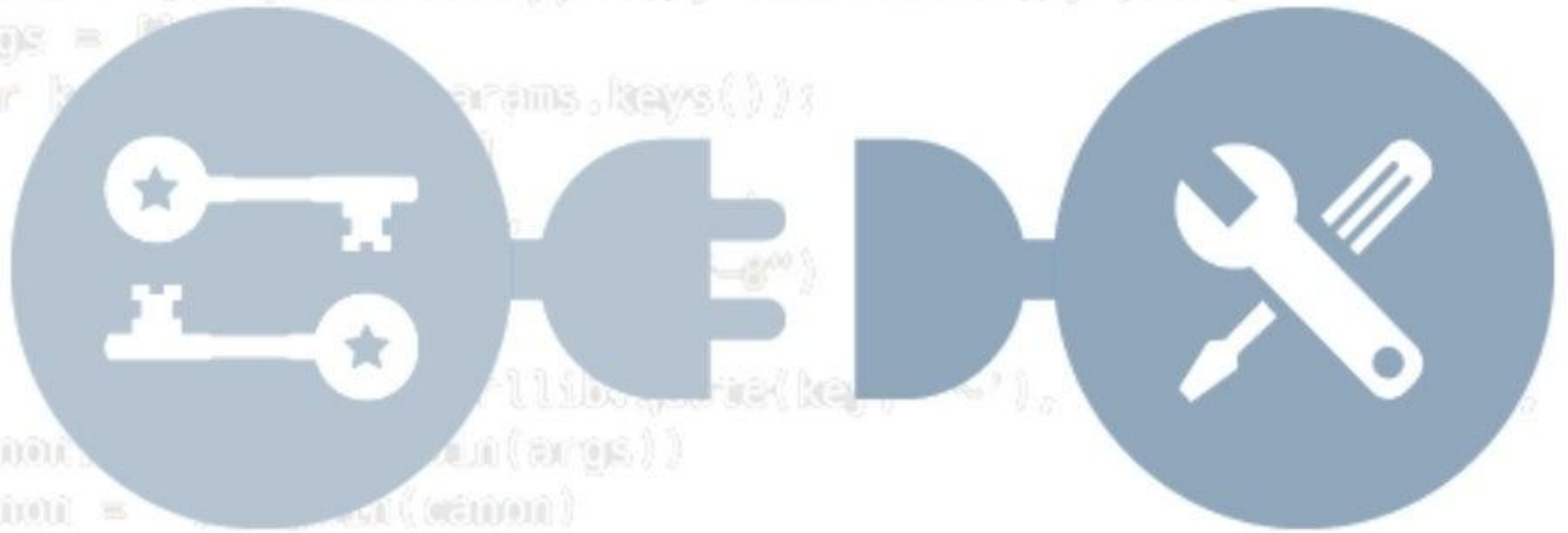


```
# create canonical string
now = email.utils.formatdate()
canon = [now, method.upper(), host.lower(), path]
args = {}
for k in params.keys():
```



```
    canon.append('%s=%s' % (k, params[k]))
canon.append('&' + libquote(k, '='))
canon = '%s%s' % canon
canon = libquote(canon)
```

```
# right canonical string
sig = hmac.new(key, canon, hashlib.sha1)
```

## The Vertical API Opportunity

Zak Schwarzman

# What Is An API?

## Definition:

- Application Program Interfaces (APIs) expose some of an application's internal functions to the outside world

## Which means?

- Application A can now access Application B's functionality by simply inserting a few lines of code

## Example, please.

- Twillio has built integrations with hundreds of telecom carriers. Using Twillio's API, any developer can enable her app to make phone calls via these carriers using a few lines of code

