Smart Solutions For Healthcare System
Cases From China

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Abstract
In the digital age, the structure of global economy has been transformed; the he
also changed. By reviewing the history and statistical data of China healthc
evaluating them in a global realm, this paper reveals the fact that medical sys
China still falls behind the world average level, which doesn t coordinate wit
urbanization development. The main reasons are deficiency of financial expen
institutions and health care workers, which is hard to be improved within a sho
local governments have adopted Smart Healthcare System to meet the people s der
care. Cases include Smart healthcare card, new health insurance policy and the
were introduced, Following by the review However, this paper also indicates t
these smart methods, and presents a holistic medical service system-planning f
predictive urban planning to responsive urban governance, the whole process of
system could be realized by big data analysis and local legislation establishmer
planning decisions more rational and feasible.

Keywords: smart cities, healthcare, China

1. Introduction

Since China implemented reform and opening policy in the late 1970s, China ha
general adoption of the market principle. Financial reform has also been made
system toward a free market system. National healthcare for all the people was c
of health facilities were encouraged to support their operations rely on us
governments continued to take control of the prices and hospitals. These finar
organizational policies were not coordinated. These uncoordinated policies
problems in the system. Market-based financing created more unequal access t
between the rich and poor. Irrational classification system of public healthcar
management caused inefficiency, waste and poor quality of health care.

In the 21st century, despite the fact that China has higher income, better
advanced medical equipment, due to negative effects raised by urbanization, ind
globalization, Chinese public health system has encountered greater difficulties
are more and more unsatisfied with the low efficiency and the high expenses

healthcare service. Then another reform in healthcare system was raised in 20
decided to recover the national healthcare insurance for all the people.

To examine China s Health care condition from a holistic perspective, data f
countries to developed countries were collected to compare with China. Four majo
chosen, including health care expenditure per capita, health expenditure propor
physicians per 1,000 people and hospital beds per 1,000 people.

1.1 Healthcare expenditure

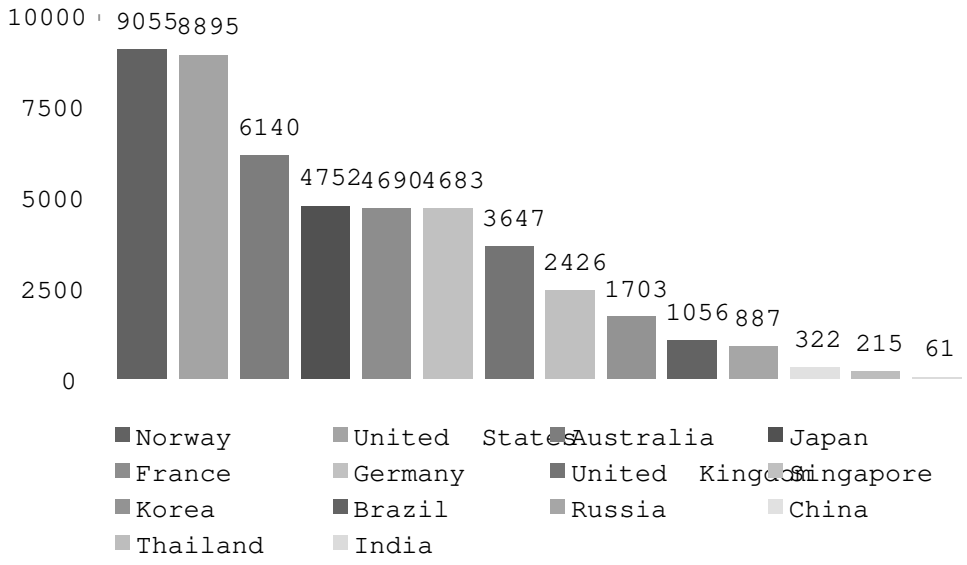

Figure 1. Health Expenditure Per Capita in 2012 (current US$)
(Resouce: World Bank Open Data)

