全息数字人 **HDH** – **H**olo **D**igital **H**uman





A

B

Non rebreathing masker

Toepassen kost jou 00:00



C

D

E

看病：个人生命云 与 机构医疗云 的一次对话



Deep patient

- 利用深度学习辅助疾病诊断和疾病发展预测，指导个性化用药和健康管理

SCIENTIFIC REPORTS

OPEN

Deep Patient: An Unsupervised Representation to Predict the Future of Patients from the Electronic Health Records

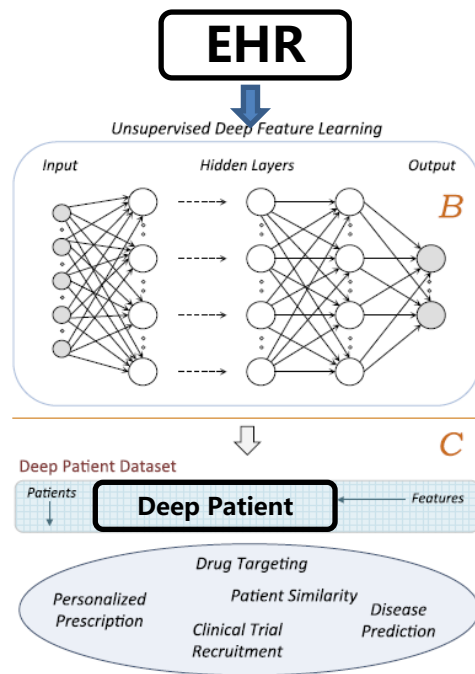
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Accepted: 27 April 2016

Published: 17 May 2016

Riccardo Miotto^{1,2,3}, Li Li^{1,2,3}, Brian A. Kidd^{1,2,3}, Joel T. Dudley^{1,2,3}

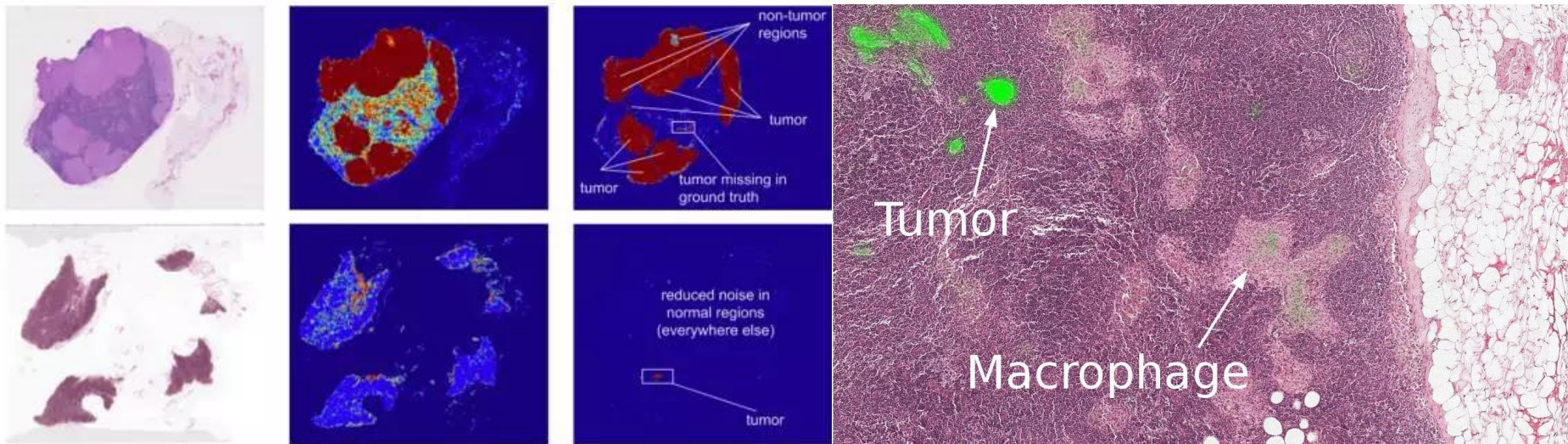
从包含120万个患者的EHR中，把每个患者的症状、主诉、实验室检查、ICD编码（78种疾病）从个变量的高维稀疏4.1万向量抽象为500个稠密的特征向量



谷歌AI进军医疗，在乳腺癌病理识别准确率上超过医生

- 病理学家花了整整30个小时，仔细分析了130张切片，准确率为**73.3%**，
- 谷歌AI交出的答卷是**88.5%**

【1】 Detecting Cancer Metastases on Gigapixel Pathology Images. arXiv:1703.02442v1 [cs]



