LivelyGig

The Decentralized and Distributed Freelance Marketplace

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v0.7
2015-06-26

Abstract

A decentralized and distributed employment marketplace that helps freelance and other workers find short-term employment gigs offered by employers would allow these parties to be introduced when mutually beneficial and to form social contracts without the need for intermediaries. This type of marketplace solution doesn't yet exist. Two of the required enabling technologies—decentralized protocol stacks and Bitcoin—are now ready for wider adoption. Imagine what it would mean to put these parties and technologies together along with integrating existing job websites and task management solutions in such a way as to leverage the strengths of each—direct connection without intermediaries, with low friction, and healthy supply & demand—to create a new synergy. So what else is needed? A set of decentralized employment protocols must be specified and then implemented on a technology stack that is up to the challenge. LivelyGig will provide these protocols and technology.

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Introduction and Current Market Landscape

There currently exists several sub-markets for on-demand online labor, including freelance gigs, impact sourcing, and crowdsourcing (microtasking/microwork). These markets are active and growing, helping to solve millions of trivial to big-data problems every day. There are millions of people in this online workforce with revenue flowing through these markets in the billions of US$ each year. The trend is exciting and making the world a better place. The participants in this marketplace are employers, freelance workers, job sites, and potentially companies who offer task management solutions.

Employers may have large or small tasks that need to be performed. The need for part-time work is often part of a larger project. A project's momentum is sometimes slowed when project managers can't quickly find great talent, especially when trying to find someone they can trust with an abstract task, someone with the ability to clarify and make progress in spite of ambiguities. Employers can accomplish more when they can draw from a large reputation-based talent pool. Projects can also be accelerated with a practical task management solution and connected marketplace that supports delegation of tasks. Crowdsourcing needs may include data collection & enhancement, data categorization, content creation, content moderation, search relevance tuning, sentiment analysis, survey, and other areas. Wikipedia's list of crowdsourcing projects is truly remarkable in its breath.

Prospective workers using these types of online services often want to freelance for various reasons and to get paid fairly for interesting work. These individuals want to accumulate reputations for their ability to deliver content and that justify their rates.

Online service providers are enjoying a rapidly growing online labor market. Freelancer.com is the world's largest freelancing outsourced service and crowdsourcing marketplace, with 14.7m freelancers, employers bidding on over 7.3M projects, and with an estimated US$16B per year revenue opportunity.[i] The commissions are healthy, yielding up to a 10% profit margin. UpWork (Elance/oDesk) is also successful. There is even more upside in this market as the network effect of increased adoption takes hold, especially with solutions that take advantage of the latest technology for distributed applications and payments.

Today, demand and supply are somewhat disconnected for the larger jobs. Demand is created in the context of projects (for clients, buyers) managed by project managers and employers in one type of system – project management, task management, or team collaboration solutions. Supply, i.e., the available workforce (freelancers, sellers), is brought to the table by job boards. Intermediaries (often "headhunters" or agencies) help match up the supply and demand. Other intermediaries handle dispute resolution.

There are other issues with these markets, especially for the more temporary and micro jobs, including many dishonest actors, ambiguous qualifications, unprotected workers, missing dispute resolution mechanisms, high commissions, and slow payments.

Potential to Transform

In the last few years decentralized technology has achieved the level of maturity where innovators can leverage it to transform many industries and markets. Network-based business models are beginning to

replace traditional business that have been hierarchical and provided bundled services. These transitions are enabled by technology-driven networks that are lowering the barriers to peer-to-peer communications and transactions, with less reliance on centralized trust and reputation. [ii]

With the emergence of cryptocurrencies, blockchain technology, peer-to-peer networks, and smart contracts,[iii] there is now an opportunity to create a new platform for a digital job marketplace that could rapidly become global in scale. A new solution can better match the needs of employers and prospective workers (for full-time, contract, freelance, and micro-tasks), with no intermediary friction. LivelyGig supports the right to work without an intermediary. Digital technology-access tokens and the Bitcoin system can be used to reduce friction in this market and actually provide accelerating incentives to provide brand new patterns of interaction and social contracts.

In the case of the decentralized marketplace we are envisioning for freelance employment, a primary goal is to clear the barriers to forming social contracts for employment, through efficient information flow, multi-faceted reputations, and higher levels of individual and community agency.

We desire a healthy marketplace that will form naturally with a system that is effective (with low barriers, low friction) and that is efficient in metrics such as the time it takes to find a suitable gig, complete a gig, and pay with quick settlement and low overhead.

Some of these goals could be accomplished through a centralized approach. However, systemic friction, overhead, and trust issues can't be removed through a centralized approach, which is why we've explored a decentralized approach.

As background, there are a number of good articles to help understand Decentralized Applications[iv] and how Decentralized Autonomous Organizations (DAOs) can be structured.[v]

What are the top reasons why decentralization makes sense for this market? What benefits can only be achieved (or optimized) only with decentralization?