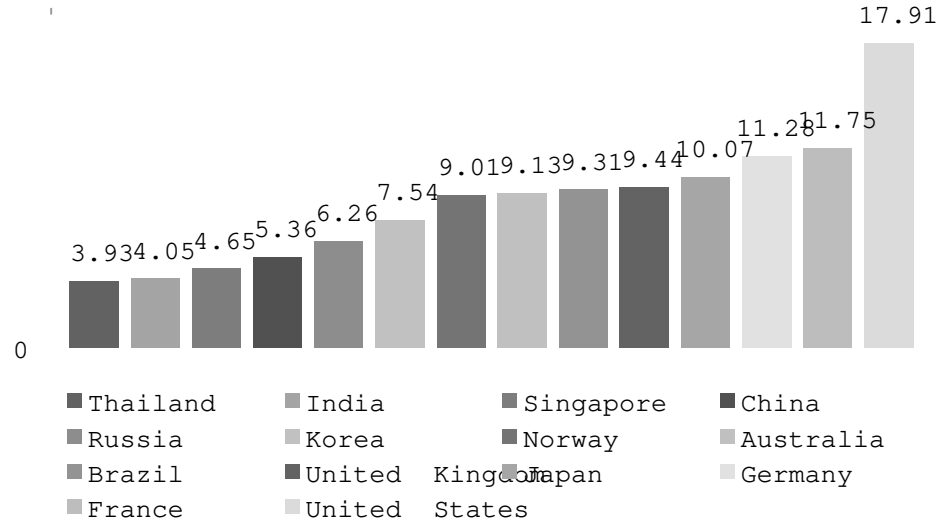

Figure 2. Health expenditure % of GDP in 2012(current US$)
(Resource: Chinese Health and Family Planning Statistical Yearbook)

China ranked 118 in health expenditure per capita in 247 countries and regio
Although China is better than Asian countries like India and Thailand, but it st
developed countries quite a lot, for example the index of Norway is almost 30 ti

Besides, despite the fact that China has experience rapid growth in economy, it
health expenditure portion of GDP. The reason may be Chinese macro-health pol
health care financing and delivery toward a free market system in the1980s.

1.2 Healthcare facilities

When it comes to the index of physicians and hospital beds per 1000 people, alt
of China are not advanced in the world, the latter could be compared with that
the former is one of the last in the main countries.

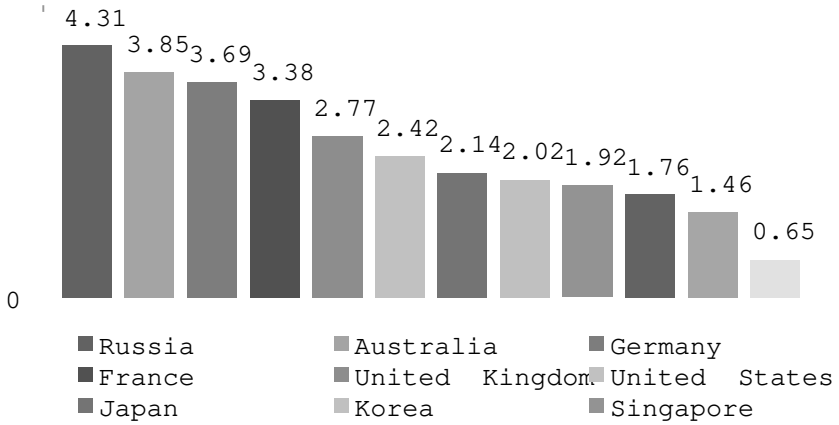

Figure 3. Physicians per 1,000 people in 2012
(Resource: World Bank Open Data)

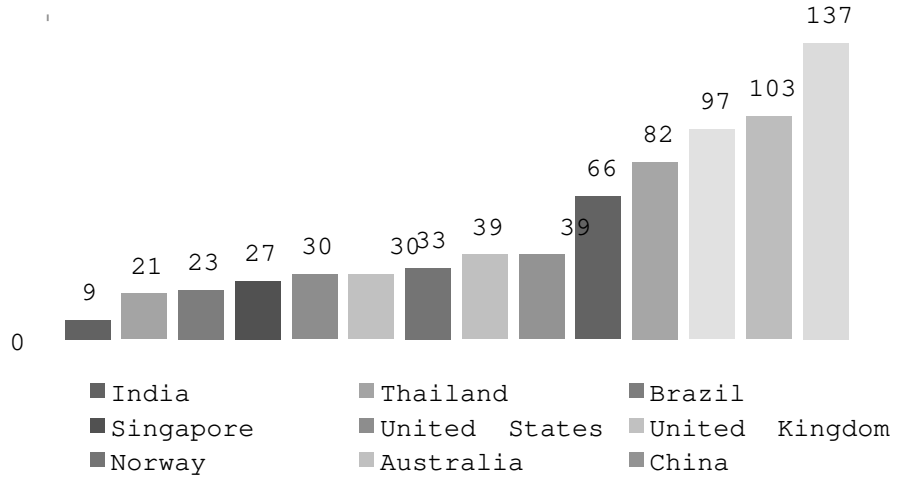

Figure 4. Hospital beds per 1,000 people in 2012
(Resource: World Bank Open Data)

