Cardstack White Paper

The experience layer of the decentralized Internet

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1.1 EXECUTIVE SUMMARY

Cardstack is the experience layer of the decentralized Internet. We believe that orchestrating cohesive user experiences across blockchain and the cloud is essential to bringing decentralization to the mass market.

For Makers: Fair Distribution of Rewards

We propose a new economic model for funding and sustaining the software that runs the world. This model distributes rewards fairly among the creators of the software and the open-source communities supporting them. In this decentralized software market, a buyer of applications enters into a direct deal via smart contracts, which coordinate a diverse network of software development teams, cloud hosting providers, and app coin-backed protocols. The buyer offers to cover all the material costs of running the app, as long as the cost is directly linked to the usage. The buyer will also pay a royalty that is split between those who developed the software, as a reward for initially creating and continuously supporting all the components making up that particular application. In this arrangement, the application software can be considered economically sustainable, since every buyer covers his or her costs and the software does not deplete the limited resources (like venture capital or token sale proceeds). The software developers are rewarded through a reward pool, based on properly designed incentives that lead to improvements of the software over time.

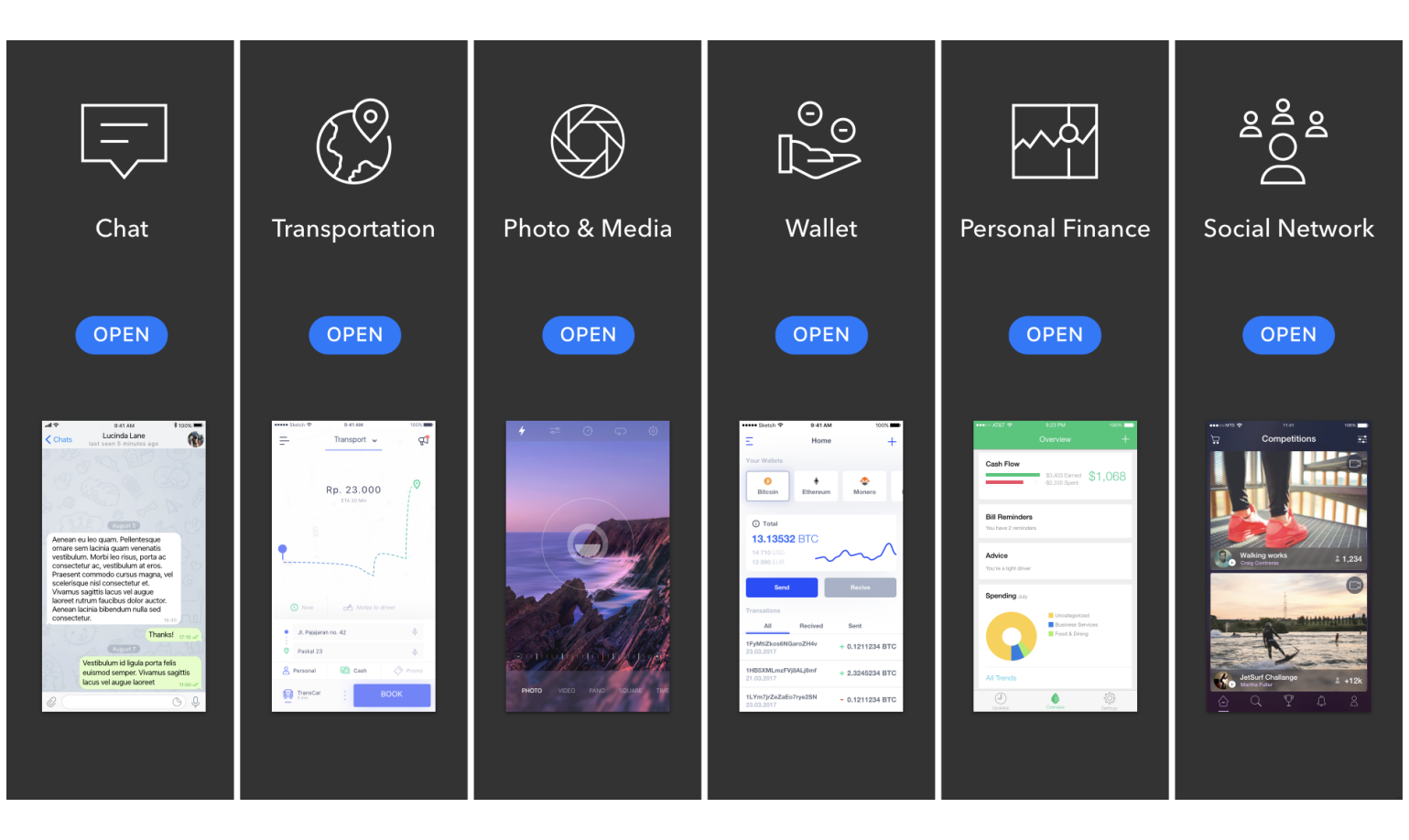
For Users: Cohesive User Experiences

Our model is based on blockchain technology, which presents us with a rare opportunity: we can break down the silos of apps defining the tech world today, in order to produce a Cohesive User Experience (CUE), which establishes a flexible design paradigm that can orchestrate all the moving parts in the user's digital life. With the fluidity of token-backed applications, we can move beyond the one-icon-per-app business arrangement of the current mobile and cloud world. Yet, for blockchain-backed applications to gain mass market adoption, we need to bridge the gap between the power of blockchains and the convenience of the cloud. Cardstack's application framework and token mechanisms combine the new possibilities provided by smart contracts, while leveraging the incredible global scale and cost efficiency of cloud computing, to deliver this user experience. Our technology puts the power of decentralization into real-world use and demonstrates how a crypto-driven economy, backed by current blockchain protocols, can enrich the world in an equitable manner. Blockchain needs a "full stack" application framework to reach mainstream users: Cardstack.

> “Our mission is to build an economically sustainable software ecosystem that fights back against the rampant lock-in mechanisms of centralized platforms.”

1.2 PROBLEM: APPLICATION SILOS (1/3)

The App Store era turns software features into standalone native apps, which usually do not communicate with each other and require users to choose between multiple overlapping features to form their workflows.



