

# 大數據行銷研究

## Big Data Marketing Research



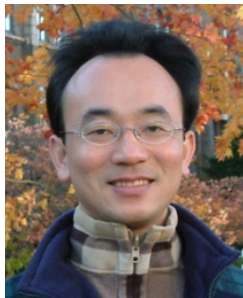
Tamkang  
University  
淡江大學

# 金融科技行銷研究 (FinTech Marketing Research)

1051BDMR12

MIS EMBA (M2262) (8638)

Thu, 12,13,14 (19:20-22:10) (D409)



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2016-12-30



# 課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2016/09/16	中秋節 (調整放假一天) (Mid-Autumn Festival Holiday)(Day off)
2	2016/09/23	大數據行銷研究課程介紹 (Course Orientation for Big Data Marketing Research)
3	2016/09/30	資料科學與大數據行銷 (Data Science and Big Data Marketing)
4	2016/10/07	大數據行銷分析與研究 (Big Data Marketing Analytics and Research)
5	2016/10/14	測量構念 (Measuring the Construct)
6	2016/10/21	測量與量表 (Measurement and Scaling)

# 課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2016/10/28	大數據行銷個案分析 I (Case Study on Big Data Marketing I)
8	2016/11/04	探索性因素分析 (Exploratory Factor Analysis)
9	2016/11/11	確認性因素分析 (Confirmatory Factor Analysis)
10	2016/11/18	期中報告 (Midterm Presentation)
11	2016/11/25	社群運算與大數據分析 (Social Computing and Big Data Analytics)
12	2016/12/02	社會網路分析 (Social Network Analysis)

# 課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2016/12/09	大數據行銷個案分析 II (Case Study on Big Data Marketing II)
14	2016/12/16	社會網絡分析量測與實務 (Measurements and Practices of Social Network Analysis)
15	2016/12/23	大數據情感分析 (Big Data Sentiment Analysis)
16	2016/12/30	金融科技行銷研究 (FinTech Marketing Research)
17	2017/01/06	期末報告 I (Term Project Presentation I)
18	2017/01/13	期末報告 II (Term Project Presentation II)



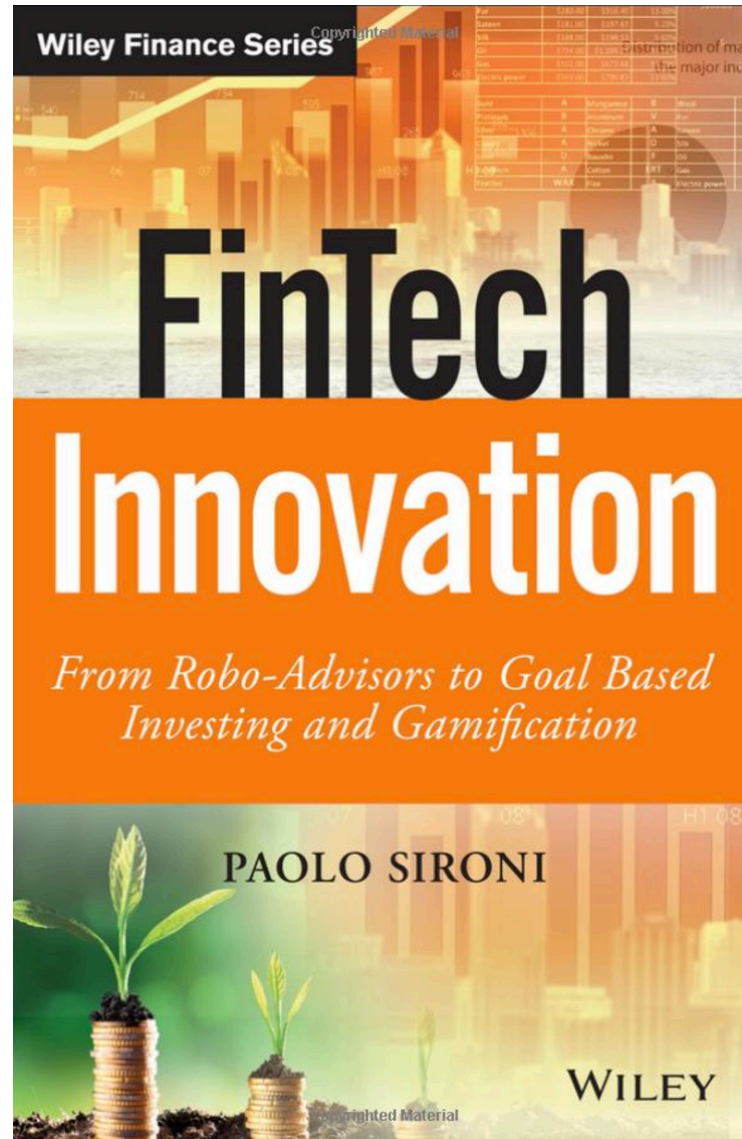
# Outline

- FinTech
- Robo-Advisors
- Financial Sentiment Analysis

# The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries, Susanne Chishti and Janos Barberis, Wiley, 2016.



# FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification, Paolo Sironi, Wiley, 2016



**FinTech**

# Financial Technology

# FinTech



# Financial Technology

## FinTech

“providing  
financial services  
by making use of  
software and  
modern technology”

# Financial Services



**Money**

# Market

# Financial Services



# Financial Revolution with Fintech

## A financial services revolution

### Consumer Trends



1. Simplification



2. Transparency



3. Analytics



4. Reduced Friction

# FinTech: Financial Services Innovation

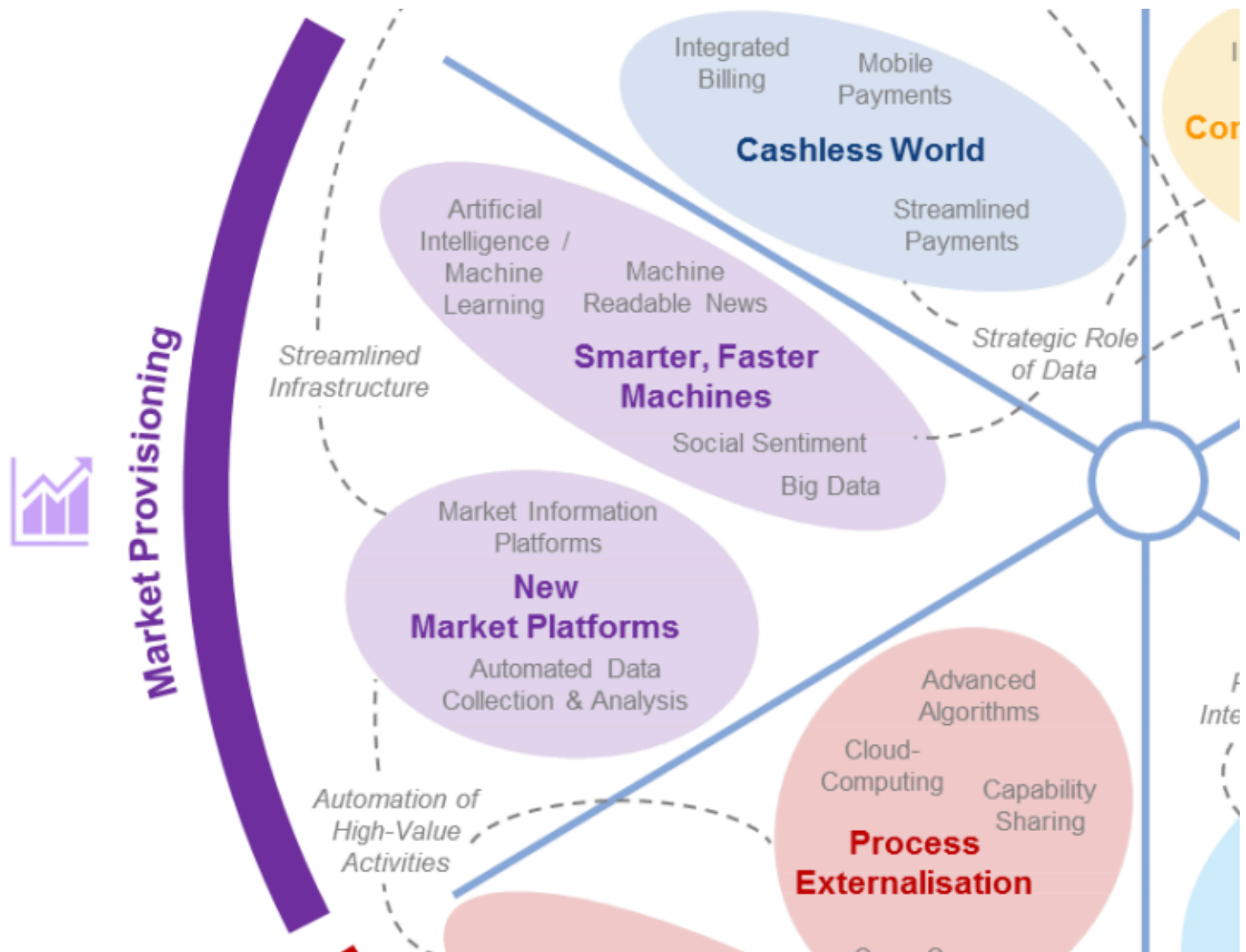


# FinTech:

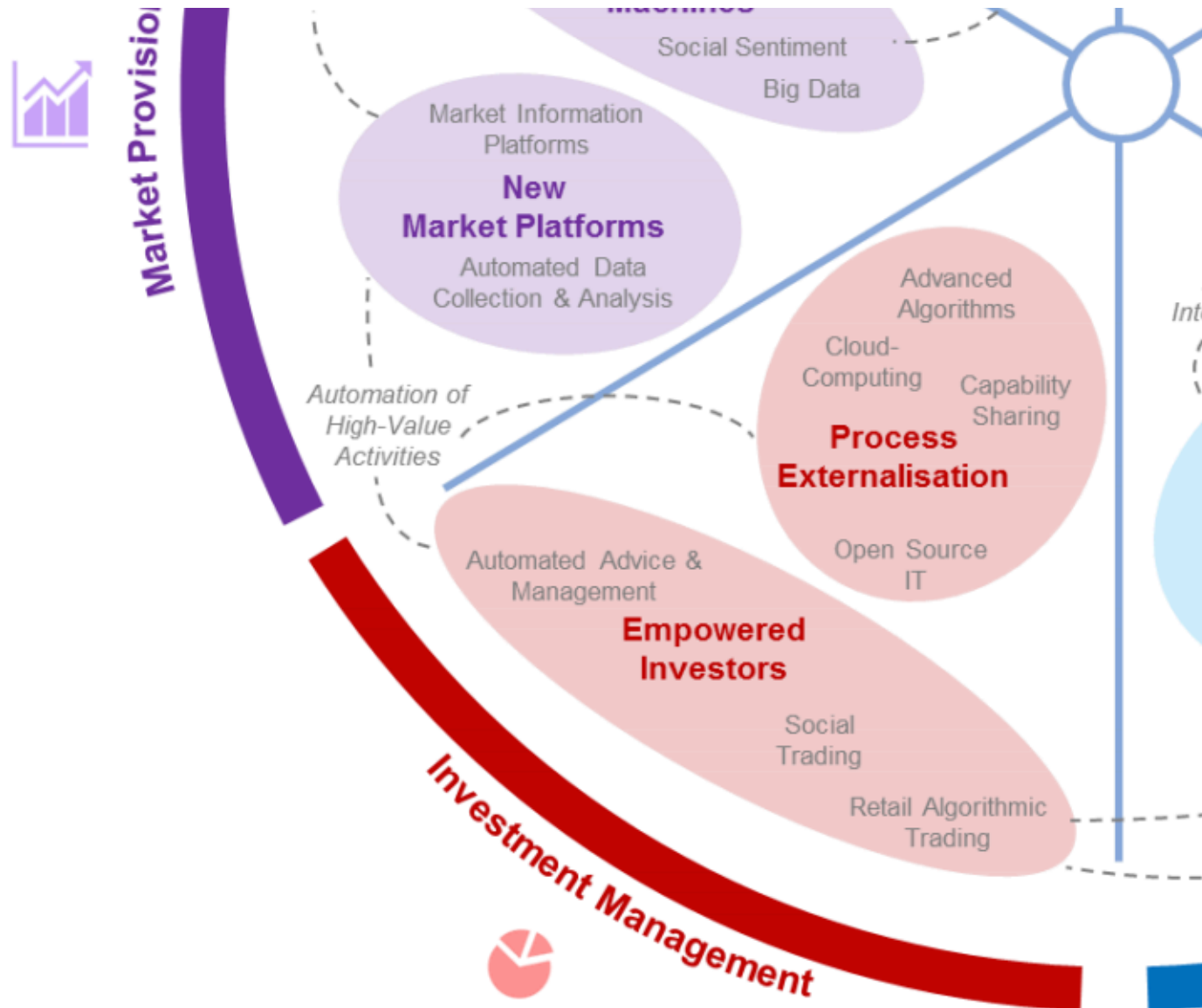
Investment Management

Market Provisioning

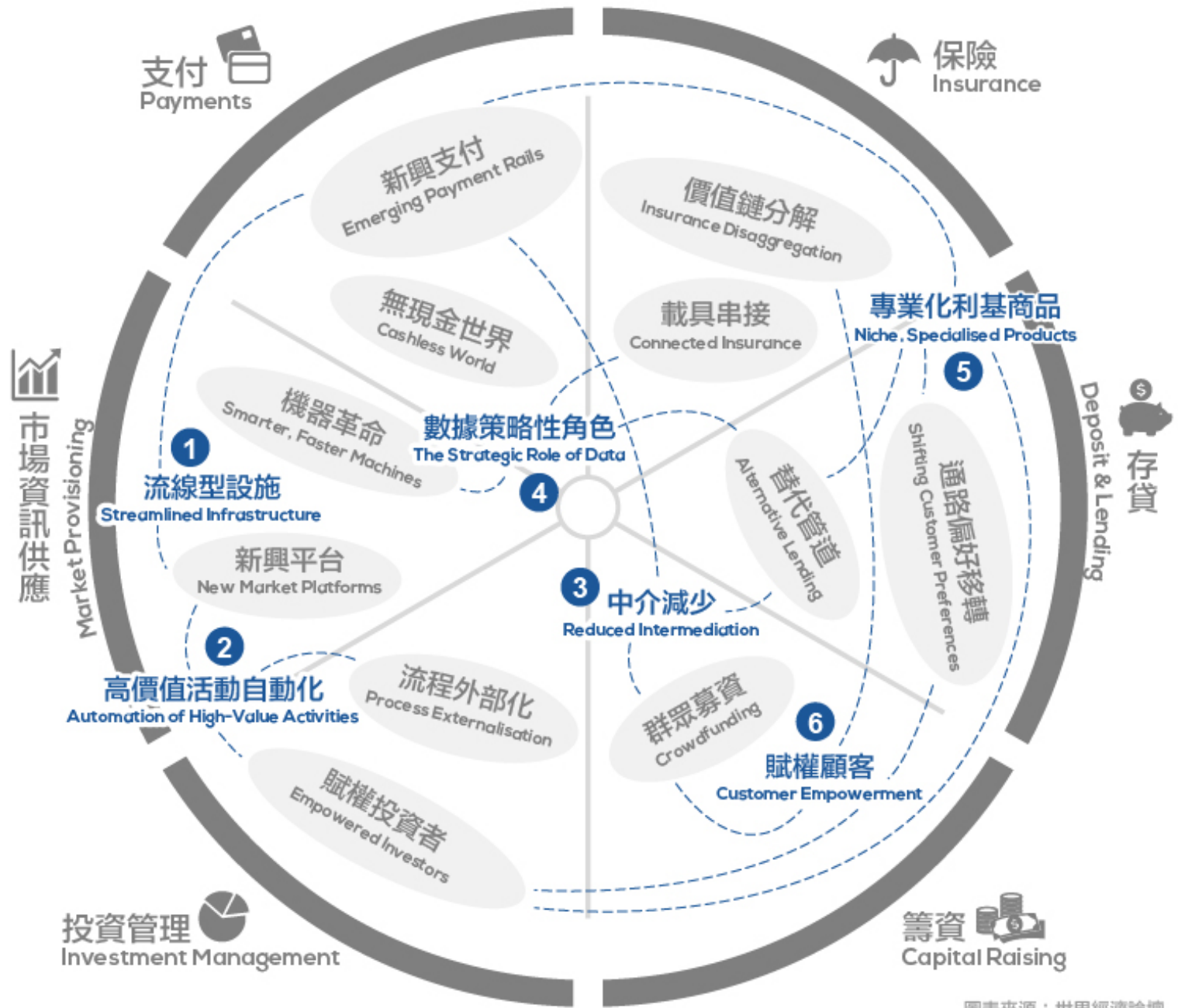
# FinTech: Market Provisioning



# FinTech: Investment Management













圖表來源：世界經濟論壇

# FinTech

功能	創新項目
 支付 Payments	無現金世界 (Cashless World) 新興支付 (Emerging Payment Rails)
 保險 Insurance	價值鏈裂解 (Insurance Disaggregation) 保險串接裝置 (Connected Insurance)
 存貸 Deposit & Lending	替代管道 (Alternative Lending) 通路偏好移轉 (Shifting Customer Preferences)
 籌資 Capital Raising	群眾募資 (Crowdfunding)
 投資管理 Investment Management	賦權投資者 (Empowered Investors) 流程外部化 (Process Externalisation)
 市場資訊供應 Market Provisioning	機器革命 (Smarter, Faster Machines) 新興平台 (New Market Platforms)

圖表來源：Fugle團隊整理

# FinTech: Market Provisioning

## Smarter, Faster Machines

市場資訊供應



創新

關鍵趨勢

**機器革命**  
Smarter, Faster  
Machines

機器易用數據 (Machine Accessible Data)、人工智慧 / 機器學習、大數據

**新興平台**  
New Market  
Platforms

固定收益商品平台 ALGOMI、基金 / 組合型基金平台 NOVUS、私募 / 創投平台 BISON、未公發股權平台 LIQUITY、原物料商品與衍生性合約平台 ClauseMatch

圖表來源：Fugle團隊整理

# FinTech: Investment Management

投資管理



創新

關鍵趨勢

**賦權投資者**  
Empowered  
Investors

社群交易、機器推薦與財富管理、零售演算法交易 (Retail Algorithmic Trading)

**流程外部化**  
Process  
Externalisation

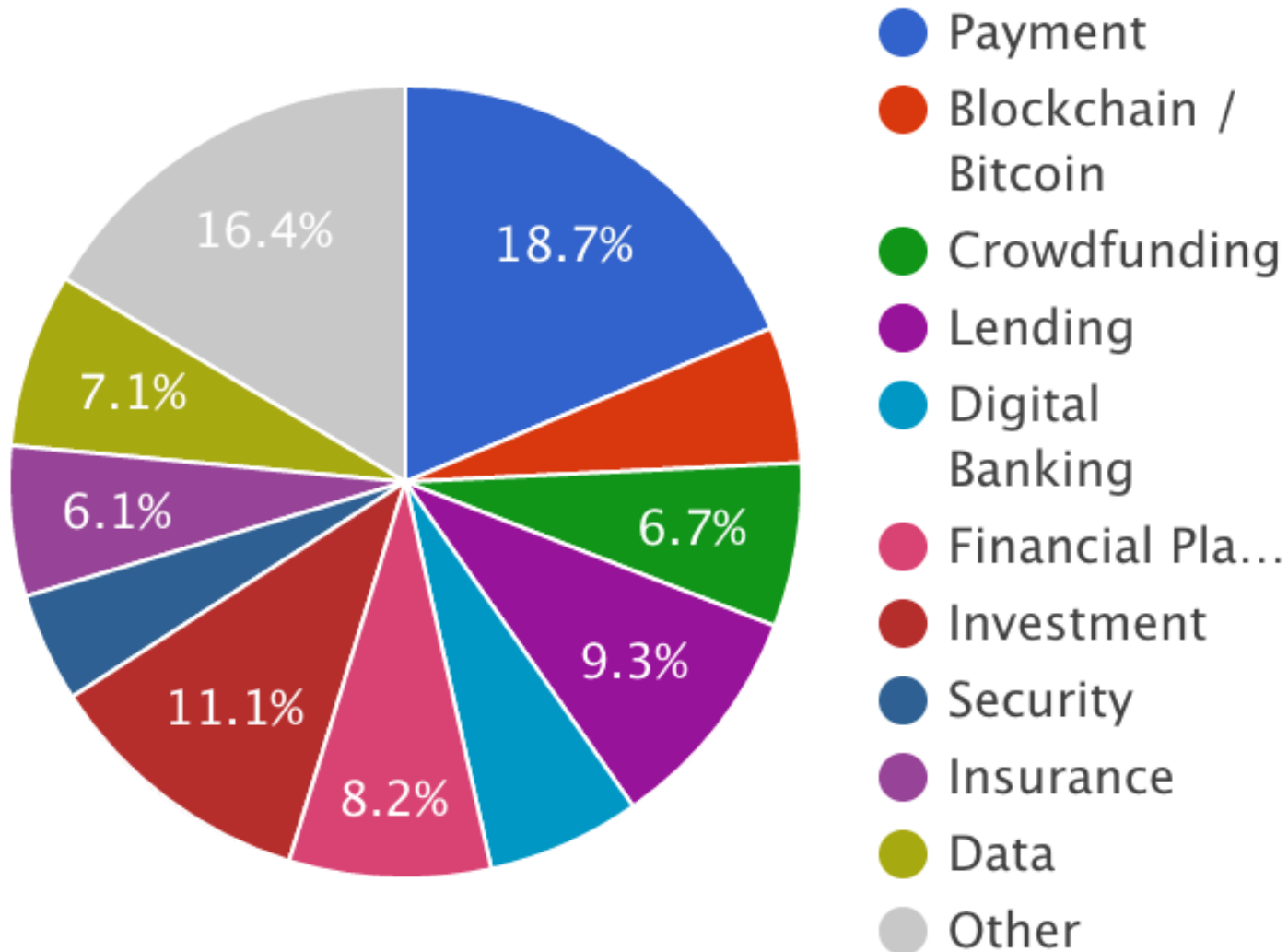
流程即服務 (Process-as-a-Service, PaaS)、能力共享 (Capability Sharing)、進階分析、自然語言