Comparing the conditions of economic development and healthcare development, obvious that healthcare service still fall behind the economic and urbanization

To conclude, the hardware condition is generally better than the software condit seen from the rank of the number of health care institutions, hospital beds and reflects the fact that China paid more attention on hardware construction, but i of workforce in health care.

The reason could be as follows: firstly, China is still a developing country, government were still going to infrastructure construction projects, but not y medical workers. Secondly, since China changed the financing policy in health was invested in the income of medical workers, therefore people working in thi adequate to provide qualified service. Thirdly, the whole system is free marke could go to hospitals whenever and wherever they want, therefore, there s alw workers in the general hospitals, but not much patients were treated in commu institutes.

2 Smart Healthcare

For several decades, China is experiencing rapid urbanization from 26% in 1990 end of 2014, but still less than other mid-level developing countries such as M urban) or developed nations like the United States (80 percent). Chinese governm further urbanization to support economic development. But pollution, housing a traffic congestion are already heavy burdens, so it s urgent for cities to fi creating a better life for migrants.

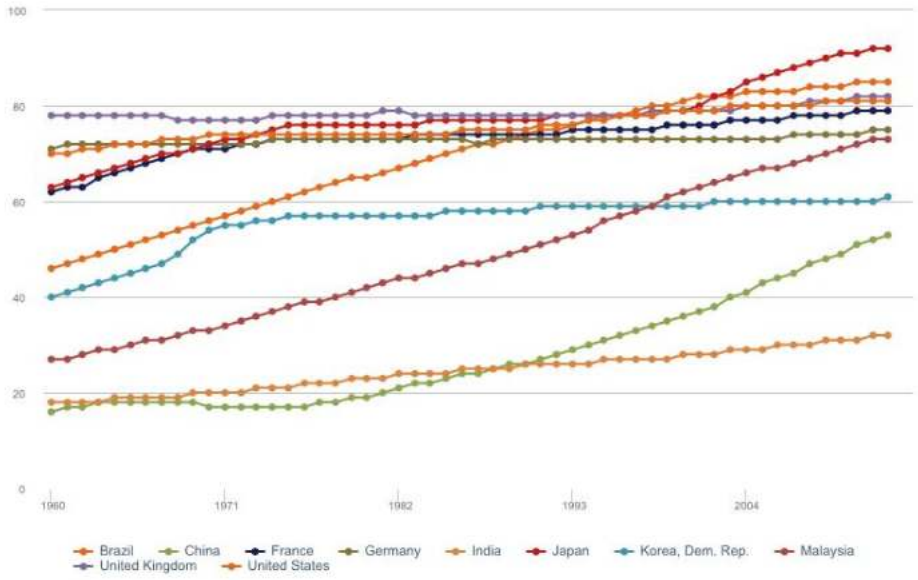

Figure 5. Urban population rate in the world
(Resource: World Bank, World Development Indicators)

Then the concept of Smart City was raised. A smart city (also smarter cit
technologies to enhance performance and well being, to reduce costs and resour
and to engage more effectively and actively with its citizens. Key 'smart' secto
energy, health care, water and waste. A smart city should be able to respond
global challenges than one with a simple 'transactional' relationship with its c