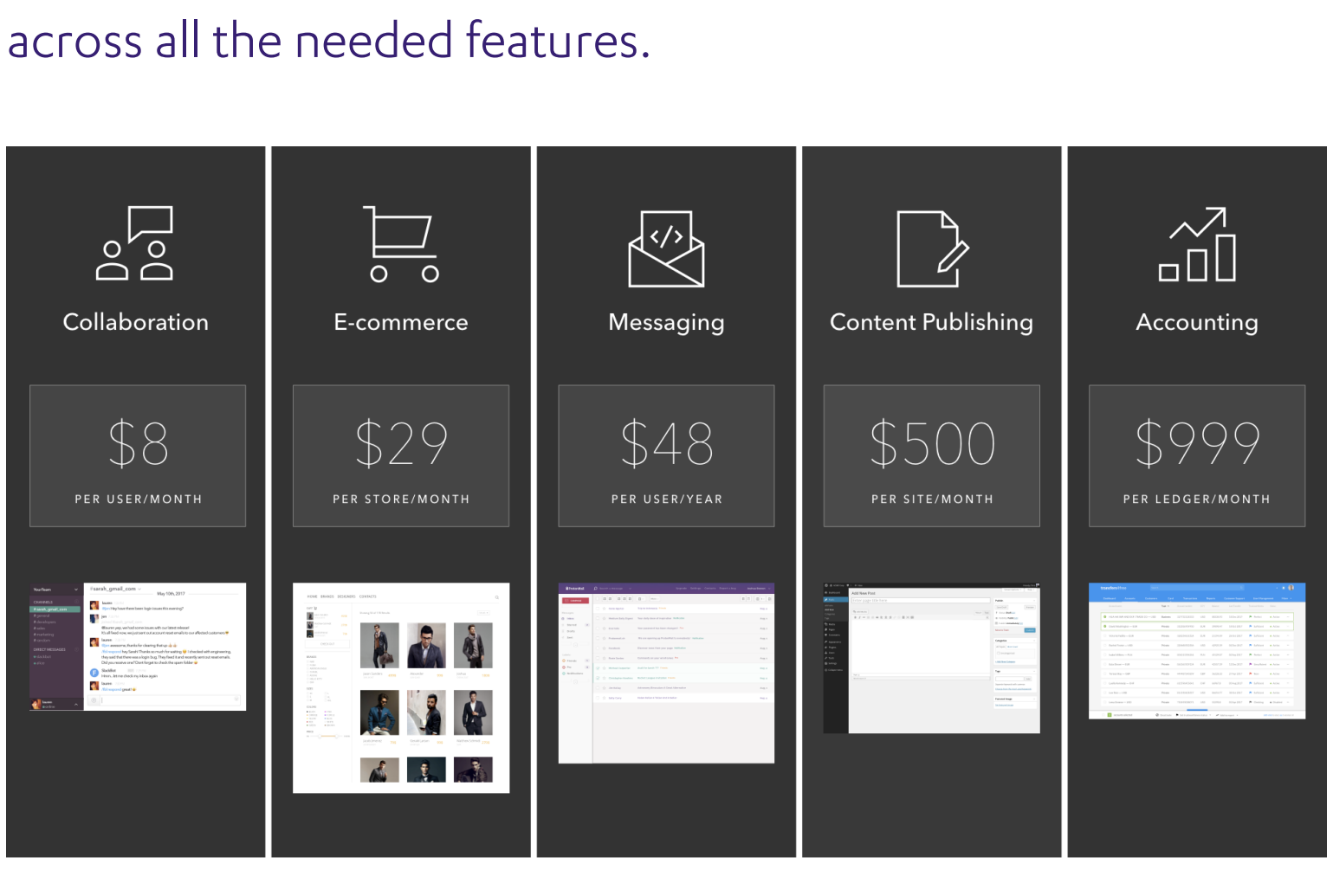
Mobile Silos: One App Per Screen

Today, there is "an app for everything". More than $70 billion have been paid out to developers of iOS apps in the last decade. When the iPhone was first introduced, there were 15 apps: iPhone, Mail, Web, iPod, Calendar, Camera, Maps, Photos, Stocks, Clock, Notes, Calculator, Weather, Text, and Settings. It allowed people to manage their lives on the go, facilitating communication and even giving directions, while their music collection served as the soundtrack to their new iLife.

But all's not well in today's app world. Outside the category of games and entertainment, most users refuse to pay for apps, which is why nearly all of today's apps are free. Additionally, the sequence of steps needed to use a native app — search, download, find the icon, launch, skip tour, register — has severely hampered the adoption of new apps. The result is that most iPhone users settle on a small number of apps (< 5) for daily habitual use. Many of these apps are supported by advertising. For a majority of development teams working outside of FAMGA (Facebook, Apple, Microsoft, Google, Amazon), the original business model for apps — "users pay money to buy app" — is effectively dead.

1.3 PROBLEM: APPLICATION SILOS (2/3)

As software moves to the cloud, users need to manage multiple subscriptions to cloud-based software-as-a-service (SaaS) products and choose the right plan to optimize cost across all the needed features.



Cloud Silos: One Subscription Per App

The monthly subscription model has taken over, as the revenue from subscriptions aligns well with the ongoing cost of developing and maintaining the software. Most small businesses need 5-10 apps to operate, large businesses need many more.

Each app requires a separate credit card, admin login, and password, which causes problems: Cards expire, logins must be reset, when the employee who signed up leaves the company, or customer support has to be called. Not to mention how costly these apps are. And there is always the risk of the team behind an app suddenly being acquired by a bigger player or shutting down because the funding has run out. Then, you have 60 days to download all the data you and your team painstakingly entered into the app as one giant zip file.

Many of these apps have duplicative feature sets, just to remain competitive and be able to retain customers. This is a natural result of uncoordinated yet competitive markets. For end users, this is expensive and painful.

