The Climate Ledger Initiative and #Hack4Climate

Digitalization of data and Distributed Ledger Technology (DLT) may become core drivers for sustainable development of the global economy. The Climate Ledger Initiative and #Hack4Climate are exploring the potential of DLT in the context of digitization by means of research on innovation on how they may support sustainable development on a global scale.

by Sven Braden and Nick Beglinger

According to the Brundtland Report «sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.» Today, the concept of sustainability can be described as a core development objective that countries, companies and individuals are gradually working towards. The United Nations 2030 Agenda for Sustainable Development as well as the Paris Agreement on Climate Change, both adopted in 2015, are set to pave the way for sustainable development on a global scale.

In order to monitor sustainable development, we need technology and processes that enable us to obtain accurate data and analysis. Accurate data form the basis for informed decisions on policies and measures to support sustainable development. Digitalisation helps to coordinate efforts on the part of data producers and users from multiple data systems. Digitalisation will also be key to identify innovative ways to produce and apply data and statistics when addressing multifaceted challenges of sustainable development and climate change. The Internet of Things (IoT) and machine learning algorithms are promising products of today's digitalisation. With IoT we will see more and more machines, sensors and other devices gathering data while communicating with each other. Combined with modern machine learning algorithms we will be able to use data of the past in order to predict events in the future. These processes can become very useful when monitoring and predicting the paths of sustainable development.

While digitalisation is core with respect to data generation and analysis, it is the distributed ledger technology (DLT) that may unleash the full potential of digitalisation for sustainable development. To that respect it is important to note that DLT itself is not a software or a product. It is more like a social technology which provides a new way to create unique assets, share data, and digitally transfer value in a decentralised and secure way. These features are extremely powerful, since they allow for new levels of transparency and inclusiveness – key success drivers on our way to a more sustainable economy.

«DLT may unleash the full potential of digitalisation for sustainable development.»

Today, many environmental frameworks already produce valuable information, such as various carbon pricing schemes around the world that monitor GHG emissions. Other approaches monitor economic activities with respect to the influence of natural resources like water, land and / or forests usage and may even determine the consequences for biodiversity in given areas. However, their usage is limited either due to their respected boundaries (e.g. to state territories or to areas of

«self-determined» corporate responsibilities) or because their data is captured in closed data silos (e.g. labelling services). Stakeholders are reluctant to share data in centralised structures, the multitude of environmental frameworks causes duplication of work, and thus misses out opportunities to use synergies, create integrated systems, and learn from the gathered data.

DLT allows users to share data, while retaining control. This in turn fosters transparency and thus greater stakeholder inclusion. Directly linking commodities like oil, gas, wood or rare minerals to their environmental impacts is one interesting use case that DLT could enable in the near future. The digital representation of commodities inclusive of its environmental impact would be stored on a distributed ledger. Every commodity and its associated impacts would be reflected in a unique identification code and put on a universal and distributed ledger system. This would allow to follow the impact until the commodity reaches its final destination (e.g. for supply chains). Over time an immutable track record related to the goods and services would be created. The data gathered that way would provide important information for producers, consumers, investors and decision makers in order to decrease environmental impacts in the future while promoting sustainable development. Furthermore, commodities could be tagged with information about taxes, levies or subsidies that have been applied to it. The use of such information in a decentralized network could address one of the major headaches of global firms who move products across borders that are subject to different carbon pricing schemes.

«Digitalization and DLT show great potential in the context of the SDGs and the Paris Agreement.»

The potential of combining digitalisation and DLT does not stop here. It also provides for new innovative ways of data usage. The DLT integration of industrial processes with the production of goods and services could be complemented by data gathered by people or whole communities who are involved in the supply chains of goods and services. The fisherman in Peru, the farmer in Kenya, the woodcutter in Romania or the tourist guide in Indonesia – they all could put information related to their activities via smart phones on decentralized ledgers which would complete the impacts of associated goods and services. Smart contracts would offer access to this data to interested stakeholders in return for payment, which would be directly forwarded via microtransactions to the data collectors. These data may not only be valuable for governments and multilateral organisations but also for food companies, insurances or impact investors.