- Low friction. Relative to centralized structures, decentralized systems can reduce the friction (measured by time and money) at every step of a freelance employment cycle – search, contract, payment. Low friction will result from automated protocols and the absence of required intermediaries. In general, any time a cost is added into a workflow transaction, it is slowed from that point forward. These costs can be kept to a minimum.
- Accelerants. Not only do technology access crypto-tokens and bitcoin allow for low-cost and for developers and promoters of the system to recoup their investments, these same tokens can be injected into workflow transactions to speed them up, to provide incentives for all the parties involved.
- Self-tuning economy. With carefully designed protocols that include incentives for all parties, the market can be more balanced, fairer, and grow faster than centrally controlled markets. The system's nodes and agents can possibly self-optimize, with occasional tuning by the open source community that will maintain the protocol.
- Individual and privacy protections. A key benefit of a DAO is that it can't be easily censored or shut down, which is especially appealing in some geographies and employment markets. With cryptographic protocols and open source software, we can better assure privacy will be protected than would be typically provided by centralized organizations. The servers won't have

access to a user's information without either 1) their private key they control, or 2) conversations they choose to explicitly make public.

This freelance employment market is ripe for the following types of transformations that will be enabled by LivelyGig:

From	To
Processes that require intermediaries helping parties connect	Direct matching of supply and demand (with an option for agency)
Centralized software	Peer-to-peer and decentralized software
Employment agreements (arranged and enforced by intermediaries)	Direct, peer-to-peer social contracts
Processes that require intermediary fees	Processes that pay facilitators only when they are helpful
Intermediaries taking 4-10% of the transaction price	Zero or low overhead costs
Delayed payment after work is accepted	Immediate payment when work is accepted
Extensive sharing of private information from worker to employer	Sharing only necessary aspects of identity and private information from worker to employer
Required dispute resolution overhead	Smart contracts with options for dispute resolution

Envisioned Usage

Let's imagine a specific scenario and then summarize the use cases more generally.

Pam, a project manager who works at SoftShop, needs to have their smartphone application updated with new artwork. However, she doesn't have ready access within her organization to the needed talent. She registers with and logs on to a LivelyGig-enabled website. She creates a project definition with a task to update the artwork. She sets the target budget, terms, required skills, and timeframe for the task and chooses to advertise the job posting.

On a LivelyGig-enabled freelance job website, Abed, a software developer who has the matching skills, sees SoftShop's job posting (which may have been promoted by LivelyGig or a 3rd party facilitator/catalyst). He's interested, so opens up a secure conversation with Pam, and they negotiate a clarification to the task along with payment terms. Abed and Pam finalize their agreement in their respective websites using LivelyGig, which records a smart contract. As part of the agreement Pam and Abed choose to put some of the promised bitcoin payment into escrow.

Later, Abed, who has been reviewing his progress with Pam, delivers the final updated artwork and indicates completion on the freelance website (or other client UI). Pam receives notification and approves the delivery. The LivelyGig protocol releases the pending payment transaction in escrow, and

this action provides bitcoin payment immediately to Abed. LivelyGig provides both Pam and Abed with reputation points as part of the task completion, which helps in their ability to more readily secure future work with less escrow requirement.

Like in this example transaction, many projects can benefit from an integrated environment that helps project teams find the optimal contract and freelance talent needed to complete a set of deliverables. In this whitepaper, there is an assumption the deliverables are digital, although other commerce including order and delivery of physical goods is possible. The requirements description of a digital deliverable might range from vague feature descriptions for software, to detailed specifications that have independently verifiable solutions, to very simple tasks. We'll refer to any chunk of required work as a task.

Once defined, a task can be immediately assigned to an existing full-time project team member or can be offered to contractors or freelancers. Task agreements can be initiated by a project manager via a talent search or by a resource once a task has been offered and advertised.

For each employer-worker relationship, the LivelyGig protocol records the equivalent of an employment agreement, a "gig", which sets the context and defaults for the worker's tasks. LivelyGig's task workflow with optional escrow with payments in bitcoin ensures efficiency and fairness. Many other options are available to employers and workers for how they choose to work together. These options include the amount of escrow required and a contract expiration date that if exceeded would trigger a refund of escrow.

Solution Overview

LivelyGig enables a uniquely integrated solution to provide talent sourcing, employment smart contracts, delegated work, process, bitcoin payments for completed work, and immutable audit trails of those processes. Therefore, the LivelyGig marketplace will bring together employers, who need a specific, defined unit of work or task performed, and a worker, who will perform the task and supply a digitally delivered output to the employer.

LivelyGig will provide the peer-to-peer infrastructure with protocols, APIs, and incentives that together forms a Distributed Autonomous Organization[vi] (or several DAOs). This creates the foundation and environment for a decentralized employment market.

Third-party providers integrate job search websites and task management solutions with the LivelyGig protocol, enhancing the value of their existing solutions.

The LivelyGig DAO will provide incentives to all participants in these employment processes through ownership transfers of a new technology-access token called dibs. This will encourage certain behaviors of users and software agents, leading to overall system success.

The manner in which the LivelyGig protocol usage was introduced in this document was with conventional use cases, scenarios, role names and so forth. However, in peer-to-peer systems, behavior is an emergent property of distributed processes. So, the real linchpin will be in LivelyGig’s protocols and reactive agents. Accordingly, incentives must be in place to encourage the desired end-to-end behaviors and properties. There is a large section of the whitepaper that outlines a number of process protocols

and user-agent events that can be rewarded (or at least encouraged) with dibs. Details will be captured in a separate document, the LivelyGig Protocol Specification.

If LivelyGig were to create its own freelance job site, task management solution, and user base, it might take a long time. Instead, LivelyGig intends on partnering with current players in this market. In addition, peer-to-peer, decentralized software is also complex to build, so LivelyGig intends to leverage existing technologies in this area, if they are available and feasible. Several potential business and technology partners are mentioned.

