

From Labor Power to Digital Commons: Evolution of Collective Economic Leverage

Foundations of Labor's Economic and Political Power

Throughout history, labor has been the central source of economic production and a basis of political power. From pre-industrial agrarian societies through the industrial revolutions, working people leveraged certain structural features of labor to assert rights and negotiate with those in power. By examining labor's role across different eras and **deriving first principles**, we can identify why labor was historically indispensable and powerful. In particular, six key characteristics underpinned labor's leverage: **universality**, **inalienability**, **perishability**, **heterogeneity**, **moral legitimacy**, and **reciprocity**.

Labor across Eras – A Global Historical View: In feudal agrarian economies, most people's "labor" was tied to land (e.g. peasants tilling soil or artisans in guilds). Peasant revolts and guild strikes were early assertions of labor power, though often limited by rigid hierarchies. With the **Industrial Revolution**, wage labor emerged as the dominant mode: masses of workers in factories had little initial power, but the concentration of workers in mines and mills spurred collective organizing. The late 19th and early 20th centuries saw the rise of labor unions and socialist movements worldwide – from Britain and the U.S. to colonial regions – all demanding better conditions and political voice. By the mid-20th century (after the Great Depression and World Wars), a "*social contract*" was forged in many countries: organized labor accepted industrial discipline in exchange for living wages, welfare provisions, and legal rights (e.g. the New Deal in the U.S., post-war social democracy in Western Europe). In this era, labor's leverage was institutionalized via collective bargaining, labor parties, and laws guaranteeing the right to organize. However, late 20th-century globalization and automation began eroding these gains – capital became more mobile and technology started replacing routine jobs, weakening the bargaining power of national labor unions. Yet even as union density fell, the **structural features of labor** remained inherently present. Below we detail those six features and how they gave labor unique power:

- **Universality:** Nearly everyone is endowed with the capacity to work. Labor is a **ubiquitous endowment** – unlike land or capital, which are concentrated, labor power (the ability to exert effort) is distributed across the entire population. This universality meant that historically the working class was the majority, forming a broad base for social movements. It also ensured that labor was a necessary input in *every* industry and locale. No matter the era – be it ancient farms or modern factories – human labor was needed everywhere, making workers collectively "non-substitutable" on the whole. Even as technology advanced, labor's universality persisted (albeit with shifts in required skills). Because everyone had labor to give, there was a built-in democratic potential: if workers organized en masse (e.g. general strikes), they could wield nationwide economic disruption, a potent source of political pressure.
- **Inalienability:** Labor cannot be separated from the person who labors – it is **inherent to human life and dignity**. Unlike a commodity or machine, a person's labor power is not something that can be permanently sold or transferred; it can only be rented for a period (as wages for work). As

economist Karl Polanyi famously noted, “*Labor is only another name for a human activity which goes with life itself...nor can that activity be detached from the rest of life, be stored or mobilized.*”. This inalienability meant that an employer could never fully own workers the way one owns a machine (except under slavery, which was outlawed on moral grounds). Workers always retained the right to withhold their labor – to quit, strike, or slow down. This gave them leverage at the bargaining table: unlike capital assets, **labor could refuse to be deployed** if conditions were untenable. Inalienability also underlies many labor rights (the “*inalienable rights of workers*” to have a say in conditions) and is tied to human dignity – treating labor purely as a commodity is viewed as morally unacceptable.

- **Perishability (Temporal):** Labor is a perishable resource – a day’s labor not used is gone forever. Each worker’s time and effort are available only in the present and cannot be stockpiled. This “*temporal perishability*” gave labor leverage because work stoppages impose immediate and irretrievable losses on employers. For example, if workers strike for a week, that week’s production is permanently lost – management cannot recover it later. This pressure tends to force employers to negotiate to avoid sustained work stoppages. By contrast, capital (machines, inventory) can often sit idle and be used later, but **idle labor time evaporates**. Historically, this asymmetry was obvious: factory owners faced mounting costs from halted assembly lines during strikes, whereas workers, though also hurt by lost wages, knew that the **cost to capital of lost production was irreversible**. Labor’s perishability thus underpinned tactics like strikes and slowdowns as effective leverage.
- **Heterogeneity (and Tacit Skill):** Labor is not a uniform commodity – **skills, experience, and effort quality vary greatly** from person to person. In different industries and eras, certain workers possessed unique know-how or abilities that made them hard to replace. For instance, skilled craft workers and engineers in early 20th-century industries had tacit knowledge of production processes that employers depended on. Even unskilled labor has heterogeneity in the form of *tacit coordination* and localized experience – a dockworker crew that knows the ins-and-outs of a port, or a team of miners intimately familiar with a mine, cannot be swapped out overnight without loss of efficiency. This heterogeneity gave groups of workers **pivotal power** if their particular contribution was critical. A historical example is the longshoremen (dockworkers) on the U.S. West Coast: they maintained high wages even as shipping mechanized, in part because their union controlled a scarce, specialized labor pool for loading ships. In the 2010s, over half of West Coast longshore workers earned six-figure salaries, reflecting the union’s enduring bargaining power in a critical, skill-intensive chokepoint of global trade ¹. More generally, employers have often found that replacing an experienced workforce with new hires or machines entails hidden costs and inefficiencies, especially when **tacit knowledge** (informal on-the-job expertise) is involved. Thus, labor’s heterogeneity – each person’s labor is a slightly different “product” – historically prevented a complete commodification of work and allowed strategic groups of workers (skilled trades, key sectors) to demand a premium or to resist exploitation.
- **Moral Legitimacy:** Labor movements have typically enjoyed a moral and political legitimacy in the public sphere that other interest groups often lack. The idea that workers “*deserve fair treatment and a voice*” has deep ethical appeal – after all, it is labor that produces the wealth of nations. From religious and philosophical teachings on the dignity of labor to modern human rights (e.g. the United Nations’ affirmation of workers’ rights), there has been broad recognition that treating workers well is a matter of justice. This moral high ground empowered labor politically. For example, early 20th-century calls for “**industrial democracy**” – giving workers a say in their workplace – were framed as extensions of democratic rights and human dignity. Labor activists successfully argued

that a just society required reciprocal obligations between labor and capital. As a result, many governments acknowledged the **moral legitimacy of labor's claims**, enacting labor protections and negotiating with unions as representatives of the working class. Even in strikes, workers often garnered public sympathy (especially when opposed by abusive industrial barons), which pressured elites to compromise. In short, labor's agenda was seen not as special-interest pleading, but as aligned with broader social justice – a crucial source of soft power.

- **Reciprocity and Interdependence:** The relationship between workers and employers has an inherent reciprocity: each depends on the other. Workers need wages to live, and employers need labor to run their business. Historically, this mutual dependence created a potential for **reciprocal agreements** – a balance of give-and-take. When labor's power was strong, the norm was that productivity gains would be shared (higher profits for firms *and* higher wages/benefits for workers) – a tacit social contract. For example, the **post-WWII social contract** in the U.S. and Western Europe involved workers accepting productivity-improving changes (like new machinery or processes) in exchange for rising pay and job security, ensuring both sides benefited. If one side broke this reciprocity (e.g. employers tried to take all gains as profit, or workers slowed productivity intentionally), it often led to conflict. Unions and collective bargaining can be seen as institutionalizing reciprocity: both labor and management make binding agreements that respect each other's needs (e.g. workers agree to no strikes during contract period, employers agree to fair raises and conditions). Reciprocity was also enforced informally by solidarity – *an injury to one is an injury to all* was a common labor slogan, reflecting that workers expected fair and mutual support from each other and from employers. This sense of fairness and interdependence was leverage because it made labor's demands seem reasonable and constrained how harshly capital could respond without risking broader backlash. In essence, employers who upheld a *reciprocal* relationship (treating workers as partners in production) often saw more labor peace and productivity, whereas those who didn't faced unrest. Thus, reciprocity reinforced labor's position by anchoring it in a social norm of fairness.

Summary: These six features made labor power “*indispensable*” in the industrial era. Labor was everywhere (universal), yet *could not be simply bought outright or stored* (inalienable and perishable), and it brought human creativity and variation (heterogeneity) that gave it special value beyond any generic commodity. Coupled with the moral narrative around workers' rights and a reciprocal social contract ethic, labor was able to translate its economic necessity into political and social influence. Across different countries and eras, we see these principles at work: whether it was factory workers unionizing in England, independence movements rallying peasants and workers in colonized nations, or social democratic parties creating welfare states, the power of labor rested on these fundamental levers.

However, as automation accelerates in the 21st century, many of these leverage points are under threat. Robots and AI do not have “rights” or moral claims, nor do they need reciprocity – and if machines become a substitute for human work, labor's universality and indispensability diminish. This leads to the pressing question: **what successor institutions or sources of power can ordinary people leverage in a post-automation economy?** The next sections explore possible answers, evaluating how emerging institutions might replicate the sixfold leverage that labor once held.

Successor Institutions in a Post-Automation Economy

As economies become more automated and traditional jobs vanish or transform, society must identify new bases for broad economic and political empowerment. Several proposals have emerged for “*successor institutions*” to the role that organized labor played in the industrial era. These include **data unions, ecological or land trusts, attention-sovereignty frameworks**, and other innovative models for collective ownership or governance of key resources. Each of these seeks to organize people around a different kind of asset or leverage point (personal data, environmental commons, human attention, etc.) in order to restore bargaining power and ensure fair distribution of wealth in a world where labor alone may not suffice. Below, we evaluate each proposal in turn, examining real-world examples or case studies where available, and analyze how well they reproduce labor’s six leverage factors (universality, inalienability, perishability, heterogeneity, moral legitimacy, reciprocity).

