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SCHOOL FOR HEALTH

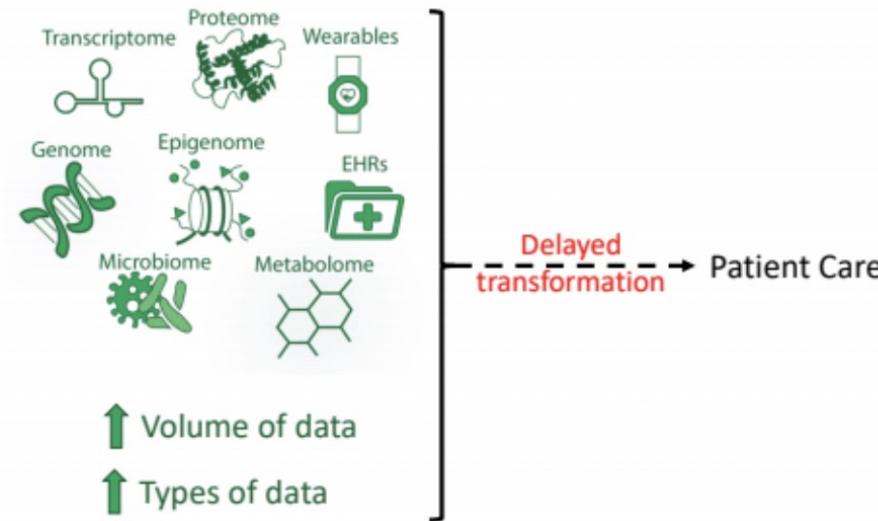
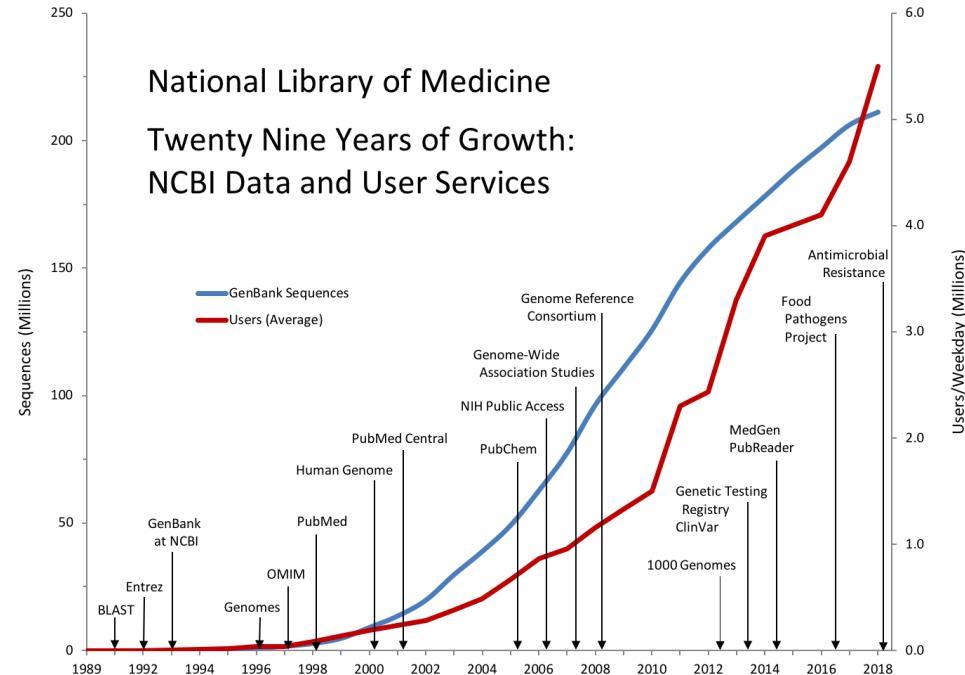
Capitalising on the Health Data Gold Mine: Using Federated Learning to Engage China in the Global Health Data Space

Simcha Jong

Professor of Management and Healthcare
Innovation



Digital revolution has led to enormous growth of available data



How to develop data infrastructures to create value out of all these data?

Data and the promise of precision medicine

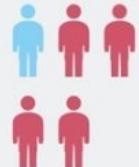
Source: Schork, N.
Personalized medicine: Time for
one-person trials. *Nature* 520,
609–611 (2015).