1.4 PROBLEM: APPLICATION SILOS (3/3)

The emergence of blockchain and decentralized apps (dApps) exasperated the situation, by requiring users to acquire and manage the supply of utility tokens for each of the functions making up their software stack.

Emerging Blockchain silos: One Token per App

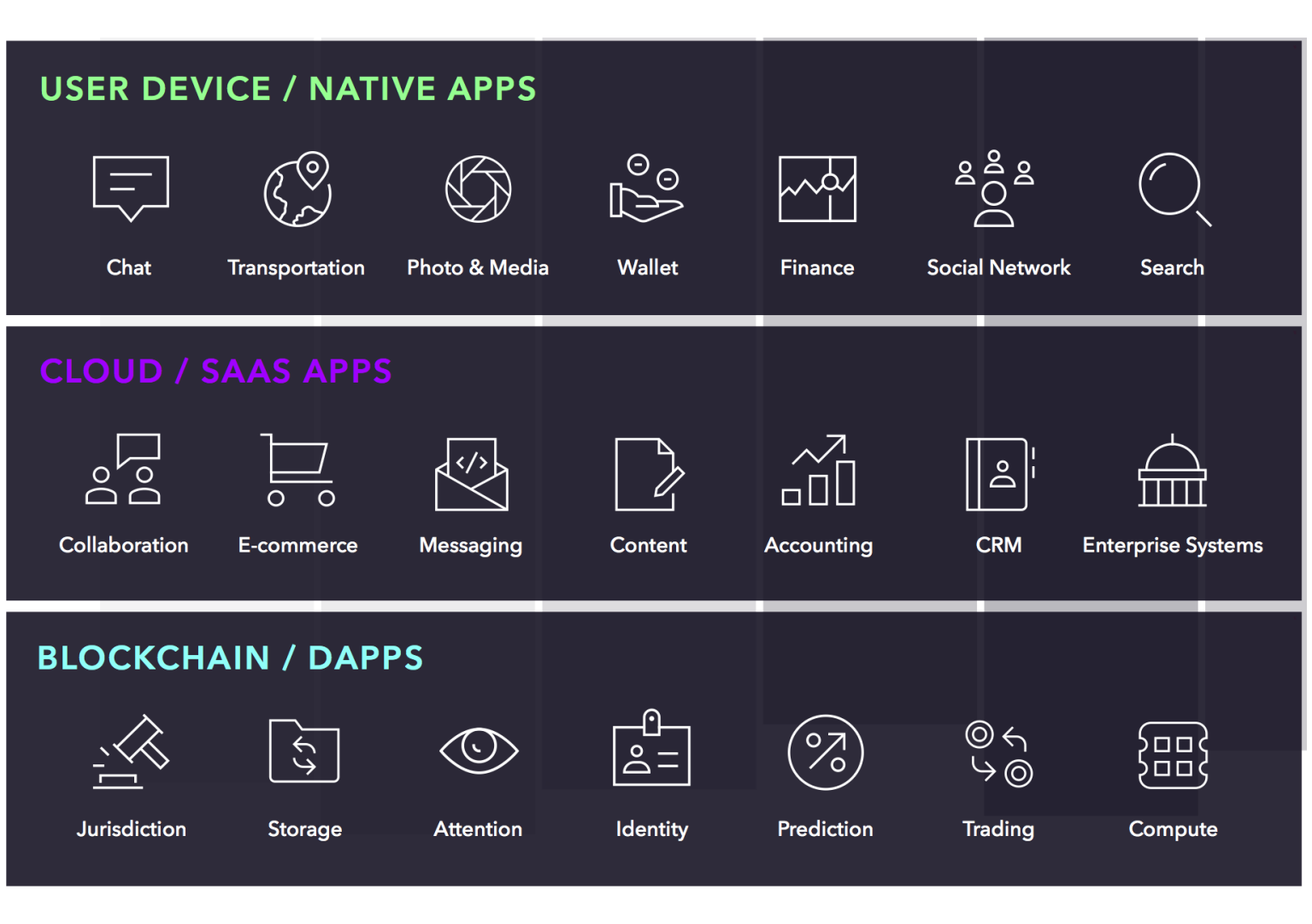
Most of the first-generation user interfaces for dApps are built as standalone Web applications that interact with a blockchain via browser plug-ins, a system tray, or a menu bar program. The user opens one app at a time — in a series of familiar browser tabs, most likely.