圖表來源：Fugle團隊整理

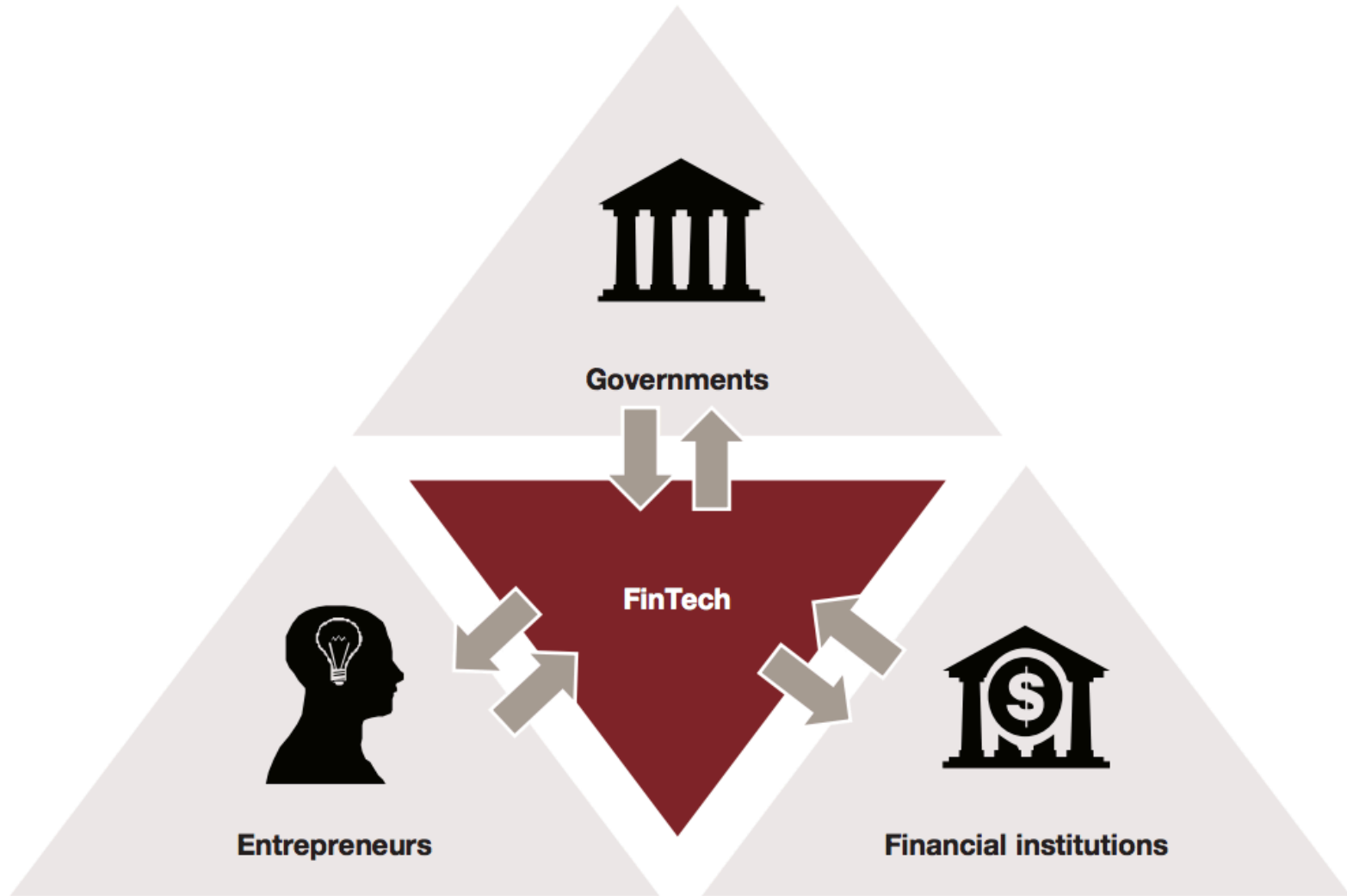
# FinTech for Financial Services

- Retail Banking
- Lending and Financing
- Payments and Transfers
- Wealth and Asset Management
- Markets and Exchanges
- Insurance
- Blockchain Transactions

# Fintech Companies



# Major Participants in the FinTech Ecosystem





# FinTech Ecosystem Development Framework

## 1. Business environment/access to markets

Cost advantages

Labor availability and know-how

Degree of clustering & integration

Infrastructure quality & access

## 2. Government/regulatory support

Policy setting

Land ownership & development

Ease of doing business

Taxes & work permits

## 3. Access to capital

Governmental funding

Bank funding

PE/VC funding

Incubators / accelerators

## 4. Financial expertise

Funding strategies

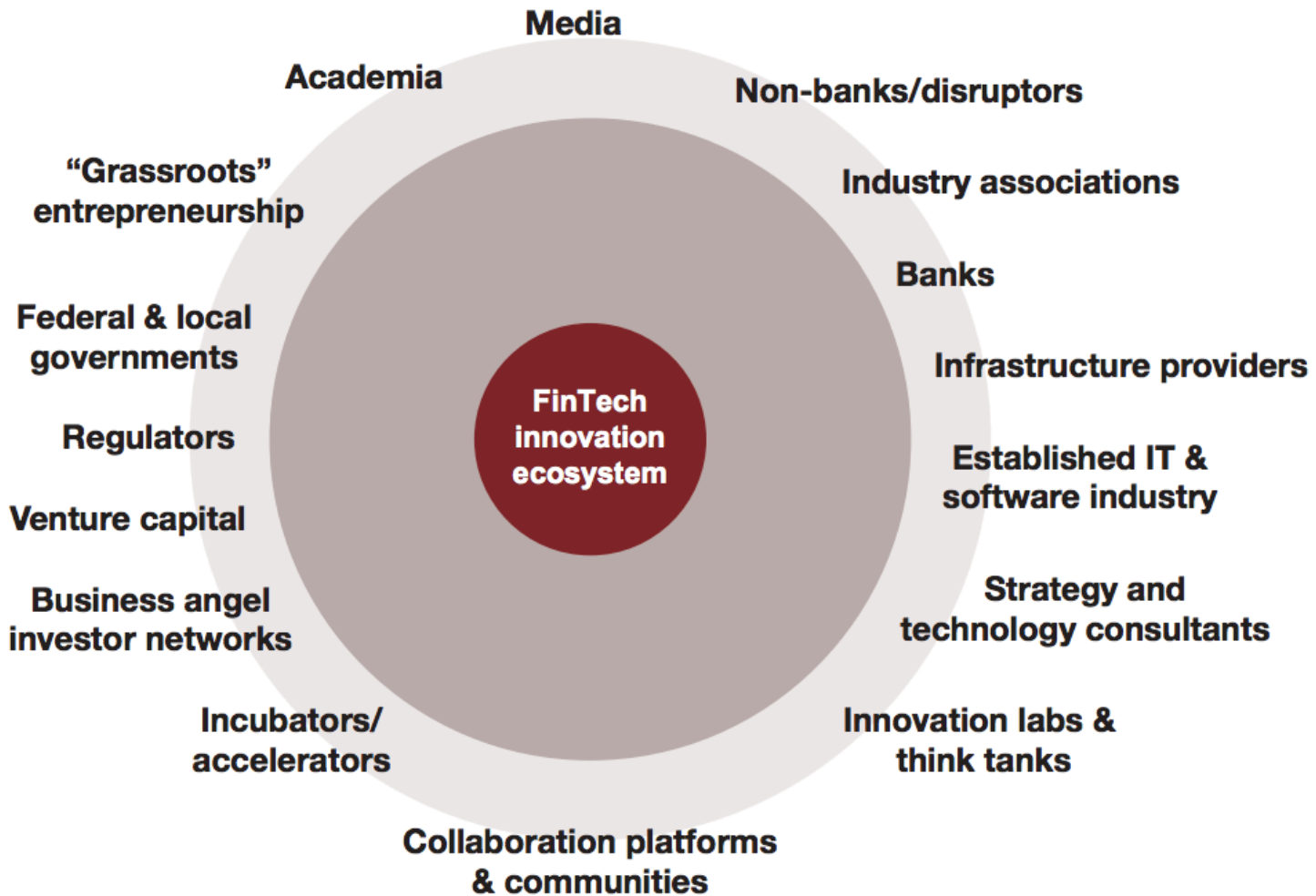
“Know your customer” & regulatory requirements

Deals structuring

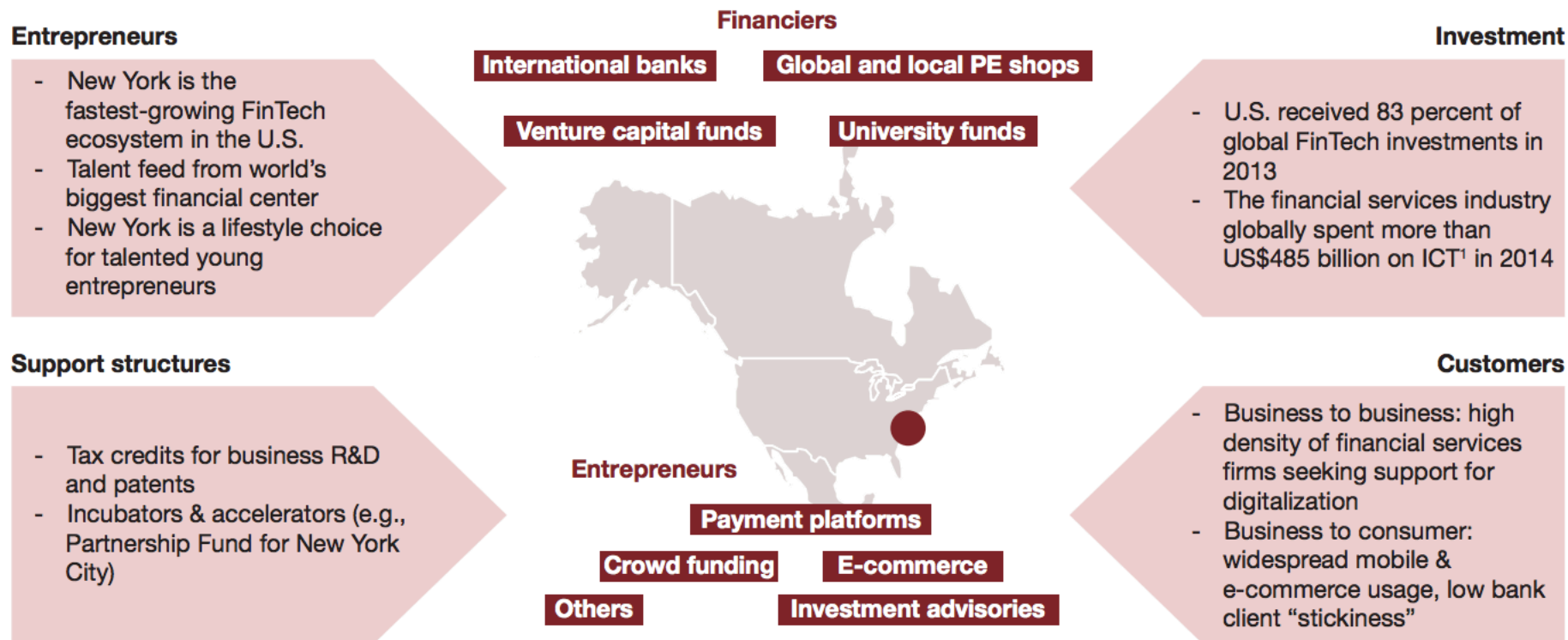
Due diligence



# The FinTech Innovation Ecosystem



# The U.S. FinTech landscape



# Fintech Startups












































## USA Fintech Ecosystem

+ ADD STARTUP

Startups (74) | News (11)

### Crowdfunding

STARTUP	DESCRIPTION	LINKS	STATUS	MONEY RAISED
 Crowdera				-
 AngelList	Community of start-ups & investors who make fundraising efficient	  	alive	\$24.1M
 CircleUp	Online marketplace that links accredited investors with consumer product and retail companies.	  	alive	\$53M
 Early Shres	Real estate crowdfunding platform	 	alive	
 Indiegogo	Crowdfunding platform	    	alive	\$56.5M
 Kickfurther	Businesses finance inventory. Backers earn returns.	 	alive	
 Kickstarter	Crowdfunding platform	     	alive	\$10M
 Local lift	Brings crowdfunding to your local area.	  	alive	\$160k
 Onevest (Rock The Post)	Equity crowd-funding platform	   	alive	\$2M
 Quirky	Community-led invention platform	  	alive	

FS

Fintech Startups WorldWide



✉ Subscribe to our Newsletter

🐦 fstartupsco

📧 fintech@startups.watch

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# Financial Technology (Fintech) Categories

1. Banking Infrastructure
2. Business Lending
3. Consumer and Commercial Banking
4. Consumer Lending
5. Consumer Payments
6. Crowdfunding
7. Equity Financing
8. **Financial Research and Data**
9. Financial Transaction Security
10. Institutional Investing
11. International Money Transfer
12. Payments Backend and Infrastructure
13. Personal Finance
14. Point of Sale Payments
15. Retail Investing
16. Small and Medium Business Tools

# FinTech Ecosystem (April 2015)

### Lending

### Personal Finance

### Payments

### Retail Investments

## FinTech

1,072 Companies

Contact  
[info@venturescanner.com](mailto:info@venturescanner.com)  
 to see all companies