# What The Big Deal?

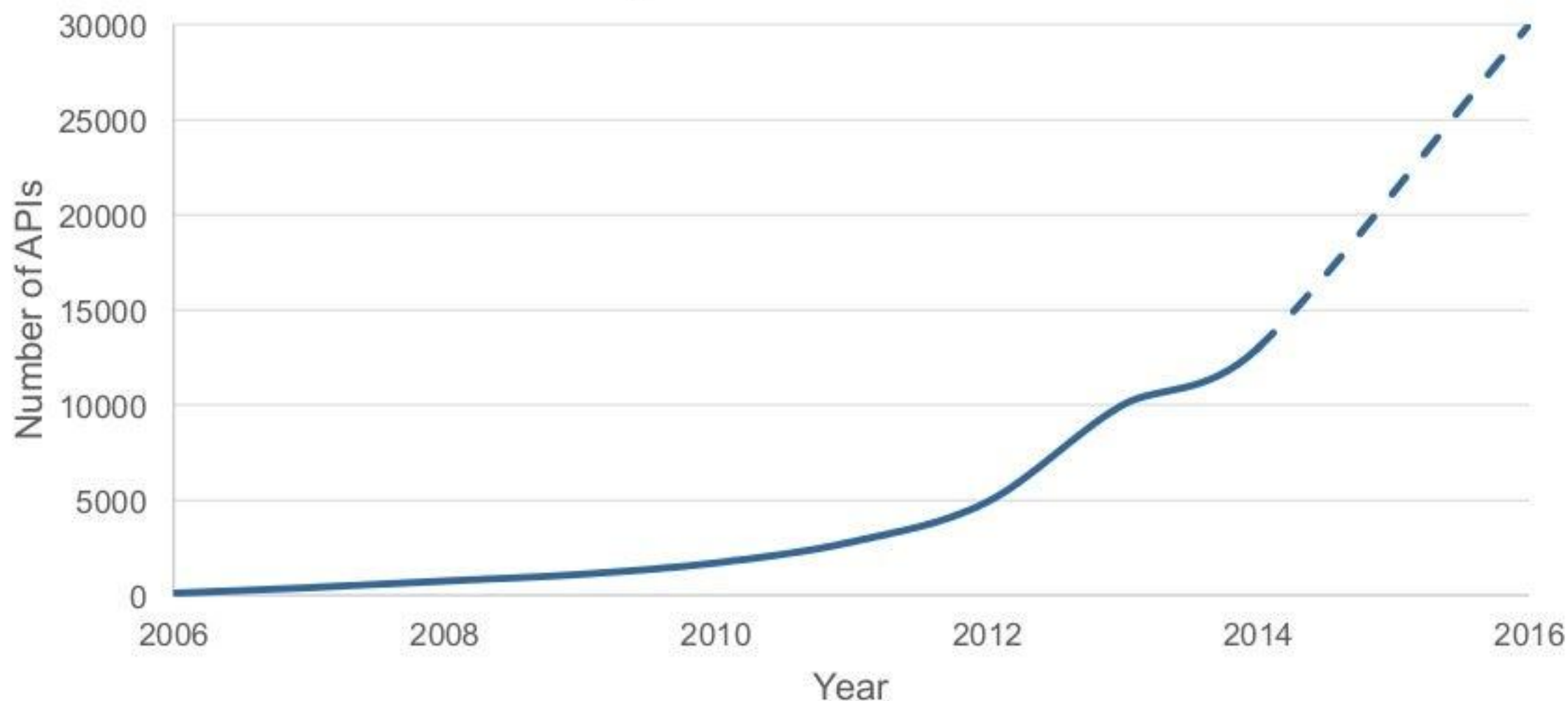
*"APIs are the 'nervous system' of our new digital world. Being able to share services and data through interoperable APIs is crucial to establishing modern, digital ecosystems in any industry. This is especially true in industries where competition or regulation has created fragmentation, such as in telecommunications, healthcare and travel."* - Chet Kapoor, Apigee CEO



# API Proliferation Is Exponential

- The number of open (publicly available) APIs grew from ~0 to 13K in the past 8 yrs
- Will more than double to > 30K in the next 2 years