Data Unions and Data Cooperatives

What is a Data Union? A *data union* is a form of collective organization in which individuals pool their personal data or digital contributions and act as a unified bargaining entity vis-à-vis corporations or platforms. The concept, inspired by traditional labor unions, recognizes that in the digital economy users generate valuable data (through their online behavior, content creation, sensor readings, etc.), but currently have little control or reward for it. Data unions aim to change this by aggregating individuals’ data rights and negotiating on their behalf – whether for **better privacy protections, compensation, or decision-making power** over how data is used. For example, Glen Weyl and Jaron Lanier have proposed “*Mediators of Individual Data*” (*MIDs*) – entities that would represent people in selling or governing their data, much like a union or guild. In practice, a data union could function as a cooperative or trust: members consent to share certain data into a common pool, the union secures deals with data buyers (or advocates for policy changes), and any benefits (revenues or rights) are distributed among members.

Emerging Examples: Early prototypes of data unions and cooperatives are appearing. In Europe, projects like **MIDATA.coop** in Switzerland allow citizens to collectively store and control their health data, deciding which researchers can use it and receiving benefits in return. Another example is the **Driver’s Seat Cooperative** in the U.S., where rideshare drivers pool their driving data to gain insights and bargaining power with ride-hailing platforms (and even sell anonymized data to city planners, returning proceeds to drivers). The EU’s recent Data Governance Act (2022) explicitly encourages **data cooperatives** as “*data intermediaries*” that help individuals exercise their data rights collectively. Academic and legal voices also support data unions: a note in the *California Law Review* envisions data unions as “*democratically controlled aggregated data pools that allow individuals to meaningfully control their data as a collective bargaining unit,*” aiming for “*informational democracy*” analogous to industrial democracy. These unions are not merely about monetizing data; importantly, they can also push for ethical data practices and prevent harms. For instance, a data union could refuse to share data with a company unless it abides by privacy standards or could collectively negotiate terms of algorithmic transparency.

Leverage Comparison – Data Unions vs. Labor:

- **Universality:** *Potentially high, but with gaps.* In principle, most people today generate data (via smartphones, internet use, smart devices, etc.), so the constituency for data unions is broad. In the way that virtually everyone has labor power, virtually everyone in a digital society produces data exhaust. This **ubiquity** gives data unions a wide base – for example, a nation-scale data trust could

represent nearly all citizens. However, unlike labor (which even the poorest individual possesses), access to data generation depends on technology use – billions of people are online, but some marginalized groups (especially in developing regions) are not yet data producers at scale. So data isn't *quite* as universal as labor historically was, though it is rapidly becoming so with global connectivity. Still, as a leverage point, personal data could involve huge numbers of people, approaching labor's universality.

- **Inalienability:** *Moderate, depending on legal design.* Currently, personal data *is* often treated as alienable – people click “I agree” and effectively surrender data to tech companies who then own or control it. A key goal of data unions would be to **restore inalienable rights** over data, treating data as an extension of the person (a *dignitarian* view) rather than a commodity to be freely bought and sold. Some proposals advocate that data rights should be legally inalienable: for instance, individuals could always retain the right to revoke consent to use their data. Indeed, one principle of “*information self-determination*” is that people should be able to withdraw their data – akin to how labor can withhold work. In a data union, members typically **grant only limited, revocable licenses** to their data. The union might negotiate usage but individuals could exit the union and withdraw future data contributions. Technologies like distributed ledgers and personal data stores could enable this by keeping an auditable trail of data uses and allowing permissions to be revoked. The United Nations’ concept of “*Attention Sovereignty*” encapsulates this: “*Individuals should retain self-determination, ownership, access and control of self-generated attention data... with the ability to revoke access for any reason.*” ² . Applied to personal data broadly, this ethos means data unions would strive to make data **not fully alienable**, always tied to the individual's ongoing consent. That said, once data is copied or sold, it's hard to *fully* retract what's been learned from it (e.g. you can't make an AI *unlearn* a pattern). So practical inalienability of data remains a challenge, but strong fiduciary rules for data unions (where the union is obliged to act in members' interest) can approximate it by never permanently selling rights, only leasing or permitting uses under conditions.
- **Perishability:** *Low – data is non-perishable (both a strength and a weakness).* Unlike labor time, data **can be stored and reused indefinitely**, which is the opposite of perishable. On one hand, this means data unions don't have the same immediate-leverage tactic as a strike (withholding data for a day doesn't “expire” the way skipping a day of work does, since the data from that day could be captured later or inferred). However, data's non-perishability also means that a valuable dataset, once amassed, becomes a lasting asset for the union. For example, if a data union collectively curates a large pool of high-quality data (say, medical records or user behavior data), that asset can continue to generate value over time (through multiple analyses, AI training runs, etc.). The union can threaten to *deny future access* to its data asset if demands aren't met – not as time-sensitive as a labor strike, but still a credible form of power if the data pool is unique. In summary, data lacks the ticking-clock pressure of labor, but it compensates by being a durable bargaining chip. The onus is on the union to make the data **collectively indispensable** (e.g. a platform's algorithms might significantly degrade if cut off from a large chunk of user data).
- **Heterogeneity:** *High – data is highly heterogeneous and context-specific.* Personal data varies enormously by type (financial data, health data, social media content, location traces, etc.) and quality. A crucial insight is that **the value of data is often in aggregate patterns**, not individual points. Data unions leverage heterogeneity by pooling data from many individuals to reveal insights that no single person's data could provide. This is akin to how a diverse workforce's collective knowledge exceeds one worker's. Furthermore, certain individuals' data might be especially valuable

(e.g. a person with a rare medical condition contributing to a health data pool). In that sense, each person's data is a unique "product" – not interchangeable – paralleling how each worker brought unique skills. This can give bargaining power if, say, a data union of diabetes patients holds a dataset that pharma companies highly desire; the union can negotiate terms collectively for access. Another aspect of heterogeneity is **tacit knowledge vs explicit data**: human labor had tacit elements, whereas data tends to be explicit recordings. However, interpreting data (e.g. labeling it, contextualizing it) reintroduces a labor-like element. Some data cooperatives involve members in curating or explaining their data, effectively injecting human knowledge that cannot be easily replicated elsewhere. Overall, data unions benefit from heterogeneity because they can specialize – one data union might corner the market for, say, ethically sourced driving telemetry data, another for music listening habits, etc., each developing expertise and thus leverage in its niche.

- **Moral Legitimacy:** *Potentially high, but still emerging.* The idea that individuals should have rights and share in the value of their personal data is increasingly framed as a moral issue. Just as labor movements argued that it's only fair for workers to get a just slice of the value they create, data unions contend that users deserve **agency and dividends** in the data economy. There is growing public concern over "surveillance capitalism" – corporations exploiting personal data without consent or compensation – which gives moral weight to data sovereignty. Advocates liken data rights to human rights, arguing that personal data is an extension of the person and thus deserves dignity and protection. This dignitarian perspective can galvanize support for data unions as a means of **justice and autonomy**, not just money. Furthermore, data unions can highlight discriminatory harms in data use (for instance, algorithms that harm marginalized groups) and claim moral legitimacy in fighting those harms collectively. Policymakers and scholars (as cited above) talk about "*informational democracy*", suggesting a broad ethical principle that people should collectively govern data about them. While data unions are a new concept to the general public, their alignment with values of privacy, fairness, and consent gives them a solid ethical foundation that could translate into political support (similar to how labor unions became seen as defenders of the common worker). However, Big Tech companies may push back with their own narrative (e.g. that data flows should be free for innovation), so the moral debate is ongoing. Overall, data unions have a strong case to be seen as the **rightful guardians of individual and community digital rights**, which can confer legitimacy to their demands.

- **Reciprocity:** *Moderate – requires new norms.* Unlike the clear two-sided dependency of labor vs capital, the reciprocity in data relationships is less established. Right now, tech platforms often unilaterally take data in exchange for "free" services – an imbalanced arrangement. Data unions seek to make this relationship more **reciprocal**: users will share data if and only if companies reciprocate with fair value or practices. For example, a data union might collectively agree to provide data to a research project only if the researchers share results with the community (mutual benefit), or they might sell data to a company only if a fair revenue share or other benefit returns to members. In essence, data unions can encode "*we'll give you our data if you treat us fairly*". This creates a new kind of data contract. We see early signs of this: some firms have begun offering small payments for data, and regulations like GDPR enforce a form of reciprocity by requiring consent and allowing opting out. A union strengthens reciprocity by negotiating *as a group* so that each member gets a consistent deal (preventing companies from playing individuals against each other). Additionally, within the union, there is an ethos of reciprocity: members pool their data for the common good and share proceeds. This internal mutual aid mirrors the solidarity of labor unions. One could imagine, for instance, a data union using part of its earnings to provide collective services to members (like

identity theft protection or dividends to those who contributed most data), creating an ongoing reciprocal bond. While the norms are nascent, if data unions become common, companies could come to expect that using personal data involves a **two-way exchange**, not a one-way extraction – a dynamic much closer to the reciprocity that existed (at least ideally) in robust labor-capital negotiations.