### Institutional Investments

### Equity Financing

### Remittances

### Business Tools

### Crowd-funding

### Consumer Banking

### Financial Research

### Banking Infrastructure

# Financial Technology (FinTech)

## THE FINTECH ECOSYSTEM

### ROBO-ADVISORS & PERSONAL FINANCE



### BLOCKCHAIN & BITCOIN



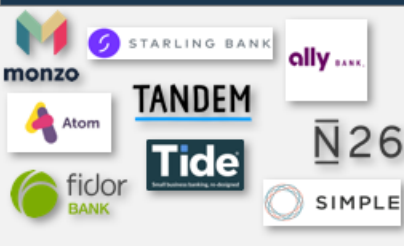
### INSURTECHS



### REGTECHS



### DIGITAL BANKS



### ALTERNATIVE FINANCE



### PAYMENTS & REMITTANCES



## BI INTELLIGENCE

Source: Company websites, BI Intelligence



# Financial Technology (FinTech)

## THE FINTECH ECOSYSTEM

### Payments & Transfers



### Lending & Financing



### Retail Banking



### Financial Management

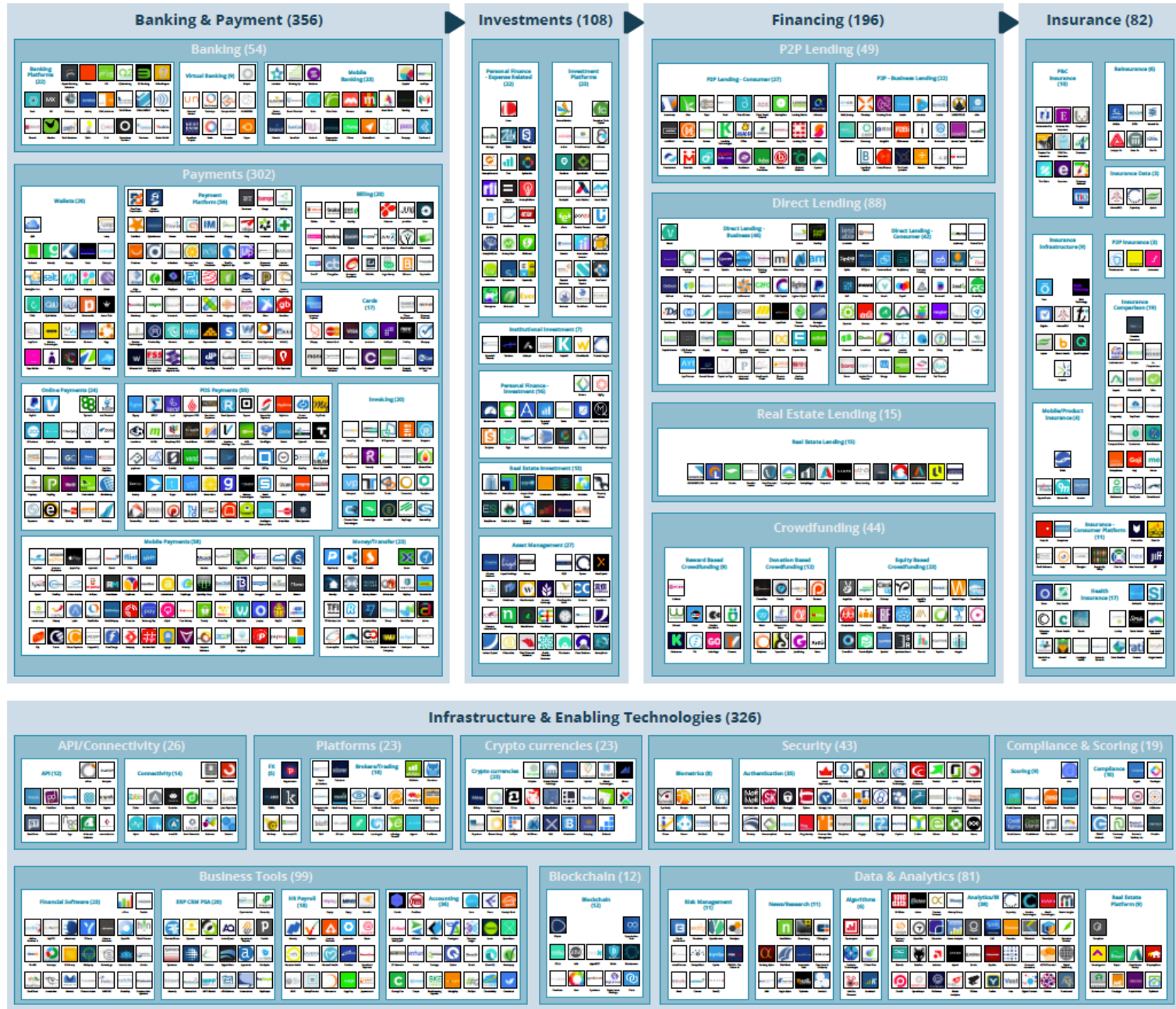


### Insurance



### Markets & Exchanges



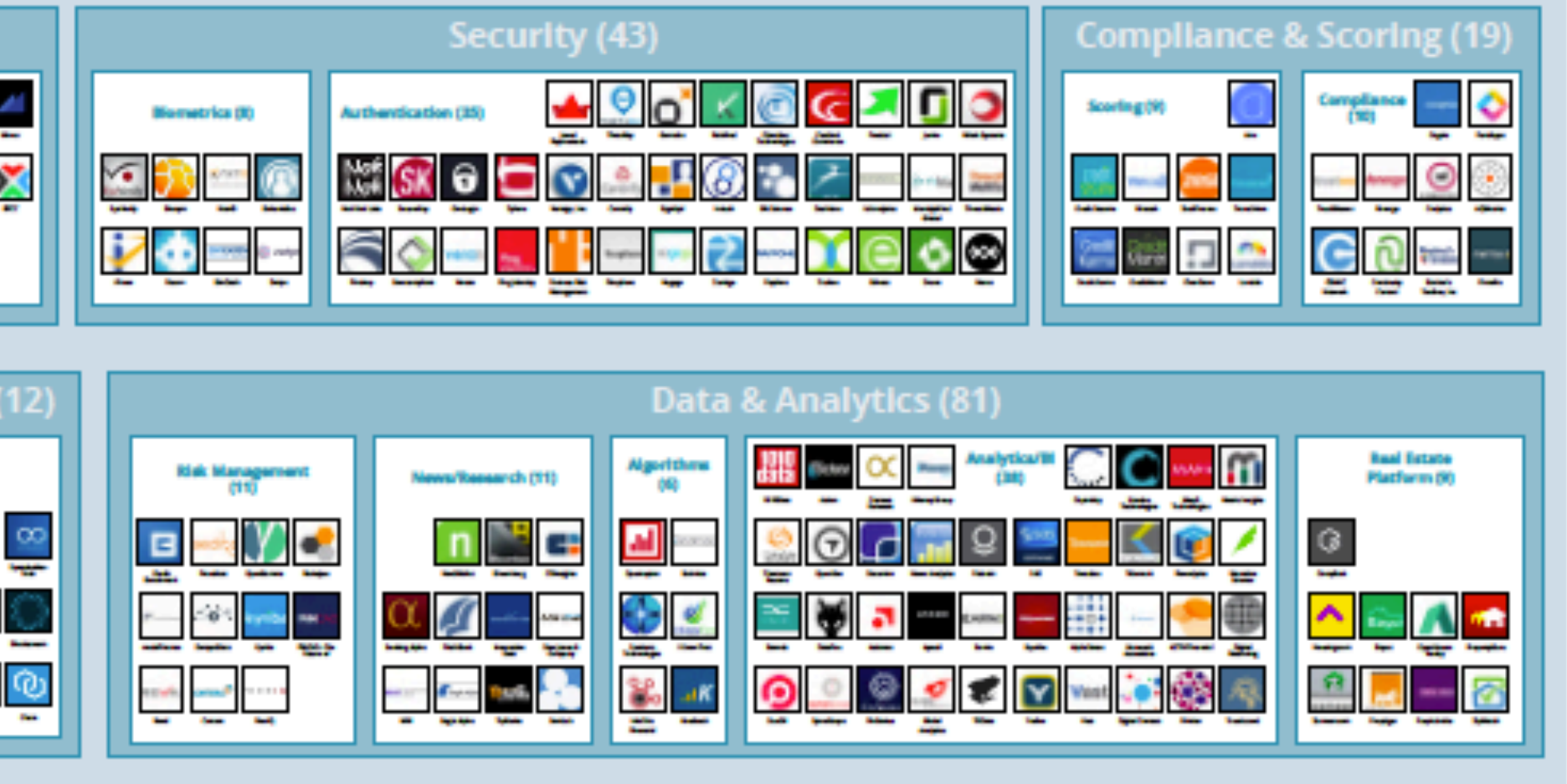




# FinTech Landscape Enabling Technologies

## Data & Analytics

### Technologies (326)



# FINTECH | LANDSCAPE

everisDigital

## Digital & Mobile payments



## Bitcoin & Cryptocurrency



## Capital Markets & Investing



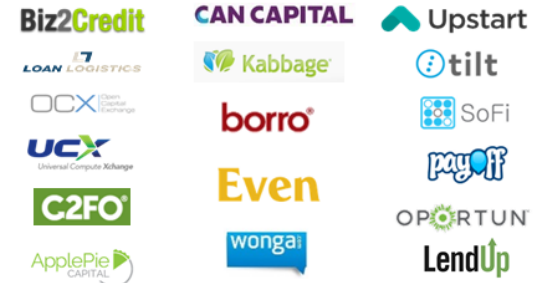
## Banking & Corporate Finance



## Big Data & Analytics



## Financial platforms



## Crowdfunding & peer-to-peer lending



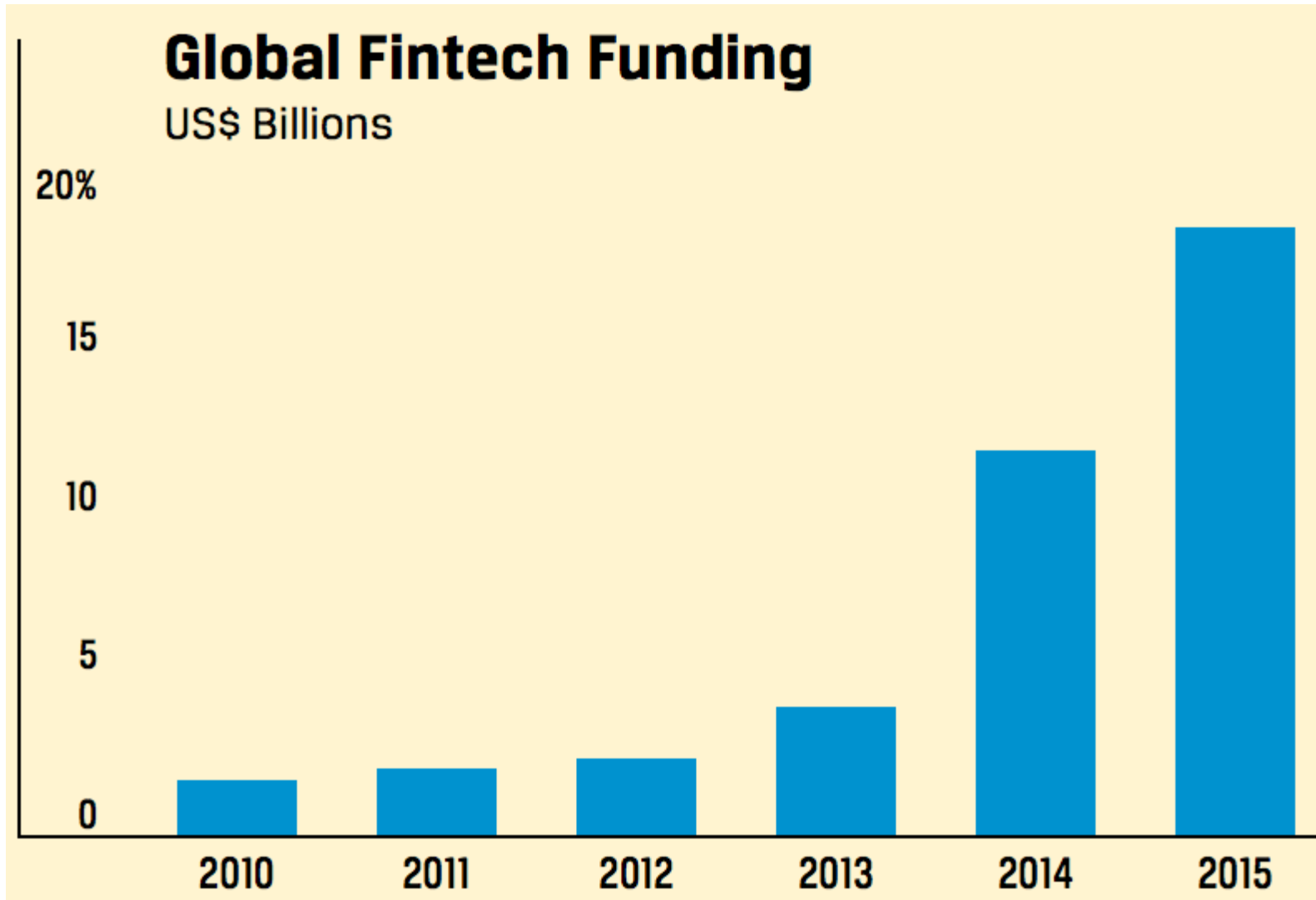
## Personal financial management



## Blockchain technology

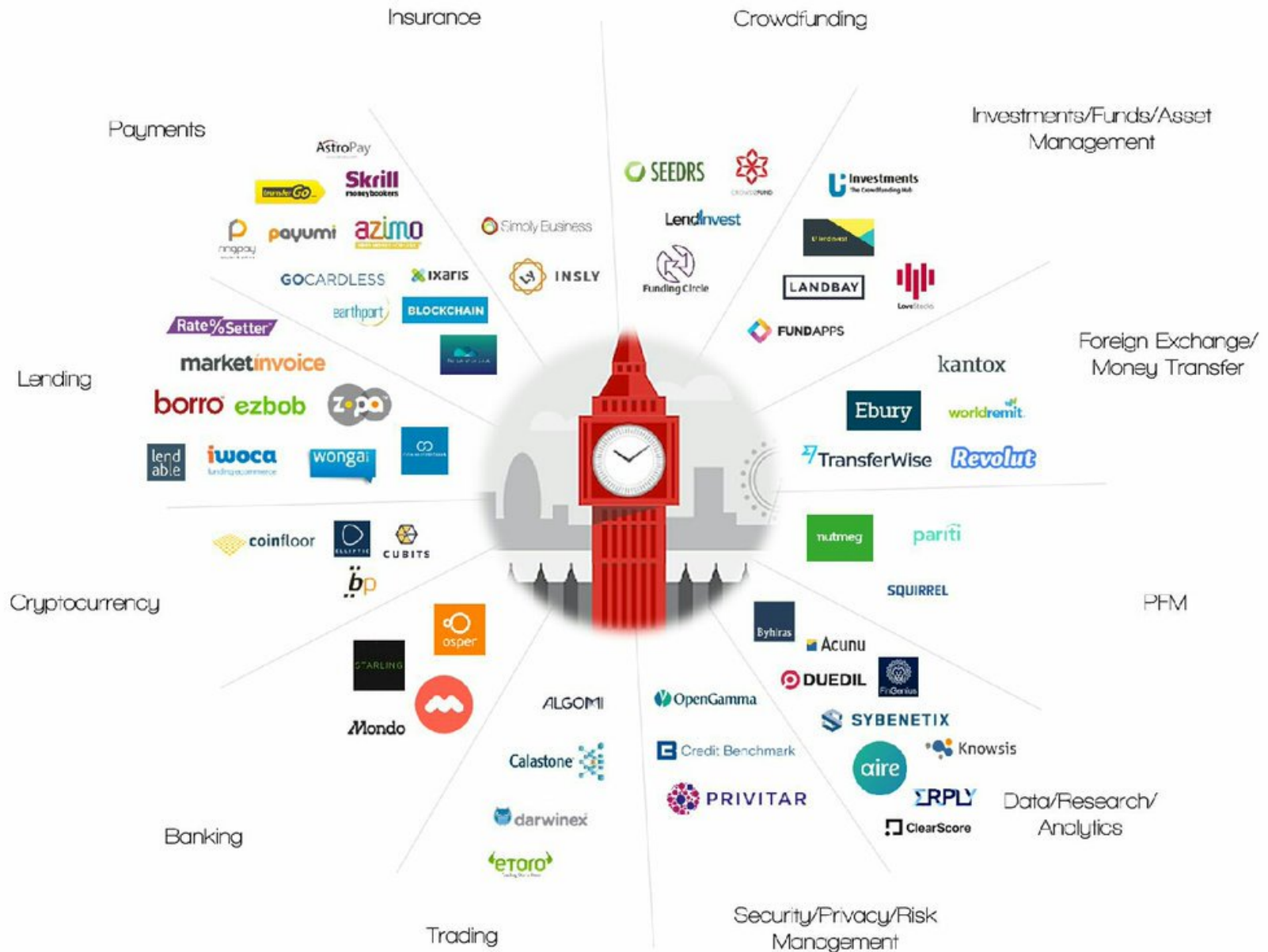


# Global Fintech Funding



# FinTech Startups Worldwide

# Fintech Startups WorldWide



Source: <https://startups.watch/fintech-ecosystems-worldwide/>



# Fintech Startups WorldWide

**German FinTech Overview - Unbundling Banks**  
powered by [www.paymentandbanking.com](http://www.paymentandbanking.com), March 2016

The image displays a comprehensive overview of German fintech startups, categorized into 12 distinct areas:

- PAYMENT:** Includes startups like payleven, iZettle, paij, sum up, GO4Q, LATERPAY, BILLPAY, payworks, PayOrShare, PayCash, kash, optiopay, and IPAYst.
- DONATIONS:** Includes HelpingCents, fraistr, twingle, elefunds, ALTRUJA, and WIKANDO.
- FACTORING:** Includes RECHNUNG48, COMPEON, PAGID, DECIMO, BillFront, FLEX, PAIR, and FLEX.
- CREDIT:** Includes Kreditech, COMPANISTO, auxmoney, Spotcap, zencap, VEXCASH, FINANZCHECK.de, Fintura, Lendico, SEEDMATCH, GIROMATCH, bankless24, Ferratum, BERGFÜRST, finmar, smava, FUNDSTERS, Debitos, kapitalendo, and CRXMARKETS.
- ORDER/CASH:** Includes liveDENT, cybits, webID solutions, IDnow, IDIVOS, Identity™, AUTHADA, GASTROFIX, INVENTORUM, orderbird, Cookies, and Quandoo.
- INSURANCE:** Includes TRASH, GetSafe, Knip, passt24, VIRADO, safeome, KASKO, Vertragium, FINANZ CHEF 2.0, AppSichern, OnlineVersicherung.de, EASYCARD, friendurance, CLARK, SCHUTZGLÜCK, Community Life, Fair-sicher24.de, massup, and asuro.
- BANKING:** Includes MAMBU, traxpay, myIBAN, fidor BANK, NUMBER26, gini, HOLVI, Fin Reach, Tullius Walden, TreasuryView, fine, BANCALIS, dwins, BRINGCASH, and baningo.
- ECOMMERCE:** Includes better payment, VAULTED, allpago, SEPAone, Fyber, Barzahlen, YAPITAL, isaacio, FastBill, RatePAY, PAYMILL, payever, HOLVI, and fashionbeque.
- API-BANKING:** Includes just SPENT, Oontis, E-POS, kontoalarm, moneygarden, PFM, stanzbank, xpenditure, Ngo, fidor, FINTEC SYSTEMS, EBICS-BOX, and finAPI.
- IMMO:** Includes weclapp, debitor, Pactas, SMOICE, battomat, FastBill, HOLVI, ZEITGOLD, ALBUS WHITE, SMAC, and DYS.
- P2P:** Includes cringle, tabbt, Payza, PAYMEY, Kittysplit, azimo, lendstar, cashcloud, elopay, collect, and Avuba.
- SAVINGS:** Includes BERGFÜRST, Stock Pulse, vaamo, smartDepot, GINMON, greenX money, Fintura, FinQ, SAVEDO, ZINSPILOT, TrueWealth, DAMANTIS, börsencompil, MINVEO, justETF, fairr.de, sharewise, twindepot, CASHBOARD, venturate, UNITED SIGNALS, COLMONEA, easyfolio, bettervest, WeltSparen, modelogiq, quiron, moneymeets, Simple Finance, ayondo, EA Guidants, ayondo, ALYON, INTELLIGENT, LIQID, secured, acalab, niio, ToolTrade, advertis, bonify, investify, WHITEBOX, and Clinic.

# Fintech Startups WorldWide



# Fintech Startups WorldWide

## FinTech Map Switzerland

Juni 2016

#185

### Investing und Asset Management

#45



### Vergleichs- und Informationsportale, Beratung, Versicherung

#30



### Payment

#27



### Crowdfunding

#31



### Crypto

#20



### Daten Management

#13



### PFM

#3



### Andere

#16





# Fintech Startups WorldWide

## 決済



## 資産管理



## 資産運用



INSNEXT

お金のデザイン  
MONET DESIGN

## ビットコイン

coincheck

bitFlyer

国内

**FinTech**  
サービス19選

## ソーシャルレンディング



Crowdcredit

maneo

AQUSH

## 金融情報

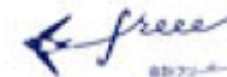


SPEEDA



## 会計

merryBiz



MFクラウド

misoca

# Fintech Startups WorldWide

## KOREAN FINTECH STARTUP MAP

Ver. 1.00

### Payments



### Bitcoin



### Personal Finance



### Remittances



### Crowdfunding



### Lending



### Security



카테고리별 순서: 기업의 영문명 순서

PDF 파일을 다운 받고 스타트업의 로고를 클릭하면, 해당 스타트업의 홈페이지로 갈 수 있습니다.



# Fintech Startups WorldWide

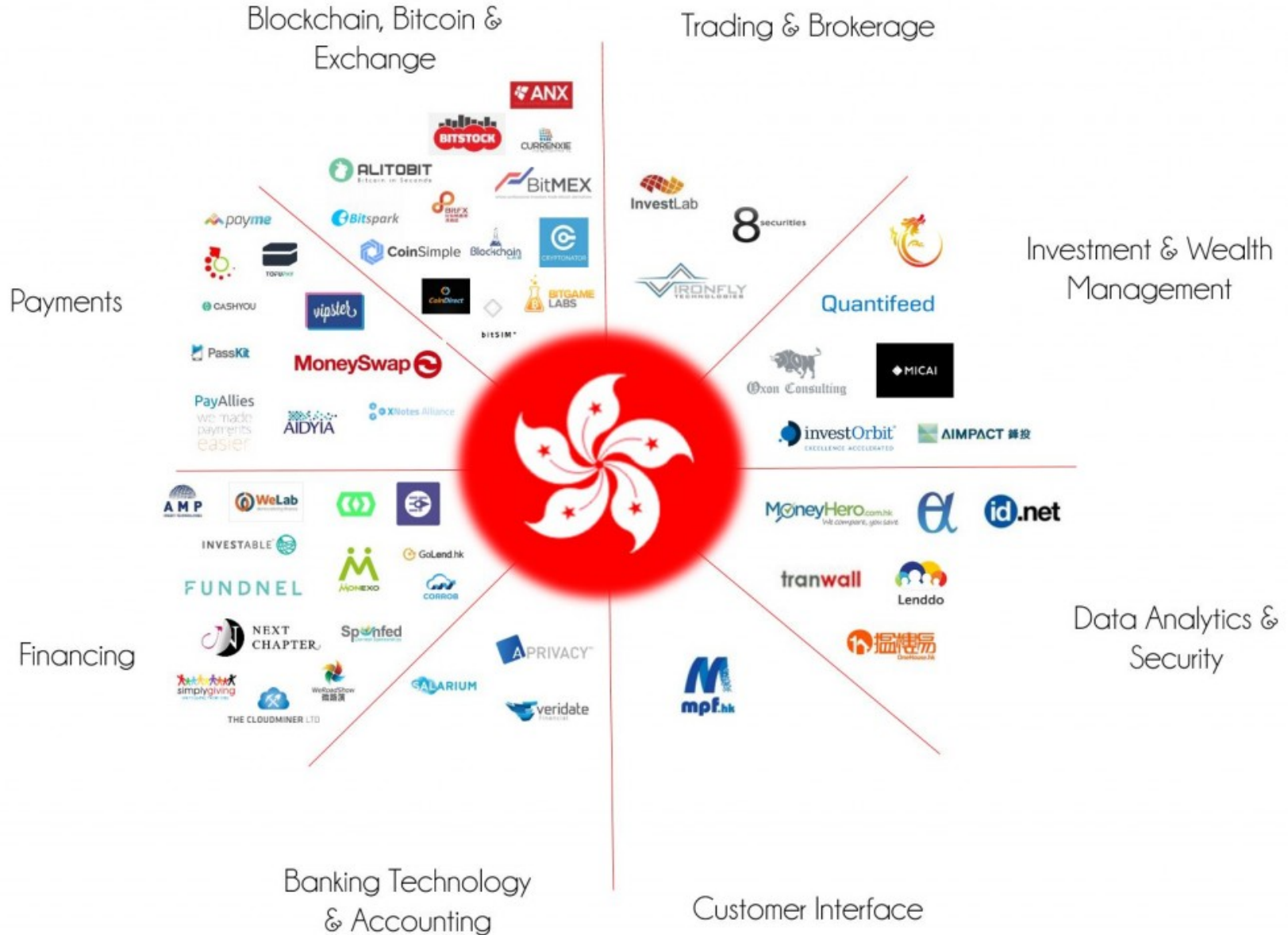
## Singapore FinTech Landscape



Payments / Remittances	Personal Finance/Wealth	Retail Banking/Investments	Banking Infrastructure									
	<th>Lending</th> <td> </td> <td> <th>Institutional Investments</th> <td> </td> <td> <th>Financial Training / Games</th> <td> </td> <td> <th>Finance Research/Analytics</th> <td> </td> </td></td></td>	Lending		<th>Institutional Investments</th> <td> </td> <td> <th>Financial Training / Games</th> <td> </td> <td> <th>Finance Research/Analytics</th> <td> </td> </td></td>	Institutional Investments		<th>Financial Training / Games</th> <td> </td> <td> <th>Finance Research/Analytics</th> <td> </td> </td>	Financial Training / Games		<th>Finance Research/Analytics</th> <td> </td>	Finance Research/Analytics	



# Fintech Startups WorldWide



# Fintech Startups WorldWide

## Bankcard Organization



## Acquiring Service Provider



## Prepaid Card Issuer



## Software, Hardware and Device Provider



## Telecom Operator



## City Commercial Bank



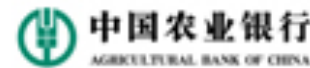
## Online Payment Company



## Mobile Payment Company



## State-owned Bank



## Joint-stock Bank



# Fintech: Financial Technology

## **Disrupting Banking:** **The Fintech Startups** **That Are Unbundling** **Wells Fargo, Citi and** **Bank of America**

# Fintech: Unbundling the Bank

## Unbundling of a Bank





# Fintech: Unbundling the Bank

## Wealth Management: Wealthfront





**Fintech: Financial Technology**

**Disrupting**

**European Banking:**

**The FinTech Startups**

**That Are Unbundling**

**HSBC, Santander, and**

**BNP**

# Unbundling of a European Bank

The image illustrates the unbundling of a European bank's services into various fintech products. The central focus is the HSBC website interface, which is annotated with numerous fintech logos and arrows pointing to specific services. The logos include SavingGlobal, borro, Bondora, Zopa, Lending Works, prêt d'union, Lendico, fruitful, LANDBAY, Property Partner, wonga, Spotcap, Funding Circle, FINEXKAP, fleximize, iwoca, capiota, Trade River, Ebury, Lydia, jusp, ensygnio, payleven, wikifolio, squirrel, nutmeg, centralway, osper, ffrees, borro, tink, CAPITAL, Money Dashboard, moni, transferGo, worldremit, azimo, CurrencyFair, Klarna, adyen, sum up, iZettle, BILLPAY, GOCARDLESS, PAYMILL, and HOLVI. The screenshots show various banking services such as 'Send money overseas in a few clicks', 'Find a mortgage', 'Our lowest ever loan rate', 'Save Together offer', 'International money transfer', 'Business Banking', 'Commercial Banking', 'Corporate Banking', 'International Business', 'Online Services', 'Community account', 'Other accounts', 'Finance & borrowing', 'Credit cards & debit cards', 'Payment services', 'Business insurance policies', 'Business savings & investments', 'Ways to Bank', 'International business', and 'Pensions'.