IMPRECISION MEDICINE

For every person they help (blue), the ten highest-grossing drugs in the United States fail to improve the conditions of between 3 and 24 people (red).

1. ABILIFY (aripiprazole)

Schizophrenia



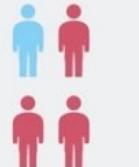
2. NEXIUM (esomeprazole)

Heartburn



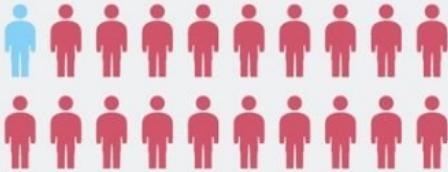
3. HUMIRA (adalimumab)

Arthritis



4. CRESTOR (rosuvastatin)

High cholesterol



5. CYMBALTA (duloxetine)

Depression



6. ADVAIR DISKUS (fluticasone propionate)

Asthma



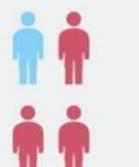
7. ENBREL (etanercept)

Psoriasis



8. REMICADE (infliximab)

Crohn's disease



9. COPAXONE (glatiramer acetate)

Multiple sclerosis



10. NEULASTA (pegfilgrastim)

Neutropenia

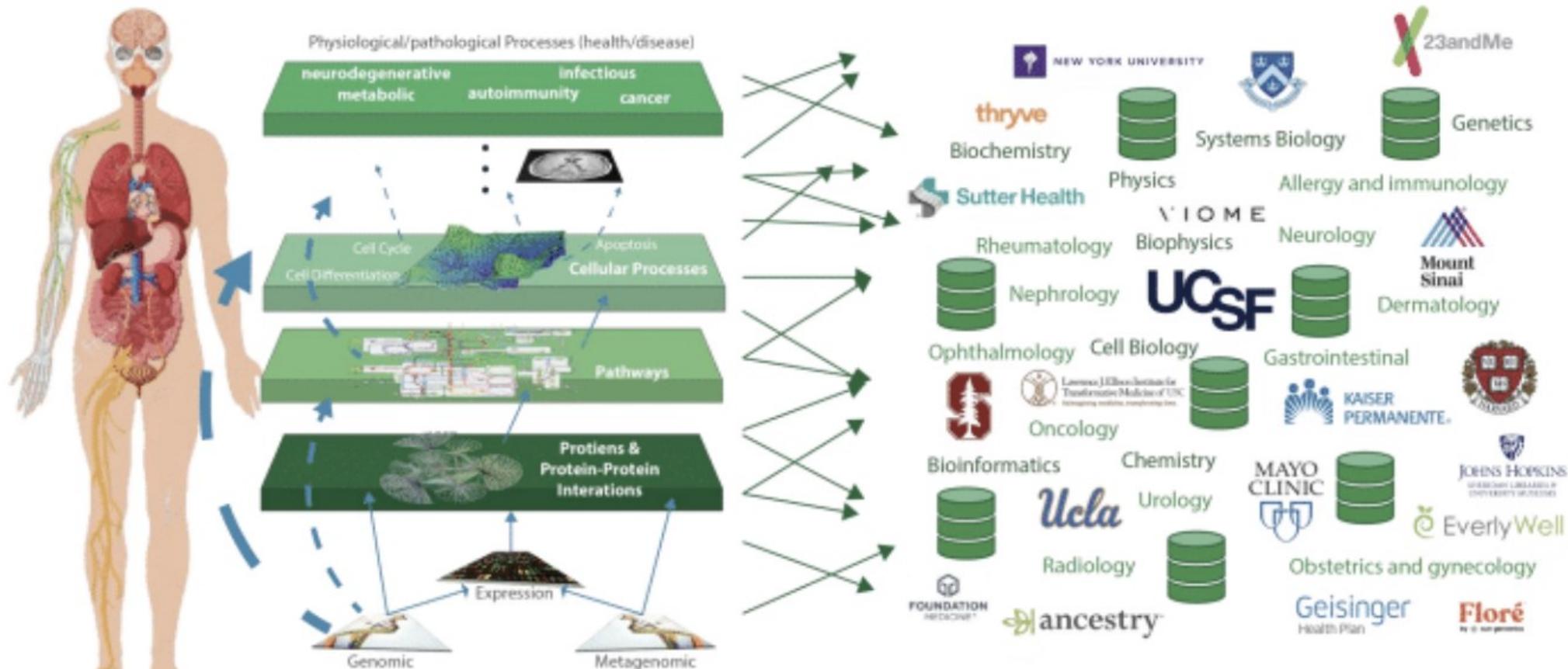


Based on published number needed to treat (NNT) figures. For a full list of references, see Supplementary Information at go.nature.com/4dr78f.