In summary, **data unions** show promise in replicating many aspects of labor's leverage. They harness the *universal* presence of data in our lives, strive to make data rights *inalienable and subject to collective consent*, capitalize on data's *heterogeneity and value in aggregation*, and build a narrative of *justice and reciprocity* in the digital domain. They do face challenges – notably the fact that data can be copied (lack of perishability means withholding data is a slower tactic than a labor strike) – but with supportive policy and technology (discussed in the next section on blockchain), data unions could form a cornerstone of post-labor empowerment. Some economists even talk of “data as labor”, implying that contributing data should be seen as a form of work with commensurate rights. In practice, data unions are still in early stages (pilot projects, legal frameworks evolving), but their trajectory suggests they could indeed carry forward a large part of labor's historical role: organizing people for collective economic agency.

Ecological and Land Trusts

What are Ecological/Land Trusts? These refer to institutions that hold and manage natural resources or land on behalf of a group (community, citizens, or even all humankind) with the aim of **sustainable use and equitable benefit-sharing**. The basic idea is to treat elements like land, water, forests, minerals, the atmosphere, etc., not as privately owned commodities but as *common wealth*. A trust (often a legal trust or a nonprofit entity) becomes the steward of these assets, preserving them and possibly generating revenue (through regulated use or rents) that can be redistributed. This concept has deep historical roots – for example, many indigenous communities managed land communally. In a modern context, **community land trusts (CLTs)** are used to maintain affordable housing (the trust owns land and ensures housing on it remains accessible). On a larger scale, proposals for **sovereign wealth funds or “commons trusts”** suggest that income from natural resources (oil, minerals) or environmental use (carbon emission permits) be placed in trust for citizens. One real-world case is the **Alaska Permanent Fund**: the state of Alaska invests oil royalties into a fund and pays out annual dividends to every resident, effectively sharing resource wealth in a quasi-trustee model.

In a post-automation economy, ecological and land trusts can serve as successor institutions by providing people with income and power derived from *nature and common goods* rather than wages. They also embody the principle that **certain vital goods (land, clean air, biodiversity) should be managed democratically for future generations, not exploited by a few**. Environmental trusts can be local (e.g. a town conservancy that owns land to prevent its overuse) or global (e.g. proposals for a global climate trust that charges for carbon emissions and distributes the proceeds). Economist Peter Barnes, for instance, has advocated for a **Sky Trust** that would manage atmospheric carbon capacity as a property held by citizens, who then receive dividends from polluters who pay into the trust.

Leverage Comparison – Ecological/Land Trusts vs. Labor:

- **Universality:** *Varies with design, but potentially very high.* If an ecological trust is set up at a national or global level, its beneficiaries can be essentially *everyone*. For example, a national land trust might declare that **all citizens are equal co-beneficiaries of the nation's natural resources**. This mirrors

labor's universality (everyone works; here, everyone shares environment). The Alaska Fund is a concrete example: every Alaskan, rich or poor, gets an annual check – a universally shared benefit. Universality gives such trusts political strength: it's like every citizen holding a "stake" akin to being a member of a giant union of resource owners. However, not all trusts are universal – some are community-specific or regional. A local land trust benefits only the residents of that locality. Still, the principle can scale. A *global* ecological trust for, say, carbon emissions would conceptually include all humans as beneficiaries (since climate is global commons). Universality was a major strength of labor (the broad working class); similarly, tying economic benefits to universal citizenship or humanity can create a powerful political constituency that expects and demands those dividends.

- **Inalienability:** *High – the trust structure by definition holds assets inalienably.* In a well-designed commons trust, the core assets (land, resource rights) are **legally inalienable** – they cannot be sold off for private gain; they are held in perpetuity for the beneficiaries. This is a direct parallel to labor's inalienability: just as one's labor couldn't be permanently seized, the trust ensures the commons can't be permanently lost to private ownership. For instance, a conservation land trust that acquires a forest will often put it under easements or legal conditions that forbid future sale or destructive exploitation – the forest is "locked in" as a commons. The trustees have a fiduciary duty to future generations. This protects the asset from short-term market pressures, much like labor laws protect certain rights regardless of market conditions. Moreover, individuals' share in the trust (e.g. the right to a dividend or to use a piece of community land) is usually not alienable either – you typically can't sell your "membership" in the commons for cash; it stays attached to your status (as a community member or citizen). That ensures **ongoing collective ownership**. Inalienability here is arguably easier to enforce than with data, because physical and legal controls can prevent the sale of land or resource rights. One could say the Earth's gifts are inherently inalienable for humanity – an ethos that many ecological movements stress.
- **Perishability:** *Moderate – some resources are renewable (perishable if unused), others are stock-like.* Natural resources have a mix of characteristics. For example, a forest's capacity to grow timber each year is a renewable yield – if not harvested, that growth accumulates (to a point) or could be lost to natural decay; fisheries quotas not caught one year might mean more fish next year (or lost if fish die naturally). In these cases, there is *some* perishability: sustainable use often means *use it or lose it*. A trust can decide to hold back usage to preserve the asset (in which case "lost" harvest might be seen as investing in future bigger yields or simply as conservation). On the other hand, minerals like oil left in the ground aren't perishable year to year – they will wait (though market prices fluctuate). The key leverage from a trust's perspective is that it can **control the flow** of use rights. For instance, a land trust leasing farmland might say "this year we allow X acres to be farmed." If potential lessees (farmers or companies) don't meet the trust's terms (e.g. offering a good rent or following environmental rules), the trust can withhold access. The *immediate cost* to the trust is the lost rent for that year (somewhat analogous to lost wages in a strike), and the asset (land) remains and can be leased later. So the dynamic is different: trusts are not under as much time pressure as labor was (land sitting unused for a year doesn't disappear, whereas labor time does). This weaker perishability means trusts have *less urgency* in bargaining – they can wait out a bad deal without irreparable loss in many cases (especially for non-renewables). In a way, this can be a strength: a national resource fund could simply refuse to privatize or exploit a resource until terms are favorable, since the oil or minerals underground act like a stored reserve. The flip side is that withholding usage doesn't sting the counterparty as sharply as a labor strike did – companies wanting to exploit a resource can look

elsewhere or wait. Overall, perishability is not a major leverage point for commons trusts; instead, their power is more from ownership and legal control of a finite resource, not from a ticking clock.

- **Heterogeneity:** *High – natural and community assets are unique and varied.* Just as every type of labor is different, every piece of land and every resource has unique qualities. Ecological trusts often control **heterogeneous assets**: one trust might manage a watershed, another a city's land, another a mineral deposit. Even within one trust, there can be multiple uses (recreation, forestry, carbon sequestration, etc.) to balance. This heterogeneity means that expertise and local knowledge matter – the trustees and community develop tacit knowledge of how to manage the asset sustainably. This is akin to skilled labor know-how. It also means trusts are not one-size-fits-all; each one can tailor rules to its context, which can be an advantage in negotiations. For example, if a city land trust owns various parcels, it can choose which to develop and which to keep green, using knowledge of the community's needs. A monolithic outside developer won't have that nuance. In terms of leverage, if a trust holds a *unique* resource (say the only port in a region, or a rare earth mineral deposit, or a rainforest with biodiversity), it has a stronger position – outsiders must come to terms with the trust to access that uniqueness. This mirrors how skilled workers in a unique craft had more leverage. Additionally, because these trusts are often decentralized (many communities having their own), there is diversity in approaches – some may find very successful models that can be replicated, akin to how different unions experimented and learned. **Tacit cultural values** also play a role (e.g. indigenous-managed trusts often succeed by applying traditional ecological knowledge). In summary, heterogeneity of resources means a network of trusts could cover a wide array of vital needs, collectively replacing the broad “portfolio” of things labor used to influence (industry, services, etc.) with an equally broad set of commons governance institutions.
- **Moral Legitimacy:** *Very high – appeals to fairness across generations and stewardship.* Ecological and land trusts rest on powerful moral arguments. They claim to serve **the common good and future generations**, which gives them a legitimacy beyond narrow economic calculus. The idea that “*the land belongs to the people*” or that “*we are only trustees for our children and their children*” resonates across cultures. For instance, many constitutions and international declarations affirm that natural resources should benefit the populace and be protected. When a trust fights against, say, a polluting company or defends community land from speculators, it often has public opinion on its side, much like workers striking against a cruel employer could rally sympathy. In the climate arena, youth movements argue for a “*climate trust*” approach, essentially saying governments have a fiduciary duty to protect the atmospheric commons for young and unborn people – a deeply moral framing. Also, by distributing dividends or benefits broadly, these trusts address inequality, which is ethically appealing: e.g. Alaska's oil dividend is credited with reducing poverty and has broad support as a fair share of wealth. The **reciprocity** concept also ties in morally: those who profit from using common resources (like oil companies) should reciprocate by sharing value with everyone. This fairness principle is easy to grasp and champion. In political discourse, commons trusts are often portrayed as correcting the injustices of enclosure or privatization. For example, the phrase “*privatizing profits and socializing costs*” (e.g. pollution) is criticized, and trusts are offered as the remedy – *socialize the ownership too, so profits are shared*. Overall, ecological/land trusts can claim moral high ground as guardians of **both social equity and environmental responsibility**. This high moral legitimacy can translate into strong political mandates (e.g. a government establishing a national wealth fund due to popular demand that resource riches be shared, as seen in several countries).