# Unbundling of a European Bank

**Personal** | **Business** | Search | Internet Banking | Log on | Register >

**HSBC** | **Everyday banking** | **Borrowing** | **Investing** | **Insurance** | **Planning**  
 Accounts & services | Loans & mortgages | Products & analysis | Property & family | for now & the future

**Send money overseas in a few clicks**  
 It's secure, quick and easy. See just how much we could save you.  
 Fees may apply. Payments may also incur agency and/or beneficiary bank fees. **Find out more**

**Find a mortgage** | **Our lowest ever loan rate** | **Save Together offer** | **International money transfer**

**Business Banking** | **Commercial Banking** | **Corporate Banking** | **International Business** | **Online Services**  
 Turnover up to £2m | Turnover £2m to £30m | Turnover in excess of £30m

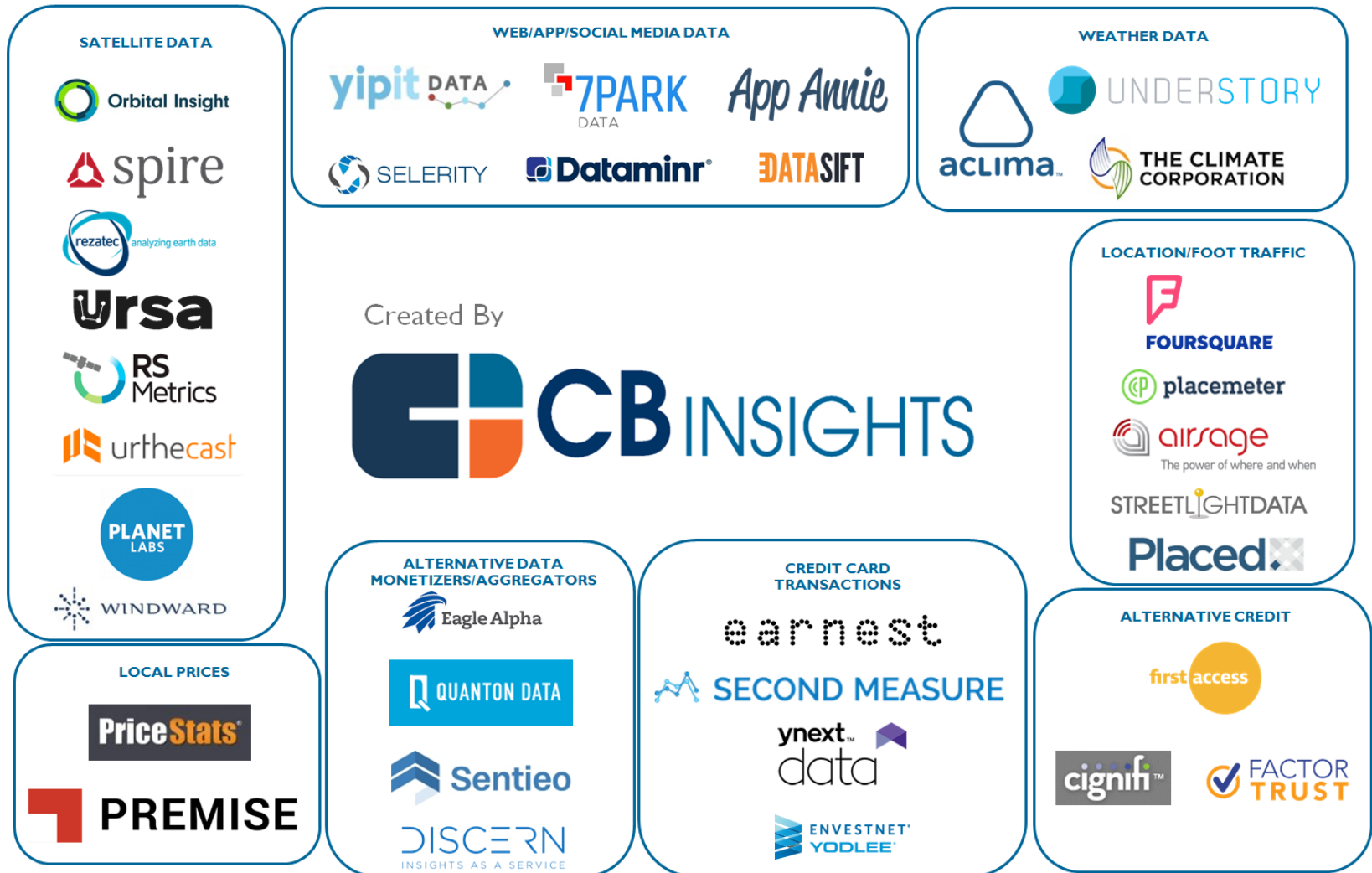
**Every business has its own story**

# The **New Alpha**: 30+ Startups Providing Alternative Data For Sophisticated Investors

New sources of **data mined** by startups like **Foursquare**, **Premise**, and **Orbital Insight** are letting investors understand **trends** before they happen.

# The New Alpha: 30+ Startups Providing Alternative Data For Sophisticated Investors

## Alternative Data Sources



# From Algorithmic Trading To Personal Finance Bots: 41 Startups Bringing AI To Fintech



# From Algorithmic Trading To Personal Finance Bots: 41 Startups Bringing AI To Fintech

## AI in Fintech

41 Startups Bringing Artificial Intelligence To Fintech

General Purpose/ Predictive Analytics



Market Research & Sentiment Analysis



Search Engine



Quantitative Trading



Blockchain



Debt Collection



AI Assistants/Bots



Fraud Detection



Credit Scoring



Personal Banking



# Artificial Intelligence (AI) in Fintech

## General Purpose/ Predictive Analytics



## Market Research & Sentiment Analysis



## Search Engine





# Artificial Intelligence (AI) in Fintech

## Quantitative Trading



## Blockchain



## Debt Collection



## AI Assistants/Bots



## Fraud Detection



## Credit Scoring



## Personal Banking



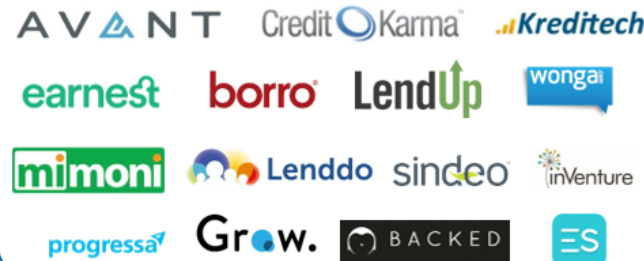
# Lending, Investments, And Personal Finance: 102 Startups Attacking The Retail Banking Value Chain

## The Digital Banking Market Map

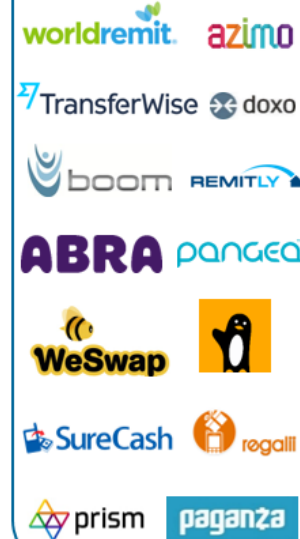
### Marketplace Lending



### Direct Lending & Underwriting



### Bill Pay / Money Transfer



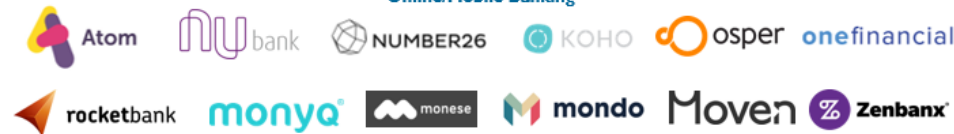
### Investment Management



Created By



### Online/Mobile Banking



### Personal Finance



### Robo-advisor



# From Point-Of-Sale To Money Transfers: 109 Startups Disrupting The Payments Industry

## The Payments Market Map



# Insurance Tech Rising: 135+ Insurance Startups Across P2P, Life, Commercial & More

## Insurance Tech Rising: 130+ Startups Across P2P, Life, Renters, & More



For more insurance tech research, check out:  
[cbi.vc/insurance-tech](https://cbi.vc/insurance-tech)  
**CB INSIGHTS**  
[www.cbinsights.com](https://www.cbinsights.com)



# Millennial Personal Finance: 63 Fintech Startups Targeting Millennials

## Fin Tech Startups for Millennials

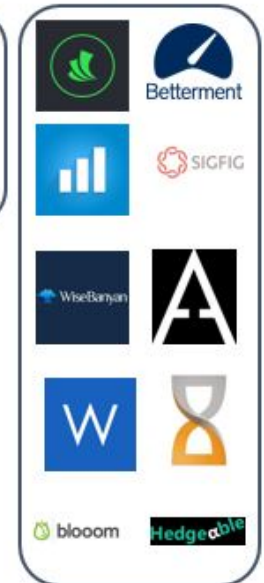
### Savings & Finances Tracking



### Personal Investing



### Wealth Management



### Insurance



### Crowdfunding



MILLENNIALS



### Loans & Credit Risk

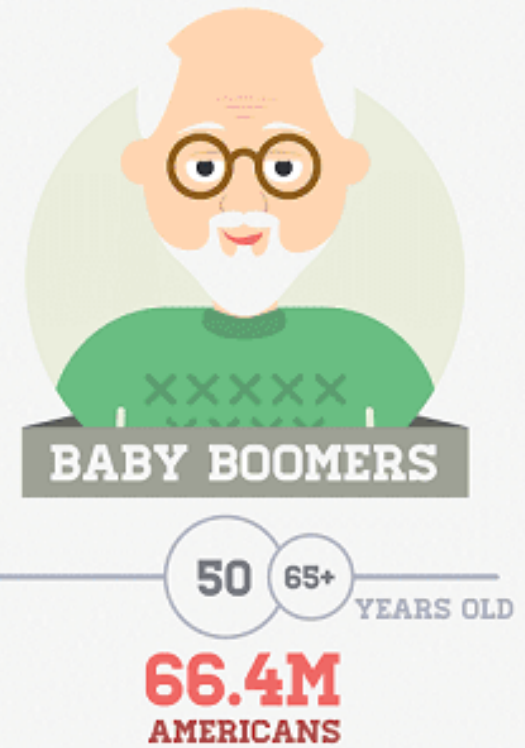


### Payments & Banking

### Acquired Companies

# Marketing to Millennials

## GENERATIONS OVERVIEW



# Marketing to Millennials

## MILLENNIAL PERSONAS



### DIGITAL WINDOW SHOPPERS

Less engaged online than other millennials



**23%**

of the millennial population

**42%** **58%**

female majority



### DIGITAL SOCIALITES

Highly social and engaged online



**26%**

of the millennial population

**45%** **55%**

female majority



### DYNAMIC MEDIA JUNKIES

Extremely tech savvy and engaged with online video and streamed content



**23%**

of the millennial population

**64%** **36%**

male majority



### CASUALLY ENGAGED

Least engaged in digital world, more likely to be unemployed



**17%**

of the millennial population

**53%** **47%**

male majority



### EMERGING TECHNOCRACY

Strongly engaged digitally and highly influential



**15%**

of the millennial population

**57%** **43%**

male majority



# Marketing to Millennials

## BEST PRACTICES FOR MARKETING TO MILLENNIALS



### OPTIMIZED MOBILE

Mobile is the **BEST WAY TO REACH MILLENNIALS** - they have the highest rates of ownership of smartphones of all generations



### MULTI-PLATFORM

Millennials **CONSUME CONTENT ACROSS MULTIPLE DEVICES**, so marketers need to create content with a multi-platform strategy. For example, **55%** are watching videos several times a day on multiple devices



### PERSONALIZATION

**85%** of Millennials are **MORE LIKELY TO MAKE A PURCHASE IF IT IS PERSONALIZED** to their interests, both in-store and with digital displays



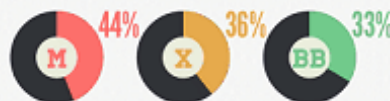
### SOCIAL MEDIA PRESENCE

Millennials are **MORE LIKELY TO USE SOCIAL MEDIA DAILY** with 62% reporting that brand engagement is more likely to make them a loyal customer



### BE AUTHENTIC

Millennials are willing to share good advertising, but **DISLIKE WHEN ADVERTISING FEELS DECEPTIVE**



believe brands say something about who they are, their values and where they fit



### INFORMATIONAL BLOGS

one in three millennials choose **BLOGS** as the top media source **BEFORE MAKING A PURCHASE**. Traditional media sources like TV and magazines have less impact on this generation



# Fintech for Millennials

Fintech Category	#Company
Crowdfunding	2
Insurance (Non-Health)	4
Loans & Credit Risk	20
Mobile Banking & Payments	8
Personal Investing	10
Savings & Finances Tracking	10
Wealth Management	9
Total	63

# Fintech: Wealth Management

Company	Select Investors
Wealthfront	DAG Ventures, Index Ventures, Greylock Partners, The Social+Capital Partnership
Betterment	Bessemer Venture Partners, Athemis Group, Menlo Ventures
SigFig	Doll Capital Management, Union Square Ventures, Bain Capital Ventures
Aspiration	Renren, GSV Capital, Capricorn Investment Group, IGSB
Bloom	Commerce Ventures, DST Systems, Hyde Park VP, QED Investors, UMB Financial
Rebalance IRA	N/A
Hedgeable	SixThirty
WiseBanyan	VegasTech Fund
Personal Capital	Institutional Venture Partners, Venrock, Crosslink Capital

# Fintech: Personal Investing

Company	Select Investors
eToro	BRM Group, Ping An Ventures, Spark Capital
Openfolio	FinTech Collective
DriveWealth	Route 66 Ventures
Tip'd Off	Raj Parekh, Bill Crane, Shaun Coleman
Kapitall	Bendigo Partners, Linden Venture Fund
Stash	N/A
Stox	SingulariTeam
Robinhood	Google Ventures, Index Ventures, Andreessen Horowitz, Ribbit Capital, NEA
Motif Investing	Norwest Venture Partners, Foundation Capital, Ignition Capital, Goldman Sachs
Loyal3	DNS Capital

# FinTech Marketing



# FinTech Trends



**Capital One** **Mashable**

# FINANCIAL TECHNOLOGY

## PREDICTIONS & TRENDS

- More than **50%** of respondents predict that by **2030**, most payments will be cashless and non-paper based.
- Respondents cited big data analytics and alternative payment forms as the two innovations that are likely to have the greatest impact on the financial services space in the next **3-5 years**.

# FinTech

## Big Data Analytics

WHICH INNOVATION WILL HAVE THE GREATEST IMPACT ON THE FINANCIAL SERVICES SPACE IN THE NEXT 3-5 YEARS?



**27%**

Big data analytics

**26%**

Alternative forms of payments/lending

**19%**

Blockchain

**17%**

IoT

**9%**

AI

**2%**

Other

# Blockchain Technology

The **blockchain** is a  
**decentralized ledger**  
of all transactions  
across  
a **peer-to-peer network**.



# Blockchain Technology

*How it works:*



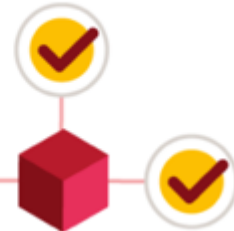
Someone requests a transaction.

The requested transaction is broadcast to a **P2P network consisting of computers, known as nodes.**



## Validation

The network of nodes **validates the transaction and the user's status using known algorithms.**



A verified transaction can involve **cryptocurrency, contracts, records, or other information.**



The transaction is complete.



The new block is then added to the existing blockchain, in a way that is permanent and unalterable.



Once verified, the transaction is combined with other transactions **to create a new block of data for the ledger.**

# Blockchain Technology

## *Benefits*



Increased  
transparency



Accurate  
tracking



Permanent  
ledger



Cost  
reduction

## *Unknowns*



Complex  
technology



Regulatory  
implications



Implementation  
challenges



Competing  
platforms

# Blockchain Technology Potential Applications



## ***Automotive***

---

**Consumers could use the blockchain** to manage fractional ownership in autonomous cars.



## ***Financial services***

---

**Faster, cheaper settlements** could shave billions of dollars from transaction costs while improving transparency.

# Blockchain Technology Potential Applications



## ***Voting***

---

Using a blockchain code, constituents could cast votes via smartphone, tablet or computer, **resulting in immediately verifiable results.**

## ***Healthcare***

---

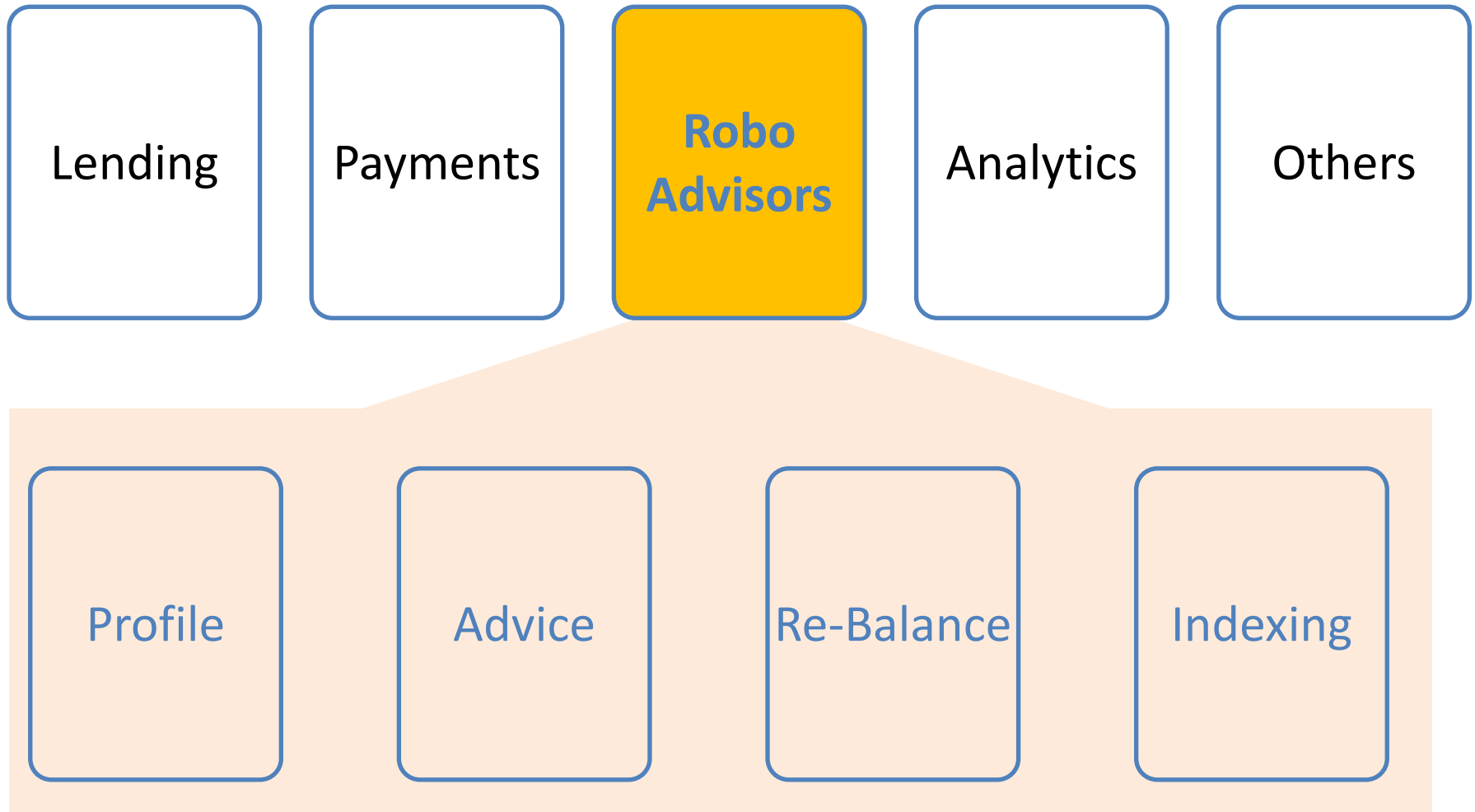
**Patients' encrypted health information** could be shared with multiple providers without the risk of privacy breaches.