Open API Growth

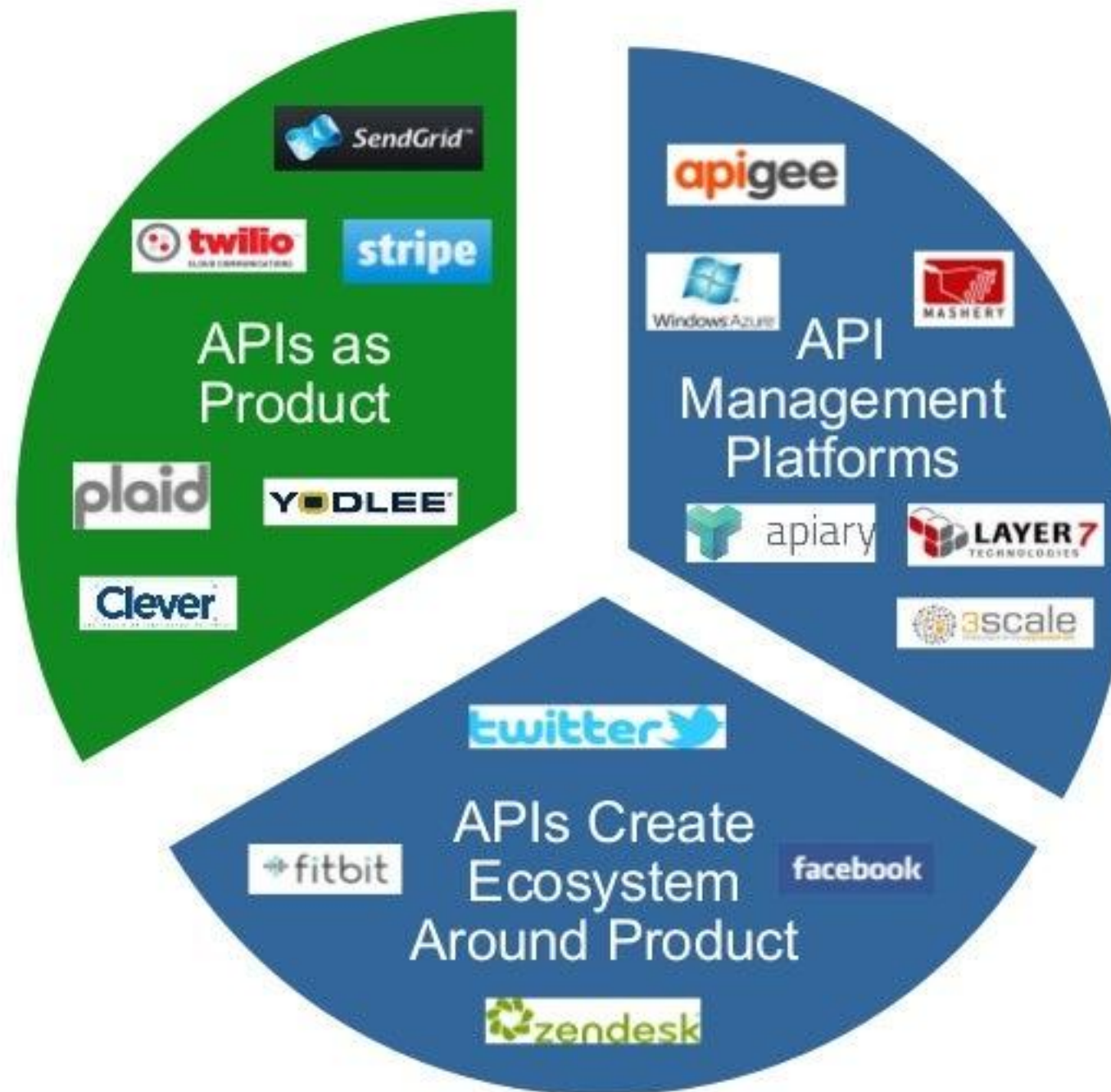


# The API Explosion Is Transforming Software Development

- With APIs, software development resembles assembling puzzle pieces rather than writing a novel from a scratch
  - APIs enable one company to solve a difficult software development challenge (e.g. cloud storage, in-app email, payments processing) and let other companies access that solution, rather than re-solve the same challenge during their own development process
- The result is a new software development paradigm characterized by:
  - Rapid development
  - Dramatically lower build costs
  - Niche products/solutions

# Opportunity: API As Core Product

Within the broader API economy, an investment opportunity exists for startups offering APIs as their core product





# APIs as Product: Horizontal v. Vertical

APIs as product companies come in two flavors:

- Horizontal: Solve a **general software development challenge** shared across a range of industries (e.g. Stripe/Braintree: payment integration)
- Vertical: Solve an acute pain point shared by developers **within a particular industry**

## Horizontal



## Vertical



The investment opportunity is particularly under-exploited for startups that offer vertical-specific APIs as their core product

# Horizontal APIs – Template For Success

- Validates the API As Product model
  - Hundreds of millions in VC funding
  - Hundreds of millions in exits