The infrastructure needed to build, support, and evolve the LivelyGig protocol itself will require capital and management. As a DAO and with the intent to open-source the software, the founders are considering a crowdsale to issue the dibs tokens and to raise capital. A non-profit LivelyGig Foundation will be formed in order to support development and adoption. Some of the business development considerations are described toward the end of this document.

Once the LivelyGig protocols gain traction in terms of their usage, the resulting marketplace for freelance talent will be transformed into one that is decentralized and self-sustained.

The LivelyGig protocol and APIs will enable integrations with job boards and task management systems that leverage Bitcoin's technology and foster a new employment marketplace. There are many companies mentioned in this whitepaper that have not adopted peer-to-peer or cryptocurrency technologies, but could benefit from leveraging the LivelyGig services. There are already several peer-to-peer and/or bitcoin solutions being formed that are relevant to LivelyGig because of their related market and/or technology. Of note are OpenBazaar[vii] and OmniBazaar[viii], and Synereo/SpecialK[ix]. It turns out that LivelyGig's technology needs appear to be well aligned with Synereo, which is a decentralized and distributed social network.

LivelyGig will enable uniquely integrated features to provide talent sourcing, employment smart contracts, delegated work, process, bitcoin payments for completed work, and immutable audit trails of those processes.

LivelyGig's open API will enable integration with existing project management, task management, and job search solutions, increasing each of these solution's value proposition. These systems collectively will create a marketplace for jobs large and small. All data is private, encrypted, and only available to users based on their permission via private keys. Hourly rates or fixed-price payment agreements can be pegged to non-bitcoin currencies.

These features are delivered via LivelyGig’s peer-to-peer nodes (including a client application, websites, and solutions built atop its APIs), as shown in Figure 1.

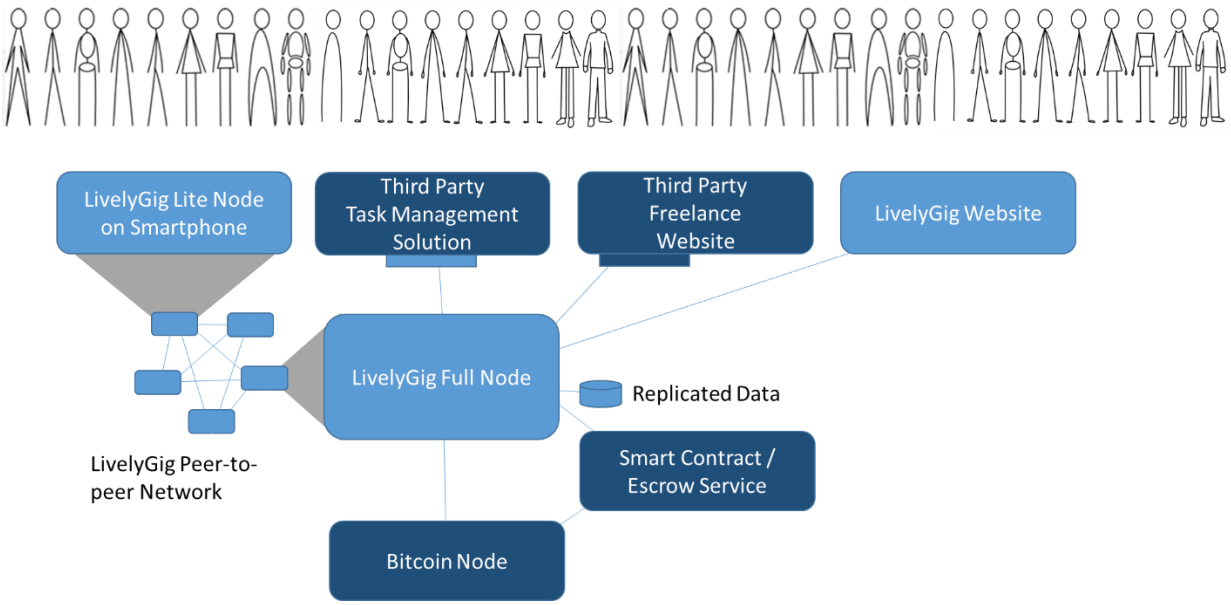

Figure 1 - LivelyGig System-level Components

The LivelyGig solution is essentially a set of protocols that

- encourages successful matching of job postings and workers;
- records and enforces social contracts created when employees and workers reach agreements;
- provides standard task-management workflows;
- maintains a reputation profile for each user, based on their longevity in and successful usage of the system; and
- motivates user behavior in order to achieve the desired, emergent properties of the system.

The system design recognizes that people are involved in voluntary social behavior, so the system design pays for desired behavior in a way consistent with their goals to get work done and to get paid.

Employees and prospective workers interact directly with each other in free trade, with low or no fees, and with respect for privacy.

LivelyGig's solution scales from tracking a simple task via LivelyGig's website, to managing a complex project plan through an integrated best-in-class project management system.

User participants in the marketplace include project managers, full-time project participants (pre-defined resource pools), contracting firms, contractors, staffing firms, and freelancers.

Access to the LivelyGig protocol is via its web UI, client UI, or any number of integrated 3rd party solutions leveraging LivelyGig's protocol via its API, as shown on Figure 1 - LivelyGig System-level Components, above.

