

Grassroots Platforms: Beyond Decentralisation

DeTaP Workshop, AFT 2026

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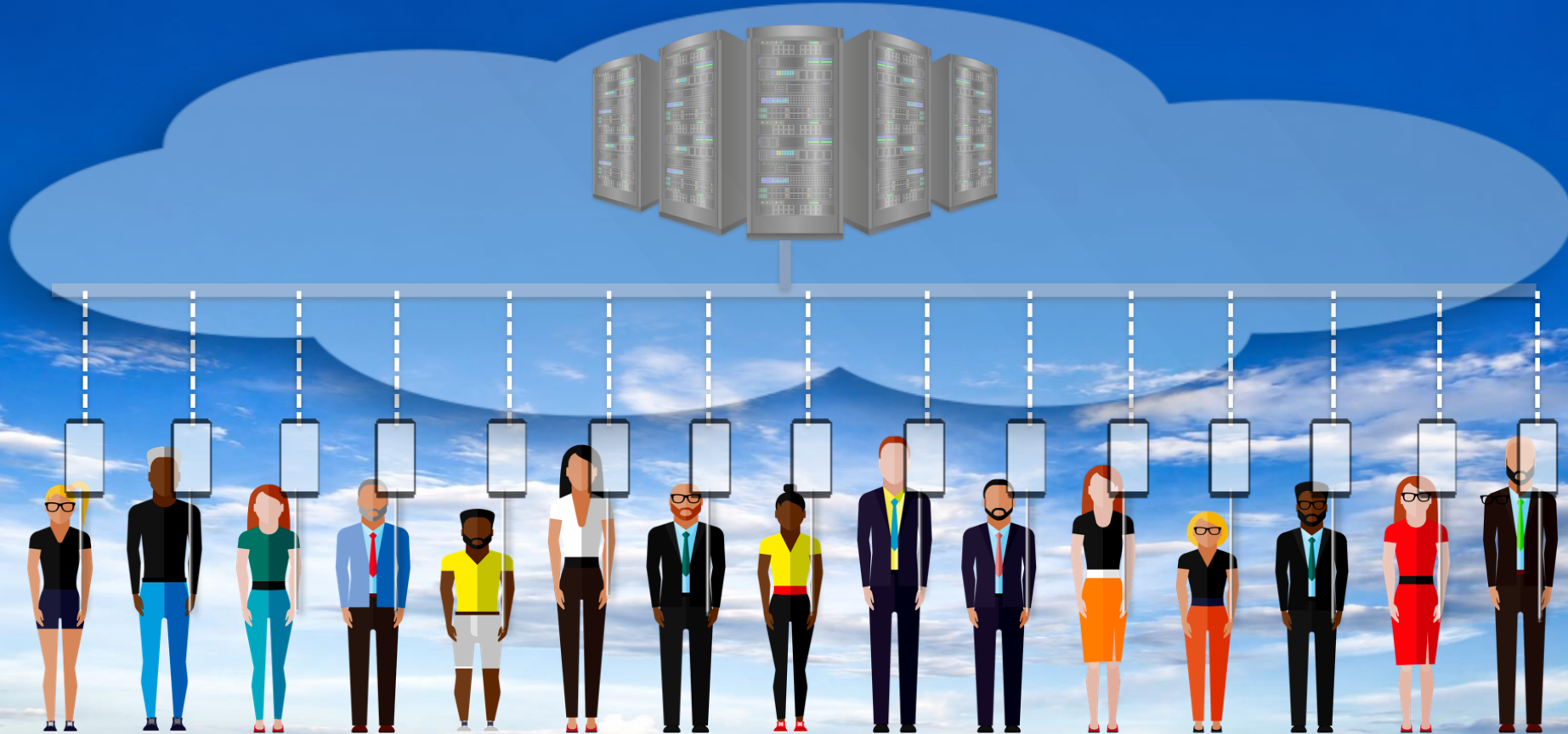
Global Platforms – Centralised



