

ABCD Inclusive Finance

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Abstract—We live in an era of uncertain future. Economic booms and busts, aging population, financialization of everything, polarization of wealth, constant struggles, eruptions of pandemics, extreme weathers and natural disasters are upon us. To prepare for such a variety of outbursts, world leaders emphasized solidarity and cooperation; but today the global society is running in the opposite direction. Individual nations are absorbed with local interests and pursuing segregated goals. Elections and resultant policies ideologically biased and fragmented aggravate the situation and deepen conflicts. Consequences include populist policies addressing superficial short-term goals while downplaying the more important longer-term goal of restoring the constitution of the economy. Examples include the debasing of money and polarized wealth. We aim to propose a new way to deal with such problems. It utilizes fast evolving state-of-the-art technologies such as AI, Blockchain, Cloud, and Data (ABCD). A new framework, called the ABCD Inclusive Finance (IF) is presented in which ABCD technologies are used to help turn things around. It is to build a financial solidarity network which helps us get united, enables us reach quickly to a large scale consensus, shapes public policies based on agreed upon consensus, and fosters innovation. A blueprint level discussion is given on how to build such an inclusive network of sovereign individuals.

Index Terms—Financial Inclusion, AI, Blockchain, Social Conflicts, Innovation, Polarized Wealth, Aging Population.

I. INTRODUCTION

Why are we uncertain about the future? What makes us being uncertain? With COVID-19, humanity has entered an era of great transformation. The world before COVID-19 was represented by globalization, urbanization, and the financialization of everything. Then, what kind of era will come after COVID-19? Currently, no country can confidently answer this question. Even the world's leading countries, including the United States and European nations, have largely failed to contain COVID-19, breaking the records every day. Globally, as of August 6th, 2020, there have been 18.6 million confirmed cases of COVID-19, including 702,642 deaths, reported to WHO [1]. Even the major developed countries are in the state of chaos, between the containment measures that ban face-to-face gatherings and the effective mitigation measures that restore the economy. The absence of a world-leading power is causing tremendous confusion and fostering uncertainty.

Such an absence of absolute power is a huge opportunity for

the born of a new leader at the same time. Defining a desirable future and boldly driving it can create a tremendous opportunity for the Republic of Korea to rise up as a world leader in the post-COVID-19 era. Compared to other countries, the Korean government has succeeded in quarantining COVID-19 using ICT technologies [2] despite no containment measures adopted and is currently leading the world by exporting the K-Quarantine models [3]. The Korean government announced the *K-New Deal* project in the second quarter of 2020. It is an ambitious, global-scale transformation project; It is to transform the country into a global pace-setter.

Hereby we present our business proposal with regards to the *K-New Deal*. Namely, we in the GIST Blockchain Economy Center (BEC) aim to propose the ABCD Inclusive Finance (ABCD IF) project. ABCD stands for AI, Blockchain, Cloud, and Data. The proposed project utilizes these technologies and aims to build a digital Social Overhead Capital (SOC). Inclusive Finance (IF) is more precisely defined in Section III. Along with the process of building it, we aim to show that we can produce many new opportunities for future generations of humanity.

The ABCD IF project is to build a digital SOC (DSOC) with two major Research and Development (R&D) components incorporated. The first component is Inclusive Dam (ID) and the second one is Friend Robot (FR). ID is a decentralized network of API-based shared peer-to-peer computers. This network is a human network as well since there are citizens behind each participating computer. It enables each member of the networked society to share information and cooperate with each other in a non-face-to-face fashion. The FR part works as an interface between the ID network and each individual, at the edge of the ID. FR is owned by each individual human partner. It plays the role of a life companion which provides financial advice to the human owner. In the sequel, we will discuss how the proposed DSOC not only addresses the main goals of the *K-New Deal* but also creates many new opportunities towards building a vibrantly innovative and inclusive society.

We organize the rest of this paper as follows. Section II gives Background. Section III presents the main proposal. Section IV elucidates some of the enabling Research and Developments needed for the success of the proposed ideas. Section V suggests a governance of the project. Section VI provides discussion and further issues. We then conclude in Section VII.

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Please note that this is a positional paper which introduces the ABCD IF project, a recent proposal from GIST BEC.