# **Fintech Robo Advisors**

# **Big Data Driven Disruption: Robo-Advisor**



# FinTech high-level classification



# Wealthfront: Fintech Robo Advisor



Why Wealthfront ▾

Products ▾

Who we are ▾

Help Center

Blog

Log In

Invest now

The most tax-efficient, low-cost, hassle-free way to invest

Invest with Wealthfront

See Our Journey

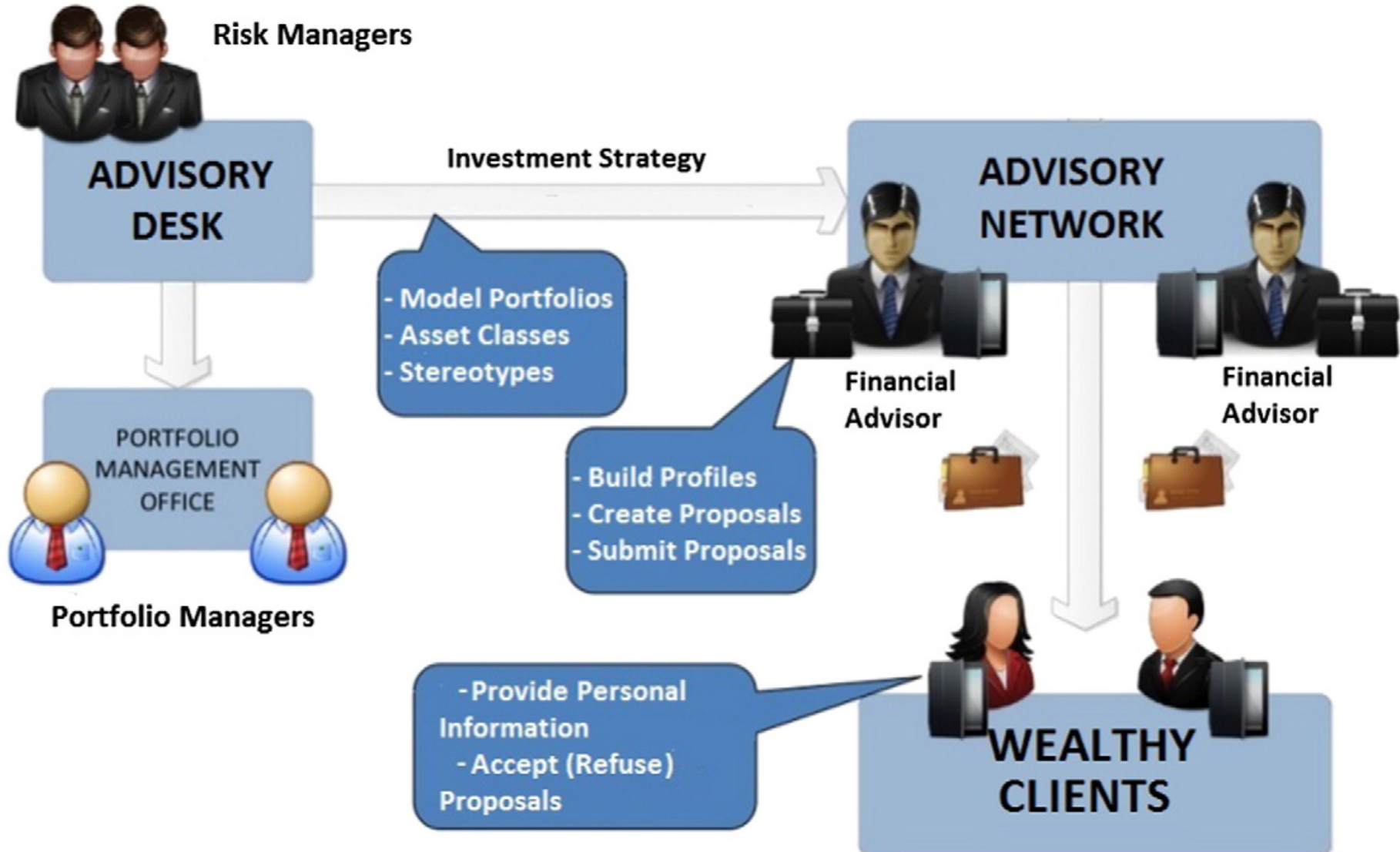


Do you have the time to invest well?

Wealthfront invests your money for you with a minimal amount of work. We monitor your portfolio every day to look for opportunities to rebalance or harvest tax losses. Are you doing the same?

<https://www.wealthfront.com/>

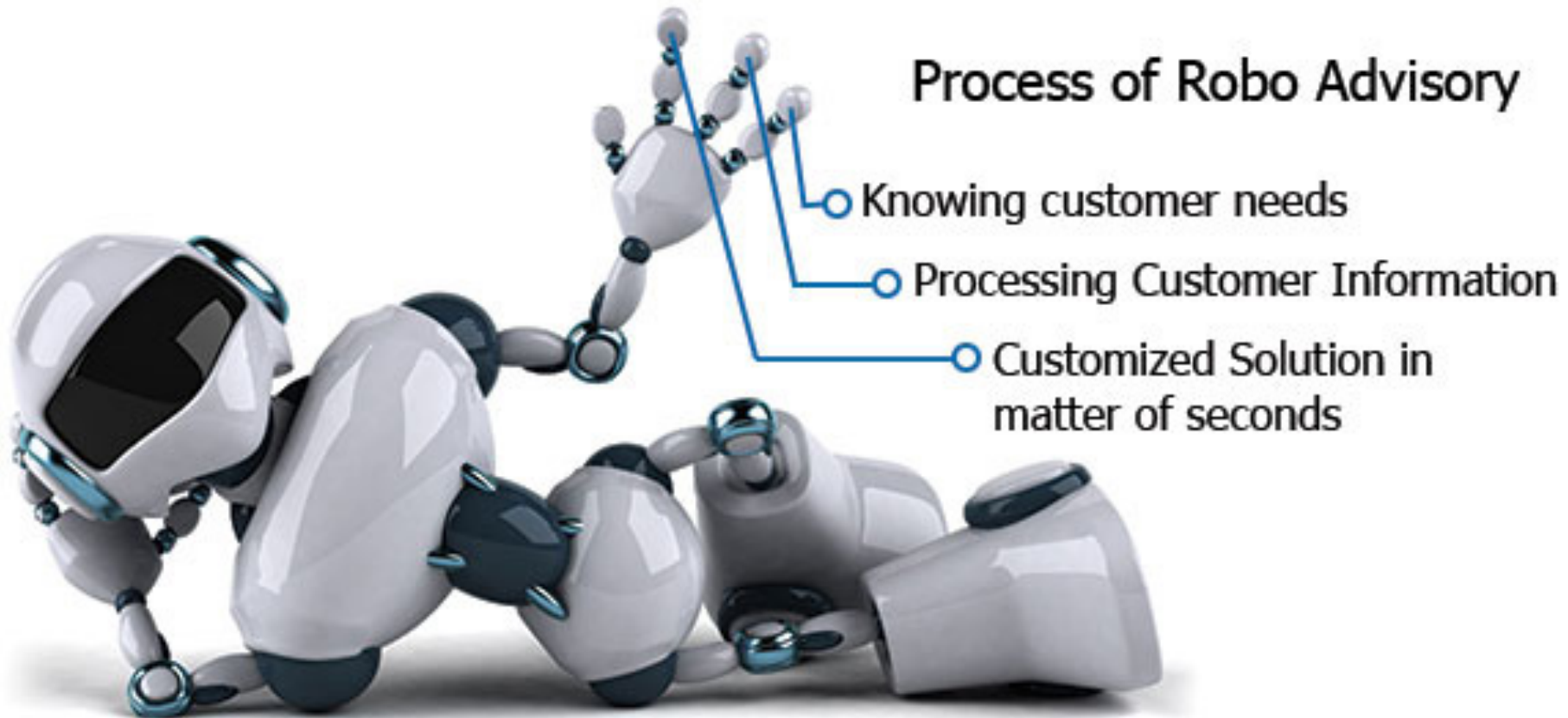
# A classic workflow for financial recommendations



Source: Musto, C., Semeraro, G., Lops, P., de Gemmis, M., & Lekkas, G. (2015).

Personalized finance advisory through case-based recommender systems and diversification strategies. *Decision Support Systems*, 77, 100-111.

# Process of Robo Advisors



# Benefits of Robo Advisors

## Benefits of Robo Advisors

- Unbiased Advice —
- No minimum Investment required —
- Low Charges —
- Transparency —
- Customised Solutions —



# Robo-Advisor Business Models

- **Full service online Robo-advisor**
  - 100% automated without any human element
- **Hybrid Robo-advisor model**
  - being pioneered by firms like Vanguard & Charles Schwab
- **Pure online advisor**
  - primarily human in nature



# Robo-Advisor Business Models

- **Full service online Robo-advisor**
  - 100% automated without any human element
- **Hybrid Robo-advisor model**
  - being pioneered by firms like Vanguard & Charles Schwab
- **Pure online advisor**
  - primarily human in nature

# Usecases of Robo-Advisors

1. Determine individual **Client profiles & preferences**
2. Identify **appropriate financial products**
3. Establish correct **Investment Mix** for the client's profile
4. Using a **algorithmic approach**, choose the appropriate **securities** for each client account
5. Continuously **monitor the portfolio & transactions** within it to tune performance
6. Provide **value added services**
7. Ensure the **best user experience** by handling a whole range of financial services

# Business Requirements for a Robo-Advisor (RA)

1. Collect Individual Client Data
2. Client Segmentation
3. Algorithm Based Investment Allocation
4. Portfolio Rebalancing
5. Tax Loss Harvesting
6. A Single View of a Client's Financial History

# Algorithms for a Robo-Advisor (RA)

- Leverage **data science** & **statistical modeling** to automatically allocate client wealth across different asset classes (such as domestic/foreign stocks, bonds & real estate related securities) to **automatically rebalance portfolio** positions based on changing market conditions or client preferences.
  - These investment decisions are also made based on detailed **behavioral understanding** of a client's **financial journey metrics**
    - Age, Risk Appetite & other related information.

# Algorithms for a Robo-Advisor (RA)

- RA platforms also provide 24 × 7 tracking of **market movements** to use that to track **rebalancing decisions** from not just a portfolio standpoint but also from a taxation standpoint.

# Algorithms for a Robo-Advisor (RA)

- A **mixture** of different **algorithms** can be used such as **Modern Portfolio Theory (MPT)**, **Capital Asset Pricing Model (CAPM)**, the **Black Litterman Model**, the **Fama-French** etc.
  - These are used to allocate assets as well as to adjust positions based on market movements and conditions.



# Robo-Advisor (RA) Sample Portfolios

## Sample Portfolios – for an aggressive investor

### 1. Equity – 85%

A) US Domestic Stock (50%)

– Large Cap – 30%, Medium Cap – 10% , Small Cap – 10%, Dividend Stocks – 0%

B) Foreign Stock – (35%)

– Emerging Markets – 18%, Developed Markets – 17%

### 2. Fixed Income – 5%

A) Developed Market Bonds – 2%

B) US Bonds – 1%

C) International Bonds – 1%

D) Emerging Markets Bonds – 1%

### 3. Other – 5%

A) Real Estate – 3%

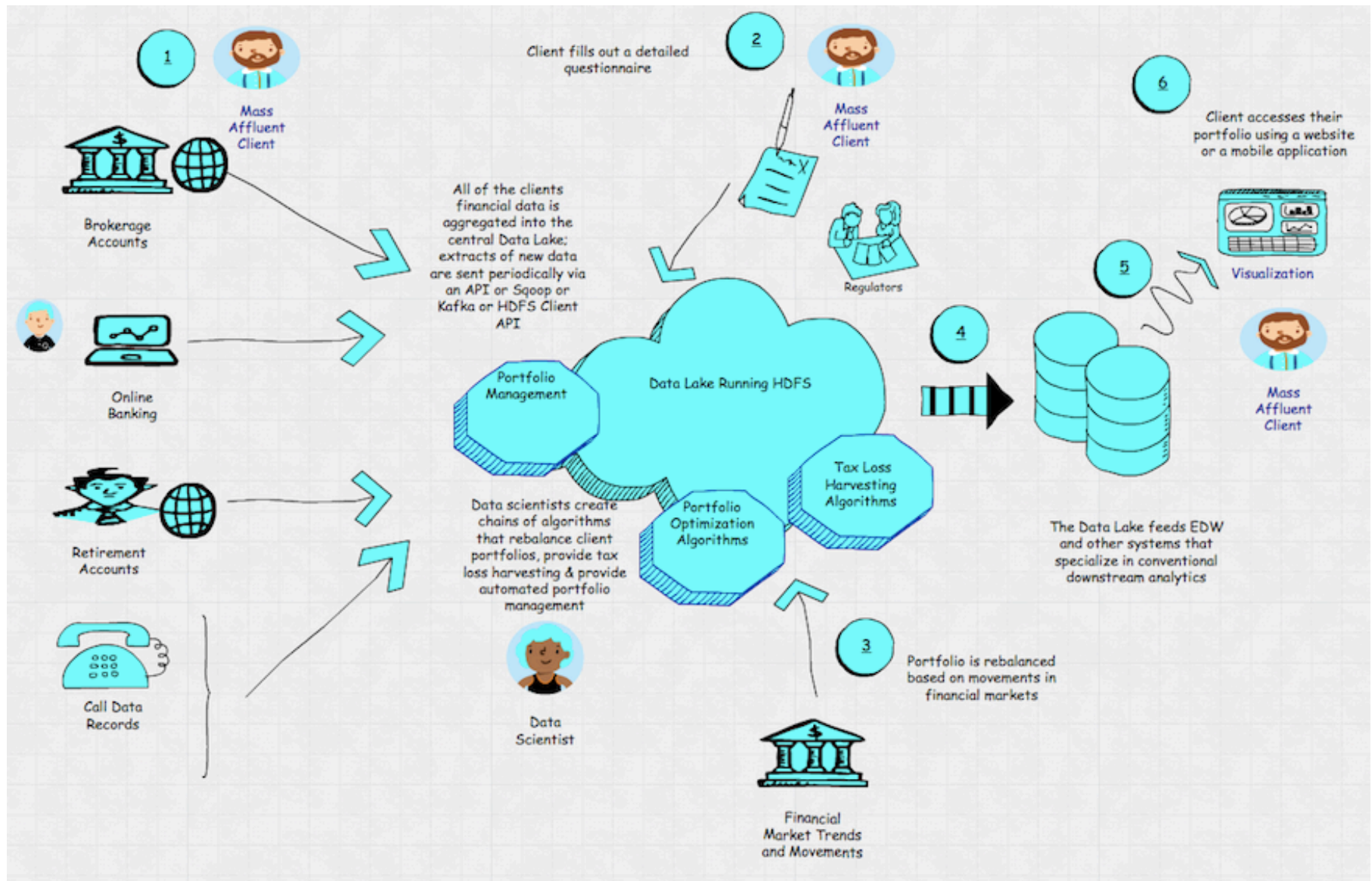
B) Currencies – 0%

C) Gold and Precious Metals – 0%

D) Commodities – 2%

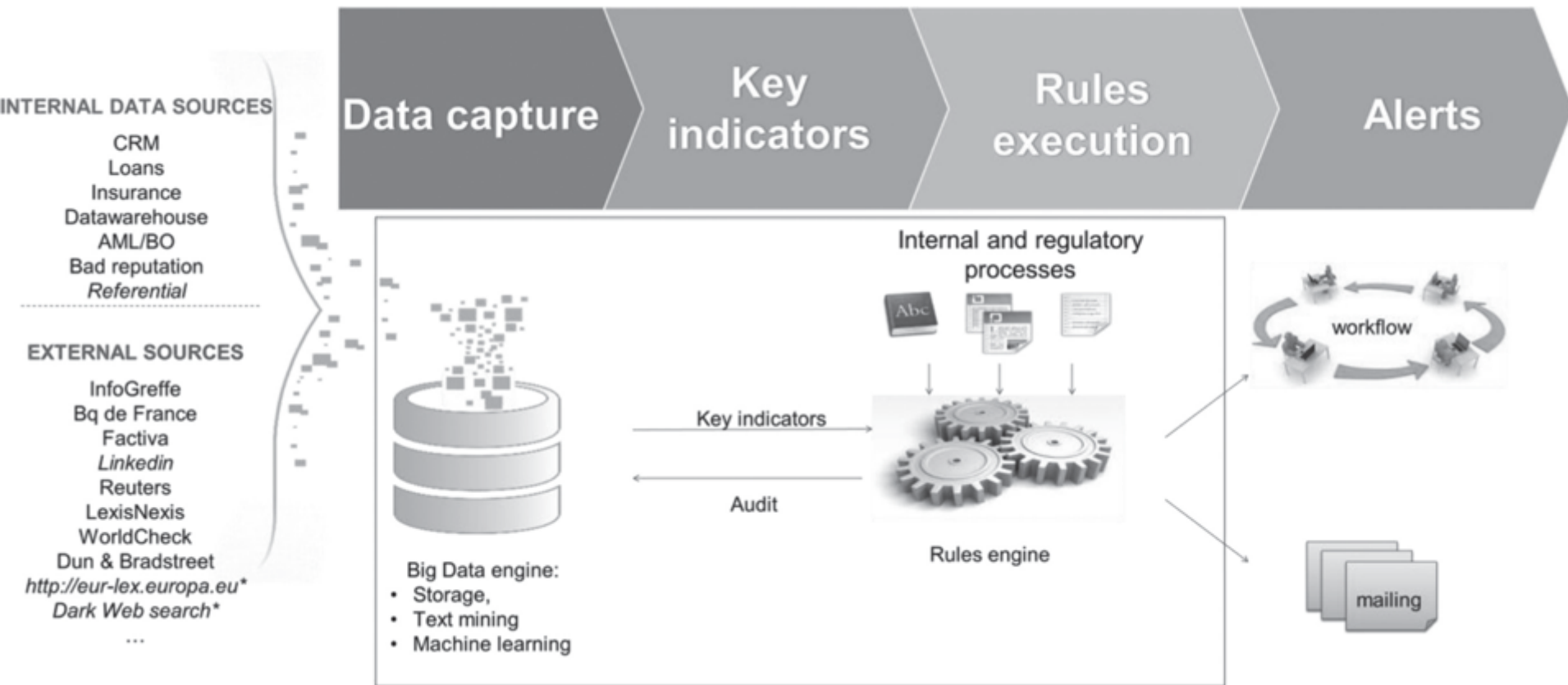
### 4. Cash – 5%

# Architecture of a Robo-Advisor (RA)

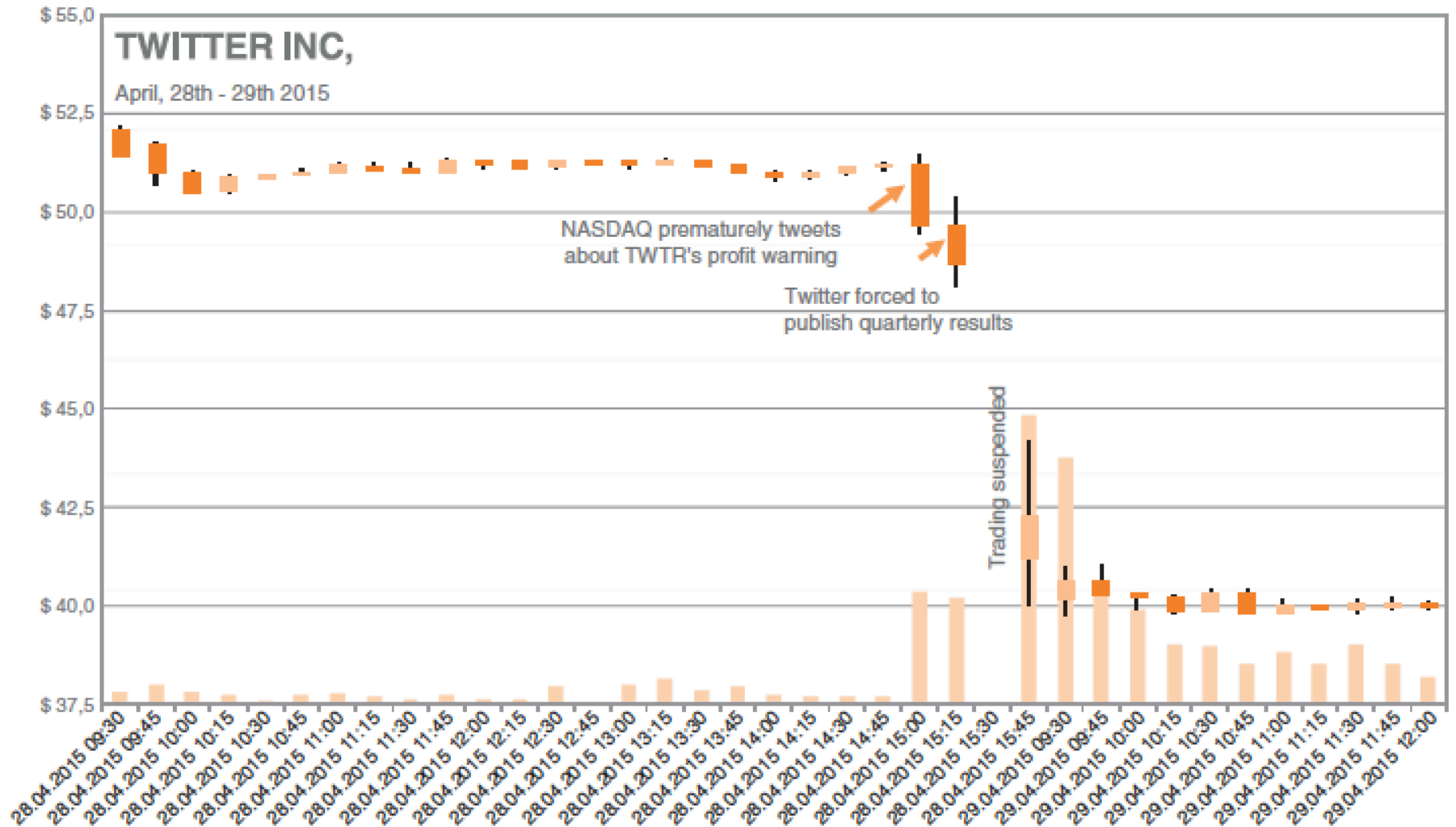


# Financial Sentiment Analysis

# Big Data Approach to Combining Internal and External Data



# Ultra-Fast Text Analytics in Trading Strategies



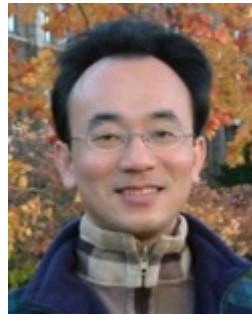
Twitter stock prices affected by news, Source: econob

Source: Susanne Chishti and Janos Barberis,



**Tamkang  
University**

# Deep Learning for Financial Sentiment Analysis on Finance News Providers



**Min-Yuh Day**



**Chia-Chou Lee**

**Department of Information Management  
Tamkang University, Taiwan**

[myday@mail.tku.edu.tw](mailto:myday@mail.tku.edu.tw)



# Outline

- Introduction
- System Architecture
- Experimental Results and Discussion
- Conclusion

# Introduction

# Financial Sentiment Analysis



# Motivation

- Investors have always been interested in **stock price forecasting**.
- The rapid development of electronic media, the big data of **financial news** are released on different media every day.