Each dApp works independently, looks distinctive, and moves assets on its preferred blockchain decisively. We get a glimpse of the power of decentralized, permissionless innovation.

We also see the perils of fragmentation, where the simple ideal of dApps — all powered by Ethereum — turns into a complex web of different app coins on different smart-contract platforms with different approaches to user interfaces and different levels of peer-to-peer requirements. Even for a savvy Web app user, this is certainly more challenging than managing 15 different SaaS subscriptions. This is more like setting one's own Linux desktop to host everything — from one's own blog to one's email account, chat server, key management server, and so on. This complexity will increase with the growing ambition of the blockchain community.

1.5 IDEA: FROM SILOS TO LAYERS

The reorientation of the vertical silos to horizontal layers allows native apps, cloud apps, and blockchain dApps to form a future software stack combining the best qualities of each of the software era's approaches.



The Parts Keep Getting Better

The problems of silos are actually a consequence of the bounty of technological progress, funded by the growth in the global, Internet-enabled marketplace.

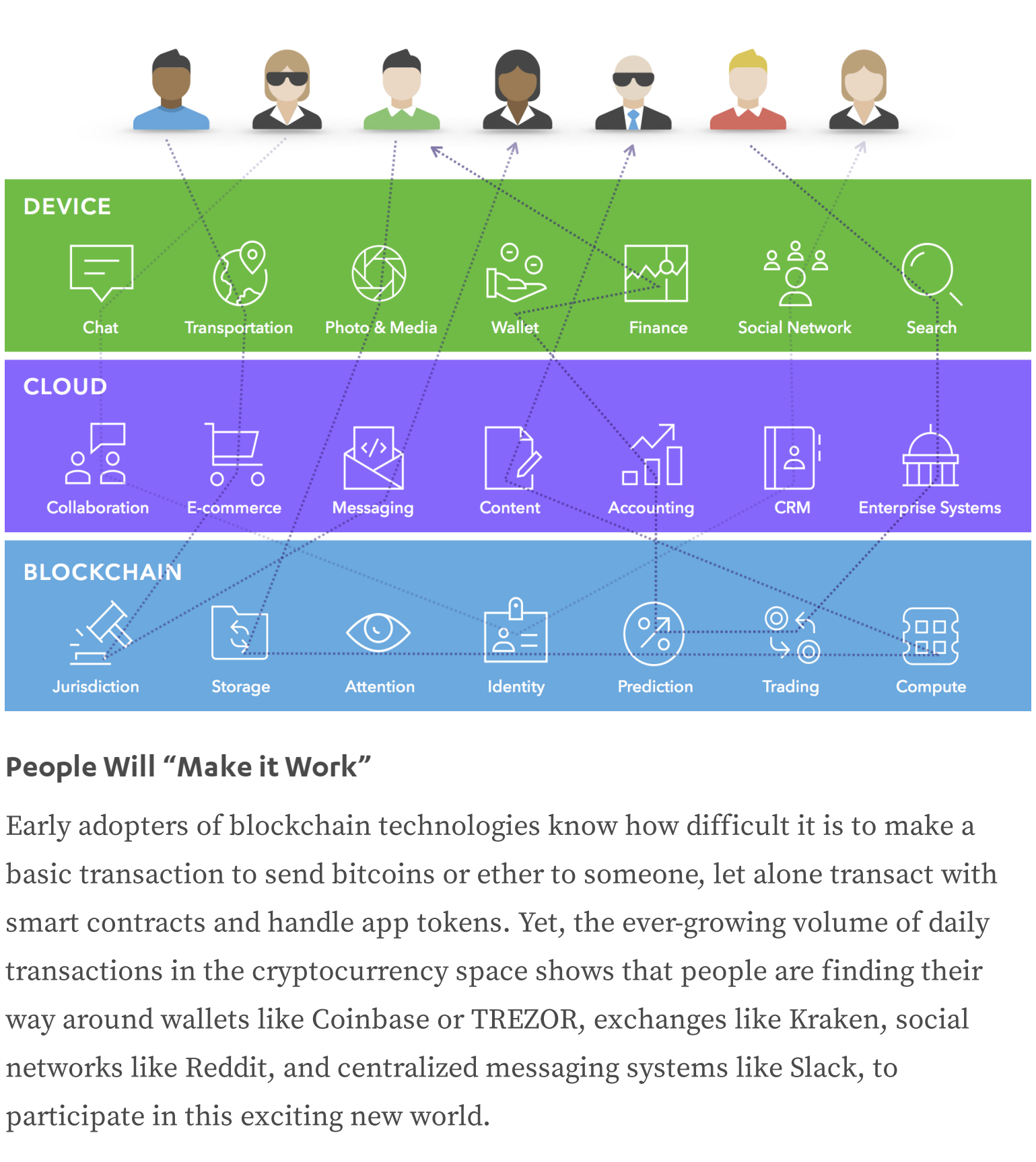
In the user's pocket, every new generation of mobile phones provides a new baseline of capabilities that begs to be incorporated into the user's workflow. The competitive landscape of mobile operating systems means that last year's striking innovations become this year's commodity features.