II. PHILOSOPHICAL AND POLICY BACKGROUND

In this section, we discuss the background of the proposal.

A. Philosophy behind Our Inclusive Innovation

A sentence that ‘Innovation and inclusion both are needed to build a healthy society’ describes the philosophy of our project. Society cannot be advanced without inclusion. Without being an inclusive society, it is very difficult to foster or even allow innovation to occur within a society. It is because innovation by its nature breaks down the old vested.

(Meaning of inclusion) Thus it is necessary to institute a society in which people are closely tied in a web of solidarity. In such a society, it is anticipated to embrace the fallen people who became the victim happened to be belonging to the sector in the old industry which is proceeded to disappear in a near future. For example, it can be the taxi industry at the dawn of autonomous driving. We need to offer the drivers and their children with the likes of basic income. They can emerge as the future workforce who will conceive the next generation of innovation.

(Innovation alone is not enough. No.) Members of a non-inclusive society will not be able to incubate human resource for the future. Trust is lost. Without a trust built up, members of the society will not choose to embrace innovation-driven policies which allocate to the innovators limited resources in the society. This is because they are fear of falling to the victims of “creative destruction.”

Innovation alone is not enough! But inclusion without innovation is no fun either!

(Creative destruction can be easier for us to accept in an inclusive society.) The members of an inclusive society in which each member has a strong belief that he and his family members will not be left behind can embrace innovation driven policies. They know that innovation eventually enhances the life of every member in the society in the long run; the fear of falling into the trap of creative destruction can be relieved in inclusive society.

(An inclusive society can resolve global problems.) Harmonious interaction among individuals in an inclusive society shall give births to new services and products. These new solutions can resolve the current societal problems and have our society advanced to the next level. They will also create a class of many empowered people who can accumulate wealth and consume the goods of innovation. The virtuous cycle of production and consumption will be continued and make the world a better place to live for everyone. Relations among members in such a society will be strengthened and the lives of individuals be enriched; Science and technologies continue to flourish; Healthy market order be established. Lives evolve through generations. It is a tremendous resource to have a variety of different society members with diverse interests and capabilities. Each will perform a different role at a different time. Taking an unexpected random turn, one of us will emerge as a leader in a crisis.

As the innovation continues, the lagged local economies shall be helped out, revitalized, and set to catch up with the economy of the advanced countries; Inequalities around the world lessened; Education opportunities, provision of decent health care

services, economic stability, and safe living environment provided worldwide.

B. Relation to the Keynesian Policies

Maynard Keynes diagnosed that in the 1930s, during the Great Depression, the free market economy had brought about a periodic economic downturn the Great Depression. He asked the government to employ active fiscal and monetary policies. The Hoover Dam construction plan was passed the US Congress in 1928. Hoover is the 31st President of the United States, who retired in the spring of 1933. The 32nd President Roosevelt took the Oval office and made the New Deal policy which consists of the following three:

- 1) fiscal policy to support large-scale public works to expand social overhead capital,
- 2) securing a social stability network, and
- 3) financial reforms including banking and monetary systems.

The ABCD IF project is aimed at addressing all the three aspects. First, it is composed of the digital SOC part which is to build the Inclusive Dam and the Friend Robots. Second, it builds a social safety network. Third, it aims to empower individuals with wealth management services so that members can safely go through booms and busts and lead a stable life.

C. Linkage to the K-New Deal

One distinction of our proposal to the *K-New Deal* is to embody the concept of *inclusive society* into an engineering project. The core philosophy of the *K-New Deal* is to make an inclusive society. We use emerging blockchain overlay networking and artificial intelligence solutions to usher in our version of an inclusive society. This new digital network helps remove obstacles that hinder people from getting united and collaborating with others. Innovation and inclusion are not contradictory concepts, but they are both necessary to make a social advancement. The goal is to show that an inclusive society we aim for can be realized and ushered in within the suggested period of time frame by implementing this philosophy into the digital network.

III. THE PROPOSAL

Definition 1. International Organization’s Financial Inclusion (The World Bank) This is The World Bank version of financial inclusion:

“Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way. Financial inclusion is a key enabler to reducing poverty and boosting prosperity. Financial access facilitates day-to-day living, and helps families and businesses plan for everything from long-term goals to unexpected emergencies. As account holders, people are more likely to use other financial services, such as credit and insurance, to start and expand businesses, invest in education or health, manage risk, and weather financial shocks, which can improve the overall quality of their lives.[4]”

(IMF) This is the IMF version of Digital Financial Inclusion.