- **Reciprocity:** *High – built into the concept of a trust.* By design, a commons trust establishes a **reciprocal relationship between stakeholders and the resource/benefit flow**. The trust structure imposes obligations on the trustees to manage responsibly and on beneficiaries (sometimes) to use the resource wisely. For example, a community forest trust might allow locals to gather firewood or food, but require they also participate in replanting or guarding against fires – a give-and-take arrangement with the land. On the grander scale, trusts create reciprocity between citizens and the state or companies: if a mining company wants to extract minerals, it must **give back** – perhaps paying royalties into the trust that will be used for public good or ecological restoration. Similarly, the trust gives back to citizens in return for their collective “ownership” of the resource (via dividends, public services funded by the trust, etc.). This mirrors the social contract of labor: both sides contribute and benefit. There’s also a solidarity component: all beneficiaries are in it together and agree on rules of use. One might think of it as an updated form of the commons systems of old, where communities had norms like “each family can graze X cows on the commons, and must help maintain the fences.” Modern trusts formalize this. Importantly, reciprocity extends across time – current generations restrict their exploitation so future ones aren’t deprived, expecting that future folks would have done the same for them. This long-term reciprocity is unique to ecological trusts (labor’s reciprocity was mostly contemporaneous between workers and bosses, not generational). It gives these institutions a kind of **transcendent duty** that can be very compelling and can stabilize their policies beyond short-term politics.

In summary, **ecological and land trusts** can serve as powerful equalizers in a post-automation era. By ensuring that natural wealth and space (which even robots need to operate!) are controlled democratically, they provide people with income (like dividends or free/cheap access to land) that is **not tied to having a job**. They also give communities leverage over corporations – for instance, a community that owns its water source can negotiate much better terms with a bottling company than if the resource was unowned or privately held. In effect, these trusts make “*capital out of commons*” and distribute that capital’s returns universally. They strongly replicate labor’s moral and political power (perhaps even exceeding it in moral clarity) and can include everyone in their scope. While they don’t replicate the urgency of a strike, they compensate by holding real assets that cannot easily be ignored or bypassed (you can offshore a factory to avoid a union, but you cannot offshore a local mineral deposit or a local market of consumers receiving trust dividends). Many scholars argue that as automation progresses, something like “**universal property**” or commons-based income will be necessary to maintain social stability – ecological trusts and allied institutions are prime candidates. Real-world momentum exists: besides Alaska, Norway’s sovereign wealth fund (from North Sea oil) is an example on a national level, and there are increasing calls to treat data or spectrum or other quasi-natural assets as public trusts as well.

Attention-Sovereignty Frameworks

What is Attention Sovereignty? The modern economy increasingly monetizes **human attention** – through advertising, engagement algorithms, and media. Companies like social media platforms and online advertisers profit by capturing our eyeballs and time (often via addictive or manipulative tactics). *Attention sovereignty* is a framework that asserts individuals (and communities) should have control and ownership over their own attention and the data generated from it. In other words, just as data unions focus on data, attention-sovereignty focuses on the *act of paying attention* as a scarce resource that we each possess. This idea leads to proposals where people collectively negotiate how their attention is sold or used, or where they are compensated for it. One concrete example is the **Brave Browser** and its Basic Attention Token (BAT) system: users can choose to view privacy-respecting ads and are rewarded with a cryptocurrency (BAT)

as a share of the ad revenue – effectively paying users for their attention. That’s an early attempt to establish that **attention has value to be paid for, not just taken**. Another angle is regulatory or rights-based: proposing that people have the right to opt out of surveillance advertising, or even that they could organize to set terms (e.g. a group of consumers agreeing to boycott or block ads unless advertisers meet certain standards).

Attention-sovereignty frameworks are less formally institutionalized than data unions or land trusts at this point, but the concept is gaining traction. The United Nations has even discussed principles for a “conscious attention economy,” listing *Attention Sovereignty* as a core principle (as we saw, ensuring individuals’ control and the ability to revoke access to their attention data) ². Some envision *attention cooperatives* that could collectively bargain with advertisers: for instance, a coop that represents a million viewers could say “we will only allow ads that meet these quality criteria and pay at least \$X per viewer.” This would flip the script on the current ad industry. Additionally, initiatives around digital wellbeing and “time well spent” (championed by tech ethicists like Tristan Harris) align with the idea of treating attention with respect and user control.

Leverage Comparison – Attention Frameworks vs. Labor:

- **Universality:** *High – all conscious people have attention to give.* Attention is, in a sense, even more universal than labor in that every waking moment we are paying attention to something. In the digital age, billions of people’s attention is a commodity being fought over by tech giants. **Everyone with a device or an internet connection is a potential source of attention revenue.** This universality means any framework that empowers people regarding their attention could mobilize a massive swath of the population. It doesn’t matter if you are employed or not – as long as you use a phone, watch TV, or even walk past billboards, your attention is in play. Thus, an “Attention Union” (to coin a phrase) could in theory include retirees, students, and others outside the labor force, giving them a say in economic arrangements. This broad applicability is similar to how labor encompassed all working-class people. A caveat: attention markets primarily target those with purchasing power (advertisers value the attention of those who can buy their products). But even children’s attention is monetized (think of ads on kids’ content) – albeit via their parents. So nearly everyone is in the audience economy. Therefore, attention-sovereignty efforts have a truly universal constituency to draw from.
- **Inalienability:** *Moderate – attention is inherently personal, but currently exploited via opaque means.* One’s attention, like labor, is tied to oneself; you can’t fully alienate it because you are always the one who must pay attention. However, the **outputs of attention (data about what you viewed, clicks, engagement metrics)** are currently taken and traded without much control. The goal of attention sovereignty is to assert that your attention **cannot be used or sold without your ongoing permission**, making it akin to inalienable. In practice, this means mechanisms like the ability to opt out of tracking, to revoke consent for targeted ads, or to charge a price for your attention. We see early regulatory moves: e.g. Apple’s iOS changes ask users if they want to allow tracking for ads – the majority say no, which is a form of reclaiming inalienability (advertisers can’t just take your attention data without consent). If attention frameworks evolve, we might see *attention licenses* that are time-bound or revocable – for example, you agree to watch 5 minutes of ads per day in exchange for some benefit, but you can cancel that agreement any time. Because attention is fleeting in time, maintaining control over it means being able to withdraw from attention-exploiting systems at will. Right now, addictive design undermines this (people get hooked and effectively lose control of their

attention to algorithms). A sovereignty approach would treat **manipulative capture of attention as a violation**, and any use of one's attention as needing explicit, revocable agreement. Technologies like ad-blockers, privacy settings, or paying for ad-free services are tools individuals use to keep their attention from being alienated. A collective approach could demand these as rights or even collectively negotiate with content providers (e.g. a group of users saying we will only watch your streaming service if you limit ads to X minutes per hour). Achieving true inalienability will require stronger legal protections (perhaps treating attention data similar to personal data rights) and collective bargaining clout to resist the subtle ways companies try to seize attention. It's challenging but conceivable, given rising public awareness of the issue.

- **Perishability:** *High – attention is extremely perishable, moment to moment.* Attention might be the most perishable resource of all. **An unwatched ad impression is instantly lost value** – if no one is looking at that banner or that TV commercial at a given second, the opportunity is gone. This gives individuals or collectives a potentially **strong leverage**: simply by *not paying attention*, they deny value to advertisers and platforms. In effect, every second of attention not captured is a tiny “strike.” For example, widespread adoption of ad-skipping or ad-blocking technology has spurred companies to find new ways to reach people, indicating that collectively, consumers can push back. If an organized movement encouraged people to reclaim their time (say, a coordinated “digital detox hour” where millions log off social media in protest of certain policies), it directly hits the platforms’ ad revenues for that period. The perishability here is similar to labor: if an eyeball is not on an ad at a given time, you can’t double up attention later to make it up – advertisers have very time-bound campaigns and budgets. In fact, the attention economy is measured in *seconds* and *click-through rates* – it’s highly time-sensitive. This suggests that attention sovereignty could use tactics analogous to strikes or work slowdowns: e.g. collective boycotts of certain media, or browser extensions that intentionally obfuscate tracking (denying quality attention data). Already we see something like this in how users install tracker blockers, which “waste” the data collection attempts of advertisers. One could imagine more explicit collective actions: an “attention strike” where users agree to not engage with a certain platform for a day to demand changes. Because attention is so perishable, even a short action can send a sharp message (advertisers notice a dip in engagement immediately). Thus, this is a strong point of leverage, perhaps even stronger than labor’s perishability, because modern businesses like Facebook or Google live and die by continuous engagement metrics – if users en masse tune out, even briefly, Wall Street notices.
- **Heterogeneity:** *Moderate – attention from different audiences varies in value.* Not all attention is equal from an economic standpoint: advertisers covet certain demographics or contexts more (e.g. a minute of a wealthy consumer’s attention is worth more to marketers than a minute of a low-income person’s, which is an unfortunate fact). Also, attention in different contexts (focused attention watching a video vs. half-attention scrolling a feed) has different qualities. This heterogeneity could be leveraged by attention-sovereignty frameworks: for instance, professional cohorts or interest groups could form *attention unions* where their specific attention is particularly desirable. Think of an “Attention Cooperative of CTOs” who agree not to attend any vendor webinars unless those vendors meet privacy standards – since tech vendors really want CTO eyeballs, this coop has clout. Similarly, regional or language-specific attention pools could negotiate with advertisers wanting to reach those audiences. There is also a tacit element – **people have subjective, qualitative experiences** that no algorithm fully captures. Human curation of attention (like a community deciding which ads are acceptable) can produce a more engaged, genuine attention than spammy ads do. That *quality* of attention is heterogeneous and potentially a bargaining asset: platforms that respect users might

get more loyal attention, which is more valuable long-term. In essence, treating attention as a homogeneous mass has led to the problematic ad-tech environment; an attention-sovereign approach might differentiate between *voluntary, high-quality attention* and *coerced, low-quality attention*, and charge premium for the former. That said, individual attention is inherently ephemeral and substitutable to a degree (advertisers can shift to whoever will look, if one group won't). So the heterogeneity isn't as protective as a unique skill is in labor. It's more about group differentiation and context. Overall, while not a primary source of power, there is some scope for leveraging the differences in attention's value to ensure those contributing the most valuable attention (for example, content creators who draw others' attention, or influential community members) have a say in how it's monetized.