Acquired by **PayPal**™ for \$800M




Acquired by  for \$70M



IPO pending, \$100M+ ARR, \$100M+ VC funding



Funding to date \$77.9M from 

- But the horizontal opportunity has been well mined



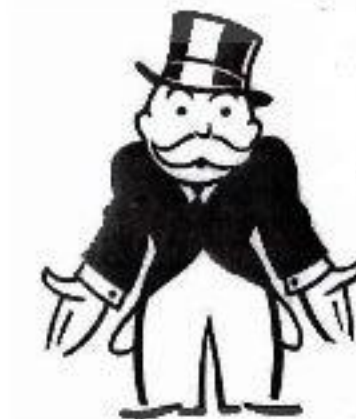
# Vertical APIs – Emerging Investment Frontier

- Proven venture scale opportunity
  - Yodlee (APIs for fintech development) \$75M IPO 10/14

**YODLEE**®

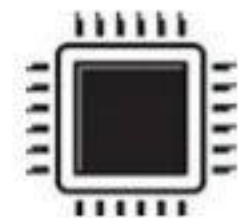
**NASDAQ**®

- But minimal VC funding to date
  - Most startups have raised < \$3M, many \$0
  - Many new entrants in past 24 months



# Vertical API Market Breakdown

- Opportunities concentrated in 3 verticals
  - Healthcare, Financial Services, and Education
  - Large + fragmented + data security issues + startup activity
- Startups solving 3 vertical-specific challenges:
  - Share: read from/write to industry data systems
  - Store: regulation-compliant cloud storage
  - Compute: industry-specific backend-as-a-service



# Vertical API Market Map

	Healthcare	Finance	Education
Share	EligibleAPI Validic KarmaData Singly (acq)	Standard Treasury Plaid	Clever Learnsprout InBloom (closed)
Store	Truevault Catalyze		InBloom (closed)
Compute	Aptible Catalyze Hippostack Doctrly	Yodlee (IPO) Standard Treasury Plaid	Teech.io (UK) Zzish (UK)



# Vertical APIs in Finance

## Financial Services Industry

- \$485B global fin services tech spend
- Incumbents under pressure to innovate (e.g. mobile, BTC, P2P), disaggregation of traditional fin services
- Complex, intertwined user base
- High data sensitivity

## Vertical APIs

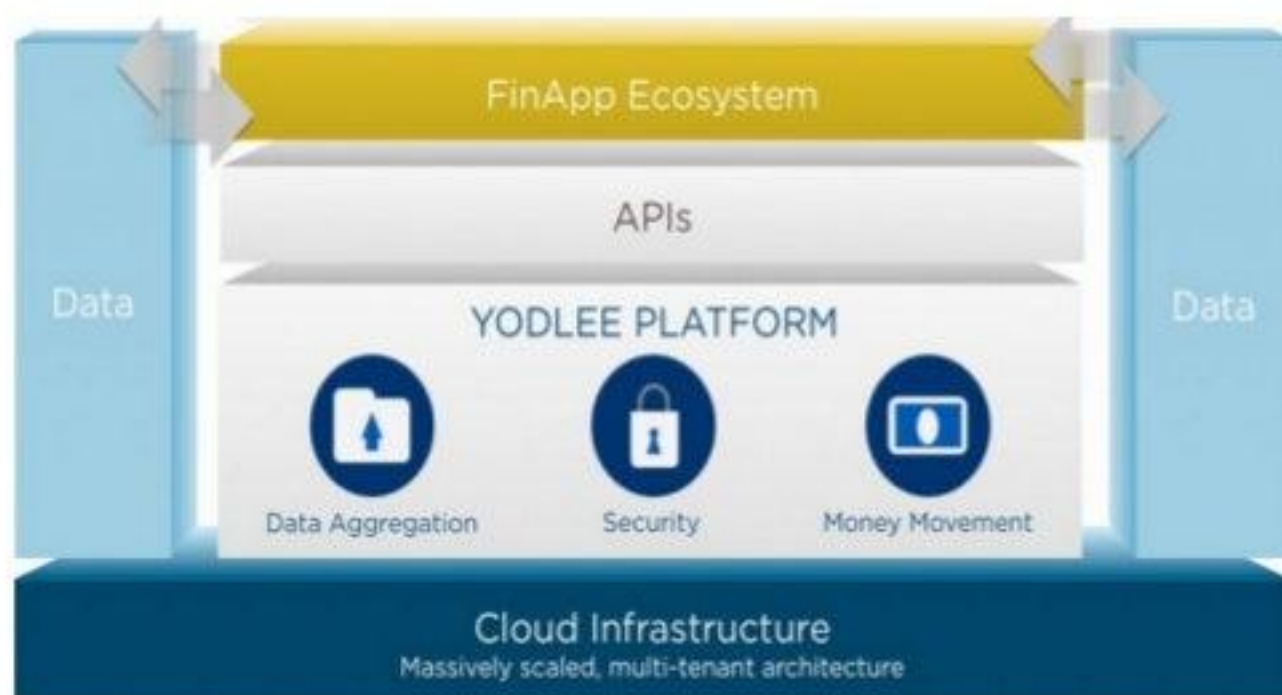
- Aggregate, standardize, enhance data
- Expose core banking functions as service
- Secure data storage/sharing