# Research Gap

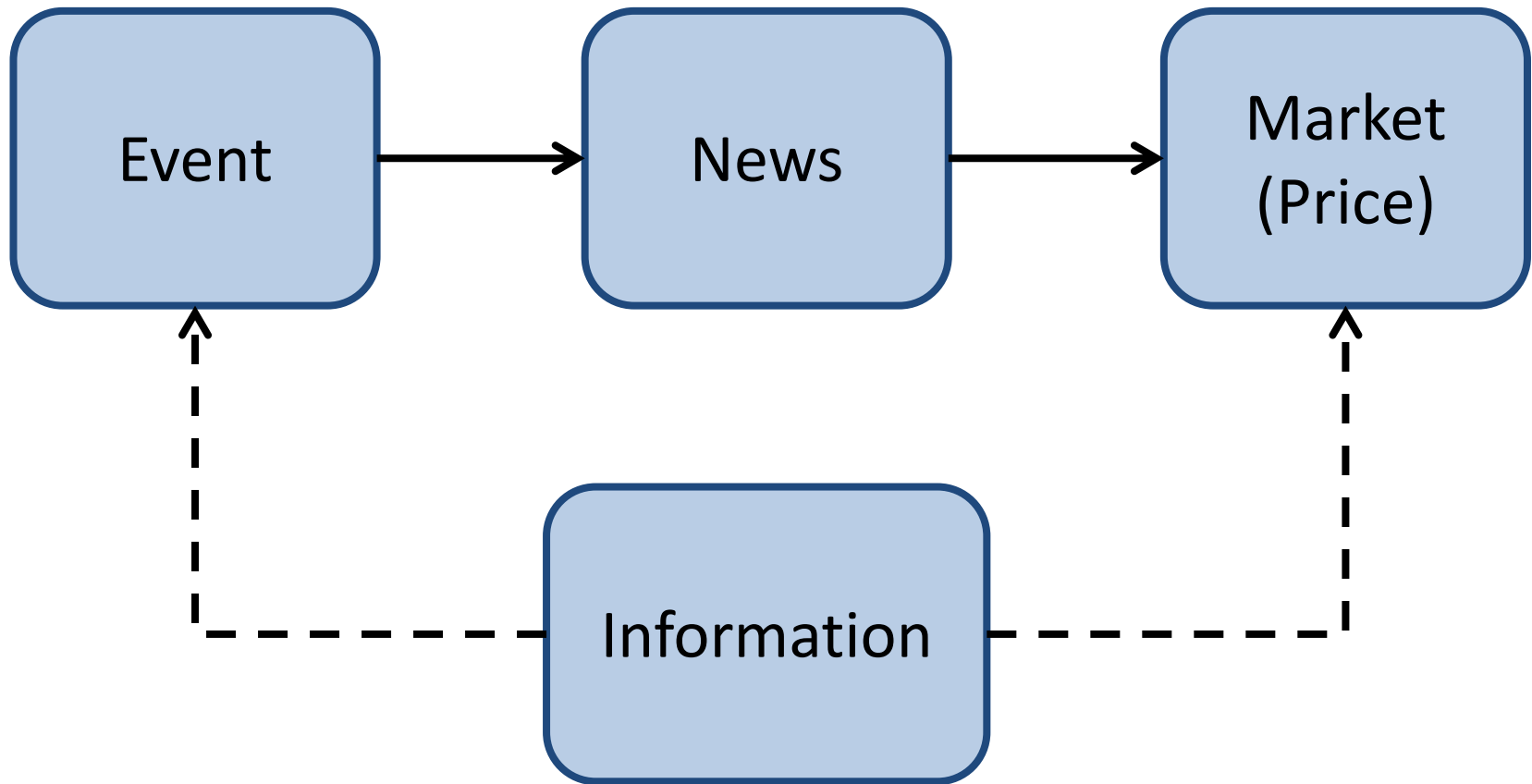
- Few research involved the discussion on whether using **different media** could affect forecasting results.
- **Financial sentiment analysis** is an important research area of **financial technology (FinTech)**.

# Highlights

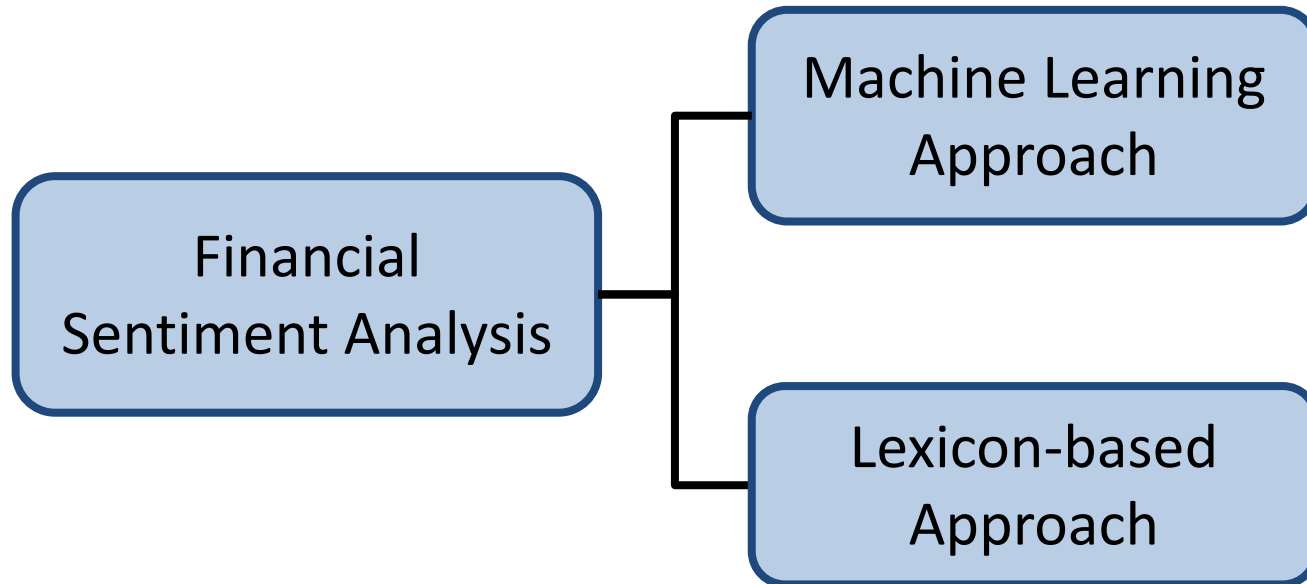
- This research focuses on investigating the influence of using **different financial resources** to **investment** and how to improve the accuracy of forecasting through **deep learning**.
- The experimental result shows **various financial resources** have **significantly different effects** to investors and their investments, while the accuracy of news categorization could be improved through **deep learning**.



# The relationship between Events, News and Markets (price) through Information.

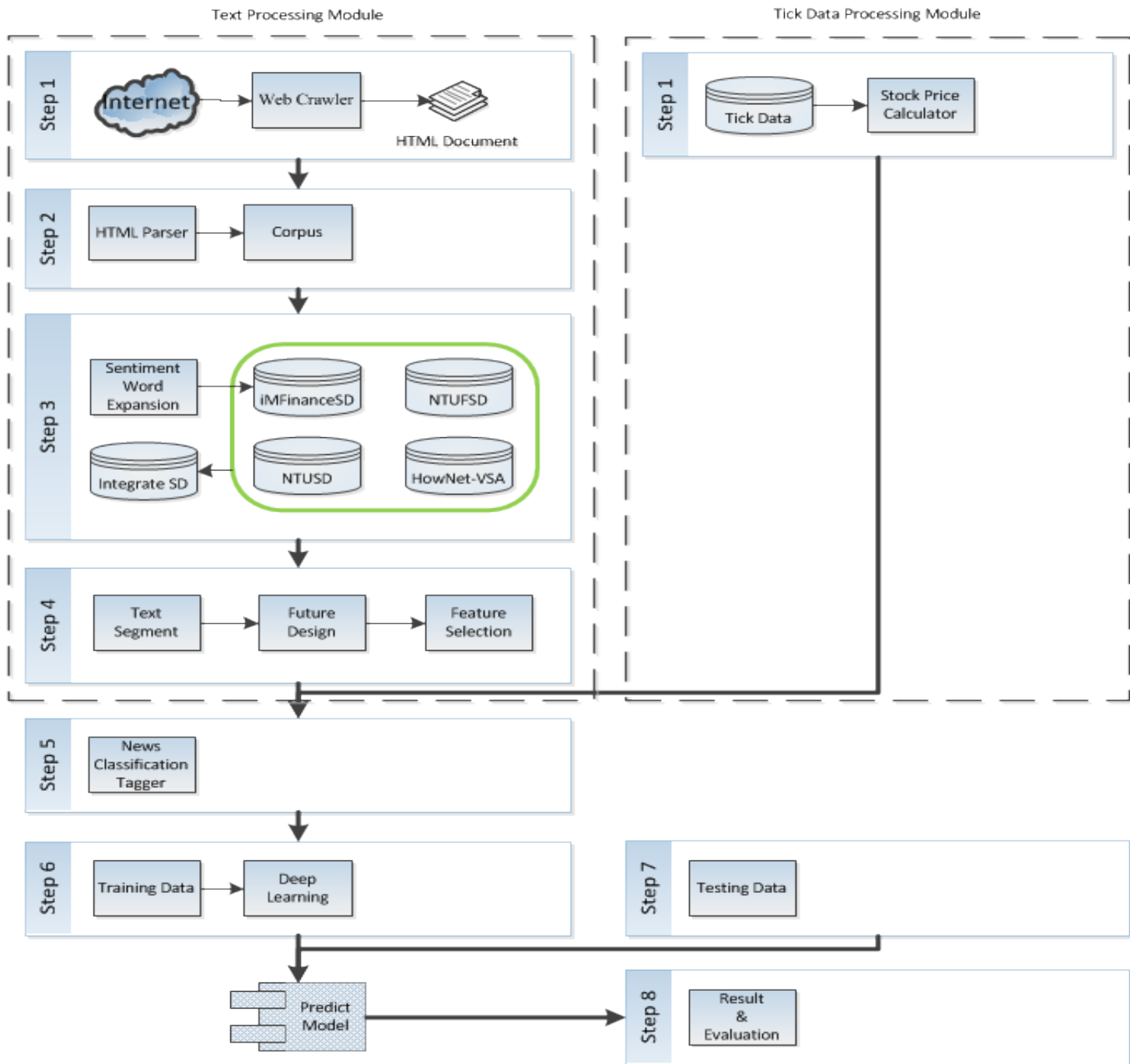


# Financial Sentiment Analysis



# System Architecture

# System Architecture



# Finance News Data

AppleDaily

NowNews



LTN



MoneyDJ



# Feature used for financial sentiment analysis

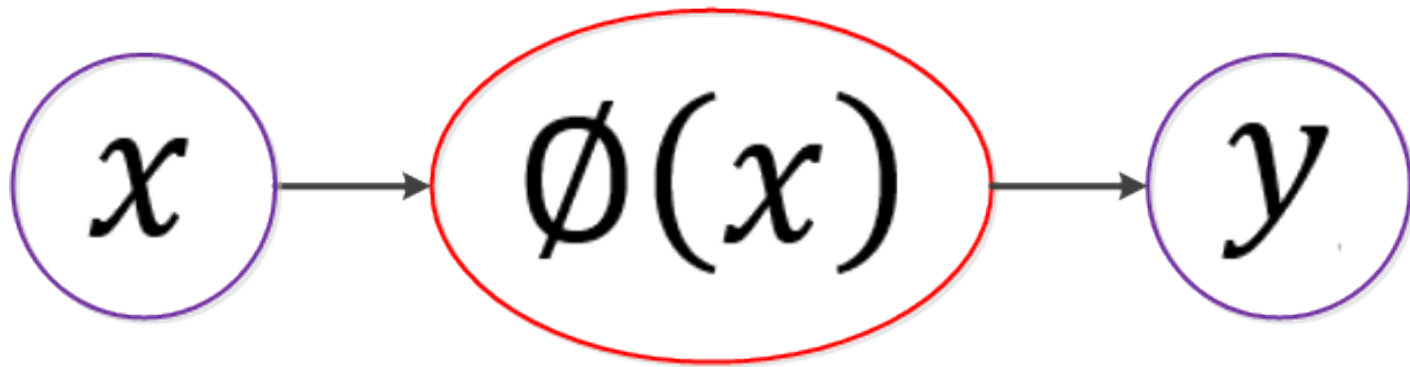
ID	Future Name	Description
F01	NewsCharacters	Total word number of news text
F02	NewsTokens	Number of news words
F03	NTUSD_Positive	NTUSD positive word
F04	NTUSD_Negative	NTUSD negative word
F05	NTUSD_PNDiff	NTUSD difference of positive and negative word
F06	HowNet_Positive	HowNet positive sentiment word
F07	HowNet_Negative	HowNet negative sentiment word
F08	HowNet_PNDiff	HowNet difference of positive and negative word
F09	FinanceSD_Positive	NTUFSD+iMFinanceSD positive word
F10	FinanceSD_Negative	NTUFSD+iMFinanceSD negative word
F11	FinanceSD_PNDiff	NTUFSD+iMFinanceSD difference of positive and negative word

# Example of feature used for Financial Sentiment Analysis

D00001, 516, 185, 3, 8, -5, 0, 1, -1, 14, 8, 6, 3008, 2013-01-04  
D00002, 534, 185, 4, 2, 2, 0, 0, 0, 13, 2, 11, 3008, 2013-01-07  
D00003, 846, 296, 6, 9, -3, 0, 1, -1, 25, 15, 10, 3008, 2013-01-09  
D00004, 1495, 489, 55, 19, 36, 3, 0, 3, 23, 16, 7, 3008, 2013-01-10  
D00005, 872, 282, 3, 5, -2, 0, 0, 0, 12, 17, -5, 3008, 2013-01-14  
D00006, 573, 183, 2, 5, -3, 0, 0, 0, 8, 9, -1, 3008, 2013-01-21



# Deep Learning and Neural Network

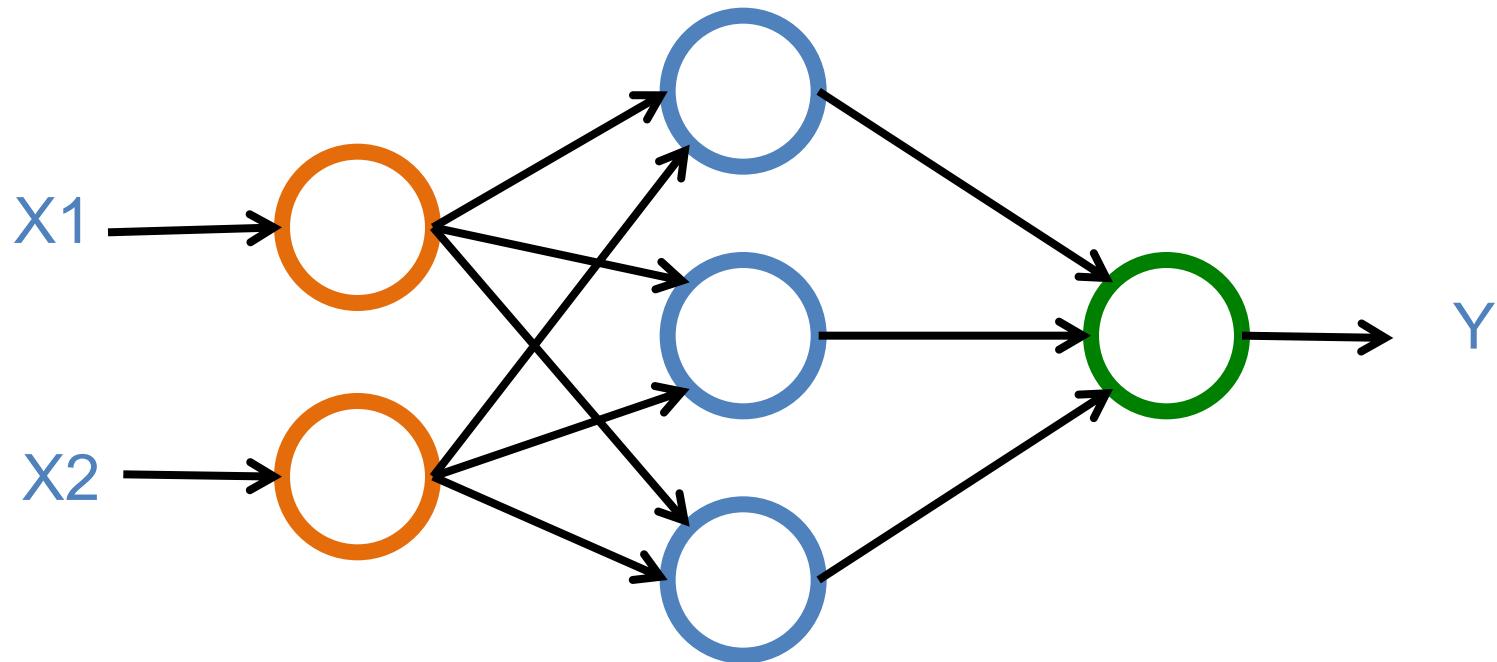


# Deep Learning and Neural Networks

**Input Layer**  
(X)

**Hidden Layer**  
(H)

**Output Layer**  
(Y)

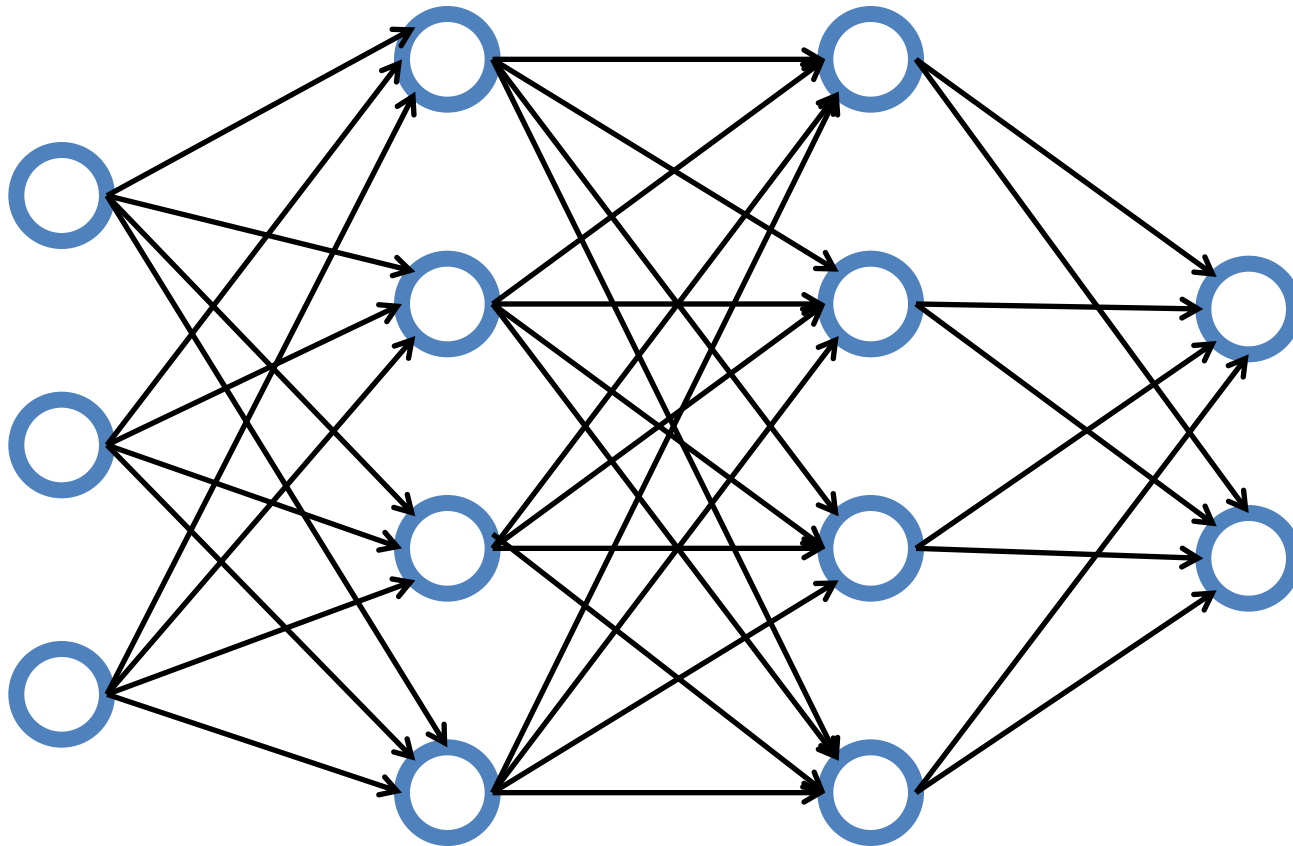


# Deep Learning and Neural Networks

Input Layer  
(X)