Projects can run as publicly or privately as desired. Employer and worker identities, locations, and other data are kept private, unless they choose or require each other to share those details.

A hash-based proof-of-process audit trail is created for each actor (user or agent) in the system. However, the contents are not revealed unless agreed upon by the actor. The audit trail capability is

especially appealing for government, government-sponsored, and non-profit projects, since this will improve their accountability through transparency.

User Behavior Rewards

The system rewards each of the contributors that provide utility to the LivelyGig marketplace. For example:

- Employers find qualified, affordable, worldwide talent for tasks quickly. Employers have the ability to monitor progress and provide incentives for faster delivery. They enjoy trouble-free payments. These payments are transparent and can be non-anonymous, if required and agreed to up-front with a worker.
- Workers, including skilled full-time and freelance talent, are able to find interesting and rewarding gigs that match their skills. They receive quick payment and their reputation builds.
- Talent sourcing sites and contract management organizations can integrate with LivelyGig to supply additional work opportunities to their community members in a way that can provide a commission.
- Project management application owners can add value of talent resourcing to their existing platform and user base. They can charge users for these value-added features.
- Matchmakers can introduce clients and freelancers, and if accepted by the client will be rewarded if these matches result in successfully completed gigs.
- Agencies can coordinate a freelancer, or even completely project manage a whole team of freelancers for a complex gig.
- Arbitrators can be elected to resolve disputes of gig payment.

LivelyGig Marketplace

The extended LivelyGig marketplace, enabled by integration partners, includes the following:

- The LivelyGig protocol provides smart contracts for tasks and interfaces to that contract. The protocol enforces the contract's terms and workflow. Upon task delivery and acceptance, LivelyGig handles payment transactions and reputation crediting.
- Project managers create tasks that can be outsourced (defining work, posting/advertising jobs, sourcing contractors, sourcing independent freelance talent, and managing agreements).
- Project management software solutions integrate with the LivelyGig protocol to provide traditional and agile project management processes that leverage the marketplace.
- Contractor and freelance workers offer their skills and availability, search for gigs, apply for work, complete tasks, and get paid.
- Job sites integrate with the LivelyGig protocol to offer their community members access to the LivelyGig marketplace.

Importantly, existing solution providers in project management, task management, job boards, and contracting firms can participate in this marketplace quickly by integrating with the LivelyGig API, even without necessarily exposing the bitcoin or distributed application aspects of LivelyGig to their users.

LivelyGig will appeal most to a niche of the large job board marketplace – to those participants who are receptive to using bitcoin or other crypto-tokens. This niche may be small initially, but will have immediate appeal to those living in areas whose local economies don't provide maximum opportunities for highly skilled digital talent, especially to those who are early adopters of bitcoin. This niche is expected to grow into mainstream. The existing demand and supply for digitally delivered content are both very large; LivelyGig will help connect these parties in a direct and efficient way.

System of Interconnected Systems

The LivelyGig peer-to-peer network and its integrated applications create system of decentralized processes. A given LivelyGig node may have only a subset of the processes and data that operate on the types of objects depicted in Figure 2.

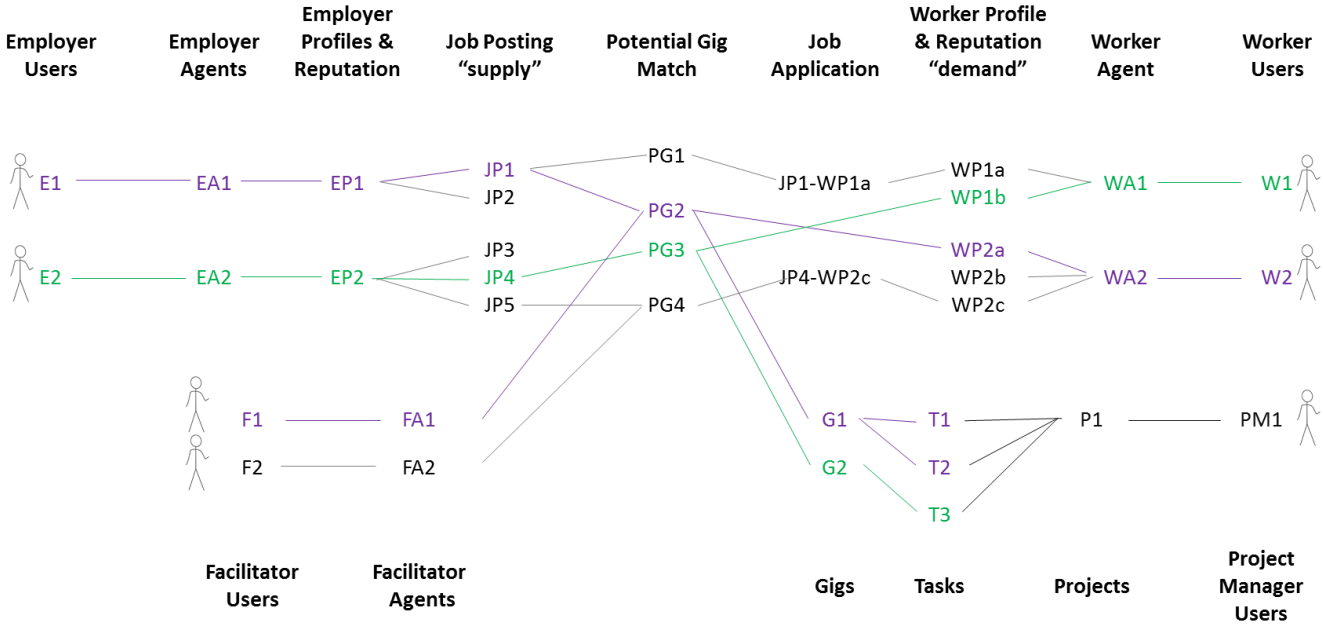

Figure 2 – Primary Objects in LivelyGig

In this diagram we can see the resulting structures, for example of how employer E1 and worker W2 have formed gig G1 with the help of facilitator F1.