“The COVID-19 pandemic could be a game changer for digital financial services. Low-income households and small firms can benefit greatly from advances in mobile money, fintech services, and online banking. Financial inclusion as a result of digital financial services can also boost economic growth. While the pandemic is set to increase use of these services, it has also posed challenges for the growth of the industry’s smaller players and highlighted unequal access to digital infrastructure.[5]”

(UNCDF, United Nations Capital Development Fund) The UNCDF’s global strategy is ‘Leaving no one behind in the digital era’. UNCDF recognizes that reaching the full potential of digital financial inclusion in support of the Sustainable Development Goals (SDGs) aligns with the vision of promoting digital economies that leave no one behind. [6]

(GPII, Global Partnership for Financial Inclusion) GPII defines financial inclusion as “a state in which all working age adults have effective access to credit, savings, payments, and insurance from formal service providers. [7]” The GPII has identified 8 priorities on G20 Fukuoka Policy Priorities on Aging and Financial Inclusion, which asserted the need for “Sustainable financial inclusion to ensure the elderly do not fall out of the system.” [8]

Definition 2 (ABCD Inclusive Finance): Inclusive finance is hereby defined as a new financial system which helps people in the blind spots of financial benefits. It aims to

- 1) help those individuals who do not own assets such as low-income and marginalized citizens,
- 2) help them to organize themselves and cooperate with each other in solidarity, and
- 3) help them to lead a life with financial independence.

We will call the Inclusive Dam when it satisfies Inclusive Finance.

Definition 3 (ABCD Innovative Finance): Innovative Finance is hereby defined as an advanced financial system, a level improvement from the Inclusive Finance, which fosters innovation. It aims to expand the solidarity ID network to

- 1) Foster engagement in innovation
- 2) Empower members with economic independence
- 3) Support high tech startups
- 4) Raise funds globally using the Inclusive Dam (defined precisely shortly after)

We will call the Innovative Dam when it satisfies Innovative Finance.

A. ABCD Inclusive Finance

Modern finance derives people into classes and causes conflicts among them. Classes are the products of financial gaps. The benefit of finance is not well distributed but highly monopolized to large investment banks and some selected elites. The top 1% possess more than 50% of wealth in the society. Continued devaluation of currencies exacerbates the problem. The price of limited assets is appreciated at a rate much faster

than the rate the wages rise. Results are the polarization of wealth. The future is extremely uncertain to the working class as they suffer from the fear of losing their job due to continued automation at their work places.

B. The Two Pillars of the ABCD IF Proposal

We propose a business plan based on ABCD IF. We aim to design and construct Inclusive Dam and Friend Robots.

(Inclusive Dam) The Inclusive Dam (ID) is not an actual dam. Dam here is a metaphor to imply it serves the purpose of the Hoover Dam in the New Deal. It is rather a distributed peer to peer Application Programming Interface (API) based digital network which helps the citizens to get united and stay cooperative in solidarity. Such a system can be built with the development of an overlay network protocols operating on top of the internet. With ID, participants can enjoy the benefits of life companion services such as smart governance, finance, and medical cares.

(Friend Robot) Friend Robot (FR) is aimed at providing connected services to participating citizens. They are located at the edge of the ID network. Each FR is equipped with enabling IoT sensors, AI speakers and immersive VR devices. FR seeks to understand the emotion and needs of its companion citizen. It communicates in real time with the human partner and provides financial/legal/medical services.

C. Inclusive Dam and Friend Robots

Korean government has announced to become a leading nation in the era of great transformation after COVID-19. In order for this to be realized in real world, there exists a precondition. It has to be accompanied with the development of a novel enabling technology. This is precisely the reason why we propose ABCD IF digital network. It is a decentralized blockchain and AI based computer network which offers API-interfaces among member computers. Each participating member should have its own computer connected to this network. This network will be formed by a novel operating protocol which provides the constitution of the network. A digital society is formed. In this digital society, each member voluntarily joins to become a member. Members are to cooperate with each other. Such a digitally networked society can be designed and built based on recent advances in blockchain technologies.