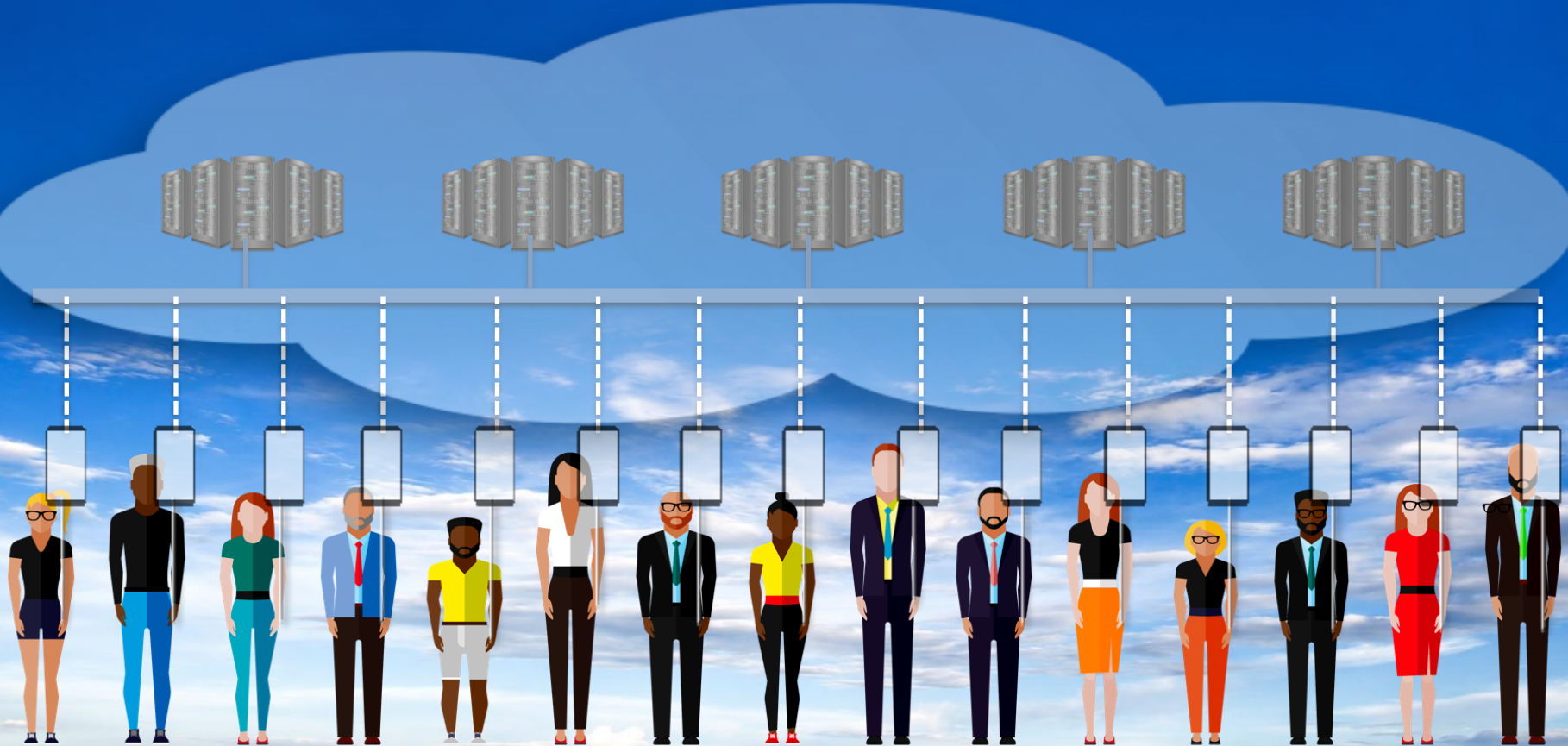
Global Platforms – Decentralised



Global Platforms

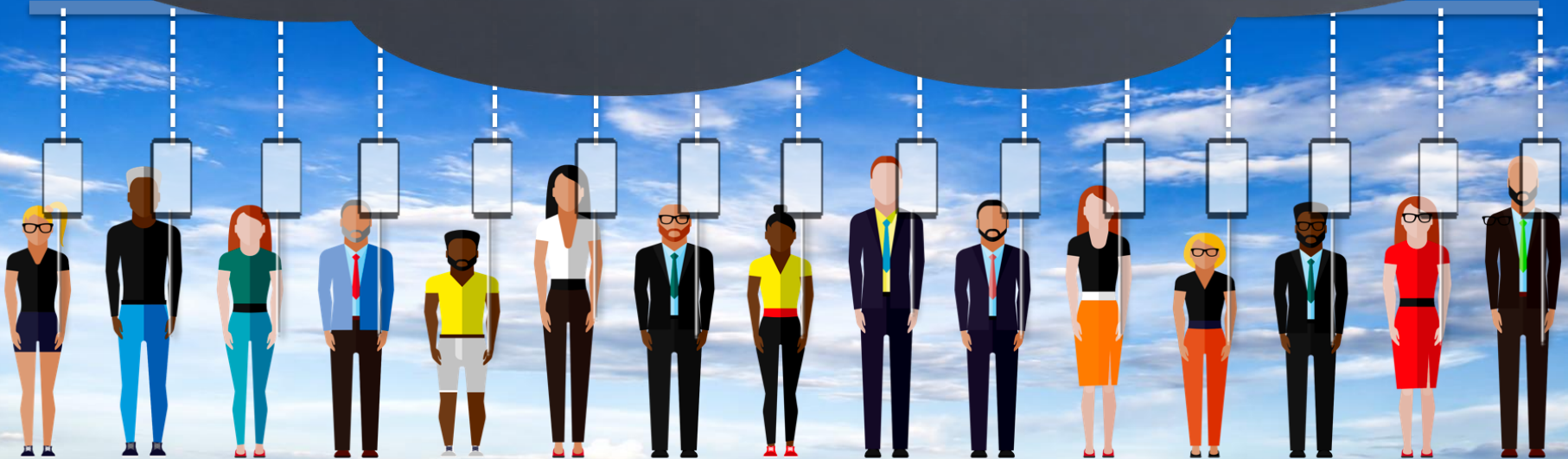


Global Platforms

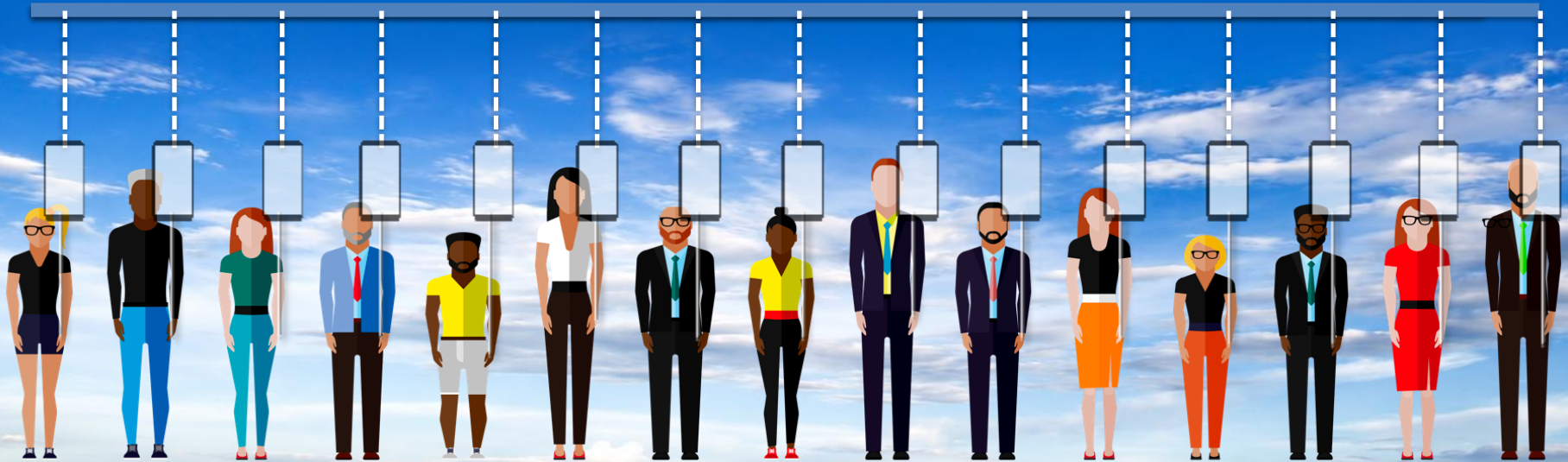


Global Platforms

monolithic entity
owned, operated and governed by others

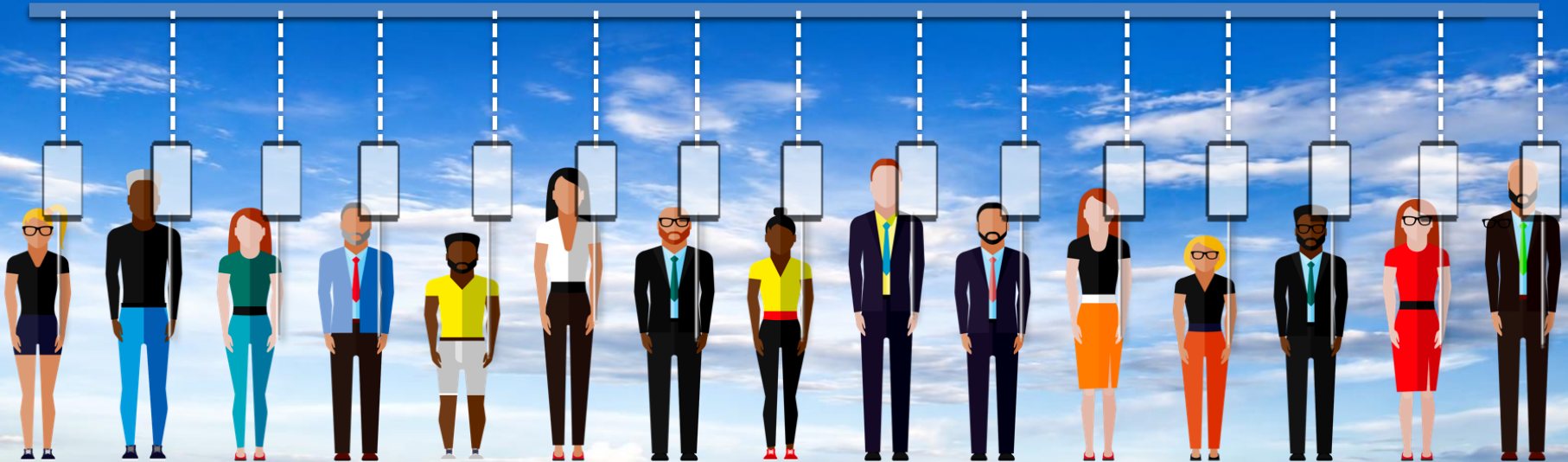


Grassroots Platforms



Grassroots Platforms