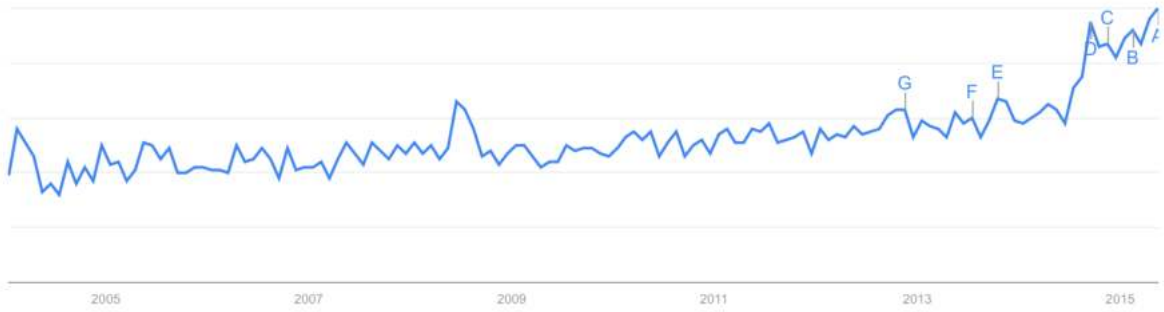

Figure 6. Search trend of Smart City
(Source: Google Trend)

Since the central government made development of smart city technology and p
national policy, it quickly gained popularity in China. Almost every city is des
the pilot project of Smart City, which is led by the Ministry of Housing and
Development (MOHURD). Till now, MOHURD selected 290 local governments and eco
development zones as official smart city pilot project sites, making them eligi
a ¥800 billion ($130 billion) investment fund sponsored by the official China De

Figure 7. Cities with smart city projects at the end of 2013, according to CC
(Source: Donald Johnson/CCID Consulting)

Health would have significant effect on the mobility of capital and labor. Howev
of public healthcare has not been recognized in the field of urban planning.
economic growth, public healthcare situation are still far from satisfactory
increasing workload of doctors and insufficient financial expenditure on p
compared to developed countries.

Smart Healthcare, as a new management approach has been introduced to improv
situation in public health in many cities in China, especially in the Yangtze
service system and remote consultation were applied. Besides the successful cas
suggests that urban planners could predict the healthcare demand before making
through big data analysis, therefore making more reasonable decisions.

3 Cases from China

The area of China is so large and diversed that it s hard to solve the problem
one time. Therefore, local governments had made efforts to introduce some new
methods to change the situation little by little, especially those in the develo

Three cases were selected here to present how local governments in China deal
considering citizens demands in the public healthcare.

3.1 Smart Health Card

Hangzhou, one of the first cities in China to introduce the concept of Smart h
Smart healthcare project in September 2012, and quickly spread it to all the
county hospital, 10 provincial hospitals, 45 community healthcare centers a
healthcare stations in Hangzhou.

The convenient payment function of the citizen card is the core technique of t
requiring patients to go to the counter for services, it enables citizens to pay
consulting rooms and nurse stations; to charge, make reservations, query, payme
test reports on the self-service machine, which is more convenient and time-savi

According to statistical data, there have been 2.5 million citizens opened th
function of the citizen card, which benefited more than 6.55 million outpatie
inpatients. The average time saved per person is about 1 hour.

Online tests and reports inquiry systems were also promoted by the Smart healt
has served about 0.95 million person-times, at least 10% patients were excuse
hospital for tests and reports personally. The estimated time saved is about 2
means 0.2 million hours were saved for the whole society, and it s also a r
conditions.

3.2 New health insurance policy

The healthcare system in China used to develop upon the administrative fra
healthcare facilities were classified into three grades according to owne
administrative departments.

Chinese government was determined to promote the classified healthcare system y
level service system of city hospitals (general hospitals, specialty hospitals)
were adopted to realize the reasonable distribution of healthcare facilities.

With the ownership of hospitals transferred from administrative departments to
provincial hospitals, city hospitals and district hospitals were expected to gr
in the city- community two-level healthcare service system.

Many cities shared the thought that emphasis should be put on general hospit
hospitals, while the hospitals in the middle would have to be modified for new d
system.