Hidden Layer  
(H)

Output Layer  
(Y)



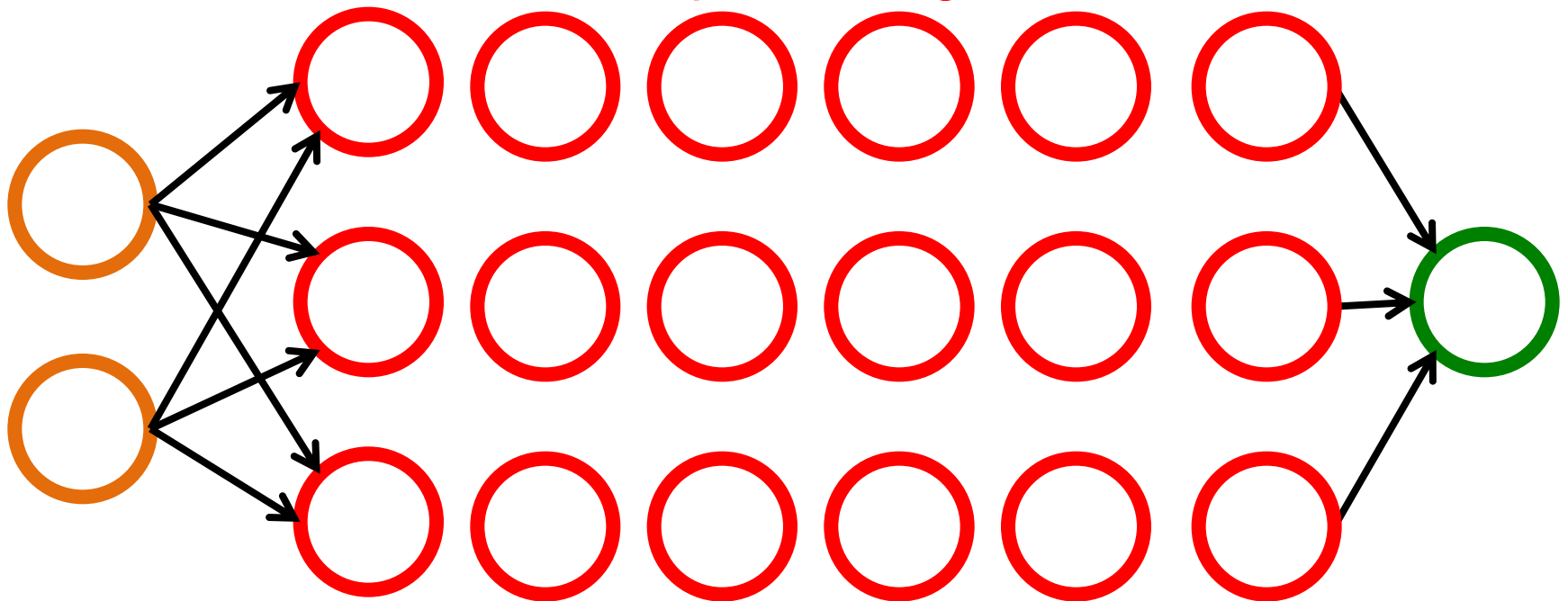
# Deep Learning and Neural Networks

Input Layer  
(X)

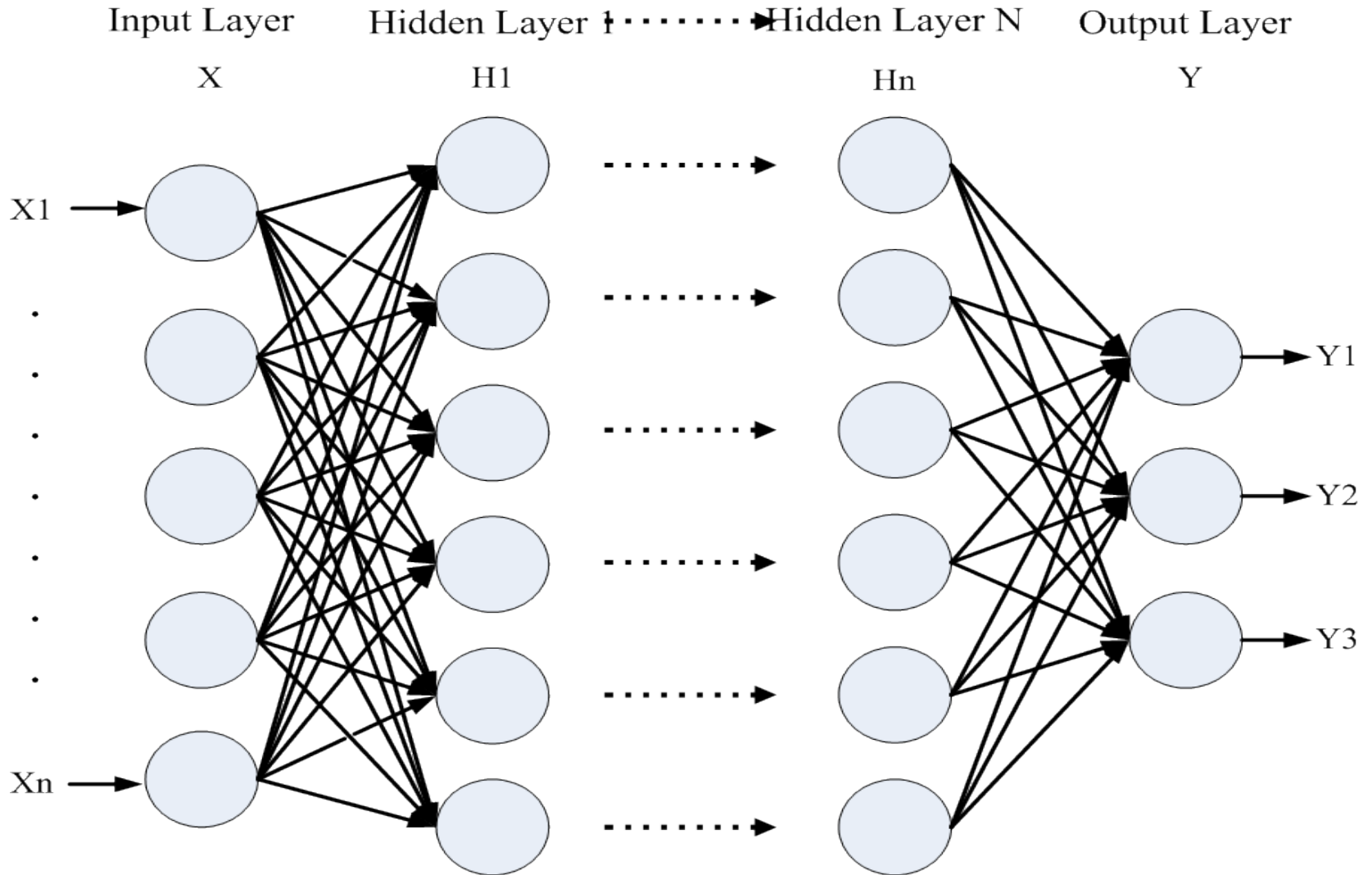
Hidden Layers  
(H)

Output Layer  
(Y)

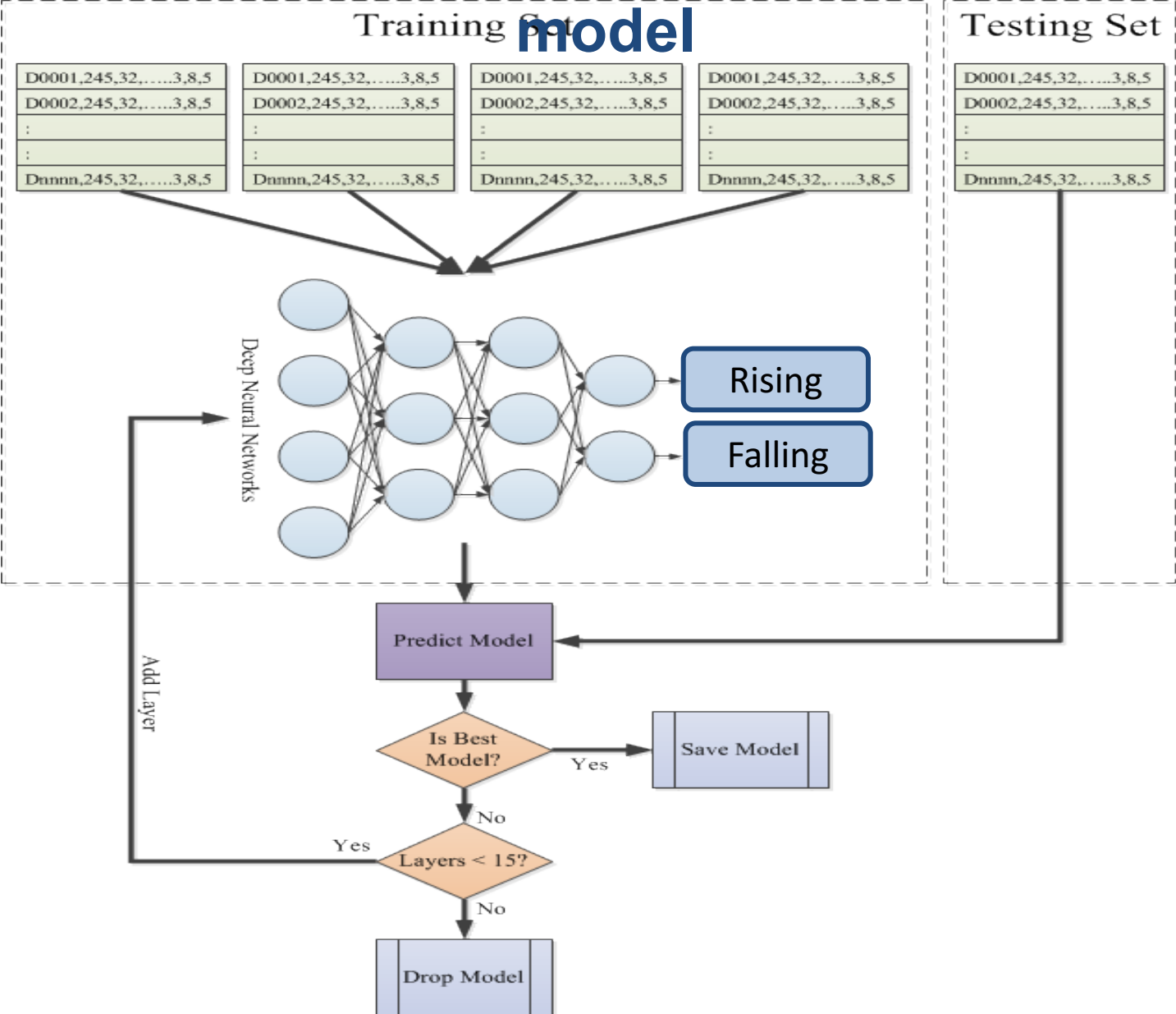
Deep Neural Networks  
Deep Learning



# Deep Neural Networks



# Construction flow chart of deep learning prediction model



# Comparison of editorial team and contents of news providers

News providers	Platform	Content	Editorial team
<b>NowsNews</b>	Electronic media	Comprehensive	Owned
<b>AppleDaily</b>	Electronic media/newspaper	Comprehensive	Owned
<b>LTN</b>	Electronic media/newspaper	Comprehensive	Owned
<b>MoneyDJ</b>	Electronic media	Finance	Owned



# Developing Finance Sentiment Dictionary

- NTUSD
- HowNet-VSA
- NTUFSD
- iMFinanceSD

# Sample iMFinanceSD opinion words

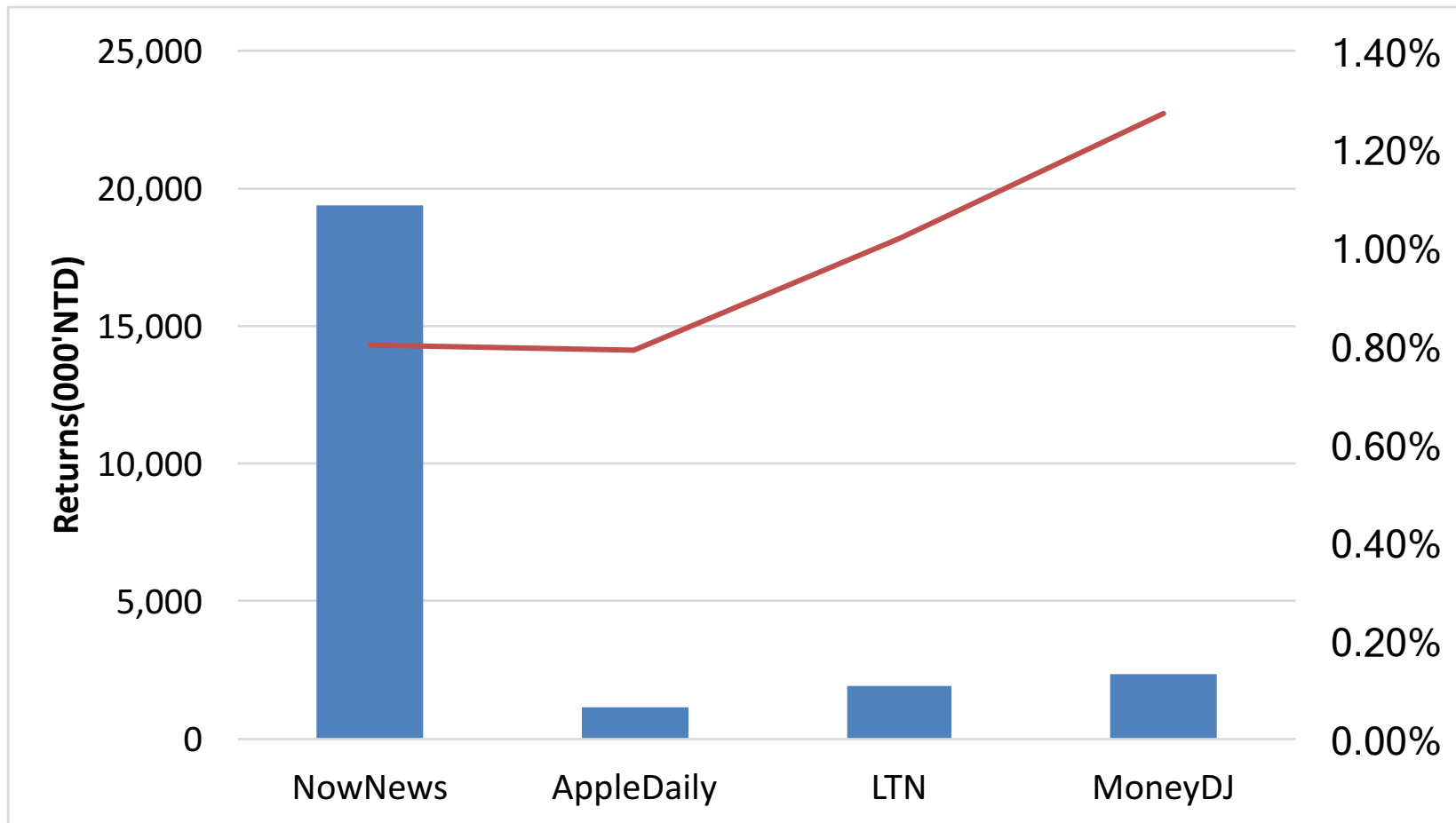
Positive		Negative	
No	Word	No	Word
1	衝破 (break through)	1	震盪 (shock)
2	穩住 (stabilize)	2	低於 (less than)
3	挹注 (inject)	3	放緩 (slowdown)
4	歷史新高 (Historical high)	4	走緩 (slowly)
5	不遑多讓 (be no slouch)	5	大幅砍殺 (Stabbed sharply)

# Experimental Results and Discussion

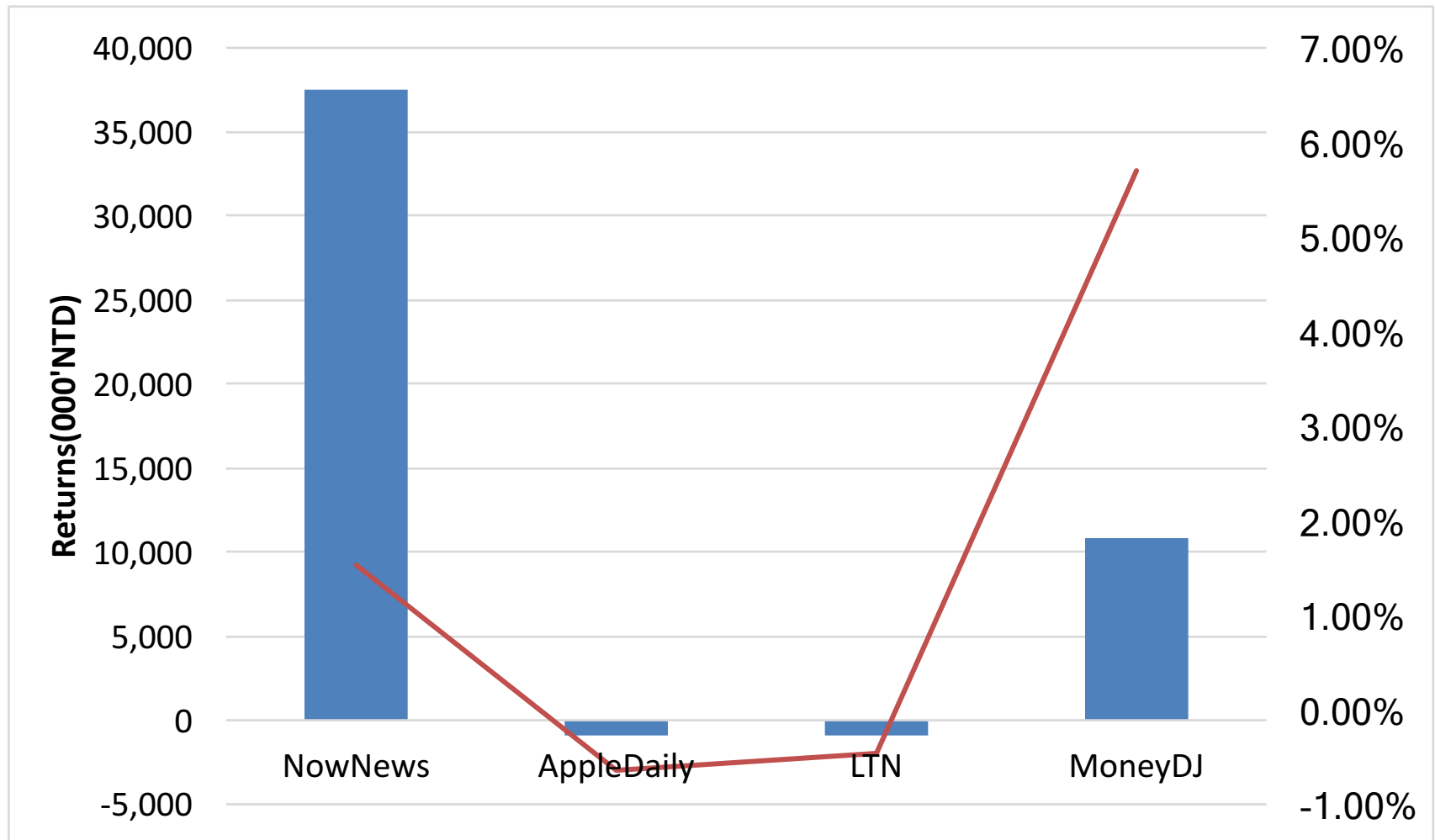
# Total news of each news provider for Financial Sentiment Analysis (Text Data)