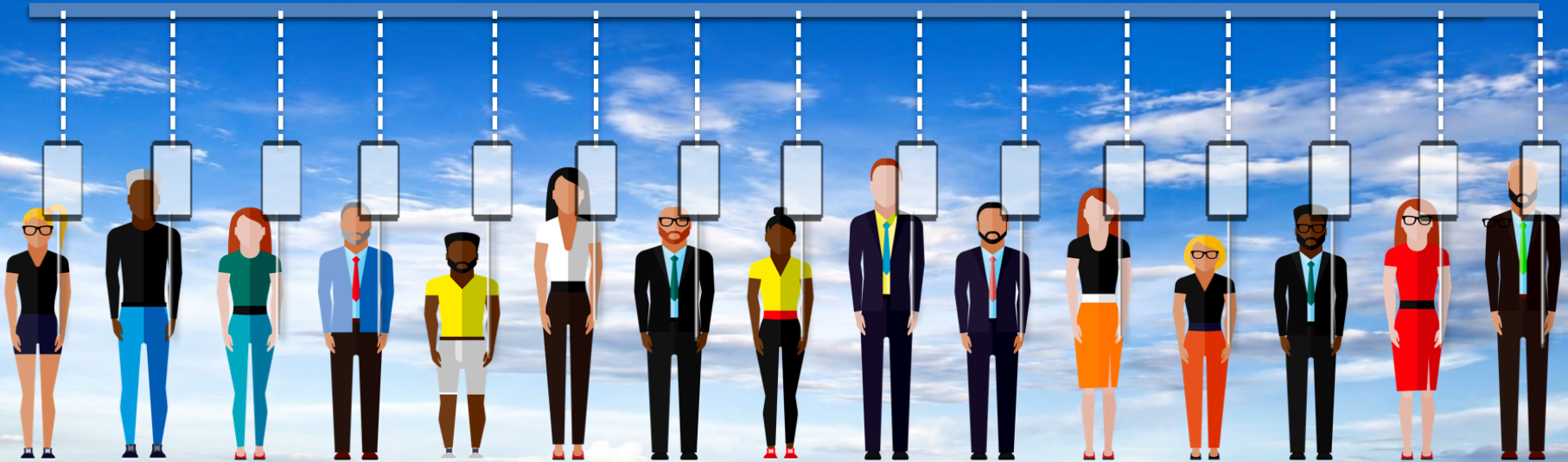
owned, operated and governed by their participants



Grassroots Platforms

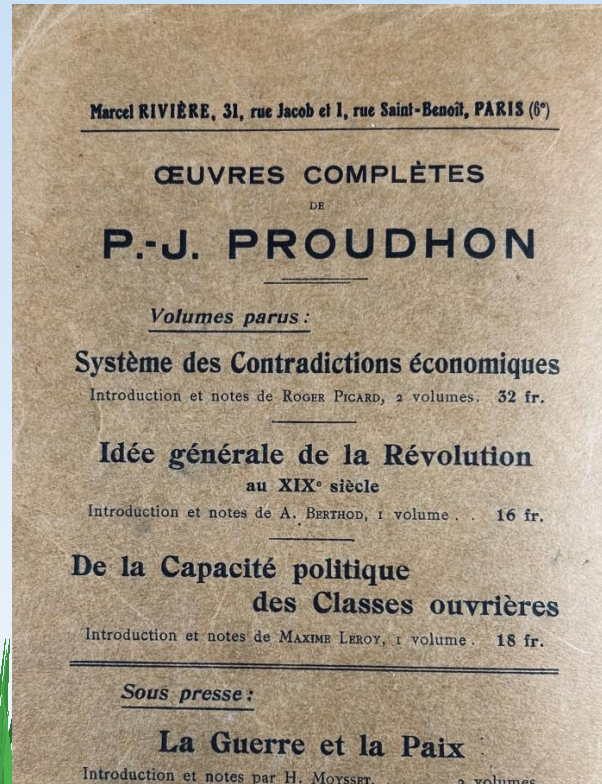
Social networks, cryptocurrencies, DeFi,
“Sharing Economy” ...

owned, operated and governed by their participants



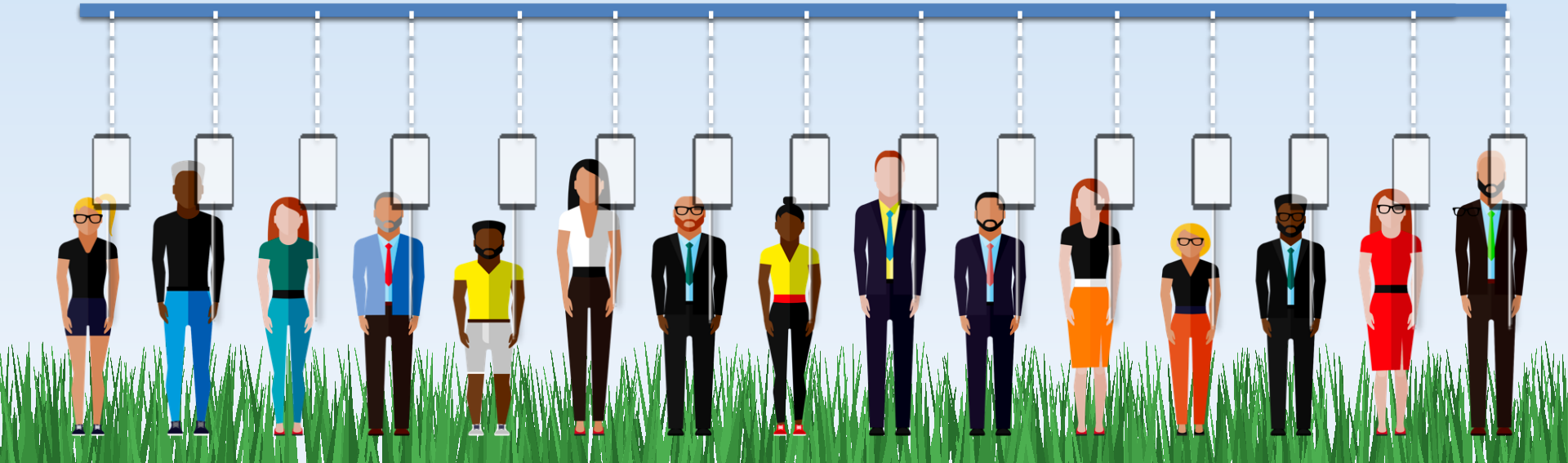
Grassroots Platforms

Pierre-Joseph Proudhon (1809-1865)
“the first Anarchist”