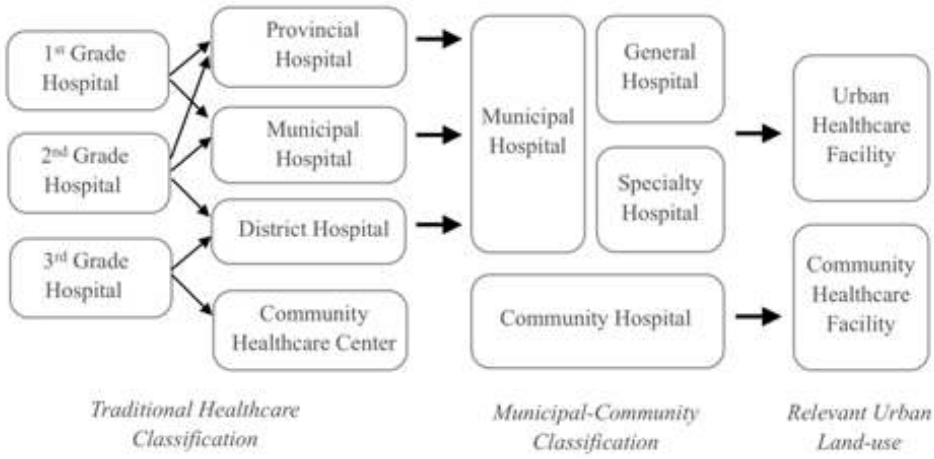

Figure 8. The transform of Healthcare classification System (W.P. Lin, 20

The new City-Community system were established, however, it didn t function we
to. Owing to the huge difference between developed general hospitals and star
hospitals in medical devices and service quality, but the same expenses they
preferred to go to general hospitals all the time, regardless of which kind of
result, the pressure of general hospitals was not released and the community
enough patients to get the chance to develop.

Therefore, Guangzhou announced a new health insurance policy that has become ef
2015. The new policy is mainly about raising the proportion of health expenditu
insurance in community hospitals. To transfer from community hospital to genera
cover a higher proportion than go to general hospitals directly. Citizens are a
regular community hospital first in order to get transaction service. Otherwise,

regular general hospital and would not get the most of health insurance. On th
than 20,000 people went to community hospitals to choose their regular hospit
more than peak number in 2014.

This means currently the new policy has an effect on attracting people to commu
the number of patients in general hospitals has not decreased obviously as expec

3.3 Ningbo Cloud Hospital

After six months of trial operation, the first cloud hospital in China, Ningb
officially opened in March, 2015. This platform based on new information techn
computing, big data, internet and internet of things is trying to deal with
healthcare system, while using internet methods to enhance current medical res
borderless hospital union. (China Business News, 2015)

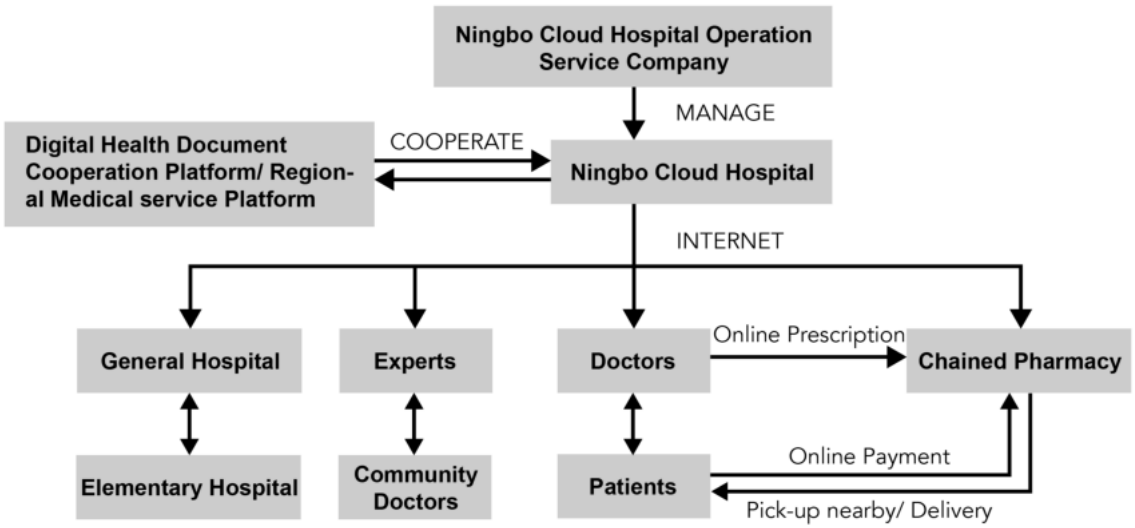

Figure 9. Illustration of the Ningbo Cloud Hospital structure

Till now, there are 100 elementary medical institutions connected to the cloud
doctors and family doctors are under contract of it. Four cloud consulting room
pressure, diabetes, psychological consultation and general practitioner are av
hospital is also connected to local chained pharmacies so that the patients co
with prescriptions at any pharmacy nearby. Door-to-door medicine delivery is exp
in June. Cloud consulting rooms will increase to 10 in July. The cloud hospital
be released in August.