- **Moral Legitimacy:** *High and rising – linked to well-being and rights.* The fight for control of attention is often framed in moral terms: protecting mental health, autonomy, and truth in society. The public is increasingly aware of the harms of an extractive attention economy – from social media addiction to the spread of disinformation and the erosion of privacy. Therefore, a movement that demands “*Attention Sovereignty*” can claim to be championing fundamental human needs: the need to not be constantly manipulated and distracted, the right to one's cognitive liberty. Indeed, there is an ethical argument that *over-harvesting attention without consent* is a violation akin to exploitation of labor. One might say, just as child labor and sweatshops became moral issues, now **exploitative attention-harvesting (especially of children or vulnerable groups) is seen as morally wrong**. This confers legitimacy to those pushing for reform. Governments are starting to respond (e.g. discussing bans on addictive “dark patterns” in apps, or requiring transparency in how algorithms curate content). From a political perspective, nearly every parent, teacher, or mental health professional would agree that we must protect people's attention and agency – thus, collective frameworks to do so could gain broad support. The narrative of *reclaiming our time* or “*taking back control from Big Tech*” has populist appeal. Moral legitimacy also stems from the reciprocity idea: people feel it's only fair that if companies profit from our attention, we should benefit too or at least consent to how it's done. The notion of “**the attention economy should be fair and conscious**” carries a normative weight. As evidence of harm mounts (for example, Facebook's own research on Instagram's negative effect on teens' mental health became a scandal), the moral case strengthens for an overhaul where *users are not just products, but empowered stakeholders*. So attention-sovereignty efforts can ride a wave of ethical concern similar to how labor rights did during the early Industrial Age when harsh conditions were exposed.

- **Reciprocity:** *Emerging – aiming to rebuild a fair exchange.* Today's attention market is largely one-sided: users get free content or services, and in exchange their attention (and data) is sold – but this exchange is opaque and often not truly consensual. An attention-sovereignty framework would seek to make this an **explicit reciprocal deal**: “*I will give you my attention if you give me something of commensurate value (money, service, knowledge) and respect my boundaries.*” Some early examples: Brave's BAT basically pays users for attention – that's a reciprocal payment. Another is the Australian law that forced Facebook and Google to pay news publishers for content: indirectly, that recognizes the attention news media bring to platforms and enforces reciprocity (the platforms must compensate for the attention that news content attracts to their sites). In a collective sense, reciprocity could mean communities negotiate attention use: e.g. a smart city could say “we allow digital billboards in our public square only if the advertising revenue goes partly into a community fund, and only if ads meet community standards.” That's a reciprocal arrangement instead of unilateral corporate ad intrusion. Over time, if such practices spread, companies would know they

must **give value to get attention** – whether that value is better content, payment, or societal contribution. This is akin to employers learning they had to give fair wages to get labor. One can imagine attention coops where members collectively decide which advertisers or content creators to support (like Patreon or collective subscription models are a mild version – users voluntarily pay for content they like instead of having their attention sold). This fosters a more mutual relationship: creators get rewarded, and consumers get content without exploitation. It's still early, but the principle of reciprocity is at the heart of slogans like *"If you're not paying for the product, you are the product"* – which implies maybe we *should* be paying or be paid to balance things. As awareness of that grows, new norms could indeed require that attention is not taken for granted. Thus, attention-sovereignty can reintroduce a **social contract** between users and services: respect our attention and we will engage; abuse it and we withdraw it.

In summary, **attention-sovereignty frameworks** aim to empower individuals in one of the most crucial and contested territories of the digital age – the battle for our mindshare. While still nascent in institutional form, the combination of widespread discontent with the status quo and the inherent leverage of attention's perishability could make this a significant pillar of post-automation empowerment. If work incomes dwindle, companies will increasingly monetize consumption and attention, so turning that dynamic into one where people collectively bargain could ensure we don't just become passive targets of a new form of exploitation. Attention unions or cooperatives, backed by ethical and perhaps legal recognition of attention rights, might become as important in the 21st century as labor unions were in the 20th.

Other Emerging Alternatives: Social Wealth Funds and Platform Co-ops

Beyond the three categories above, there are other notable proposals to equip people with economic power as automation advances. We highlight two: **social wealth funds (universal capital ownership)** and **platform cooperatives**.

Social Wealth Funds (Universal Basic Capital): This idea is to collectively own a diversified portfolio of capital assets (stocks, real estate, intellectual property, etc.) on behalf of the public, and use the returns to provide an income floor or citizens' dividend. Essentially, it's a way for **everyone to become a capitalist without individually having wealth to invest** – the fund (often state-run or community-run) accumulates assets over time (through taxes, sovereign investments, etc.) and then shares the proceeds. This concept has gained attention as a remedy for inequality and the prospect of jobless growth. For example, economists have proposed that revenue from taxing automation or tech monopolies could feed a social wealth fund. **Norway's oil fund** and other sovereign wealth funds are precedents, though not all pay direct dividends. One bold proposal in the U.S. is to create a national social wealth fund that issues every citizen an equal share, effectively giving each person a stake in the nation's capital stock. This would mean that as robots and AI generate more profits, those profits flow back to people in the form of dividends, rather than only to a few owners. It's been described as creating a *"universal basic income funded by returns on capital"*, or a way to **"own the robots"** indirectly. Notably, Alaska's fund is a small-scale example: it's essentially a state-owned wealth fund that pays out to individuals, cushioning the impact of economic shifts (in Alaska's case, oil booms and busts).

From a **leverage** perspective, a social wealth fund gives people collective clout as shareholders. If large enough, the fund can influence corporate governance (acting as a block of public ownership voting for socially beneficial practices). And the dividends give individuals **economic security** that can empower them

to refuse bad jobs or pursue education (improving labor's fallback position even in a high automation scenario). It replicates labor's idea of broad-based prosperity: instead of wages, it's shared capital returns.

To map it to the six features: - Universality: Ideally yes, every citizen gets a share (like universality of labor). - Inalienability: Shares might be non-tradable to keep ownership equal and permanent (you can't sell your stake, similar to inalienable labor rights). - Perishability: Capital income is not perishable day-to-day, but one could say dividends not claimed in a year might expire (or be smaller if economy dips). Less relevant, though the fund needs continuous management. - Heterogeneity: The fund holds diverse assets (like an economy-wide portfolio), hedging like a collective "index fund" – this diversity is strength but not heterogeneous in the personal sense. - Moral legitimacy: Strong in terms of fairness – it addresses the moral claim that everyone should benefit from national/global wealth, not just capital owners. It's a "socialist answer" to automation, as one commentary put it. - Reciprocity: It's more of a redistribution mechanism, but one could frame it as reciprocity between tech/capital and society – if you use our markets/resources, you give back via the fund.

Implementations are being explored: for example, Singapore's Central Provident Fund and other public investment schemes, although not universal in the sense of equal shares for all, show governments acting as collective investors. If automation keeps displacing work, pressure may grow for such funds to provide income. One risk is political control – unlike grassroots unions, a state-run fund could be mismanaged. But with democratic governance and transparency, it could become a pillar of the social safety net, *reducing individuals' dependence on selling labor* and thus complementing diminished labor power.

Platform Cooperatives: While labor unions traditionally negotiate with employers, platform cooperatives *are* the employer (and platform) owned by workers/users themselves. In the gig and digital economy, **platform co-ops** offer a way for workers to collectively own the apps and marketplaces they rely on, instead of being at the mercy of tech companies. For example, drivers could create a ride-hailing app cooperative to compete with Uber, or freelance artists could cooperatively run a marketplace for their work. These co-ops combine cooperative business models (one member, one vote governance, profit-sharing) with modern technology platforms. In a post-automation context, many service jobs that remain (like care work, creative work, artisanal services) might be mediated by platforms – ensuring those platforms are cooperatively owned can preserve worker/community control and income.

Platform co-ops address **labor's leverage** by design: they *bypass the traditional capital-vs-labor conflict* because the users and providers of the service *are* the owners. They carry forward labor's principles of **democratic governance and reciprocity** into the digital marketplace. For instance, **Up & Go** is a cooperative of house cleaners in New York that runs a shared booking platform – it charges lower fees than corporate apps and returns more money to the cleaners, who also vote on business decisions. Another example is **Resonate**, a co-op music streaming service owned by artists and listeners, aiming to pay artists better than Spotify. While platform co-ops face the challenge of competing with venture-capital-fueled giants, they have the advantage of **trust and loyalty** from participants, and they avoid the extractive fees that investor-owned platforms demand.