Limits of current medical knowledge production

- While learning from large, complex data is becoming routine in digital firms, medicine has been slow to catch on
- Medical practice still anchored in producing knowledge through narrow, extended, and expensive studies that avoid real-world complexities – often detached from local contexts.
- Data generated every day for different practical purposes could serve as source of knowledge to fuel learning health system

Data silos impede development learning health systems



Health Data as a global public good – a call for Health Data Governance 30 September

29 September 2021 | [Call for data](#)

1.1 The COVID-19 pandemic is increasing volumes of health and health-related data being generated worldwide and accelerating the trend towards digitalization in health. The increased demand for health data[1] and statistics[2], has exposed long standing data governance issues, including issues of intellectual property rights, inequalities in data access and capacity, availability and sharing (including cross border due to differing data protection, regulations and interpretation), use, reuse, storage and bias in data analytics with possible misuse. Persistent data gaps and fragmented approaches to governance of health data in different contexts are a major roadblock to the use of data as a global public good, and have contributed to the lack of cross-pollination of health research and information systems data. Health data is both a strategic asset and a public good, the management of which requires cooperation and leadership at global level and in countries to address fragmentation.

Health as a global challenge without borders

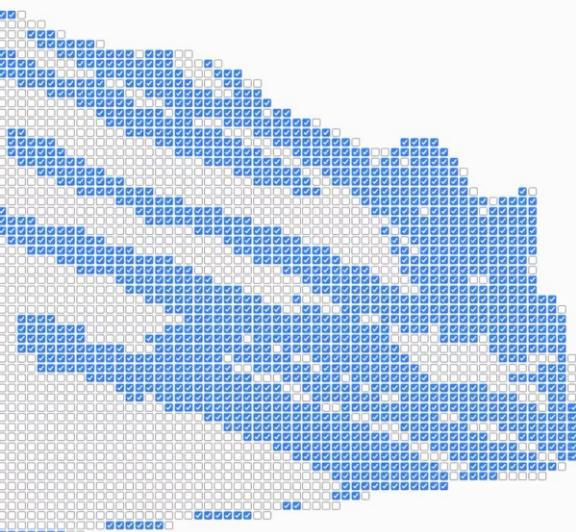
Growing importance of national health data silo's

The New York Times

The Era of Borderless Data Is Ending

Nations are accelerating efforts to control data produced within their perimeters, disrupting the flow of what has become a kind of digital currency.

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CAIXIN

China tightens controls on cross-border data transfers

Regulators struggle to balance enhanced data security with promoting growth



Tighter rules on overseas data transfers could slow the development of China's digital economy, according to some observers.

QIAN TONG and WANG XINTONG, Caixin
June 16, 2023 14:21 JST

财新 Caixin

China is putting cross-border data transfers by multinational companies and others under the toughest government oversight ever.

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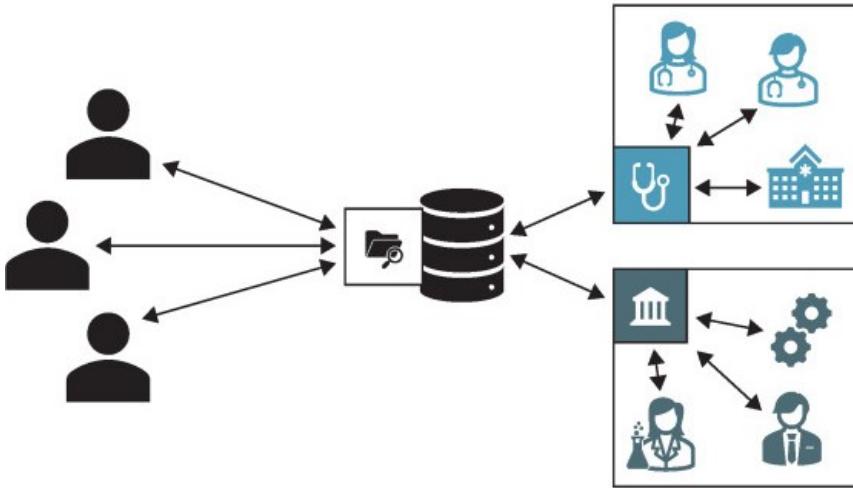
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The challenges of bridging silo's – Centralized data infrastructures



