

Decentralization \neq Equality?

DINRG Interim Meeting: Centralization on the Internet

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In the last decade, the Internet has been perceived to become increasingly centralized, as most of the exchanged information is stored, processed, and served by so called “hypergiants”. Their large-scale, global infrastructures are able to provide benefits in terms of availability, performance, and security thanks to their resource richness, which provides scale benefits and further drives centralization. However, these increasing centralization trends have led to concerns regarding user privacy and data sovereignty. As such, the networking community has expressed interest in (empirically) studying the motivation, extent, and implications of such centralization trends in the Internet ecosystem from technological, societal, economical, and legal points of view.

In recent years, many novel decentralized alternatives to the services offered by hypergiants have been proposed to counteract Internet centralization. These solutions are typically P2P-based, such as Distributed Ledger Technologies (DLT) like blockchains or DAGs, or the InterPlanetary File System (IPFS). In contrast to the centralized systems, the authority, control, but also the overall operational cost is broken down and split across the different peers of the P2P network, with the goal of making it more robust, removing central trust anchors from the network, and “give power back to the users”.

Nevertheless, despite being technologies that foster decentralization by concept, the question of whether these decentralized systems are truly fair and equal for its users remains open: Participation in P2P systems usually requires the peers to contribute their own resources (such as data, storage, bandwidth, or computing power, among others) in a tit-for-tat manner, which will increase the cost for an average user. Thus, with a lack of sufficient resources, the value that a user can obtain from a decentralized system can be severely limited, which may lead to inequalities. E.g., in a Proof of Work-based blockchain, miners that run large server farms can crowd out smaller miners, meaning that smaller miners are unable to leverage the system (or benefit from it) to its full extent or (in the worst case) at all. In centralized systems, upfront costs are largely covered by the central entity, i.e., clients with fewer resources can also use network and its services equally (or at least similarly) to clients with more resources; however, all the control lies with the central entity, making the system differently unequal.

Therefore, during the interim meeting on Centralization on the Internet, a comprehensive discussion around motivations and implications of Internet (de)centralization along with the associated tradeoffs (benefits and drawbacks) for different stakeholders from different points of view (technological, societal, economical, legal, regulatory) is essential to have more fair and equal solutions for the Future Internet.