In terms of the six features: - Universality: Applicable to many sectors, but each co-op is typically specific to an industry or locality, so not universal in membership (though the *idea* is universal – anyone could form one in their domain). - Inalienability: Members' ownership stakes are often not tradable (preserving cooperative control), and one's work is inherently one's own, respected by the co-op model (no selling your digital labor outright). - Perishability: Co-op workers can still strike or withhold work if needed, but since

they own the platform, conflicts are internal – more about self-management. Less relevant except that they remove the scenario of an external boss exploiting perishable labor. - Heterogeneity: Co-ops can tailor services to community needs (a heterogeneous approach vs one-size platforms). Also, they often celebrate the individuality of providers more than gig platforms do. - Moral legitimacy: High – cooperatives have long been seen as ethically positive, empowering communities and preventing exploitation. Platform co-ops inherit that goodwill, presenting themselves as the *fair alternative* to gig-economy exploitation. - Reciprocity: Fundamental – all stakeholders share in decision and profits, aligning interests rather than adversarial. For example, a co-op ride-share might distribute surplus to driver-members or invest in better services, rather than siphoning it to outside investors.

Platform co-ops thus carry forward the **spirit of the labor movement into the digital age**, focusing on *collective ownership* rather than collective bargaining. They don't solve the issue of jobs vanishing due to automation, but they ensure that the jobs or gigs that *do* exist remain under worker control. They could also interface with other institutions: e.g. a data cooperative could be run as a co-op of the individuals contributing data (this overlaps with data unions idea). Indeed, new legal forms, like the **Limited Cooperative Association (LCA)** in certain U.S. states (e.g. Colorado), are enabling such hybrid co-ops that can include multiple stakeholder classes (workers, users, investors) under a democratic structure. DAOs (decentralized autonomous organizations) in the blockchain world often resemble co-ops and are experimenting with these models too (more on that next).

In conclusion, a **mosaic of successor institutions** – data unions, commons trusts, attention cooperatives, social wealth funds, platform co-ops, and others – may collectively substitute and even expand upon the sixfold leverage that labor once provided. Each has strengths and weaknesses with respect to universality, moral force, etc., but together they point to a future where power is derived not solely from one's job, but from one's *participation in collective assets and digital communities*. The final piece of the puzzle is how to implement and scale these institutions. This is where technology (particularly blockchain and related digital infrastructures) and innovative legal frameworks become crucial, as discussed next.

The Role of Blockchain and Digital Technology in Enabling New Collective Power

Transitioning to these new institutions of economic power will require **robust technical and institutional support**. Blockchain and other distributed ledger technologies offer a toolkit of unique *affordances* that can help build trustworthy, large-scale cooperative structures. In tandem with supportive legal frameworks (like modern cooperative laws and DAO-recognition statutes), technology can provide the **governance rails and enforcement mechanisms** for data unions, commons trusts, and other collective arrangements. Here, we analyze several key affordances – **revocability, consensus enforcement, auditability, and democratic governance** – and how specific blockchain protocols and designs (such as Ethereum, Filecoin, Polkadot, Cosmos, etc.) exemplify or support these features. We also touch on legal wrappers like **Limited Cooperative Associations (LCAs)** that bridge decentralized organizations with real-world law.

Revocability and Individual Control

One challenge in collective systems (be it a data union or an attention coop) is allowing individuals to participate without irrevocably giving up their rights. **Blockchain-based identity and consent systems** can enable revocability – the ability for a person to *take back* their data or permissions. For example, using

smart contracts, a data union could issue a personal data license token to companies that grants usage under certain terms and auto-expires after a time unless renewed. If a member withdraws, the smart contract can prevent any further access to that member's data. Projects in the Ethereum ecosystem focusing on self-sovereign identity (SSI) and decentralized consent illustrate this: a user could provide a platform with a cryptographic token that represents their consent to use data, and they can later revoke (invalidate) that token, cutting off access. This is aligned with the *Attention Sovereignty* principle of being able to **"revoke access for any reason"* ², and blockchain provides a transparent, programmable way to do it.

Another aspect is **personal data stores** or pods (like Tim Berners-Lee's SOLID project) which can integrate with blockchain for access control. Imagine a data trust where each member's data is encrypted, and only a smart contract holding aggregate keys can decrypt it for authorized uses. If the member leaves, the key can be shredded (or their portion removed) – something auditable thanks to the ledger. While not trivial to implement (revocation in practice can be hard if data was copied off-chain), the ledger can at least record and enforce policies like deletion requests or paid usage periods.

In blockchain-based content platforms (for attention), NFTs (non-fungible tokens) might serve as revocable licenses to one's creative work or even to one's attention. For instance, one could "rent out" a slice of their screen real-estate via an NFT that an advertiser holds, but the NFT could be programmed to return to the owner after a week. This level of fine-grained control simply isn't possible in Web2 systems governed by opaque corporate databases.

Some protocols natively emphasize user control. **Filecoin**, for example, is a decentralized storage network where clients can choose to stop renewing a storage deal, effectively *revoking* the continued storage of their data after the contract ends. This is simpler than revoking data already copied, but it shows how blockchain networks put control in the hands of users cryptographically. Filecoin is also exploring **retrieval markets** where data providers can condition access – potentially allowing future scenarios like a data cooperative storing its files on Filecoin and only granting decryption keys to those who comply with its terms, with all actions (storage proofs, access requests) logged.

In summary, blockchain gives us *programmable revocability*: you can encode the right to withdraw or modify consent into the system itself. This is crucial for inalienability: it ensures any contribution to a collective is not a one-way door. Whether through smart contracts on **Ethereum** or permission logic in newer chains, individuals can participate in collective bargaining without surrendering permanent control – the code can guarantee their right to exit, analogous to how labor laws guarantee one can quit a job (but in this case enforced by code, not just law).

Consensus Enforcement and Automated Trust

A major advantage of blockchains is that they can enforce agreed-upon rules **without relying on any single party's discretion**. This *consensus enforcement* is vital for ensuring all members of a cooperative or union trust the system. In a traditional organization, members have to trust leaders or third parties to carry out decisions (with risk of corruption or error). In a blockchain-based DAO or cooperative, the core rules (like how funds are distributed, how votes are counted) are executed by smart contracts that all nodes verify. This dramatically reduces the *principal-agent problem*: for instance, if a data union smart contract says "pay 70% of revenue to members proportionate to data contributed," no CEO can decide otherwise – the code will do it automatically, and all members can see it.

Protocols like **Ethereum** pioneered this concept with DAOs (Decentralized Autonomous Organizations). Although early high-profile failures (e.g. The DAO hack in 2016) showed risks, today we have many successful DAO treasuries and governance processes running on Ethereum and layer-2 networks, managing billions in assets with rules enforced on-chain. For example, **GitcoinDAO** manages funds for open-source grants via community votes executed by smart contracts – when the community approves a grant round, the contract disburses funds trustlessly. A similar approach could be used by a social wealth fund: imagine a national wealth fund where spending decisions are encoded as proposals and automatically implemented once approved, removing possibilities of funds being siphoned off, since every token movement is tracked and requires a blockchain-logged vote.

Another example is **Polkadot**, a blockchain ecosystem that has on-chain governance to even upgrade its own protocol. Polkadot's governance system (recently evolved into "OpenGov") allows token holders to propose changes and, if they reach the required approval and support thresholds, the blockchain protocol *automatically updates itself* in the enactment period. This is **consensus enforcement of collective decisions** at the deepest level – no central authority needed to implement a new rule; the network's consensus does it. Such technology can be directly applied to cooperative institutions: rules can be transparently changed by member vote and then immediately enforced by the smart contracts. This ensures the *reciprocity* agreements and other terms the collective relies on cannot be unilaterally broken. It's like having a built-in, incorruptible contract enforcement officer.

Filecoin also showcases consensus enforcement in a different way: it uses cryptographic proofs (like Proof-of-Replication and Proof-of-Spacetime) to ensure storage providers actually store data as agreed. These proofs are verified by the network's consensus, and if a miner fails (consensus sees missing proof), they lose collateral or rewards. Translating that concept, a data union using a similar mechanism could require any data user to post a "bond" and cryptographically prove compliance (for instance, prove they deleted data after usage) or lose the bond. While proving deletion is hard, creative approaches like zero-knowledge proofs might emerge to enforce aspects of data usage policies. The general point: blockchains can make *cheating collectively agreed rules expensive or impossible*. This is exactly what you need for large-scale cooperation without a strong central enforcer.

Cosmos, with its app-chain model, allows communities to launch their own blockchains with custom logic. For example, a community land trust could have its own Cosmos-based chain where the consensus rules encode that land parcels can only be transferred according to trust charter (say, require 2/3 community vote to approve a sale, otherwise transactions won't go through). By being a sovereign chain, they can enforce very specific rules at consensus level. Cosmos also supports inter-chain communication (IBC), so these specialized chains can interact (e.g. a data co-op chain can interoperate with a payments chain to pay dividends).

In summary, consensus enforcement by code ensures that *agreements don't depend on goodwill alone* – they are backed by mathematics. This builds confidence among participants and even external partners (who know the rules are transparent and binding). It lowers the need for costly intermediaries (no need for as many auditors or escrow agents when the blockchain itself audits and escrows). For successor institutions, this means a **data union DAO** could automatically enforce that any data sale revenue is split 80/20 between members and the union's treasury, or an **attention token system** could automatically distribute ad revenue to viewers and content creators per agreed formulas, with no delays or excuses.