Beta Doctor 的打造

能读电子病历中的非结构化文本

患者2月余前“右腹胀痛伴乏力纳差1月余”，查肝功能：总胆汁酸

14.7umol/L，谷草64U/L，乳酸脱氢酶287U/L，γ-GT194U/L，前白蛋白114mg/L。查AFP > 1210ng/ml，

CA125 41.85U/ml，铁蛋白715.1ng/ml。查乙肝表面抗原：阳性。

肝脏B超示：肝肿大、肝内多发占位、门静脉癌栓；肝内弥漫性病变（肝硬化回声像）；脾肿大、脾静脉增宽；肝周少量积液。腹部CT示：右肝癌伴肝内自身转移，门脉右支癌栓考虑，右肝周少量积液；胆囊显示不清，请结合临床及B超；前列腺斑点钙化；盆腔少量积液。

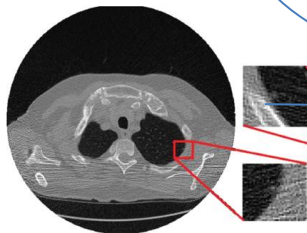
MR示：肝脏多发原发性肝癌，门脉主干和右支癌栓，少量腹水。2月前患者为求进一步治疗至我院就诊，查乙肝表面抗原阳性，甲胎蛋白 16549.9ng/mL，

白蛋白 34.9g/L，凝血酶原时间 14.3秒，谷丙转氨酶 224U/L，谷草转氨酶 301U/L，肝胆脾胰（彩超）：慢性肝病图像肝内多发占位，Ca伴子灶、门脉主干及右支癌栓考虑，建议进一步检查。

1天前至我院门诊随访，查肝胆MR示：肝癌TACE术后，肿瘤活性存在，多发子灶形成，门静脉右支癌栓形成。左肝近膈顶结节，考虑血管瘤可能。肝硬化、脾大。

脾大。

能看肉眼观察不到的医学影像



能融合专家知识的自我学习



AI混合模型

体征

右腹胀痛
乏力
纳差

实验室检查

血清Tbil
胆红素
乙肝表面抗原
...

影像学检查

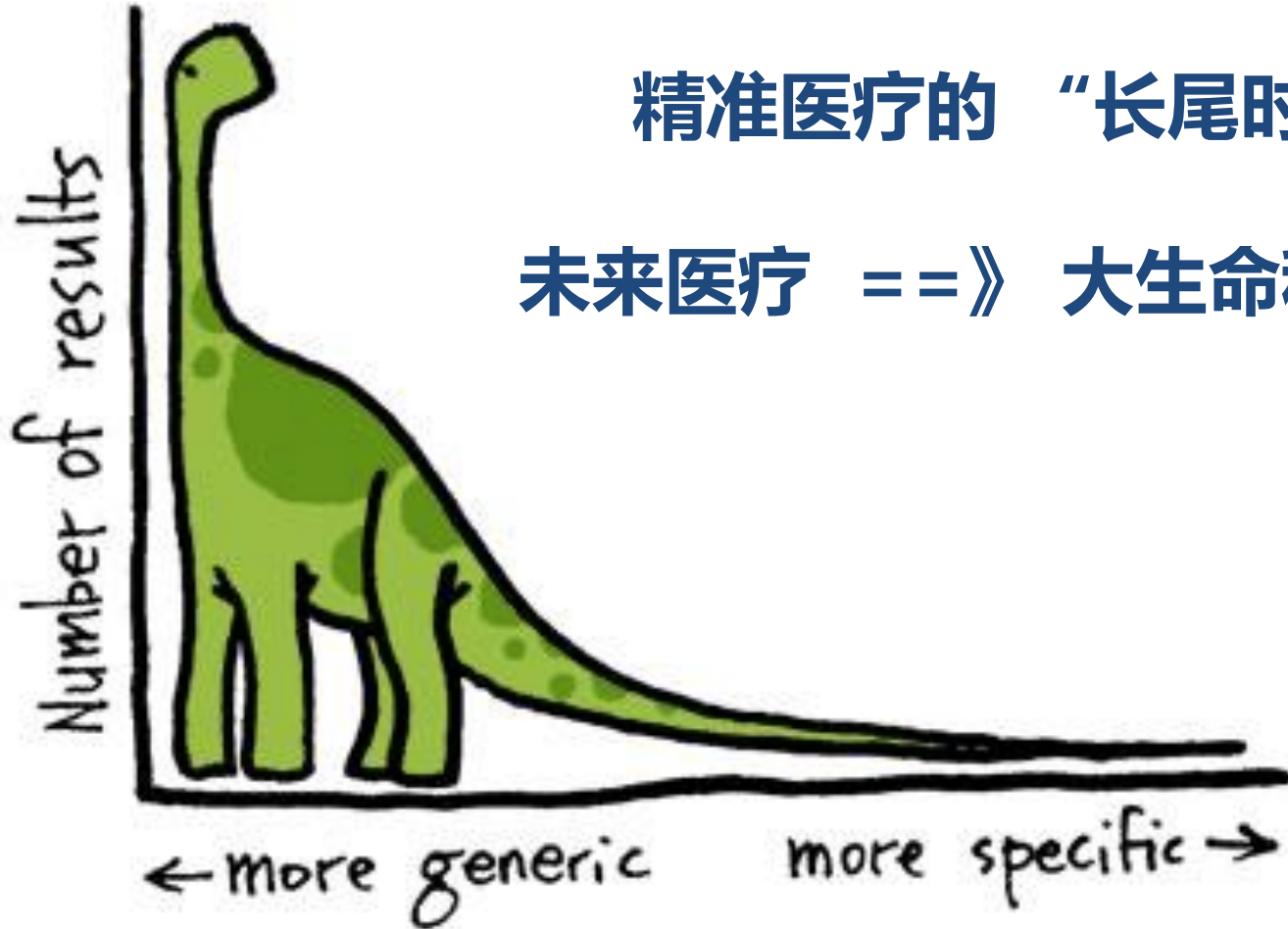
B超:肿大...
CT:肿大...
MR:腹水...
彩超:肝内多发占位...