Processes

After a user registers (perhaps with a stated *intention* but minimal or no private data), the primary goals of the system are to help the parties through the high-level steps of forming and fulfilling a social contract:

1) post a job opportunity
2) get *attention* and introduce the parties (forming a *channel* between them)
3) assure clarity of expectations

4) assess competence and fit
5) make an offer and agree to the *gig* (i.e., the *social contract*)
6) create tasks (optional)
7) complete tasks and complete execution of the gig
8) fulfill any payments due
9) enhance reputation

This list just provides the flavor of the end-to-end system behavior. Since this is not a centralized system, each process (instantiated for an agent) must be described independently and then verified it has the desired emergent properties when assembled into system-level use cases.

Desired Properties and Incentives

In addition to assuring the successful high-level flows, it is important to be clear about the desired system-level properties in order to guide the protocols and incentives. These are the critical success factors of the overall running system:

- Getting started with LivelyGig is easy (including switching from existing freelance sites).
- Gigs successfully complete with satisfaction and result in payment.
- Users are rewarded for successful completion of gigs, including getting a bump to their reputation.
- Gig volume is high.
- There are loyalty incentives for participants to keep using LivelyGig (e.g., based on transaction volume and length of time on platform).

LivelyGig is a network of consent – people involved in behavior. The system rewards desired behavior, in a way consistent with their goals. In this case that is to get work done and get paid for work. An employer may measure their success in terms of available talent pool, their capabilities, availability, reputation, cost rate, and gig size supported by the market. A worker has other needs, including their ability to make a living based on LivelyGig opportunities, the need to enjoy what they are good at, accommodating their availability schedule, high pay rate, and so forth.

Dibs are the currency of the gig-attention model, and will flow as generously as needed in order to encourage the desired emergent system properties.

Process Specification Approach

Since the LivelyGig processes are concurrent and decentralized, they really can't be adequately specified in the way many of us are used to thinking, with use cases, scenarios, object models, and APIs. That approach is still helpful and works okay for centralized systems, but does not match the paradigm of decentralized architectures and reactive interaction patterns.

So, the LivelyGig team is now learning about new techniques modeled in process calculi, especially π-calculus. These are applicable to model and guide the implementation of process interactions. In this

paradigm, a compositional system becomes feasible and comes into existence only when processes work together in parallel composition with the appropriate properties.

As a simple example, a LivelyGig system-level process comes together when the processes for Employer, Gig, and Worker interoperate with a success that is defined ahead of time in terms of the properties required of the system. In fact, if specified correctly, the entire system-level process can be validated before it is developed, tested, and deployed.

Processes send and receive events over named channels. Depending on the technology stack, the following communication may also be supported: request/response, solicit response, one way, notification, timeouts (deadline and duration), and exceptions.

Initially, the modeling of LivelyGig could follow the industry standard modeling languages such as BPDM or BPEL.[x] If the specification can be written in a language that maps directly to implementation, then the realization of the LivelyGig vision will be accelerated. The protocol specifications may start initially sequence diagrams, and will then refined to language that is more precise for independent agents and also friendly to reactive design patterns for high-data-volume applications. The Social Contract language of Synereo is currently being explored.[xi]

In the completed LivelyGig protocol set, there may be tens of protocols and hundreds of message types. Each of these messages may require a signed transaction and a cost in dibs, where that cost is determined by one of the protocols (pricing). Dibs are the internal currency of the software, but might not even be exposed directly to the users. In one business model they could behave like quotas, where the user needs to buy some level of protocol access that correlates to a supply of dibs.

The following list of protocols and events are a subset of those in the system, to help the reader appreciate the process-centric architecture and the incentive parameters that can be used to optimize the system.

<u>Employer</u>

- create a project
- post a gig (job)
- promote a gig
- request attention of prospective worker
- reward prospective worker for attention
- search for available talent
- select a worker for a gig
- update a gig or task state via events – Offer, Assign, Complete, Cancel
- request reputation evaluation of prospective worker

<u>Worker (or prospective worker)</u>

- post a talent profile with capabilities
- set cost of his/her attention
- attend to (e.g., read, comment, reply) a gig
- update a gig or task state via events – Accept, Complete, Cancel
- accept a reputation bump

Facilitator

- User
  - vouch for reputation of another
  - accept recommendation from another
- External matchmaker – "headhunter"
  - clarify gig
  - clarify fit of employee for gig
- Escrow agent
  - provide insurance or bond
  - resolve dispute (arbitrate, mediate)
  - record a smart contract with escrow agreement
- Note that LivelyGig itself may act in any of the facilitator roles. Spending dibs in this way would be a legitimate way to encourage the ecosystem.