Auditability and Transparency

Blockchain ledgers are *append-only and transparent* (at least to participants, and in public chains to everyone). This creates a reliable audit trail of all transactions and decisions. In the context of our new institutions, **auditability** addresses the critical issue of trust: members need to trust that their representatives or the algorithms are doing what they should, and outside observers (including regulators or the public) may also require assurance that, say, a commons trust isn't being mismanaged.

By recording key actions on-chain, we achieve an **immutable log**. For instance: - A data union can record on-chain every time data is accessed or sold (perhaps not the data itself, but a hash or a pointer to an event). Members could inspect this log to see who used their collective data and whether proper payment was made. If combined with techniques like zero-knowledge proofs, even privacy-sensitive info can be audited in aggregate (e.g. proving that no unauthorized access happened without revealing the data). - A social wealth fund's investments could be tokenized – each asset it owns could be represented as tokens, and all trades or votes that the fund makes would be on-chain records. Citizens could thus *track the portfolio in real-time*. Compare this to traditional pension funds or sovereign funds where one must rely on periodic reports; a blockchain-based fund could offer continuous transparency, deterring corruption. - Land trusts could use blockchain registries for land titles or usage rights. Projects like **Ethereum-based land registries** have been tested in some countries to reduce fraud. In a commons scenario, every lease of land, every grant of resource extraction, can be logged, and the rules (like requiring community approval for certain deals) can be verified by looking at the transaction history (e.g. “this timber contract was accompanied by transaction X which is the community's multi-sig approval”).

Filecoin provides auditability of storage – every block contains proofs that can be checked, creating a public record of who stored what data when (in encrypted form). This is useful if a data trust wants to ensure data is being stored redundantly by different parties (you can audit that files indeed have 3 replicas, etc.). Other projects, like **Carbon credit tracking on blockchains** (e.g. Toucan protocol on Polygon, or Climate Action Data Trust using a blockchain-based metadata system), aim to make environmental asset usage transparent. A global climate trust could plug into such systems to audit emissions and credits in an open way.

Auditability is closely tied with **moral legitimacy**: when funds and decisions are transparently handled, stakeholders are more likely to believe the institution is acting in good faith, which is crucial for collective buy-in. Furthermore, external auditors (like NGOs or government watchdogs) can easily verify compliance. For example, if a data union promises it will not sell personal identifiers, an auditor could examine the smart contract code and logs to ensure only aggregated anonymized data was traded. Or if an attention cooperative sets a rule that no more than 5% of its ad inventory can be political ads, the logs could be analyzed to confirm compliance.

That said, transparency has to be balanced with privacy. Blockchain's public nature means solutions often involve encrypting data and only putting hashes or proofs on-chain. Emerging tech like **zero-knowledge proofs (ZKP)** can square this circle: prove to the chain that rules were followed without revealing underlying private info. For instance, a ZKP could prove “the total dividend payout equals 100% of revenue” without revealing individual identities of recipients. This field is growing, with protocols like Zcash, Aztec, or StarkNet enabling selective transparency.

In summary, blockchains can serve as **the books and records of our new institutions**, but unlike traditional ledgers, these books are distributed and tamper-proof. Every member becomes, in effect, an auditor with the tools to verify that promises are kept. This fosters trust and can also help scale these models because potential supporters (like governments or large NGOs) will be more willing to channel resources to, say, a global commons trust if they know its operations are transparently governed on-chain.

Democratic Governance and Inclusive Decision-Making

Perhaps the most transformative affordance of blockchain for these institutions is the ability to implement **democratic governance at scale**. This means moving beyond shareholder-weighted voting (which traditional corporations and even some blockchain protocols use) toward systems that can reflect one-person-one-vote or other inclusive models in a secure and efficient way. In labor unions and co-ops, democratic participation is core but often limited by practical constraints (e.g. geographical meeting requirements, low turnout in ballots, etc.). With digital tools, especially decentralized ones, we can dramatically broaden participation.

Ethereum itself doesn't enforce how DApps do governance – many token-based projects default to coin voting (which is plutocratic). However, we are seeing experiments in **quadratic voting** and **quadratic funding** (e.g. Bitcoin's democratic funding of grants) which weight votes differently to favor broader consensus rather than just big holders. These experiments often use Ethereum smart contracts to collect votes, compute outcomes, and even to distribute matching funds in quadratic funding (where the number of people contributing matters more than the amount). This kind of mechanism could be utilized in data unions, for instance, to have members vote on which advocacy issue to focus on – quadratic voting would ensure that a choice with broader, albeit maybe less intense, support could win over one pushed by a small group of power users.

Polkadot and **Cosmos** both have interesting governance features. Polkadot's OpenGov has multiple *tracks* for different proposal types and allows delegation of votes if one wishes. While Polkadot's voting is still weighted by token stake (which might be fine for a public infrastructure like a blockchain), a cooperative could fork similar frameworks but assign voting power per member (identity-based) rather than per token. The substrate framework (used in Polkadot parachains) is flexible enough to allow custom voting modules. For example, a data cooperative chain could require that each verified member address has equal voting weight, possibly verified by a decentralized identity system to prevent Sybil attacks (fake members). We see the beginnings of this with projects like BrightID and Proof-of-Humanity on Ethereum – providing a way to certify unique persons without centralized ID, enabling one-person-one-vote DAOs.

Cosmos chains like **Regen Network** are essentially cooperatives of ecological stakeholders – they govern carbon credit methodologies and approvals via on-chain votes (here token-weighted, but the token is somewhat distributed among stakeholders like scientists, project developers, etc.). **Joystream** (a cosmos-based project) is a user-governed video platform where users vote on platform rules and moderate content collectively. These are early examples of how on-chain governance can mimic or even enhance democratic practices. Votes can be tallied within seconds to days, and results enacted automatically. There's also continuous governance: proposals can be made anytime (as opposed to annual general meetings only).

Importantly, blockchain governance can incorporate **accountability** directly. For instance, DAO frameworks allow the community to **recall elected delegates or multi-sig signers** by a vote, which is akin to a union recalling its leaders but easier to execute and transparent. Funds can be put behind time-locks so that if a

treasury transfer is initiated (say, paying developers or an external partner), members have a window to veto if it violates the agreed budget.

Additionally, blockchains enable **global participation** without a heavy apparatus. A data union could include members from many countries all voting on the same platform with low friction (just a wallet app). This is crucial for global digital cooperatives or climate trusts that inherently span borders. Traditional organizations would struggle with cross-border voting (different legal systems, etc.), but a well-designed DAO can be borderless, relying on cryptographic membership proofs rather than national ID.

One must note, technology doesn't automatically solve governance problems – people can still be apathetic or form cliques. But it lowers barriers and provides novel tools (like **liquid democracy**, where you can either vote directly or delegate your vote to someone you trust for each issue, and change delegation anytime). Some DAOs are using liquid democracy via blockchain (e.g. Tezos had a form of delegate voting in its on-chain votes).

To tie in the **legal wrappers**: While blockchain handles internal governance, legal recognition of these groups is important for interacting with traditional economy (signing contracts, owning real-world assets). That's where models like the **Limited Cooperative Association (LCA)** in the U.S. come in. The LCA is a legal form that accommodates cooperative principles (member voting, profit-sharing) while allowing some investor involvement, created by the Uniform Law Commission. It has been specifically cited as a good fit for DAO-like entities because it provides flexibility and clarity: a DAO could register as an LCA to get legal personhood and limited liability for members, while still running its governance and operations via smart contracts. The Colorado Cooperative Law is at the forefront here – some crypto projects (like the mentioned *Opolis*, a digital employment cooperative) use the LCA to wrap their DAO. This hybrid approach marries code governance with legal enforceability in courts if needed. It's an active area: the UK has its *Co-operatives UK* exploring how DAO principles can update coop law, and some jurisdictions (like Wyoming with its DAO LLC law) are creating new entity forms specifically for blockchain communities.

In effect, the technology enables **trust-minimized, scalable democracy**, and the law can provide a bridge to the off-chain world. Together, they address one of the hardest problems of collective action: how to organize large groups fairly, efficiently, and in a way that can't be easily undermined by insiders or outside forces.

Specific Protocols and Use Cases

Let's briefly connect the dots with the protocols named:

- **Ethereum**: Home of countless DAOs and experiments, it provides the most mature smart contract environment. Projects on Ethereum are creating tokens to represent data rights (e.g. Ocean Protocol issues *datatokens* for access to datasets, which data unions could use for selling collective data). Ethereum's upcoming upgrades (and layer-2 scaling) will lower costs, making small transactions (like micro-dividends to users for their attention/data) feasible at scale. Its community has also pioneered NFT-based community membership (could be used to denote co-op membership) and decentralized finance, which a social wealth fund could leverage to grow the fund programmatically.
- **Filecoin**: Useful for data unions/trusts needing to store large volumes of data or content addressably and verifiably. It's essentially a decentralized AWS. A data union could store its pooled

data on Filecoin with encryption; Filecoin's incentive structure (token rewards for storage) could reduce costs or even earn the union income by providing open datasets to Filecoin Plus program (which rewards storing useful public data). Also, Filecoin's concept of **Data DAOs** is emerging: DAOs formed to curate and finance storage of important datasets (like archiving libraries, scientific data). This aligns with treating data as a commons asset.