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Although the combination of digitalization and DLT shows great potential, especially in the context of the 2030 Agenda for Sustainable Development and the Paris Agreement, it must be kept in mind that DLT is still in its infancy. It is thus crucial to strive for comprehensive research and innovation activities at the intersection of climate and DLT.

The potential of DLT for climate was first raised by the Zurich-based Cleantech21 foundation (C21) during the UN Climate Conference in Morocco in 2016. Still in the same year, LIFE Climate Foundation Liechtenstein and C21 teamed-up to launch a series of stakeholder workshops, including international experts from both climate and IT communities. This work was driven by the aim to better understand the power of digitalisation in general, and DLT for climate action in particular. After analysing workshop results, C21 and LIFE Climate Foundation Liechtenstein invited the Swiss environmental consultancy INFRAS and the Gold Standard Foundation to jointly establish the Climate Ledger Initiative (CLI). Upon establishing formal links with the UN Climate Change Secretariat, CLI obtained initial financial support from the governments of Liechtenstein and Switzerland. It also defined the first five blockchain use cases supported by the EU's Innovation Program Climate-KIC. CLI today runs a research agenda and integrates multiple stakeholders. It currently invites other governments and multilateral organisations to join this initiative.

At the last UN Climate Conference in Bonn, Germany in 2017, CLI presented its research agenda and introduced the five use cases to an international audience. At the same time, C21 organized #Hack4Climate, the first-ever hackathon linked to an UN Climate Conference. During the five-day program IT developers from around the world worked on DLT based solutions to accelerate the implementation of the Paris Agreement on Climate Change. The event was held in partnership with CLI, UN Climate Change Secretariat and the World Bank's Connect4Climate initiative and officially supported by the UN Climate Change Secretariat.

C21 received more than 500 hackathon applications in the course of an elaborate registration process, involving preparatory workshops in global DLT hubs from San Francisco to Shanghai and Berlin to Johannesburg. At the end 100 young developers from 33 countries with core skills in DLT, artificial intelligence and machine learning were selected and invited to come to Bonn. From build-up to main event and follow-up, the spirit, collaboration and project results of #Hack4Climate exceeded all expectations and clearly demonstrated strong interest in the intersection of climate and DLT.

The winning team of #Hack4climate was GainForest, a project that wants to encourage anyone in the world to become a caretaker of the Amazon rainforest. In addition, GainForest will use exiting

data to feed computers in order to predict what areas of the Amazon rainforest are at risk of deforestation and then use the model to boost payments to protect forest in these areas.

Other winning teams include Autonomie, developing an end-to-end transport booking and payment platform that allows users to seamlessly transit between public and private transport. Planet Life, exploring how gamification and incentivisation can help prevent deforestation. Evoke, looking at how blockchain can help people affected by climate change to communicate with the rest of the world to take action, and Balcony Climate, which explored hyper-local air quality monitoring.

The organisers enjoyed the support of strong partners and sponsors, including some of the world's leading companies, universities, and foundations. C21 will continue to develop the #Hack4Climate format and will hold its next main hackathon event at The UN Climate Change Conference in Poland in December 2018.

CLI and #Hack4Climte will continue their research and innovation activities within the area of digital data and DLT in order to support sustainable development on a truly global scale.

About Blockchain:
Blockchain – today's most prominent DLT: By the use of web clients thousands of computers form a network which monitors and records data transaction along commonly agreed rules. Based on these rules, every single computer creates its own database. After every new data block insertion, the whole dataset of every computer in the network is given a unique ID (using cryptographic coding procedures). Instead of a time-consuming reconciliation of all computer databases in the network, every computer just checks the latest dataset ID against the ID of the majority of the network computers. This is how every participant can be sure to look at the same data. Thus, consensus about the actual content of the distributed database is achieved without the need to trust a centralized authority. In addition to that the data is now stored on thousands of computers. Any attacker of the network would have to change the data set entry of every single computer in order to change the database status. This is why data stored on distributed ledgers is often described as being stored immutably.