Grassroots Platforms

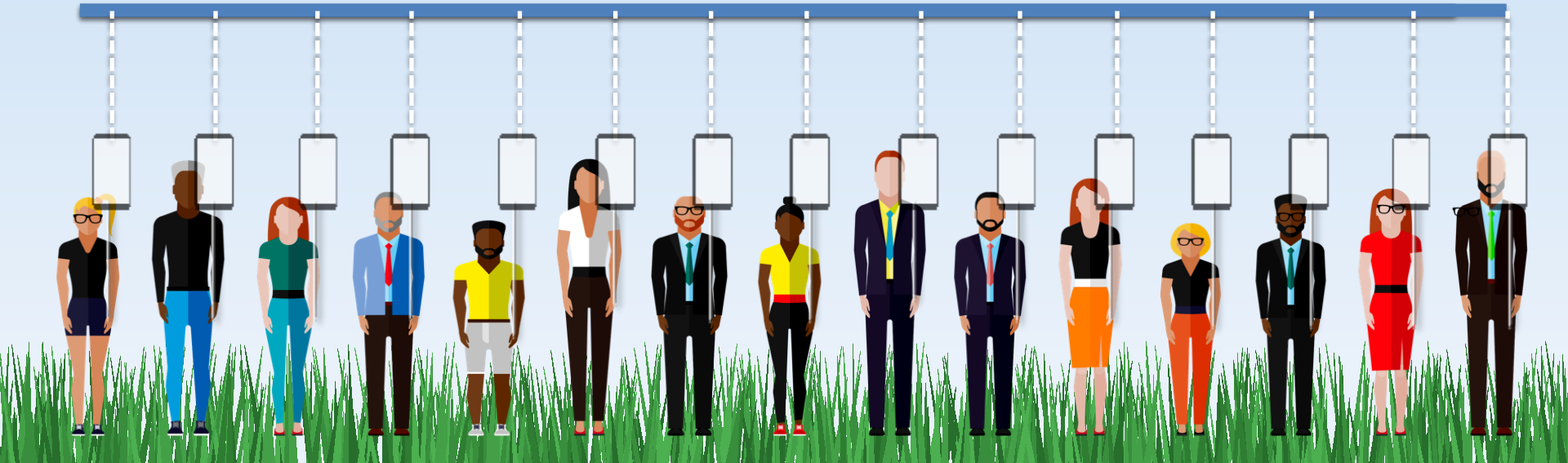
Digital incarnation of Proudhon's **social contract**:



Grassroots Platforms

Digital incarnation of Proudhon's **social contract**:

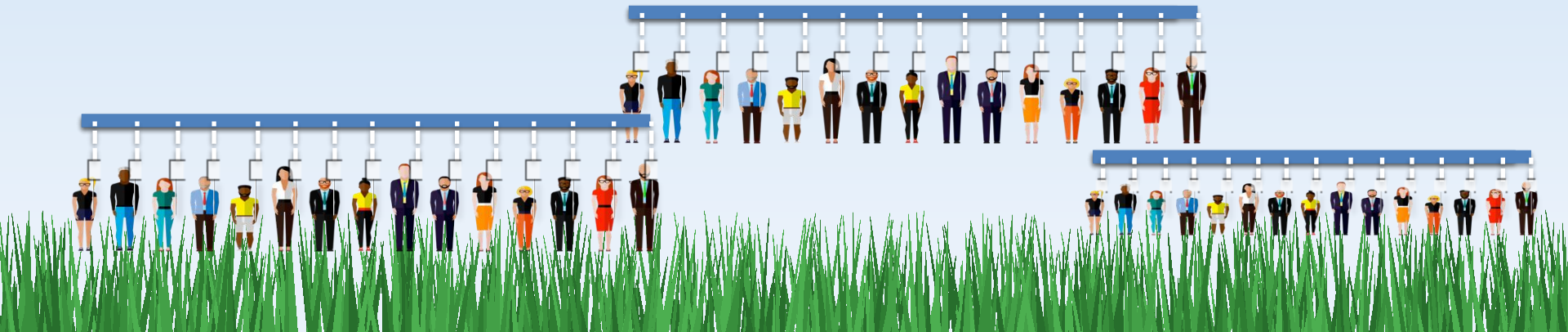
1. Multiple instances



Grassroots Platforms

Digital incarnation of Proudhon's **social contract**:

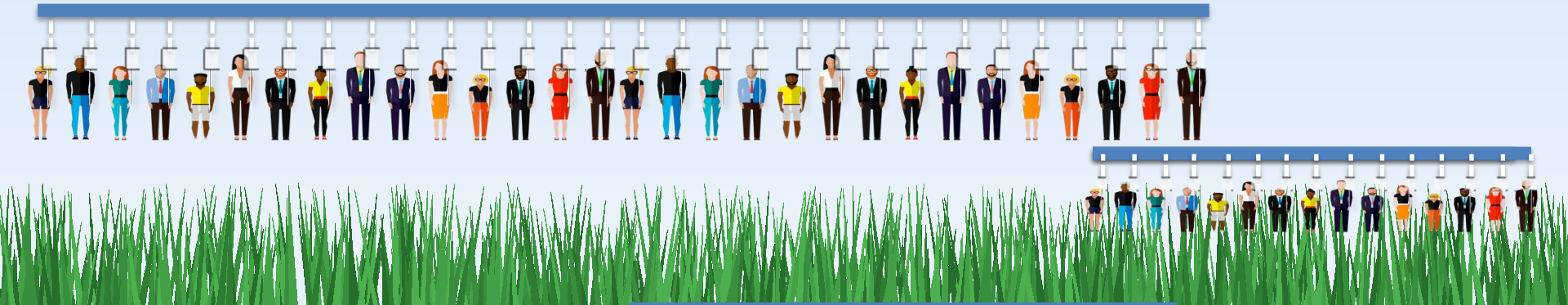
1. Multiple instances



Grassroots Platforms

Digital incarnation of Proudhon's **social contract**:

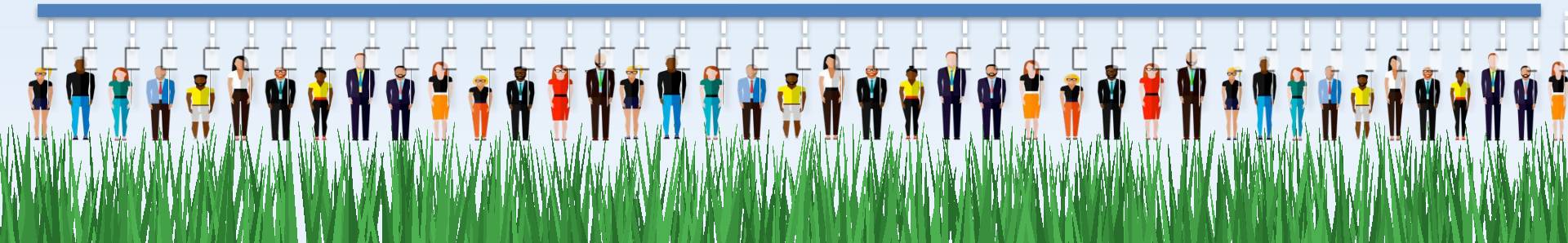
1. Multiple instances
2. May coalesce into a single instance.



Grassroots Platforms

Digital incarnation of Proudhon's **social contract**:

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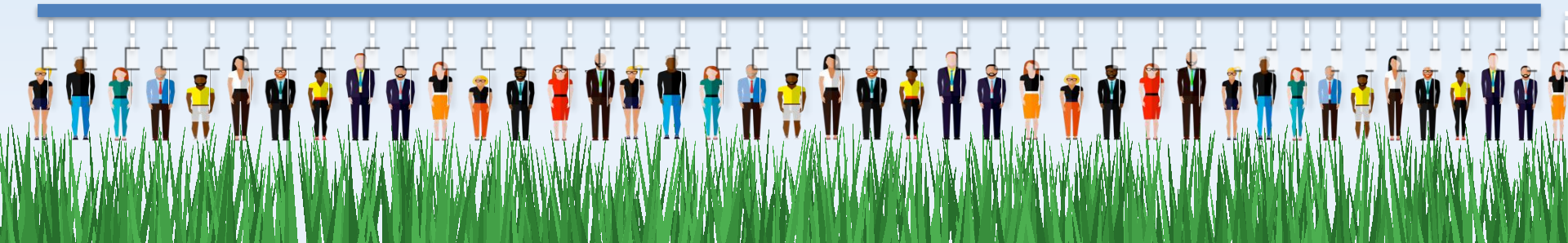


Grassroots Platforms

Digital incarnation of Proudhon's **social contract**:

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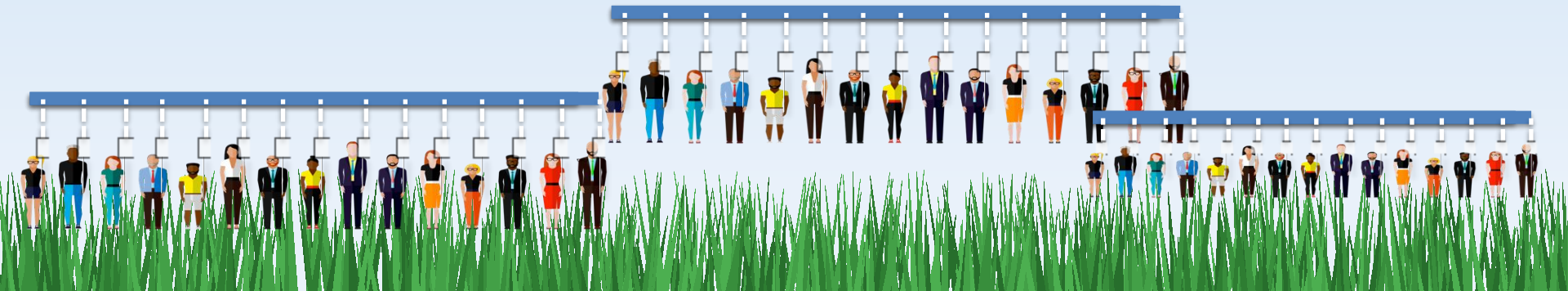
people, unlike machines, have free will



Grassroots Platforms

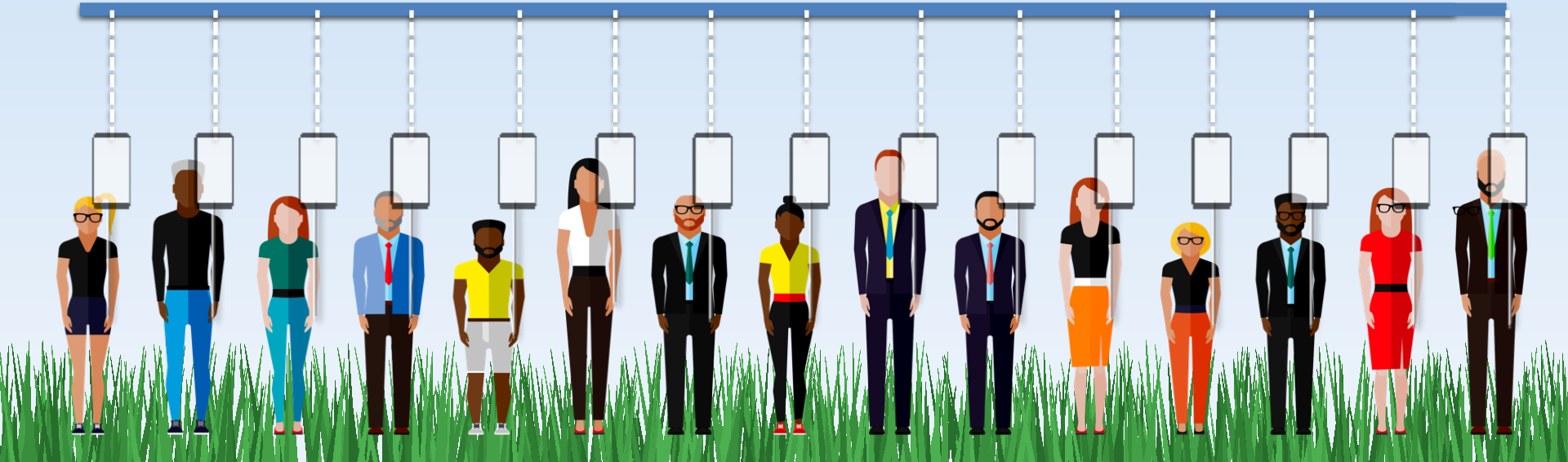
Digital incarnation of Proudhon's **social contract**:

1. Multiple **volitionally-forming** instances
2. May coalesce **by mutual consent**, possibly into a single global instance.