On the cloud, all SaaS vendors want to add features, in order to attract a new segment of customers or simply keep current customers from migrating to a competing suite that is starting to encroach on their feature set.

While the blockchain-based dApps vendors are all new to the game, most of them not having shipped any working code yet, the land grab for mindshare and potential use cases is already in full force. With each white paper and smart contract design published, we see the potential for blockchain dApps to compete or to augment the powerful tools that are available on the market as native apps or cloud subscriptions.

1.6 IDEA: HUMANS AS ORCHESTRATORS

Savvy users are already learning to work with multiple apps across their devices, cloud, and blockchain to fulfill their needs. Human ingenuity will continue to close any gaps left between the technologies.



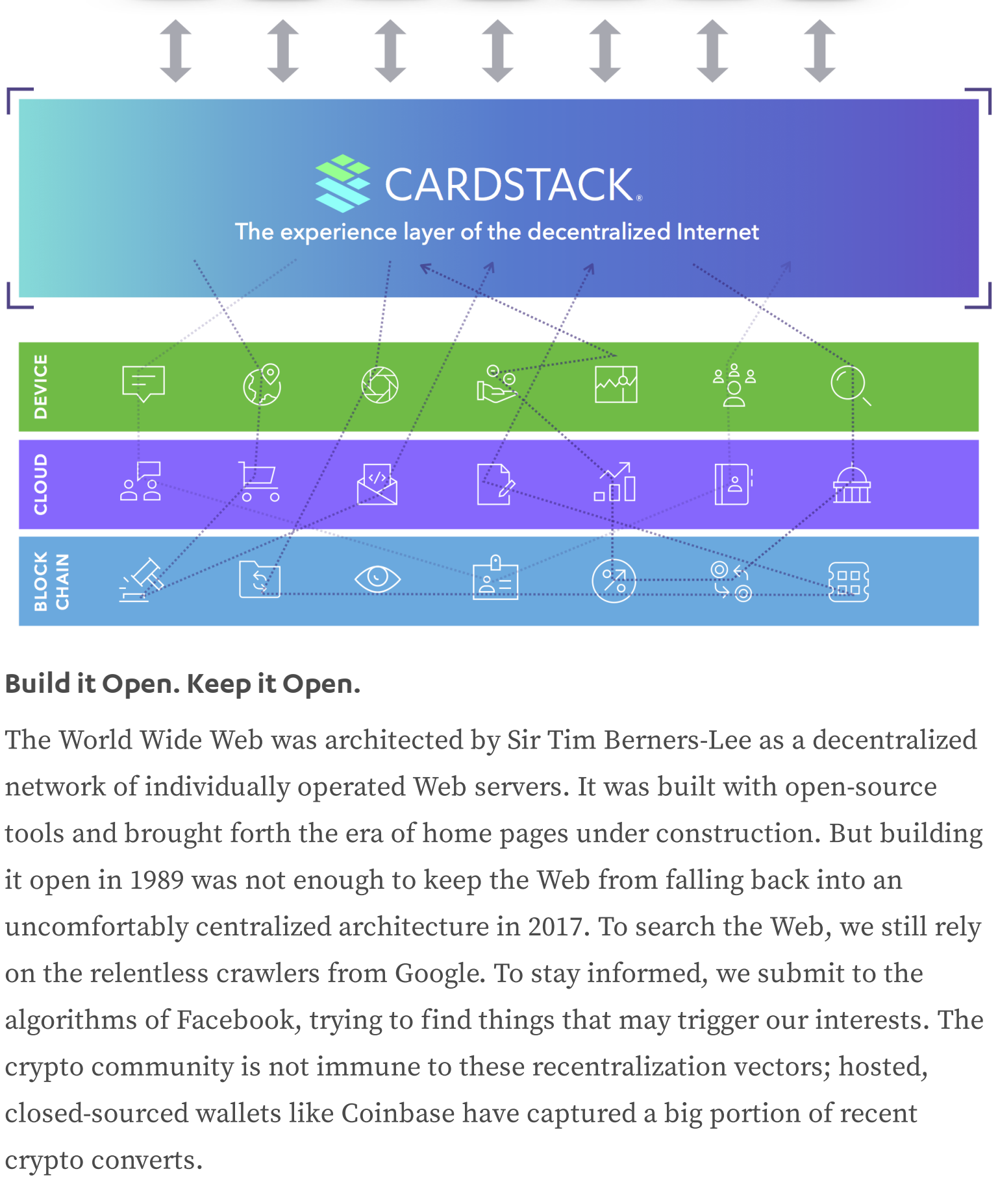
People Will "Make it Work"

Early adopters of blockchain technologies know how difficult it is to make a basic transaction to send bitcoins or ether to someone, let alone transact with smart contracts and handle app tokens. Yet, the ever-growing volume of daily transactions in the cryptocurrency space shows that people are finding their way around wallets like Coinbase or TREZOR, exchanges like Kraken, social networks like Reddit, and centralized messaging systems like Slack, to participate in this exciting new world.

The largely manual workflows pioneered by these early adopters (see dotted lines on the diagrams above) criss-cross the boundaries between their devices, various cloud-hosted apps, and the many blockchains. For them, the theoretical debates about the merits of purely decentralized systems give way to practical concerns of getting