Gig

- co-sign a contract

Site

- promote a gig
- promote a worker
- promote an employer
- register a user
- score the fit of worker for a gig

In every case, the process operates in the context of a software instance or agent that represents the real-world concept. The corresponding events might or might not directly correspond to direct user interaction. Several of these events are simply to motivate a user's attention. Some of these events might entitle the agent/actor future benefits when a workflow completes (as if an escrow of dibs).

Example Processes

Several processes are described below to help understand the vision, although these processes will ultimately documented in the LivelyGig Protocol Specification.

Task Offer, Talent Match, and Employment Agreement

- When working with LivelyGig, a project team can search for and select talent from among a highly skilled global community of software developers and other digital content producers.
- A task can be advertised (generally or very targeted) and made visible to potential workers.
- For a given task, there can be a single resource assignment or a contest-with-bounty, depending on the needs of the project and employer. Even auctions could be supported someday.
- The Gig employment agreement and task assignment agreements can be made and priced via a process of negotiation, auction, fixed-price, or other means.

Task Completion, Delivery

Depending on project policies, the entire delivery can be made privately (email, Gdrive, Dropbox, StorJ, etc.) or may need to be provably accessible in an immutable repository such as GitHub, in which case the worker would provide a pointer to the delivery.

LivelyGig will record proof of process in Factom. Minimally, this Factom entry contains a hash of the delivery artifacts, where those contents can be kept secret and optionally revealed later. This process creates a provable audit trail.

Escrow

As an option, any task can be enabled for payment in bitcoin. Escrow pay-in may be required from the worker and/or employer, depending on applicability of various policies of LivelyGig, the employer, the worker, or integrated third party solution. In general, escrow amount does not need to match the full payment amount; any portion of the agreed upon amount could be handled independent of LivelyGig. The key concept here is to be able to align the incentives of the freelancer and client to finish the gig.

Escrow Ratio

One possible escrow example for a one bitcoin task is shown in figure 2, where the employer and worker each pay into the escrow (in red) and upon successful task completion the escrow is paid out (in green). In this case, a 0.5% commission to LivelyGig is shown, paid by the employer.

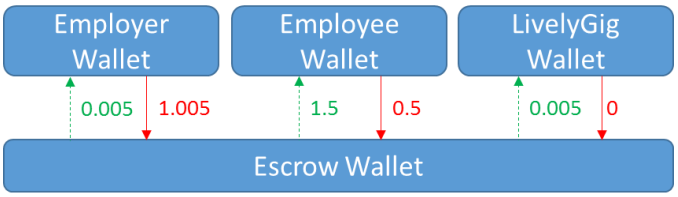

Figure 3 – Per-Gig or Per-Task Escrow Wallets and Typical Flow of Funds

Alternate escrow policies and exception paths are supported.

Escrow Creation

- Funded by Employer:
    - Pay the worker for work, and pay LivelyGig commission. This is the normal escrow that LivelyGig will co-sign when work is accepted.
    - Refund to Employer. LivelyGig will co-sign this under certain circumstances, such as when the worker's task deadline has passed.
- Funded by worker:
    - Refund to worker. This is the normal escrow refund that LivelyGig will co-sign when the work (task delivery) is accepted.
    - Pay the Employer and pay LivelyGig commission. LivelyGig will co-sign this under certain circumstances, such as the worker's deadline has passed or they choose to cancel/renege.

Additional escrow creation and payment workflows can be supported for high-value and complex tasks.

Escrow Release

Depending on agreed upon policies, the protocol will release escrow to worker, employer, and possibly LivelyGig as conditions are met.

- Release to worker:
  - at intervals agreed upon up-front, for progress payments
  - as agreed on for demonstrated progress (for "time and materials" type of work)
  - at the final delivery of the work
  - at acceptance of the delivery
- Release to Employer:
  - if worker cancels the agreement early
  - if worker fails to deliver after an elapsed duration once the task started
  - if worker fails to meet deadline date
  - if employer rejects delivery
- Release to both worker and employer:
  - if both parties agree to cancel the task
  - if the task's prerequisite tasks were not satisfied after an expiration date (must start by date)
- Release to LivelyGig:
  - at acceptance of the delivery

Escrow Mechanism

Escrow via the LivelyGig protocol may use existing smart contract technologies. Under consideration include Bitrated[xii], Trustatom, Codius, Mirror (formerly Vaurum), and Ethereum. A direct implementation by LivelyGig is also an option.

The LivelyGig escrow flow could implement a distributed contract via the blockchain;[xiii] however, its transaction volume would be limited and require bitcoin. One approach under consideration is to utilize P2SH including 2-of-2 multi-signature addresses created per task, using a user's and LivelyGig's hierarchical deterministic multi-signature (HDM) addresses.

Trust and Recourse

How the LivelyGig protocol and marketplace will provide a minimally necessary level of trust and safety for its participants is an important consideration. For example, whether the protocol provides for dispute resolution in the event there were to be disagreement between the employer and worker about satisfactory completion and payment needs to be decided. The current thinking of the LivelyGig team is that “intermediary” task contracts (i.e., as an agent in between the employer and worker task) could be constructed as a value-added feature in order to help address trust and resource topics, including participant risk, insurance, dispute resolution, escrow arbitration, reputation, and surety bonds.

Several escrow considerations are described in Lex Cryptographia for managing risk in contracts.[xiv] The LivelyGig team will study techniques emerging in the sharing economy that are technologically centralized (Craigslist, Uber, Airbnb), decentralized (OpenBazaar, Bitmarkets), and escrow service providers.