However, the key issue of getting the medical expenses of the cloud hospital inc
health insurance is yet to be solved. The condition of current hospital operat
but it is believed to change people s life in the future similar to eBay and Tao

4 Conclusions

The cases presented above worked in the different levels of the healthcare
Healthcare technologies such as self-service system, easy payment are improving
inside the hospital, saving time and money for patients; The new policy on cor
Guangzhou showed a way to cope with irrational medical resources distribution; t
to some extent toward a future lifestyle. All of them have strengths and limitat

The Smart Healthcare card is dealing with problems in the small scale not for
and small investments could produce effect immediately, and directly making
advantages it brought about, such as saving time and efforts. But on bigger pic
the basic issues of the healthcare system, it is more like a compensation but
After all, people would still rush to general hospitals because of a cold, and
distribution would still be insufficient and unequal.

The new healthcare insurance policy adopted by Guangzhou is more strategic solut
system. When the resources are not enough, at least the distribution should be
patients of different levels of diseases, saving the resources for more urgent
to be more reasonable for the current situation in China. It might seems to be
carried out in developed countries for decades, however, it still works and it
Because social justice and affordability are always the core issues citizens car

The cloud hospital has a really smart concept, and it make advantage of the col
stakeholders. It definitely makes referrel and treatment of chronic diseases eas
for the patients. But the limitations are face-to-face contact is still import
online consultant could not replace that. Therefore it could not take the place
specialty hospitals. It is more like the future version of family doctors that a

When we think about Smart Cities, technologies like cloud computing, big data,
might be the first things to occur. However, Smart does not necessarily mean tec
Guangzhou Case indicated. Technologies alone was not enough, they could only be
stable base has been established, which can be achieved by proper policies.

The most important change brought by Smart Cities is not only technology. Sin
been introduced, there would be no top-down or bottom up procedures any more.
network instead of a vertical way. Every stakeholder including citizens, govern
institutes, hospitals are all on the same level of a huge co-creation platform.

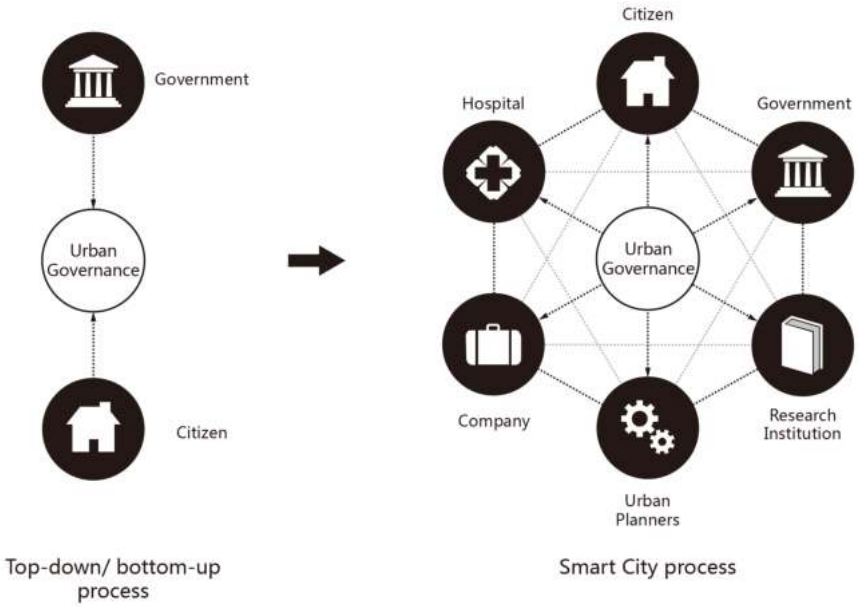

Figure 10. The change of process in Smart City Governance

The improvement of the healthcare system would not be reached by the effort of
It requires the collaboration between healthcare department and urban planning
and government. As we can see from the cloud hospital case, intersection c
important right now but also very difficult to realize. There would still be
through before we finally got to the smart future.

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