辅助诊断

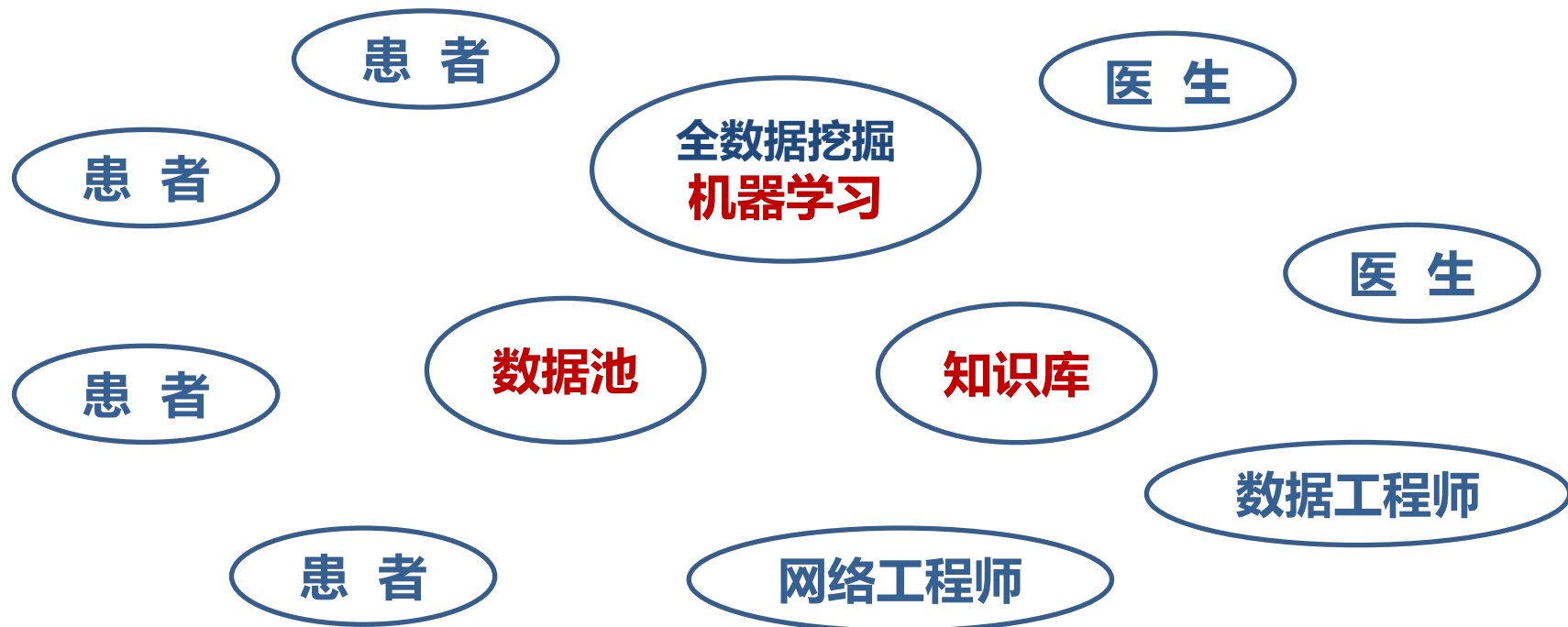
Dubin-Johnson综合
症

精准医疗的“长尾时代”