Grassroots Vision: Egalitarian and Democratic Digital Realm

Build grassroots platforms competitive with
centralised and decentralised global platforms.
owned, operated and governed by their participants



10 years of paper writing...

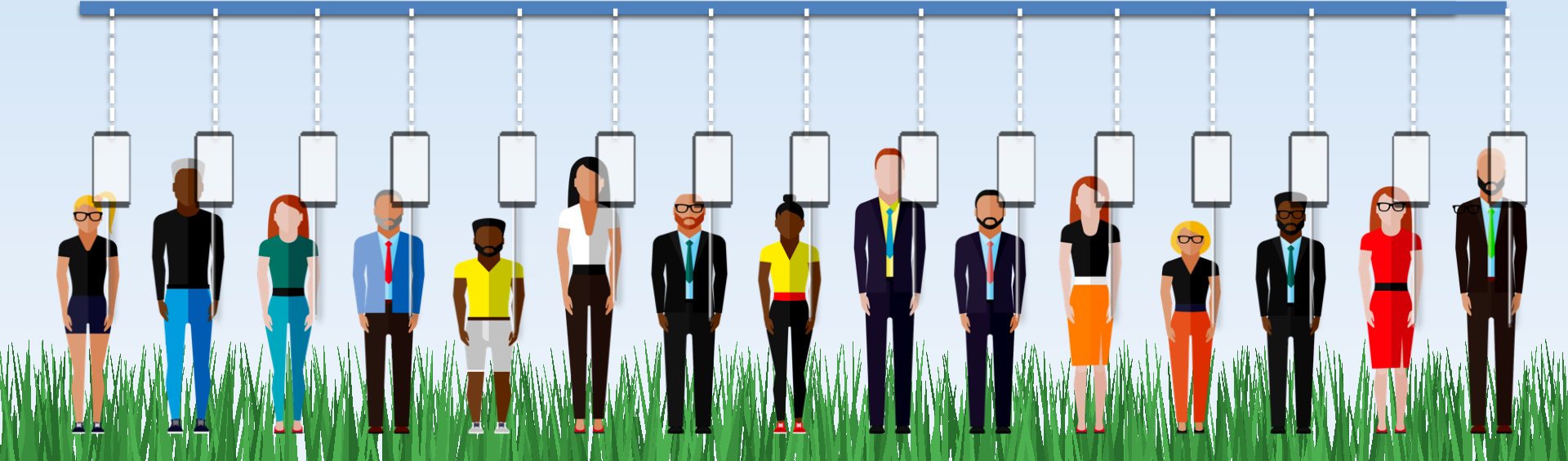
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Formalising and Implementing Grassroots Social Contracts: From Legal Text to Grassroots Platforms (Full Version)
Authors: James Golike, Andy Lewis-Pye, Ehud Shapiro
Abstract: Two centuries ago Pierre-Joseph Proudhon envisioned a social contract that is (1) an agreement of man with man; (2) reciprocal; (3) imposing no obligation upon the parties except that which results from their personal promise; (4) subject to no external authority; (5) freely accepted and signed by all the participants; (6) of the nature of a contract of exchange. He also envisioned a property of s... [More](#)
Submitted 13 September, 2026; **v1 submitted** 5 September, 2026; **originally announced** September 2026.
2. [arXiv:2609.27727](#) [\[pdf, ps, other\]](#) [econ.GN](#) [cs.DC](#) [cs.MA](#)
Sovereign Grassroots Currencies: A CBDC Architecture for Credit and Monetary Policy (Full Version)
Authors: Ehud Shapiro
Abstract: A Central Bank Digital Currency (CBDC) is central-bank money in digital form, held by the public. Leading designs have two limitations: conversion from bank deposits into CBDC can accelerate deposit flight, requiring safeguards, and the CBDC stays outside credit creation and monetary-policy operations. Here we present a CBDC architecture based on grassroots currencies that overcomes these limita... [More](#)
Submitted 24 September, 2026; **v1 submitted** 23 September, 2026; **originally announced** September 2026.
3. [arXiv:2607.14138](#) [\[pdf, ps, other\]](#) [cs.PL](#) [cs.AI](#) [cs.DC](#) [cs.HC](#) [cs.MA](#)
Volition Elicitation: Operational Semantics for People and Their Machines
Authors: Ehud Shapiro
Abstract: The most prevalent distributed systems today include people and their personal machines (smartphones). In such systems, computations are driven by people's volitions: a payment when a person wishes to pay someone, befriending when two people wish to become friends, etc. Volition-Guarded Multiagent Atomic Transactions were proposed as an abstract specification language for such systems, in which ea... [More](#)
Submitted 10 July, 2026; **originally announced** July 2026.
4. [arXiv:2607.02304](#) [\[pdf, ps, other\]](#) [cs.DC](#) [cs.CR](#) [cs.MA](#)
Securing People and their Machines Against Major Faults
Authors: Ohad Eltan, Idit Keidar, Ehud Shapiro
Abstract: We consider grassroots platforms – distributed systems of agents consisting of people identified by self-chosen public keys and their machines (smartphones) – and wish to make them secure against lemp(major faults): the loss of their private keys and/or their smartphones. As grassroots platforms have no global resource to rely on for recovery, our peer-based solution is based on: (1a) lemp(a... [More](#)
Submitted 11 September, 2026; **v1 submitted** 2 July, 2026; **originally announced** July 2026.
5. [arXiv:2607.21189](#) [\[pdf, ps, other\]](#) [cs.PL](#) [cs.DC](#) [cs.LO](#) [cs.MA](#) [dbp](#) [10.4204/EPTCS.450.11](#)
GLP: A Grassroots, Multiagent, Concurrent, Logic Programming Language for AI
Authors: Ehud Shapiro
Abstract: A grassroots platform is a multiagent distributed system in which multiple independent instances can form and operate independently of each other and of any global resource, yet may coalesce into ever larger instances, possibly resulting in a single global instance. Grassroots platforms aim to offer an egalitarian/democratic alternative to centralised/autocratic and decentralised/plutocratic glo... [More](#)
Submitted 23 July, 2026; **originally announced** July 2026
Comments: In Proceedings ICLP 2026, arXiv:2607.17707
Journal ref: EPTCS 450, 2026, pp. 119-133
6. [arXiv:2606.19263](#) [\[pdf, ps, other\]](#) [cs.SI](#) [cs.CY](#) [cs.MA](#) [econ.GN](#)
Digital Speech Acts Retain Control of Copyright with People, Not Platforms
Authors: James Golike, Ehud Shapiro
Abstract: Legal precedents protect computer code as copyrightable expression. They have enabled centralized digital platforms – operating from corporate servers that hold all user data – to construct private governance regimes through the interaction of copyright, contract, and technical architecture: people who create virtually all platform value must surrender effective copyright control through Terms o... [More](#)
Submitted 27 June, 2026; **v1 submitted** 17 June, 2026; **originally announced** June 2026.
7. [arXiv:2605.13362](#) [\[pdf, ps, other\]](#) [cs.MA](#) [cs.AI](#) [cs.DC](#) [cs.CT](#) [econ.TH](#)
Constitutional Governance in Metric Spaces
Authors: Ehud Shapiro, Nimrod Talmon
Abstract: Computational social choice and algorithmic decision theory offer rich aggregation theory but no end-to-end process for egalitarian self-governance: aggregation, deliberation, amendment, and consensus are each considered in isolation, with key metric-space aggregators being NP-hard. Here, we propose lemp(hconstitutional governance in metric spaces). Integrating these stages into a protocol for c... [More](#)
Submitted 7 July, 2026; **v1 submitted** 13 May, 2026; **originally announced** May 2026.