## FinTech Startups

- \$3B FinTech VC in 2013, up 3x in 5 years
- Startups req access to core fin services functions/rails to build on
- Demand for fin process automation
- Wealth of financial data = new potential FinApps

	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** A modular suite of APIs that provides data and functionality for financial institutions/fintech cos to build FinApps ranging from SMB banking to consumer wealth management.



- **What:** APIs provide data aggregation, account verification, money movement, and analytics
- **Founded:** 1999
- **IPO:** \$75M IPO 10/14
- **Funding:** \$125M total
- **2013 #s:** Subscription fees from 15M consumers; 27M API calls/day; \$70M rev; \$1.2M loss in 2013

**Use Case:** Xero, (cloud-based SMB accounting solution) used the Yodlee API to integrate with live data feeds from 10K+ banks/acct sources to provide Xero customers a single ledger view of their finances.



# Standard Treasury

	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** Helps banks become digital services providers by offering their core financial functionality (e.g. transfers) via API. Makes it easier for businesses to deal with banks and startups to incorporate bank functionality.



STANDARD  
TREASURY

APIs for Commercial Banks

Contact

Jobs

- **What:** A set of APIs that ease the integration of banking services for small businesses and startups
- **Founded:** 2013
- **HQ:** San Francisco
- **Funding:** \$2.7M Seed, 5/14



Index  
Ventures



Data collective

**Use Case:** Using the Standard Treasury API, Wells Fargo customers and third-party developers can programmatically interface with the bank to process electronic checks, book transfers, open/close accounts, and exchange foreign currency.



	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** The modern API for banking data. Plaid allows developers to programmatically interact with banks and credit cards. Integrate in minutes and get high-quality transactional and account data from financial institutions.