the deal or the trade done. These trails left by the pioneering users should deliver inspiration and guidelines for designers and developers of the next generation of user experiences. They should serve to make these steps easier and quicker or, if possible, eliminate them altogether through a streamlined process.

1.7 SOLUTION: THE EXPERIENCE LAYER

Cardstack is building a new experience layer that helps users orchestrate their interactions across the (d)Apps they use, ushering in the age of mass market adoption of decentralized technologies in an open ecosystem.



Build it Open. Keep it Open.

The World Wide Web was architected by Sir Tim Berners-Lee as a decentralized network of individually operated Web servers. It was built with open-source tools and brought forth the era of home pages under construction. But building it open in 1989 was not enough to keep the Web from falling back into an uncomfortably centralized architecture in 2017. To search the Web, we still rely on the relentless crawlers from Google. To stay informed, we submit to the algorithms of Facebook, trying to find things that may trigger our interests. The crypto community is not immune to these recentralization vectors; hosted, closed-sourced wallets like Coinbase have captured a big portion of recent crypto converts.

The nascent movement towards blockchain-enabled decentralization is a great opportunity. Builders can learn from the past and lay a more resilient technical, social, and economic foundation, ensuring that a powerful, beautiful, and convenient layer of great user experience is kept open — as fork-able open-source software, coordinated via open governance of decentralized protocols, and available for open participation from all around the globe.

Next Chapter