Implementation Technology

Overview

LivelyGig will be implemented as a decentralized application protocol[xv], including:

- open-source
- operates autonomously, with no entity controlling the majority of its tokens
- data and records of operation cryptographically stored in a public, decentralized block chain
- contribution from users rewarded by payment in the application's tokens
- may adapt its protocol in response to proposed improvements and market feedback but all changes must be decided by majority consensus of its users.
- protocol has its own usage tokens (dibs). The protocol will also leverage bitcoin and potentially other crypto-currencies or smart properties.

The LivelyGig team is currently exploring a few distributed application and smart contract software stacks.

Data

Data storage is dependent on the chosen technology stack. Regardless, it will be stored in a distributed manner, potentially as follows:

- In SpecialK / KVDB (as used by Synereo):
    - Project definition
    - Tasks and dependencies on other tasks
    - Minimal project plan information needed by LivelyGig protocol
    - User registration (minimally, a bitcoin address)
    - Skills and reputation
- On Omni, the Bitcoin blockchain, or a new sidechain:
    - Contracts for work
    - Escrow
    - Payment of dibs
- In Factom:
    - Hash of process artifacts (transactions, deliverables, and other data)
    - Proof of publication for work completion

Business Model

Value Generation

The LivelyGig team is considering several economic models to cover expenses and create a self-sustaining DAO, including the following non-exclusive options:

- Charge participants a fixed or percentage fee for bitcoin transactions managed and sent via escrow mechanism, upon a task's acceptance. This approach is assumed in this whitepaper, but might not be essential.
- Charge participants (especially large-volume applications utilizing the APIs) for use of the protocol with digital technology-access token called dibs.
- Reward node operators and sub-sites that are specialized and targeted to niche audiences. This is especially important for localized versions.

Business Model and Integration Partners

LivelyGig will focus its own efforts on building the platform and protocols that aren't currently available in a decentralized fashion – to manage gigs (employment agreements), task workflow, and possibly smart contracts, escrow, and payments.

Creation of the peer-to-peer architecture and protocols will be challenging enough, so instead of attempting to build a complete marketplace from scratch, LivelyGig will likely leverage the momentum and marketing already in place: 1) for matching jobs and workers, especially freelancers; and 2) for task management. Some BizDev possibilities are outlined below.

Integrations with Project Management Solutions

Integrators can leverage LivelyGig's API to create synergy with best-in-class project management solutions, which already support traditional and agile project management techniques. In addition to integrating with LivelyGig's Task smart contract, project management solutions provide value around concepts such as Tasks (work packages, epics, user stories, scenarios, etc.), work breakdown structure, dependencies, work effort, duration, schedule, critical path, and cost. Interesting task management solutions with which to integrate, including Trello, Slack, Asana, and Jira.

LivelyGig may itself implement a plug-in to an existing PM solution in order to accelerate adoption.

Integrations with Freelancing Websites

Independent integrators may also be able to integrate with job websites. However, since the companies running those sites have proprietary code and rely on fees from their participants, it is more plausible those companies interested participating would need to extend their code themselves and would consider this only after seeing a market forming for freelance workers wanting payment in bitcoin. LivelyGig will provide the API to enable integrations to be written with job-seeking solutions on the

market, including Freelance.com, Fiverr, UpWork (oDesk/Elance), Bountysource, DesignCrowd, 99Designs, Guru, GigCoin, Coinality, and Mechanical Turk.

A Bitcoin-centric site such as Coinality or participants in sub-Reddits BitMarket and Jobs4Bitcoins might be early adopters. By targeting a niche market initially (as a wedge) LivelyGig would be able to build its own marketplace without competing directly with existing job management solutions.

Integration with Micro-Job Applications

With the assumption that bitcoin will become more widely adopted, this opens up a huge market for smaller jobs because of bitcoin's low transaction fees. Small job sites such as CoinWorker.com (already working in bitcoin in collaboration with CrowdFlower), microwork.io, BitLancerr, CoinTasker, and many others[xvi] provide workers a supply tasks such as proof-reading, spell checking, writing, translating, surveys, playing videos, price checking, social marketing, taking photos, and so forth. Even the market for live person-to-person services such as counseling and sites like LivePerson could benefit from the LivelyGig protocol.

Integration with Personal Project and Service Applications

Somewhat of a hybrid of all the above solutions is the category of helping consumers accomplish their personal projects and chores. Applications such as Thumbtack could be integrated with LivelyGig. Thumbtack's credits for service provider pros are analogous to LivelyGig's dibs. In Thumbtack, pros purchase a bunch of credits that are used to get the attention of prospective customers. Subscription plans are available. This same type of business model is an available option for LivelyGig.

Integration with Payroll

In order to expand the appeal of LivelyGig to organizations who are careful to comply with employment laws and regulations, enhanced user registration and an integration with a payroll company such as BitWage can provide the data necessary for compliance.

Dibs

The dibs technology access crypto-token will likely be created during a software technology sale ("crowdsale" or "initial coin offering"), with a fixed supply and without mining.

Some notable crowdsales in US$ include Ethereum $15M, Maidsafe $6M, SuperNet $3M, SWARM $1M, ZiftrCoin $875k, Gems $780k, Mastercoin (now Omni) $600k, Storj $550k, Synereo Amps (unknown), and Factom factoids ~$500k. [xvii] [xviii]

A dibs crowdsale would likely be structured as follows:

- Crowdsale event:
    - Creates dibs tokens that provide participants rights to access the protocol.
    - Issued on Omni, Counterparty, or a pegged sidechain.