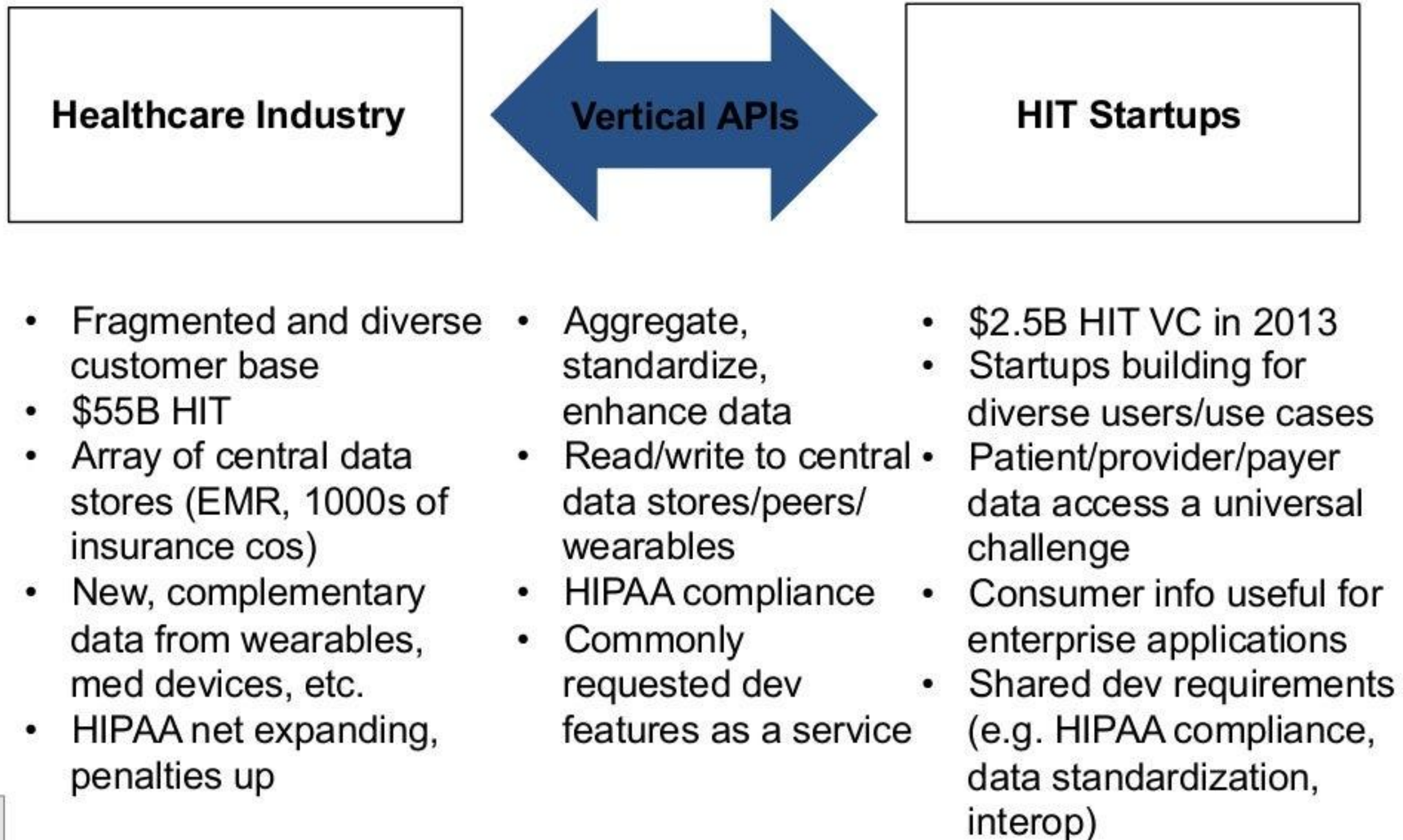


- **What:** APIs to access banking/ credit card data for accounting, auto tax, and expense management apps
- **Founded:** 2012
- **HQ:** San Francisco
- **Funding:** \$2.8M Seed 9/13



**Use Case:** Betterment uses Plaid's bank integrations to verify new users' account and routing numbers during onboarding. Enables instant account access vs. 2-3 days wait with traditional dual deposit verification.