Centralized data infrastructures are not feasible in facilitating cross-national data sharing

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Abandoned NHS IT system has cost £10bn so far

Bill for abortive plan, described as 'the biggest IT failure ever seen', was originally estimated to be £6.4bn

Rajeev Syal
Wed 18 Sep 2013 00.06 BST
1,153

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Dossier médical partagé : un coût excessif pour un succès mitigé

Selon des informations du « Parisien », seuls 418 000 dossiers ont été ouverts, contre les 5 millions prévus, pour un coût estimé à 500 millions d'euros.

Le Monde avec AFP

Publié le 04 janvier 2014 à 08h50 - Mis à jour le 04 janvier 2014 à 13h56 - [Lecture 1 min.](#)

La Cour des comptes avait critiqué en 2012 le pilotage « défaillant » par l'Etat du développement du DMP. [AFFIANDREAS SOLARO](#)

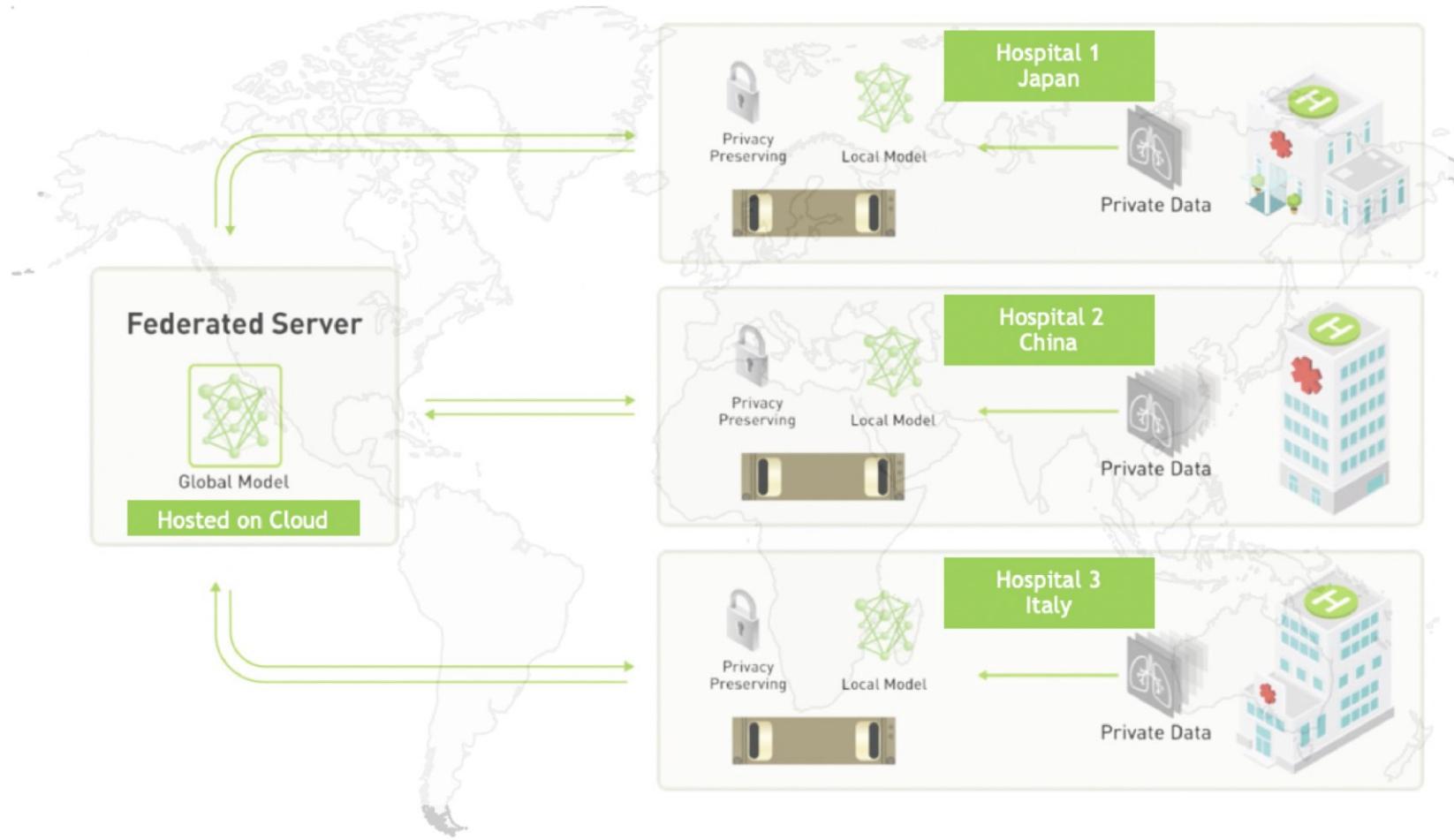
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The promise of federated data platforms in bridging silos