Grassroots Vision (and plan): Egalitarian and Democratic Digital Realm

Build (with AI) grassroots platforms competitive with centralised and decentralised global platforms.
owned, operated and governed by their participants



Grassroots Platforms: Beyond Decentralisation

(Preliminary Draft)

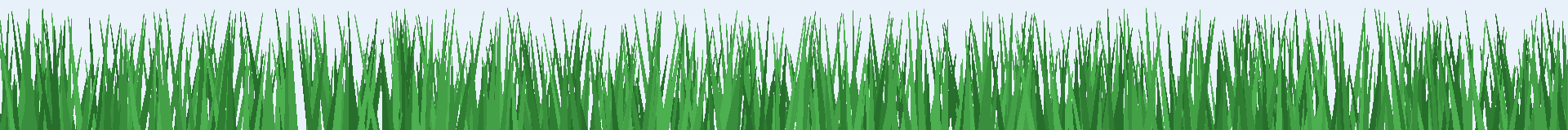
Andrew Lewis-Pye^a and Ehud Shapiro^{a,b}

^aLondon School of Economics, UK, and ^bWeizmann Institute of Science, Israel

Abstract

Decentralisation arose as an antidote to centralised control, with Bitcoin and Ethereum as the prime examples of decentralised global platforms. However, from the perspective of ordinary people, all global platforms—centralised and decentralised alike—appear as monolithic entities, owned, operated and governed by others.

Grassroots platforms are designed to be owned, operated and governed by their participants. They are person-to-person smartphone apps that realise Proudhon's two-centuries-old concept: A social contract that can have multiple, independent, volitionally-forming instances that may coalesce by mutual consent, possibly into a single global instance.



Building Grassroots Platforms **with AI**

1. Human-Science-AI methodology

Paper is the interface between human and AI

2. Abstraction-Cascade programming

The antipode of vibe coding

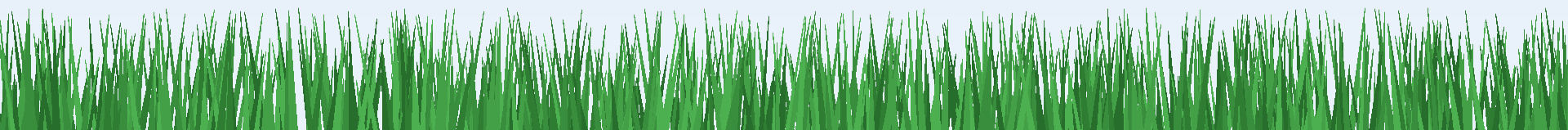


Figure 1: The Abstraction Cascade

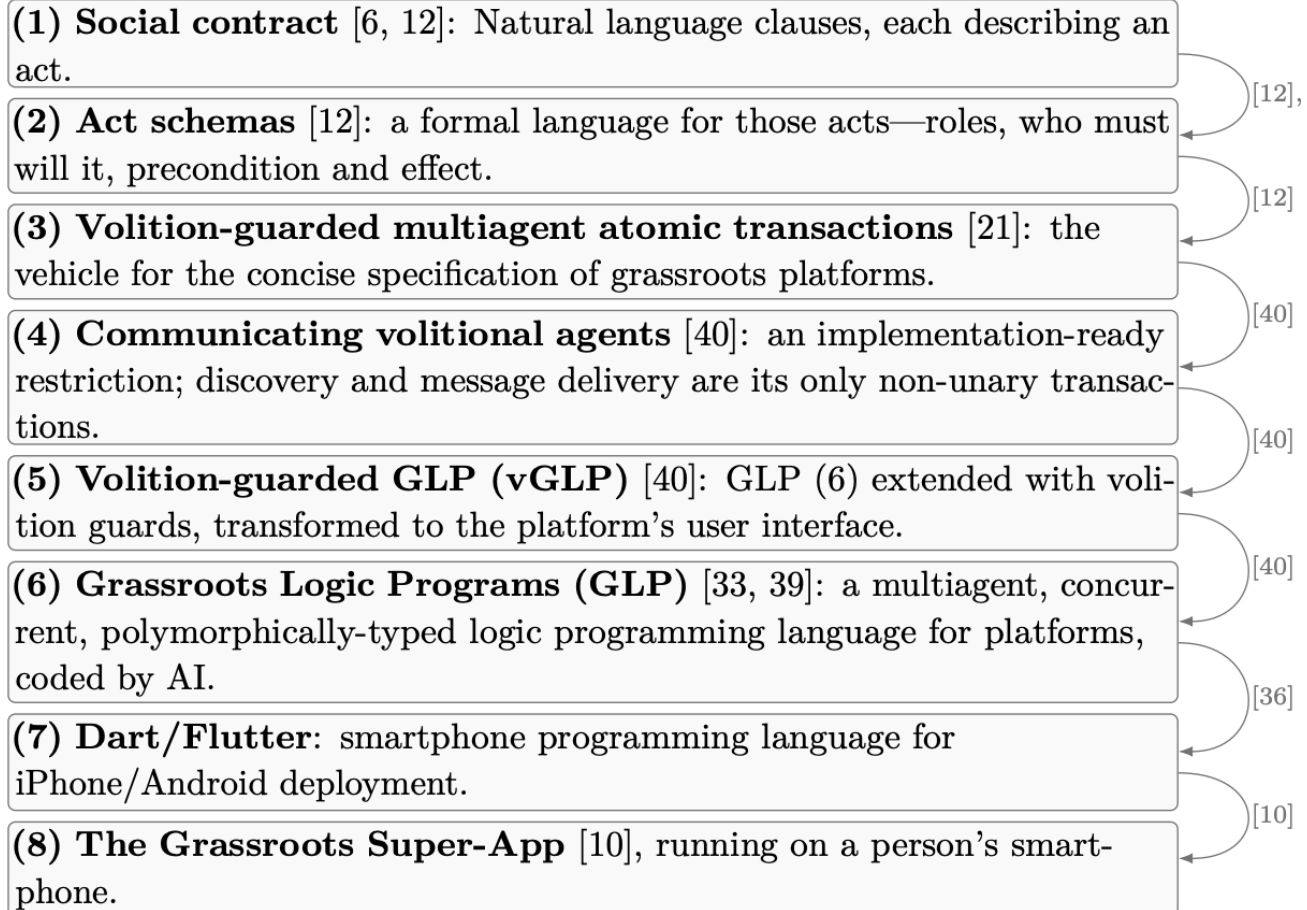


Figure 1: The Abstraction Cascade

(1) **Social contract** [6, 12]: Natural language clauses, each describing an act.