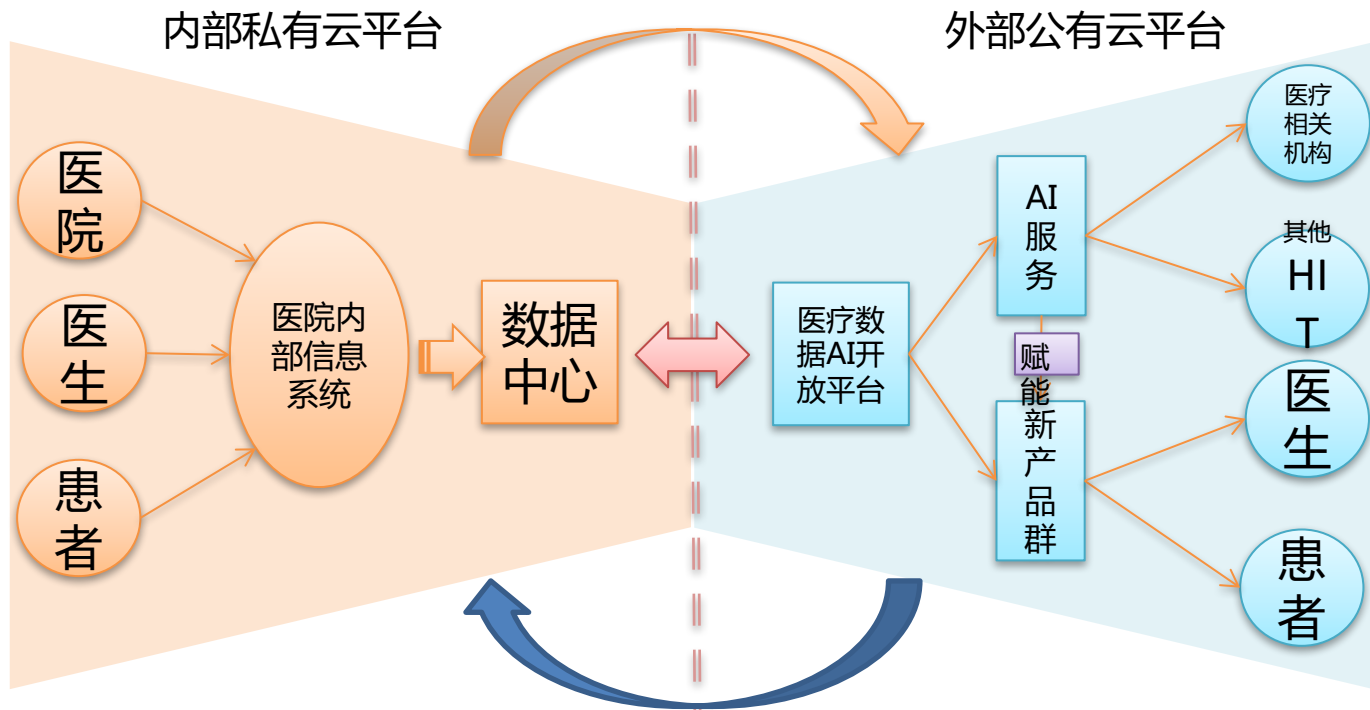
未来医疗 ==》 大生命科学时代



学习型 医疗信息系统 - 2016 打基础年



面对大数据 AI 时代，医院IT基础架构面临重大转型

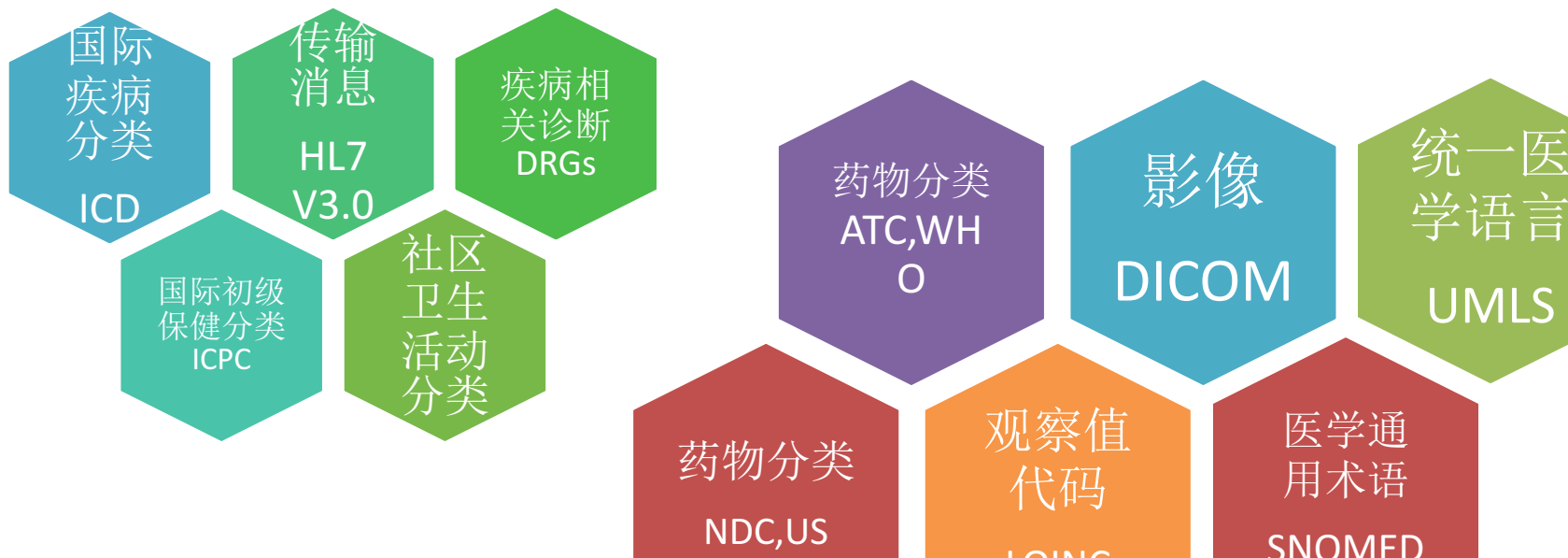


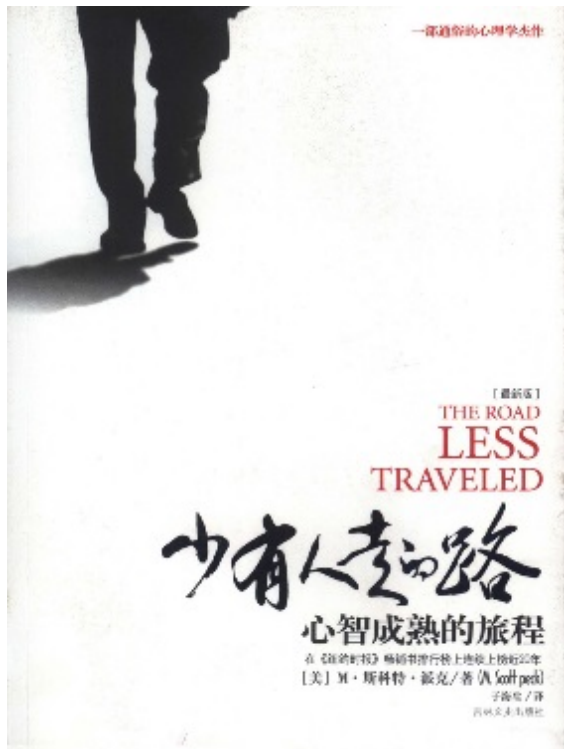
- 混合云架构
- 弹性计算
- 信息标准、区块链
- 数据开放
- 一把手到信息中心
- 自开发与外包

- 移动的医生与患者
 - 集团化多院区
- 医学中心到微诊所
- 临床到科研到产业
- 管理式医疗到健康险

通往大数据的必由之路：标准建设与认证

标准是医学数据融合和开放服务的基础





郑杰



樹蘭醫療
Shulan Health

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