The distributed computer network of the Inclusive Dam is connected to the participating members via the AI and IoT enabled Friend Robots. A FR is a life companion to its human partner. They deliver the values and opportunities created in the Inclusive Dam to the participating citizens. Our goal is to build a sustainable society that lasts. Quantitative easing, liquidation of all assets, soaring asset prices, polarization of wealth, and falling of labor values are attributable to predatory financing. We aim to develop the Friend Robots and supply them to people. We envision that with the help of FRs, people can overcome the risks of predatory financing. Namely, FRs can provide timely financial market information and stable means of savings to working citizens.

D. Impacts of Inclusive Dam and Friend Robots

The impact includes short-term economic recovery amid COVID-19 pandemic. We employ researchers and engineers to build the digital SOC's such as ID and FR. We can also create many new opportunities for the unskilled as well. It can be gleaned from the following discussions.

My Data Economy: We aim to create My Data economy. It is based on the blockchain technology which enables us to gather trustworthy data and pay for them. The data, while shared openly on a blockchain platform, it is designed, belongs to the citizen who produced and shared it. Personal information is hidden with cryptographies such as zero knowledge proofs, secure multiparty computation, and homomorphic encryption. Various data from medical, administrative, and financial activities are to be made available in the ocean created by the Inclusive Dam. The data gathering is done through the blockchain overlay, the gathered data can be provided to the enterprises who want it and charged whenever they are used. Machine learning algorithms such as supervised learning and reinforcement learning can benefit from the ample availability of quality data. They can cultivate jewels hidden in the ocean of data. This value creation process can be repeated.

Solidarity and Cooperation: The era of 4th industrial revolution is expected to bring out many ups and downs through one's life. Economic booms and busts, aging population, financialization of everything, polarization of wealth, constant struggles, eruptions of pandemic, and natural disasters are constantly facing each one of us. It is not a good idea to prepare for such variety of outbreaks and fast adoption pressures all alone. We have been told, as world leaders emphasized, to build a society of cooperation and solidarity. But this is simple to say but extremely difficult to achieve in a fragmented society.

Inclusive Dam is to build a digitally connected society. This is new. There is no vested group. If we designed it well, we can build a society in which members stay cooperative in solidarity. We can utilize smart contracts and blockchains. Smart contracts can be written and stored into a blockchain; they offer auto execution capability of the contractual terms; the use of a blockchain guarantees immutability of the made contracts. On the Inclusive Dam, stakeholders such as institutions, citizens and governments can come and work together without worrying about someone betraying the relations in solidarity. The Inclusive Dam can be continuously updated as it is a digital network. The working protocol of the Dam can be upgraded each time the society comes up with a new idea and a new consensus. The Inclusive Dam offers a protocol upgrading mechanism through which opinion collection, social consensus, and decision making via online voting can be carried out as needs arise.

Remote Health Care Services: Friend Robot uses 5G network and VR technology to build a realistic remote face-to-face contact capability. Medical consulting, treatment and diagnosis services can be provided to the citizens via these robots. These FRs are to connect remotely located people to the Inclusive Dam.

E. Empowered Individuals

Using the Inclusive Dam, we can build a new society. Every

member in this society shall believe in that no one is left behind, including elderly, dislocated workers, and disabled. When such a level of solidarity is established and working, a sustainable society can be built. The current state is far from this ideal state. Quantitative easing, liquidation of all assets, soaring asset prices, polarization of wealth, and fallen labor values are attributable to predatory financing and monetary policies traversing the spaces global leading nations have created.

Our proposal aims to counteract the results of such policies by placing a dam against predatory waves and crises. The Inclusive Dam and Friend Robots are there to protect people from such dangers. The Dam not only offers stable means of savings but also accesses to financial means to meet the needs of working citizens.

The Inclusive Dam can be upgraded to the Innovative Dam for some members who choose to use it for more active uses. For example, some can use it to create wealth. New wealth is created when someone offers the others new valuable services and products. They can initiate new businesses and venture startups utilizing the provided capabilities of the Digital Dams such as market information, data and opinion collection capabilities, data analytics, and decision-support tools.