# Vertical APIs in Healthcare

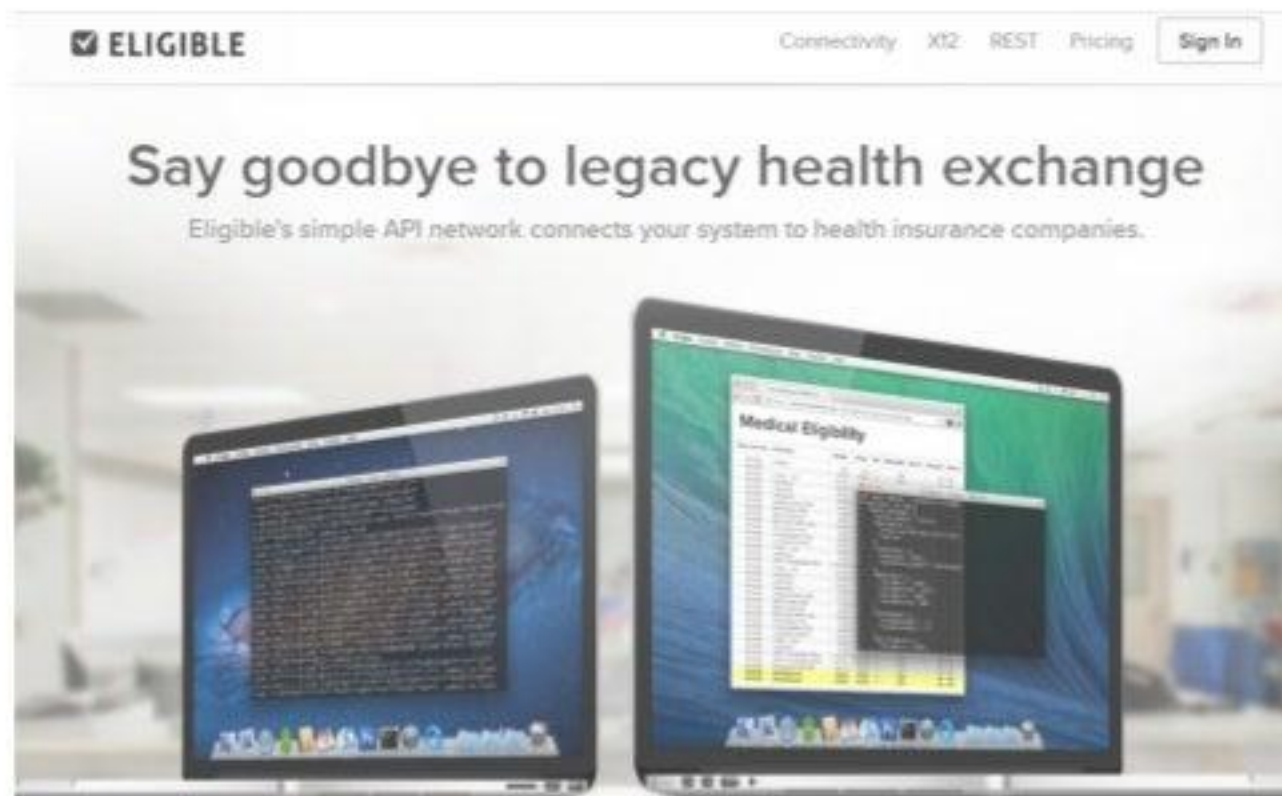




# Eligible API

	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** Instantly create & retrieve healthcare financial transactions to over 2,000 insurance companies including: eligibility, policy, coverage, authorizations, claims, payments and more.



- **What:** Aggregates, standardizes, and integrates w insurance company data systems
- **Founded:** 2011
- **HQ:** San Francisco
- **Funding:** \$2M Seed 1/15

🕊️ **AngelList**

Y **Combinator**

**Use Case:** Kareo, whose practice management cloud software is used by 25,000 healthcare providers, uses Eligible API to interface with insurance companies and process thousands of of patient eligibility transactions per day.



# Validic API

	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** Validic is a cloud-based technology platform that solves the accessibility and integration challenges for healthcare organizations by providing a one-to-many connection to digital health technologies



- **What:** Aggregates/standardizes data from health apps and devices
- **Founded:** 2010
- **HQ:** Durham, NC
- **Funding:** \$5M Series A, 8/14

GREYCROFT



**Use Case:** Using the Validic API, a wellness company can access its population's fitness activity and clinical data across dozens of wearable devices and mobile health apps to offer incentives for exercise and compliance.

# Human API

	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** Human API is the easiest way to integrate health data from anywhere, enabling users to securely share their health data, regardless of how that data was recorded, processed, or stored.



- **What:** Aggregate, standardize, and organize health data from various tracking devices and health apps, single sign on
- **Founded:** 2013
- **HQ:** Palo Alto
- **Funding:** \$6M Series A 1/15

A16Z

AngelPad

BlueRun  
ventures

**Use Case:** A provider of individualized weight loss programs (coaching, meals, evaluations) uses Human API to integrate with and track data from client's wearable devices.



	Health	Fin	Edu
Compute			
Store			
Share			

**Overview:** Catalyze offers two products: a PaaS that provides a HIPAA-compliant alternative to AWS; and a mobile backend as a service comprised of a set of APIs to build HIPAA compliant mobile apps.



- **What:** HIPAA compliant platform as a service and backend as a service, available via APIs
- **Founded:** 2013
- **HQ:** Madison, WI
- **Funding:** \$2M Seed 11/13



**Use Case:** The VA and Blue Shield of California use Catalyze PaaS for cloud hosting, without having to worry about HIPAA configuration, maintenance or auditing. Health app developers use Catalyze's mobile backend to add compliant user management, data storage, and secure messaging.