Data never leaves local facility / silos; algorithm

Experimentation with federated learning platforms



Medical Image Analysis

Volume 70, May 2021, 101992



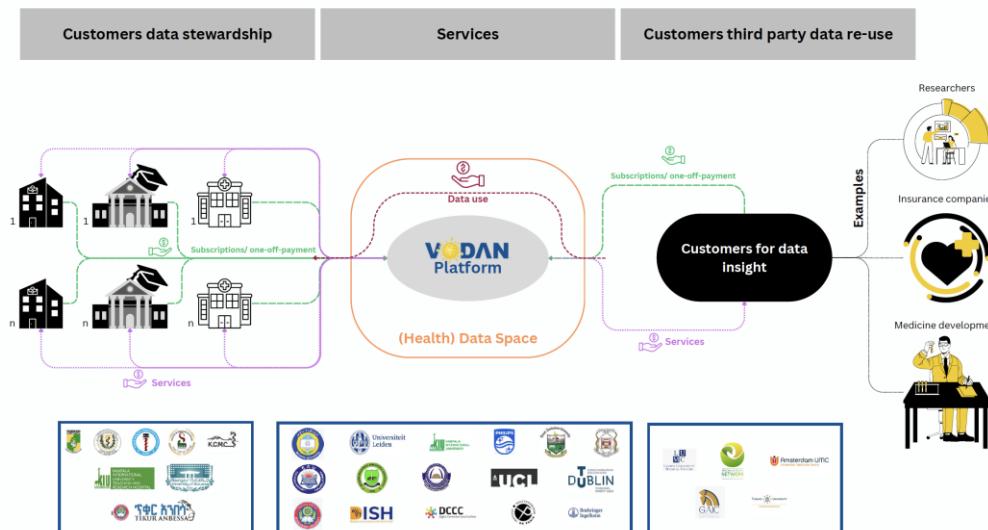
Challenge Report

Federated semi-supervised learning for COVID region segmentation in chest CT using multi-national data from China, Italy, Japan

Dong Yang^{1 a}, Ziyue Xu^{1 a}, Wengi Li^a, Andriy Myronenko^a, Holger R. Roth^a,
Stephanie Harmon^{b c}, Sheng Xu^d, Baris Turkbey^b, Evrin Turkbey^e,
Xiaosong Wang^a, Wentao Zhu^a, Gianpaolo Carratello^f, Francesca Patella^g,
Maurizio Cariati^g, Hirofumi Obinata^h, Hitoshi Mori^h, Kaku Tamura^h, Peng Anⁱ,
Bradford J. Wood^d, Daguang Xu^a

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VODAN-AFRICA (88 healthcare facilities, 8 countries)

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Jordan Sollof

21 November 2023



NHS England awards £330m Federated Data Platform contract to Palantir



NHS England has awarded a contract to operate its future federated data platform project (FDP), worth £330 million, to US data analytics giant Palantir, with support from Accenture, PwC, NECS and Carnall Farrar, NHSE officially announced.

Challenges federated learning collaborations

- Need for international cooperation on data standards, quality assurance
- Key role of public trust implementation of federated data infrastructures
 - Importance of transparency and informed consent
- Regulation of access to platforms that represent a commercial goldmine



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Thank you