IV. THE K-NEW DEAL AND PROPOSED R&D PROJECTS

A. Brief Overview of the Digital New Deal

Last month, the Korean government announced the official roadmap of The Korean New Deal, a package of measures designed to create jobs and spur growth to revive the Korean economy. In an address from the Blue House, President Moon said: "The Korean New Deal is Korea's declaration of its transition to becoming a leading country from a country that has trailed behind, from a carbon-dependent economy to a low-carbon economy, and from an unequal society to an inclusive society." According to the government, it plans to invest 160 trillion won to create and provide 1.9 million jobs by 2025.

The *K-New Deal* program is based on two main policies – the Digital New Deal and Green New Deal – and an overarching policy support to strengthen employment and social safety net.

- The ten key projects in The *K-New Deal*
 - (Digital New Deal)
 - ① Data Dam
 - ② AI Government
 - ③ Smart Healthcare
 - (Digital & Green)
 - ④ Green and Smart Schools
 - ⑤ Digital Twin
 - ⑥ Digitalization of SOC
 - ⑦ Smart and Green Industrial Complexes
 - (Green New Deal)
 - ⑧ Green Remodeling
 - ⑨ Green Energy
 - ⑩ Eco-friendly Mobility of the Future

Through the Digital New Deal, 58.2 trillion won will be invested; and 0.9 million jobs will be created. With the aim to

accelerate the transition towards a digital economy, investment will focus on the integration of data, network and AI (DNA) throughout the economy, digitalization of education infrastructure, promoting the so called ‘untact’ industry, and digitalizing the social overhead capital (SOC). With the Digital New Deal, Korea aims to further strengthen its digital capacity based on its competitive edge in information and communication technology (ICT), thereby promoting innovation and dynamics throughout the economy [9].

B. Key plans of the ABCD IF project

The objective of this subsection is to list down a set of possible R&D projects that are fundamental to making the ABCD IF project successful. Due to space limitation, we simply put down the list of R&Ds without detailed explanation. We propose to allocate the national budget of 110 billion won, a local budget of 23 billion won, a private funding of 197 billion won.

The list of R&Ds for Inclusive Dam is as follows:

- 1) Construction, opening, and utilization of data closely related to national life: 5G technology and AI convergence
 - ① Establishment of mm-class 5G demonstration network --(Induce participation of large companies with private contributions)
 - ② Self-Sovereign DID & My Data trading platform
 - ③ Global blockchain based data network technology: Development and demonstration of the ID that complies with the three laws of data and privacy
 - ④ Quantum cryptography, multi-party computation, zero-knowledge proof, and homogeneous cryptography.
- 2) 5G-AI-based intelligent governance: build the solidarity and cooperative based network.
 - ① Local to global scaling blockchains, fast and robust consensus algorithms
 - ② Revitalization of local economies. The use of digital money
 - ③ Data sharing/federated learning, living lab, labeling, Financial AI, HW/SW upgrading
 - ④ Global fund raising platform for tech start-up supports

At the edge of the Inclusive Dam, Friend Robots connect the citizens to the information space created by the Dam. Friend Robots are equipped with IoT sensors, AI speakers, and immersive VR devices. They understand the emotion and the needs of their partner citizens and communicate with them in real time and provide life companion services including financial/medical/wealth management services. Some of the essential R&Ds include:

- ① Voice Recognition
- ② Non-face to face Intelligent Sensors
- ③ Realistic VR technology

- ④ Remote Emotion Detection
- ⑤ Non-face-to-face remote treatment
- ⑥ Biometric Authentication

V. PROPOSED GOVERNANCE STRUCTURE

In order to make sure that the project vision is materialized, we aim to suggest a governance structure. Figure 1 illustrates how government, industry, academia, healthcare industry, and local communities shall mutually cooperate with each other throughout via the Inclusive Dam.

Research institutes such as GIST, for example, shall take the role of design and implementation. The Inclusive Dam shall be constructed well enough to serve the role of Hoover Dam in the Roosevelt's New Deal. Recall that Hoover Dam was the aggregation of major technologies at the time. Research institutes and industries shall put together the best technologies available today to construct DSOC. This DSOC shall play the role of playgrounds for startups and citizens. On this Dam, new information is transformed to create wealth via the so-called ABCD Value Creation Process. The DSOC shall serve as a firm foundation for decades of years to come.