(2) **Act schemas** [12]: a formal language for the acts—roles, who will it, precondition and effect.

(3) **Volition-guarded multiagent** [12]: a formal language for the acts—roles, who will it, precondition and effect.

(4) **Communicative** [40]: a formal language for the acts—roles, who will it, precondition and effect.

(5) **Volition-guarded multiagent** [40]: GLP (6) extended with volition guards for the platform's user interface.

(6) **Logic Programs (GLP)** [33, 39]: a multiagent, concurrent, statically-typed logic programming language for platforms, designed by AI.

(7) **Dart/Flutter**: smartphone programming language for iPhone/Android deployment.

(8) **The Grassroots Super-App** [10], running on a person's smartphone.

AI Coding
the antipode of vibe coding

Table 1: Decentralised vs. Grassroots

Dimension	Decentralised	Grassroots
1. Global state	replicated	distributed
2. Ledger	blockchain, totally ordered, replicated by all operators [22]	attested streams, one per person, replicated by state custodians [11], interlaced into a blocklace [2]
3. Operation	miners/validators armed with high-performance servers	participants armed with smart-phones
4. Trust	trustless	trust-based
5. Sybil resilience	proof of work [22]/stake [17]	grassroots social graph [23, 27, 30, 11]
6. Contract	smart contract, among accounts, operated by third-parties, requires consensus/SMR [9]	social contract [6], among people, operated by the participants, consensus as needed [14, 19, 2, 15]
7. Efficiency	global transactions	local transactions [30, 28]
8. Scalability	global state synchronisation	network or federation of independent local states [42]
9. Governance	plutocratic (one coin – one vote) [5, 4]	democratic (one person – one vote) [15, 41]
10. Essential agents	finite (> 1)	infinite (all but one) [32]
11. Implementation	Bitcoin and Ethereum, deployed at global scale since 2009 and 2015 [22, 44]	implemented and tested on a small scale [40, 10]; simulated with stochastic agents [37]; not deployed

Cryptocurrencies vs. Grassroots Currencies

Crypto	Grassroots
Coins	Coins
DeFi	Bonds
Stablecoins	Sovereign coins

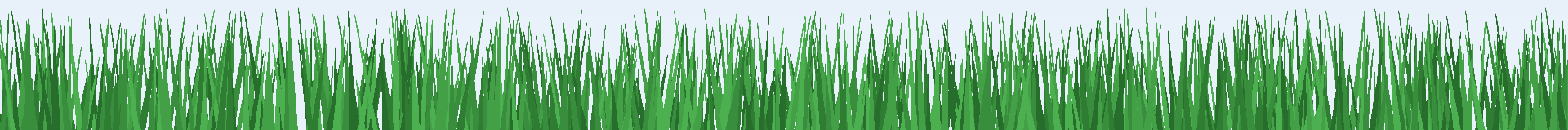


Table 2A: Crypto vs. Grassroots Coins

Dimension	Bitcoin and Ether	Grassroots coins
A1. Unit and backing	unbacked; scarcity fixed by the protocol [22]	the issuer's debt, backed by their offerings and holdings, redeemed at par [28]
A2. Issuer	the protocol, by mining or staking	any person, natural or legal
A3. Ledger	one, replicated, totally ordered	none shared; the issuer's signed log, replicated by their state custodians for fault tolerance [19, 11]
A4. Consensus	on every transaction	none; final on the issuer's countersignature
A5. Transaction cost	computing or locked capital, and a fee	operating a smartphone
A6. Double spending	excluded by the total order	excluded by the issuer's countersignature [19]
A7. Liquidity	a market among strangers	mutual credit lines; payment along chains of holdings; clearing exactly when no member owes more than they hold [28]
A8. Unit of account	one global unit	one per issuer
A9. Loss of key or device	the holdings are lost	identity and log recovered from custodians [11]
A10. Implementation	in operation at global scale since 2009 and 2015	implemented in GLP from the contract; implemented and tested on a small scale [28]; simulated with stochastic agents [37]; not deployed

Table 2B: DeFi vs. Grassroots Bonds

Dimension	Decentralised finance	Grassroots bonds
B1. Credit	lending pools over pooled state, over-collateralised	a bond, the issuer's debt due at a date, redeemed at maturity against a coin [34]
B2. Interest	set by the pool's protocol	the discount at which coins are swapped for a bond
B3. Instruments	smart contracts, automated market makers, flash loans [28]	swaps: loans, sale of debt, forwards; with escrow: payment schedules, options, collateral, guarantees, insurance, credit default swaps, letters of credit, credit lines [34]
B4. Trust	code and overcollateralisation; no counterparty known	the counterparty; the escrow agent; an oracle where an outside event decides; each stated
B5. Order and atomicity	global atomicity and a global order; maximal extractable value [28]	bilateral swaps; no global order
B6. Time	block time	each issuer's attested date; maturity by the issuer's date
B7. Clearing	liquidation by the protocol	the community clears exactly when no member owes more than they hold, once dates advance [34]
B8. Implementation	lending pools and automated market makers in operation at scale	implemented in GLP from the contract; implemented and tested on a small scale [34]; not deployed

Table 2C: Stablecoins vs. Sovereign Grassroots Coins

Dimension	Stablecoins	Sovereign and non-sovereign grassroots currencies
C1. Unit	a fiat-denominated token	a debt of one fiat unit, redeemable at par [38]
C2. Issuer	one party, against reserves it holds	any person (non-sovereign); the central bank (sovereign)
C3. Backing and price	reserves; the peg held by reserves	redemption at par; arbitrage-free price one fiat unit while the issuer redeems; sovereign coins redeemable into fiat [38]
C4. Record and parties to a payment	one ledger on a blockchain; the issuer mints and redeems	payer, payee and issuer; the issuer's log [38]
C5. Credit creation	none	every person, as inside money; banks issue coins in place of deposits
C6. Interest	none to holders	bonds, sovereign and non-sovereign
C7. Monetary policy	none	the central bank lends, absorbs liquidity, sets rates, and buys and sells securities in the coins and bonds the public holds [38]
C8. Runs	a run on the issuer's reserves	a run is on one issuer and is met from their holdings; the central bank issues at its own election [38]
C9. Implementation	in operation at scale	implemented and tested on a small scale [38]; not deployed

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Build (with AI) grassroots platforms competitive with centralised and decentralised global platforms.

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