- Crowdsale proceeds:
    - BTC
        - Early investors who contributed before the crowdsale
        - Most of the sale proceeds will be controlled by the LivelyGig Foundation, to support participants in the LivelyGig marketplace: protocol developers, initial node operators, and integration partners.
    - Dibs
        - Development mechanism – Some percent of dibs total tokens will be set aside for development of the LivelyGig protocol.
        - Some percentage will be controlled by the LivelyGig Foundation, to provide incentives for system behavior.
- Market for Dibs after crowdsale:
    - The market for dibs after the crowdsale is unclear. With the positioning of dibs as an access token (rather than a tradable crypto-currency), the exchange from currencies to dibs may be designed to be a one-way purchase.

LivelyGig Foundation

The foundation will have the charter of making better and better open source LivelyGig software and to help facilitate uses of the protocol. Initially, this would include funding development, infrastructure, and maintenance. The foundation will operate with transparent governance, with elected board members and make any important decisions in a decentralized manner, using a proof-of-stake voting mechanism (e.g. based on LivelyGig reputation or dibs holdings) as defined by its bylaws.[xix]

Summary

The LivelyGig protocol and its integrations with other software solutions will provide project teams and talent an employment marketplace and set of rules for managing work on tasks – small to large. LivelyGig enables smart contracts and incentives that are aligned with a project's economics. A project run with LivelyGig assures an appropriate level of transparency, creates a provable audit trail, and completes a task workflow with an immediate payment to the worker. LivelyGig's marketplace (including the protocol, its users, and integrated applications) will encourage a qualified supply of satisfied talent and a demand for talent that together delivers digital products with unprecedented speed, quality, and participant profitability. Adoption network effects will hopefully create a virtuous cycle and shared prosperity for participants.

Endnotes

[i] Freelancer receives buy recommendation, A$1.46 price target. March 17, 2015 http://www.proactiveinvestors.com.au/companies/news/61298/freelancer-receives-buy-recommendation-a146-price-target-61298.html

[ii] Macro-trends mentioned are inspired in part by Fred Wilson, Managing Partner, Union Square Ventures as presented during LeWeb Paris 2013, available on YouTube https://www.youtube.com/watch?v=R43OKYmGbhU

[iii] "A smart-contract is an event-driven program with state, which runs on a replicated, shared ledger and which can take custody over assets on that ledger." - Richard (@gendal) Brown. See http://gendal.me/2015/02/10/a-simple-model-for-smart-contracts.

[iv] From "Best Reads For Learning About Decentralized Applications" published September 25, 2014 https://koinify.com/blog/top-10-resources-for-understanding-decentralized-applications/

[v] See "An Operational Framework for Decentralized Autonomous Organizations" by William Mougayar 04-Feb-2015 http://startupmanagement.org/2015/02/04/an-operational-framework-for-decentralized-autonomous-organizations/

[vi] References for Distributed Autonomous Organization (DAO). See What Does it Take to Succeed as a Decentralized Autonomous Organization? CoinDesk. William Mougayar published on February 21, 2015.
See also other articles mentioned in Koinify's blog post, Best Reads For Learning About Decentralized Applications https://koinify.com/blog/top-10-resources-for-understanding-decentralized-applications/.

[vii] OpenBazaar is a decentralized network that is censorship-resistant, with no mandatory fees, using Bitcoin. As of March 1, 2015 it is in beta. See https://openbazaar.org/

[viii] OmniBazaar is a distributed, anonymous, and cryptocurrency-enabled e-commerce platform. See http://www.omnibazaar.com/.

[ix] Synereo is a decentralized and distributed social network that has a technology stack, attention model, and technology access tokens similar to this whitepaper. See http://www.synereo.com/, including blog articles.

[x] Business Process Modeling, see www.bpmi.org.

[xi] Synereo Social Contracts. See https://discuss.synereo.com

[xii] Bitrated is an escrow agent and reputation system. See https://bitcoinmagazine.com/19371/bitrated-unveils-reputation-system-multisig-escrow.

[xiii] Distributed contracts via the blockchain, see https://en.bitcoin.it/wiki/Contracts.

[xiv] Lex Cryptographia. See http://bitcoinism.blogspot.com.au/2013/12/lex-cryptographia.html.

[xv] Distributed Application Protocol, DApps. See the background documents at http://www.dappsfund.com/ by David A. Johnston.

[xvi] Micro-Job sites. See http://workathomemoms.about.com/od/Micro-Jobs-Crowdsourcing/ss/Micro-Jobs.htm.

[xvii] Notable Crowdsales are listed in the SWARM Crowdsale Guide, captured March 1, 2015 by Joel Dietz from https://docs.google.com/document/d/1XkffsLaSSJrokTOgHZ2WTtyu70T2oXTHRjroltTsj-M/edit

[xviii] Koinify is a team that helps manage campaigns to launch decentralized applications projects with crowdsales. See https://koinify.com.

[xix] LivelyGig Foundation will be influenced by the success and challenges of the Bitcoin Foundation, other Distributed App foundations, and considerations outlined by William Mougayar in http://startupmanagement.org/2015/02/04/an-operational-framework-for-decentralized-autonomous-organizations/.