Figure 1: Governance of ABCD Inclusive Finance

VI. DISCUSSION AND FURTHER ISSUES

A. Hoover Dam an Engineering Marvel in 1935

Hoover Dam was the largest in the world when it was completed in 1935. A set of pioneering techniques were used in the design and construction of it. The state-of-the-art technique, a *gravity-arch* dam, was conceived to withstand stress and strain of Colorado River. No dam of such a dimension and magnitude was ever designed nor built before.

What the designers had back then was only theories. To be extra careful, the dam was designed with an extremely heavy horizontal arch with its curve facing upstream. This was done to have the weight of the concrete and the strength of the arch resist the push of the Colorado River against the dam.

There were many critics on the project. They said the dam would never hold. The fluctuating reservoir, loading and unloading the earth's crust, they added, would cause earthquakes.

Hoover Dam on the Colorado River is 85 years old this year. It was designated in 1985 as a historic landmark by The American Society of Civil Engineers.

It still stands firm.

B. ABCD Inclusive Dam, a wealth creating platform.

The Inclusive Dam we aim to design and build shall be a Hoover Dam today, targeted to position itself as an engineering marvel in the year 2020. It shall serve as an infrastructure for decades to come. We need a platform of solidarity on which the world citizens can come and work together beyond local and national boundaries. Inclusive Dam shall be grown to be, as we envision, such a global platform on which world citizens can come together and trade with each other in a digital contact fashion. This blockchain and AI network will allow not only free sharing of information but also of paying for digital services and products.

With the Inclusive Dam, a worldwide digital market can be built in the future. Such a network has never been built yet.

There would be critics complaining such a network cannot be possible and prone to failure due to security risks.

It certainly is a challenging task; but BEC believes it can be done.

The world economy is expected to change dramatically depending on who leads the information economy. The Dam will contain an ocean of information. Around this resource “water” many relations can be formed. Such networked relations will grow thicker and diverse; this network is the source of new knowledge. New knowledge creates new information; new information solves problems and creates wealth; lives of human beings grow easier. Thousands of venture startups can be launched. Funding to venture startups are done through digital money offered within the Inclusive Dam. This wealth creation process will be repeated.

C. ABCD Brain Service

Individual citizens share computer to form the blockchain and AI network. Members come up with a governance rule. It can be programmed in to the operating protocol for the network. They govern, for example, how the data is shared, utilized and expensed. How to utilize the gathered data and pay for it. How to train the AIs from the data. How they can be sold for a service upgrade. How an updated AI program can be download to the Friend Robots. FRs then provide upgraded financial/medical/legal services to the human owner. We call this ABCD Brain Service.

D. Timeliness and Global Vision

The world economy is rapidly shrinking due to the increase in the unemployment rate due to COVID-19 and the collapse of traditional industries such as airline and travel industries. Depression and suicides are on the rise due to the psychological atrophy of the members.

Such Dams operate on the open internet and thus they can be expanded to serve the world citizen as well whoever choose to join from anywhere in the world. World citizens have motivation to come thanks to the offering of ABCD Brain Service and

ABCD Value Creating Process.

The global expansion of the Inclusive Dam means the extension of the Korean virtue, i.e., world citizens live in harmony. Citizens of the world can come together and respond to global problems such as pandemics, natural disasters, fine dusts, greenhouse gases, and climate changes.

VII. CONCLUSION

At the center of our proposal, there are the human beings. We have shown how ABCD technologies can help us. Using these technologies, we aim to build a digital SOC—Inclusive Dam and Friend Robots. The Hoover Dam built under the *New Deal* was strong enough to withstand the constant force of Colorado River for the past 85 years. Inclusive Dam and Friend Robots are to make us lead a balanced society. The dam and robots offer us shelters against predatory waves and shocks such as pandemics, devaluation of currencies, dislocation from work, and global financial crisis. The pressure to adapt in the era of 4th industrial revolution will be lessened. No one should be left behind. But at the same time, it also aims to deliver the message “it is no fun without innovation.” Wealth is created when new knowledge is born. To create new knowledge, we need to fund R&D projects. To create services and products, we fund venture startups. Through the virtuous cycles of innovation and inclusion, we are envisioned to move a step closer to an inclusive society.

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