- **Polkadot:** With its multi-chain setup, one could imagine a Polkadot parachain dedicated to, say, a global climate trust. Polkadot offers robust on-chain governance and the ability for the chain's governance to control treasury funds (Polkadot's own treasury is substantial and community-voted spending happens regularly). A climate parachain could automate carbon credit issuance and connect via Polkadot to other chains (for carbon trading markets, etc.). Polkadot's *shared security* could help smaller cooperative chains avoid needing their own huge validator sets. Its governance (especially with OpenGov) is an evolving model of decentralized democracy that other sectors can learn from.
- **Cosmos:** Provides sovereignty and modularity – perfect for communities that want full control of their blockchain. Cosmos SDK has been used to build chains for decentralized exchanges, gaming communities, and more; it could equally build a chain for a **data cooperative** or a **city coin** that shares revenue. For example, the city of Seoul could launch a Cosmos chain where citizens vote on budget proposals (some cities experimented with “city tokens” off-chain; on-chain would increase transparency). Cosmos chains like **Desmos** are aiming to be social networks with user-governance. The flexibility means a cooperative could encode unique bylaws directly. Cosmos's IBC means these specialized chains can still trade or interoperate (so a data union chain could send tokenized payments to an identity chain or accept assets from a wealth fund chain, etc.).
- **Others:** Protocols like **Aragon**, **DAOstack**, or **Colony** (Ethereum-based) specifically provide DAO frameworks out-of-the-box for governance, which many new co-ops could utilize rather than coding from scratch. And newer identity/blockchain hybrids like **Kleros (for decentralized courts)** can add a layer of adjudication for disputes that smart contracts can't handle (say a member claims their data was misused – a decentralized arbitration could resolve it and enforce a smart contract penalty).

Finally, consider **cooperative legal tech**: There are efforts to standardize legal wrappers (like LCA) and even create “*legal DAO templates*”. For instance, the UK's Co-operative Law Association might in future allow a DAO's transaction history to serve as proof of member decisions in court, which would be a deep integration of blockchain into legal process.

Conclusion and Path Forward

Descriptive Rigor vs. Prescriptive Vision: In analyzing the foundations of labor power and its prospective successors, we see a clear pattern: the leverage once afforded by labor's universality, inalienability, perishability, heterogeneity, moral claim, and reciprocity must be reconstituted in new forms if economic power is to be democratized in the 21st century. Historically, labor's power was not given; it was organized and won through institutions – unions, parties, laws – that harnessed those structural features. Similarly, the new sources of power (data, environmental commons, attention, community capital) will require *institutions and technologies* to truly empower people.

We have surveyed **data unions, ecological/land trusts, attention-sovereignty frameworks, social wealth funds, platform co-ops**, and more, finding that each can mirror aspects of labor's sixfold leverage: - Data unions and attention coops tap into new *universal assets* of the digital age, asserting inalienable rights over them and bargaining collectively. - Commons trusts ensure that *universal needs* like nature and capital income are secured for all, with moral authority and reciprocal obligations across society. - Platform co-ops and new legal forms carry forward the *democratic governance* ethos, ensuring heterogeneity of needs is met by customized, member-driven solutions.

The six leverage points remain a useful lens: for any proposed institution, we should ask, does it include everyone (universal)? Do individuals maintain dignified rights (inalienable)? Can its power be wielded in a timely way (perishable)? Does it account for differences and expertise (heterogeneity)? Does it hold the moral high ground (legitimacy)? And does it create mutual benefit (reciprocity)? By these measures, no single new institution is a silver bullet – but a **pluralist strategy** (much like labor had both unions and political movements and cooperatives in its arsenal) is likely to cover all bases. For example, a social wealth fund can provide universal income (addressing reciprocity and universality), while data unions can give people voice in tech (addressing heterogeneity of digital experiences and moral claims for digital dignity), and blockchains/DAOs can supply the trustworthy governance backbone.

Policy and Case Studies: On the policy front, encouraging these innovations will require legal recognition and perhaps public investment: - Governments could update cooperative laws to accommodate *data cooperatives* and *platform cooperatives* (as some EU discussions and state laws in the US are doing). They could also mandate data portability and collective bargaining rights over data (for instance, the EU's Data Governance Act explicitly supports *data altruism organizations* and coops). - Setting up **public trusts** for natural resources (like many constitutions mandate state ownership of minerals, which could evolve into stakeholder trusts) or even for digital resources (imagine a "data dividend" law requiring companies to pay into a fund when they profit from user data). - Recognizing **personal data as potentially a labor product** to give data unionization a stronger legal footing (some scholars suggest labor law reforms to cover certain crowdsourcing or user-generated content situations as labor). - Case studies like **Barcelona's data trust experiments, India's data empowerment and protection architecture (DEPA), and Estonia's e-residency data governance** could be referenced as pilot implementations of data sovereignty. On ecological trusts, the **Yurok Tribe's carbon credit program** in California (where a tribe acts as steward of forest carbon and sells credits, sharing revenue among its members and land restoration) is a working example of communal environmental leverage. For attention, **Brave** and also the rise of subscription models (Netflix, etc.) show consumers willing to pay to avoid ads – a revealed preference that could be harnessed by coops offering *ad-free collective funding* of content.

Blockchain's Prescriptive Role: Technologically, we should continue developing public-interest blockchain infrastructure: identity solutions for one-person-one-vote, privacy-preserving smart contracts for sensitive data handling, and legal standards for DAOs to be recognized globally. Protocols like Polkadot and Cosmos, which themselves are governed by token-holder democracy, are essentially proving that decentralized governance can manage valuable infrastructure – lessons which can be translated into non-crypto realms. The integration of blockchain into government services (e.g. voting, registries) in countries like Estonia can lend credibility to these tools. The more these technologies are used in *public or cooperative contexts* (rather than purely speculative finance), the more they will be seen as trustworthy by average citizens.

Balance of Descriptive and Prescriptive: Descriptively, we can say that labor's power peaked in a certain era and has declined with neoliberal globalization and now automation – but prescriptively, we find that *new*

power centers are rising: data is the “new oil,” attention is the chokepoint of tech giants, and climate constraints make environmental stewardship non-negotiable. By treating these as the new “commons” around which people can unite, we have a chance to not only reclaim what was lost in terms of bargaining power, but to create a fairer and more inclusive economy than the industrial wage system was. Each person could become, in effect, a stakeholder in multiple commons: a member of a data union, a beneficiary of a land trust or climate dividend, a co-owner of the platforms they use, and a recipient of social fund dividends. This *multiplicity of affiliations* might replace the singular identity of “worker” that defined 20th-century power politics.

Finally, it’s important to recognize that none of this will happen automatically. Just as workers had to organize and sometimes strike or protest to establish unions and rights, citizens and consumers will need to **push for these new institutions**. It might mean forming local data coops, pressuring legislators for wealth funds, or collectively boycotting platforms to demand user governance. Technology provides tools, but human agency and solidarity must drive the change. We may well see the rise of **“digital union organizers”** or **“commons activists”** analogous to past labor organizers.

In conclusion, while the tools and contexts are new, the underlying goal remains what it was in labor’s great struggles: to ensure that economic progress and power are broadly shared, that people have agency in the systems that govern their lives, and that dignity and fairness are upheld even as technology transforms how value is created. With thoughtful integration of academic insight, community experimentation, and cutting-edge technology like blockchain, the six levers of power that once resided in labor can be reimaged and reasserted in the coming post-automation era – forging a new social contract for the digital age.

Sources:

- Polanyi, Karl. *The Great Transformation*. (Excerpt on labor as a fictitious commodity: **“Labor is only another name for a human activity which...nor can that activity be detached from the rest of life, be stored or mobilized.”**)
- California Law Review, *Data Unions: Informational Democracy*. (Concept of data unions as **“democratically controlled aggregated data pools”** for people to control data collectively; history of industrial democracy as **“the absolute and inalienable rights of workers to have a compelling voice”**.)
- Noah Smith, *Rise of the Robots – Social Wealth Fund Solution*. (Discussion on automation and proposal that **“a social wealth fund...would allow each person to own a piece of those robots’ output”**, creating an ownership society.)
- Opolis Coop White Paper on DAO Legal Models. (Advocates using Colorado’s LCA law for DAOs: **“platform cooperatives...driven by shared ownership and democratic governance, meaning they can scale equality without a fiduciary duty to maximize profits for shareholders.”**)
- UN “Yellow Economy” report (Attention Economy). (Defines Attention Sovereignty principle: individuals control their attention data, with ability to revoke at will ².)

- FES/ILO report on data stewardship. (Describes how data trusts/stewards can empower gig workers: **“data stewards...with duty of care...help rebalance power in favor of workers and give them greater control of data decisions.”**.)
 - Polkadot OpenGov Wiki. (Shows advanced decentralized governance: **“OpenGov...shifts all decision-making power to the public, ensuring a more democratic process”** and ability to enact decisions on-chain.)
 - Filecoin/PR News on data integrity. (Using blockchain for auditable data for AI: **“immutable and auditable record-of-data technology can ensure trustworthiness in generative AI/ML”**.)
-

1 How longshoremen command \$100K salaries in era of globalization and automation - Los Angeles Times
<https://www.latimes.com/business/la-fi-dockworker-pay-20150301-story.html>

2 UN Economist Network: Yellow Economy & Sustainable Development Insights - Studocu
<https://www.studocu.vn/vn/document/vietnam-national-university/international-economics/un-economist-network-yellow-economy-sustainable-development-insights/128192549>