Provider	NowNews	AppleDaily	LTN	MoneyDJ
Total	5,499	456	1,147	1,370

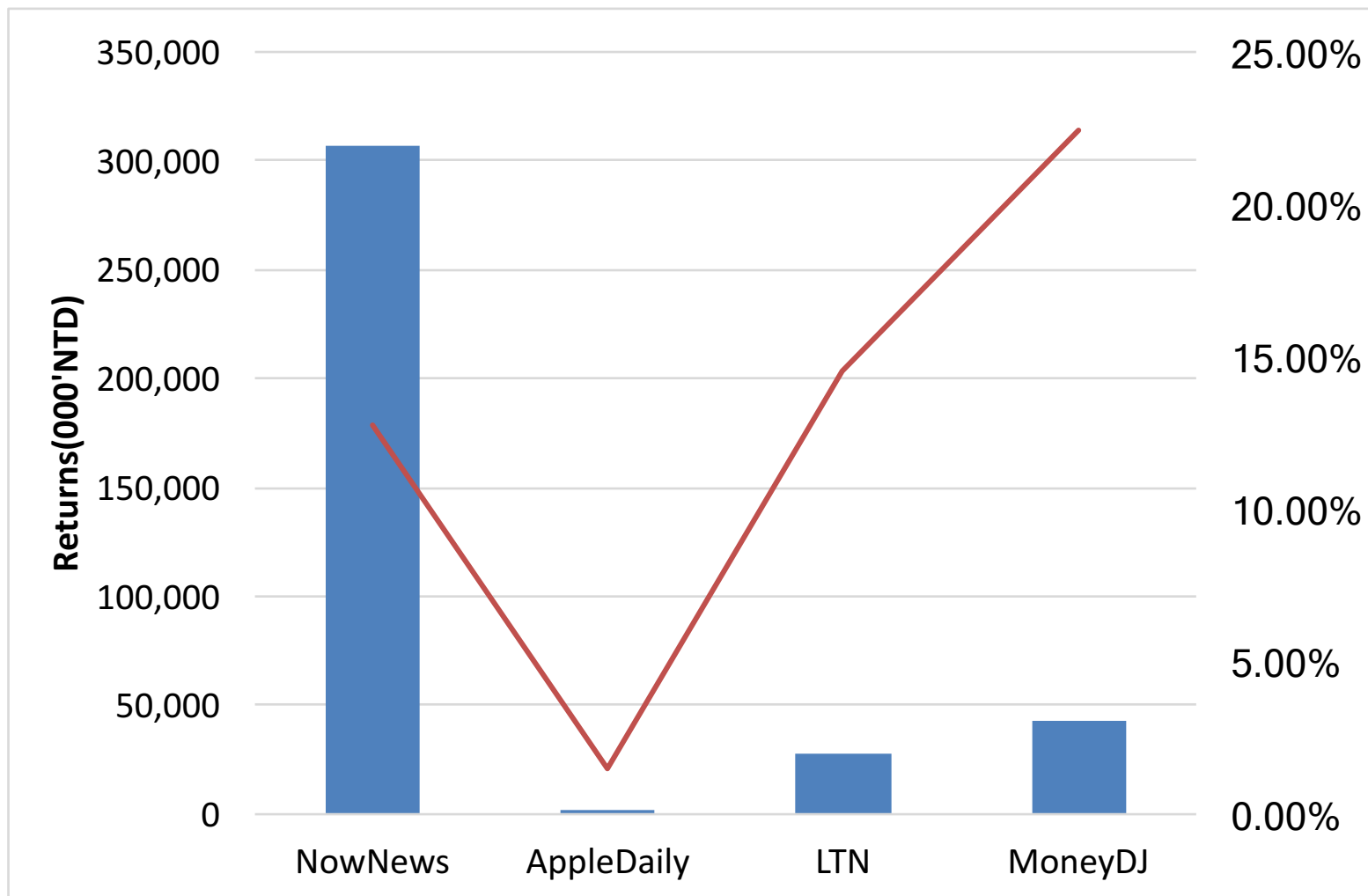
# ROI of 5 days trading with Deep Learning predicting stock price trend



# ROI of 20 days trading with Deep Learning predicting stock price trend

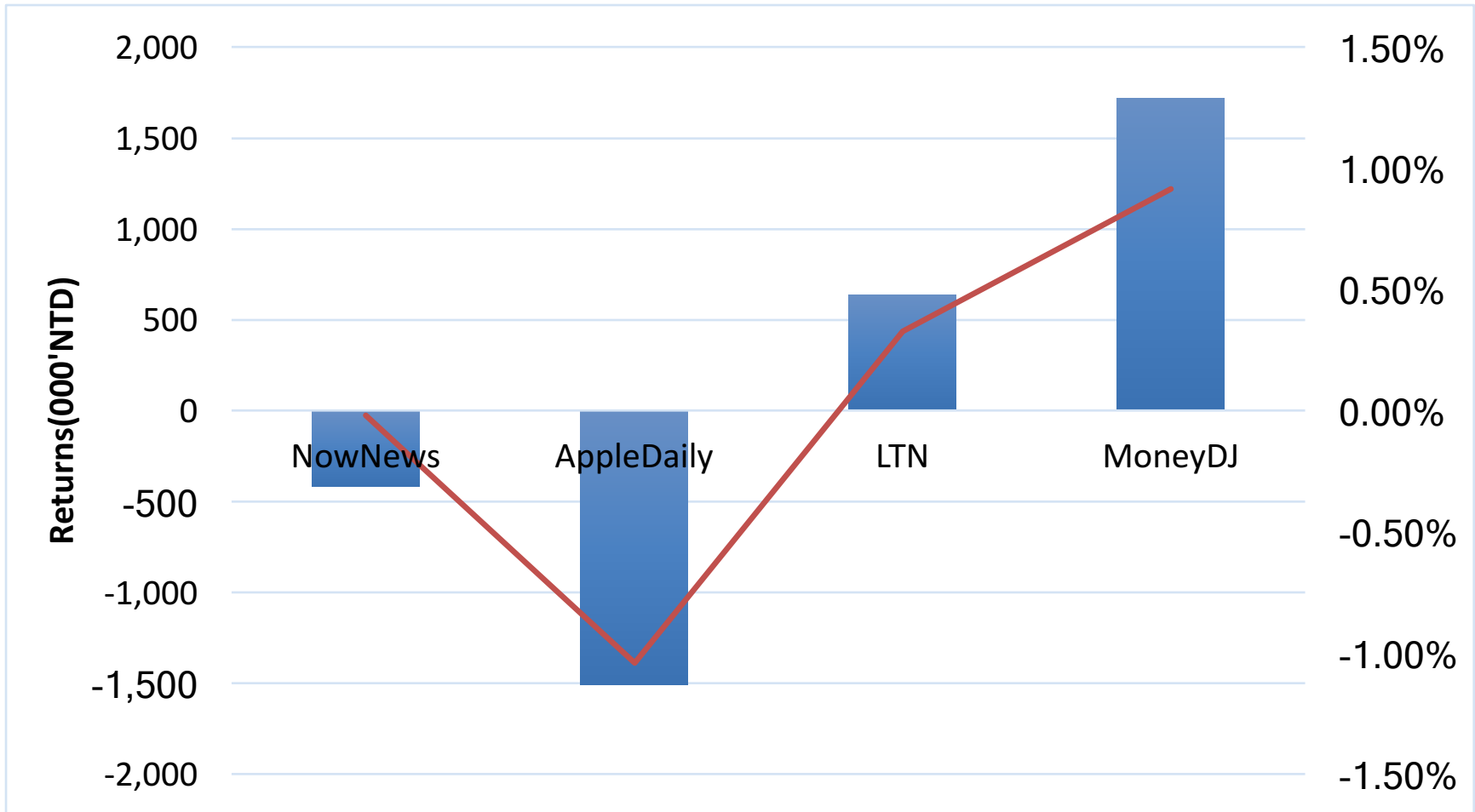


# ROI of 60 days trading with Deep Learning predicting stock price trend

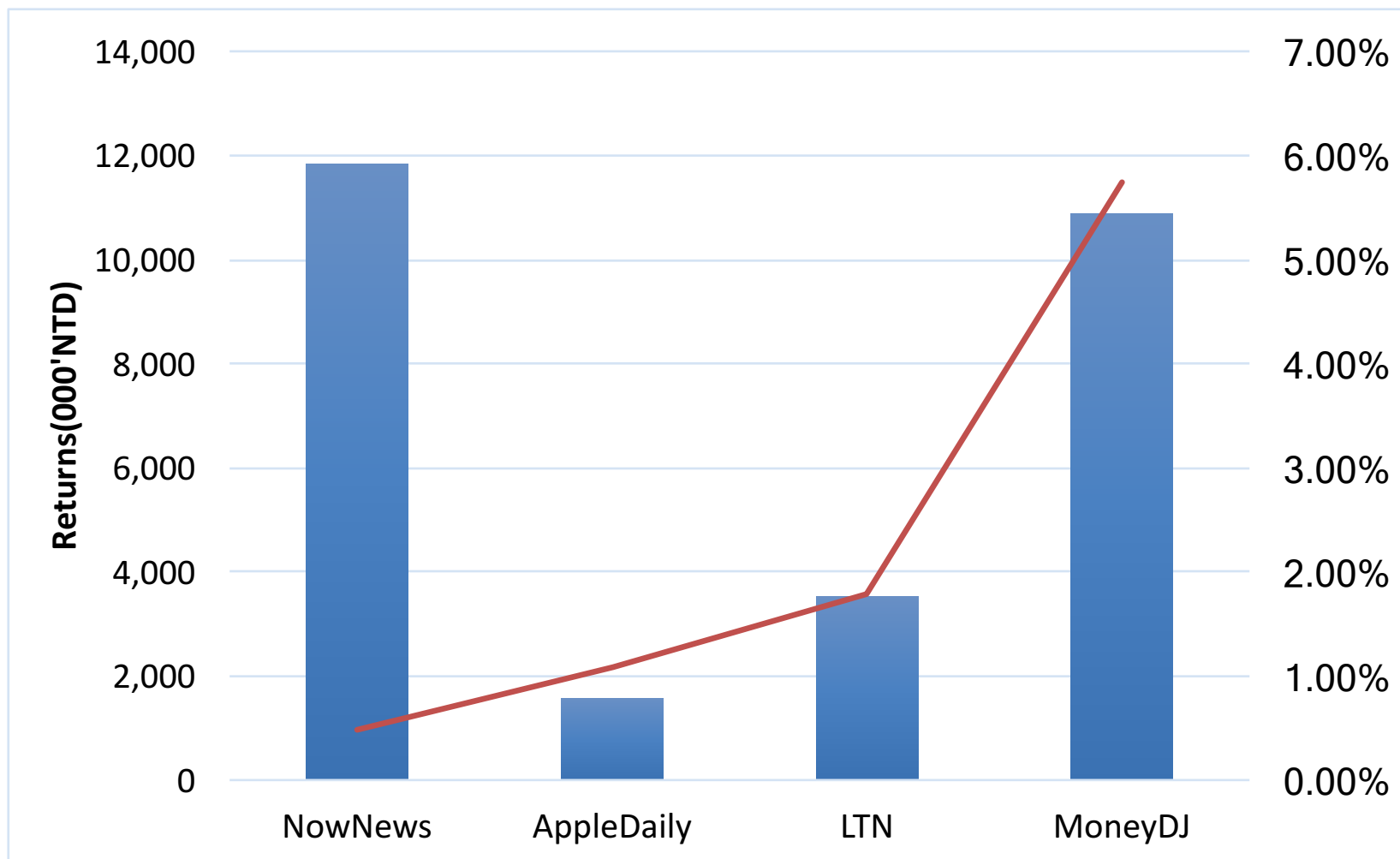




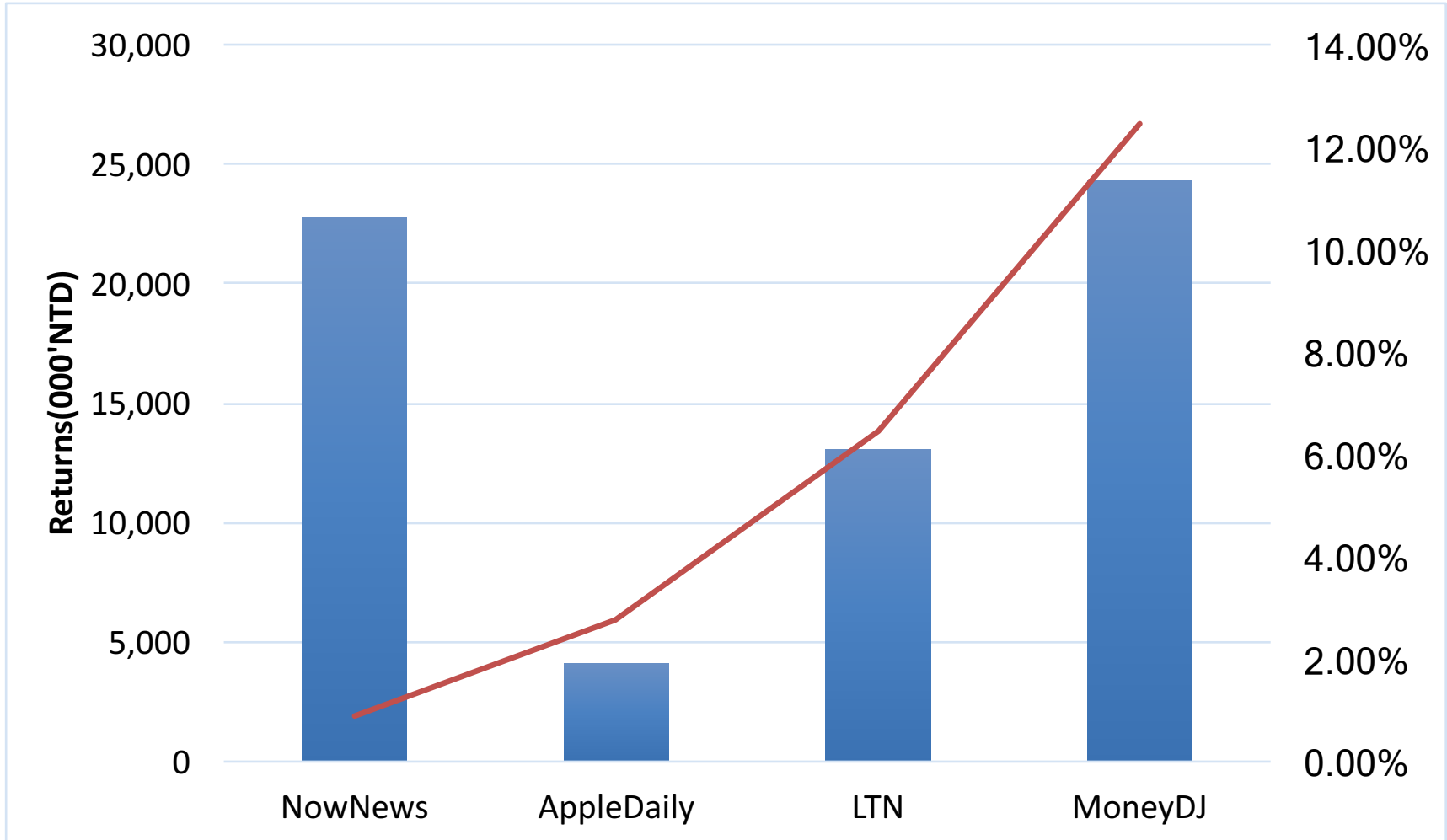
# ROI of 5 days with Lexicon-based Trading



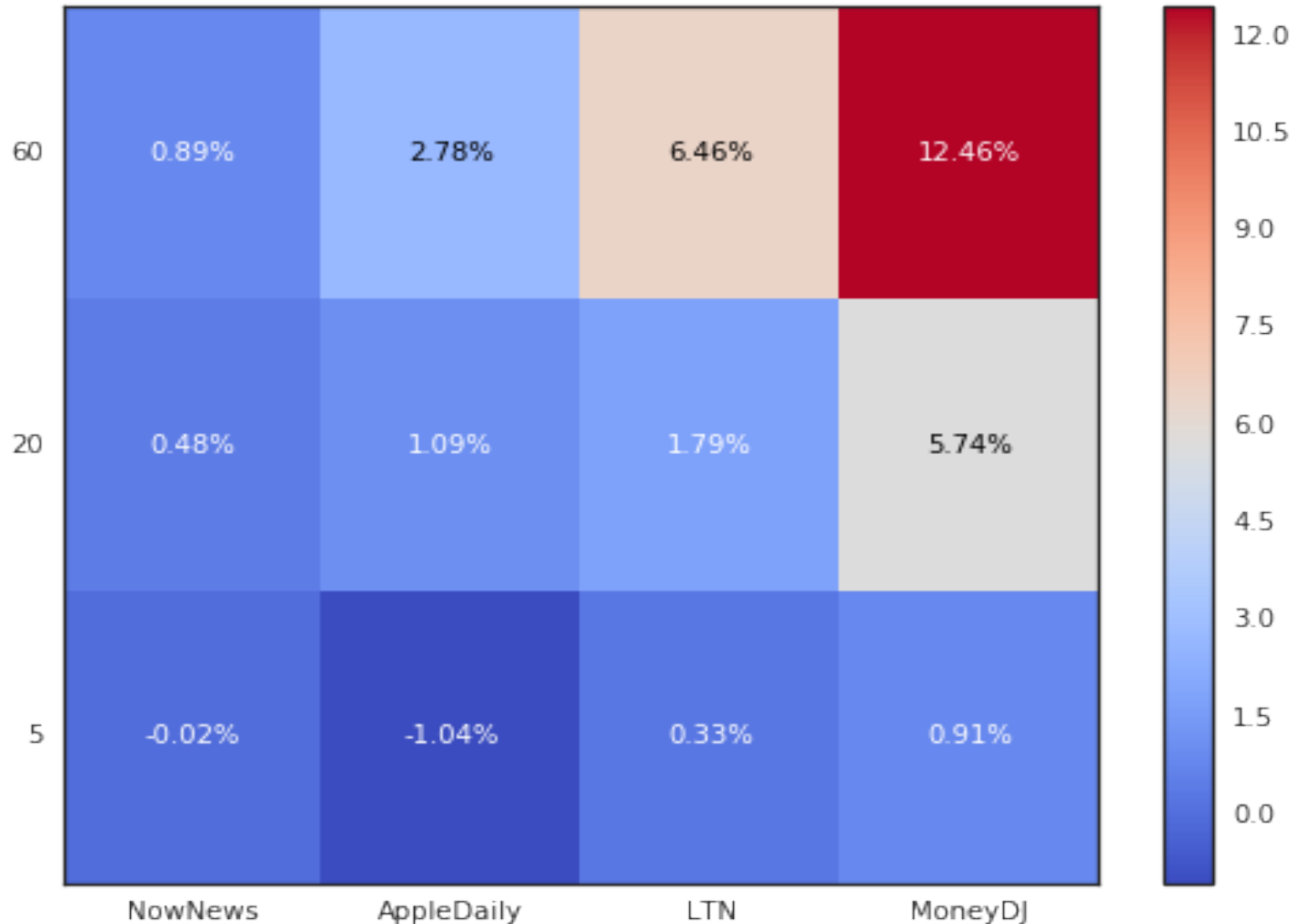
# ROI of 20 days with Lexicon-based Trading



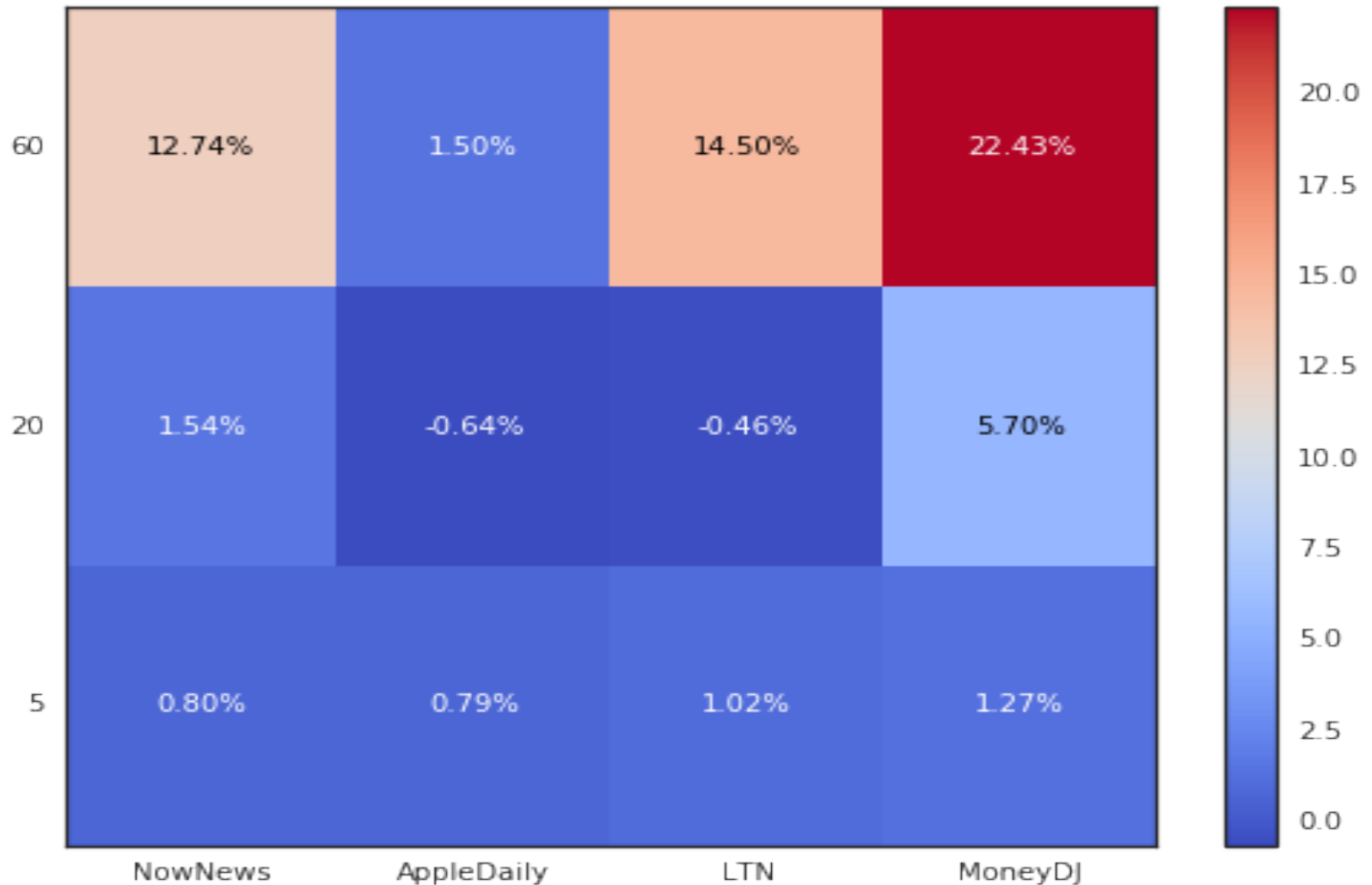
# ROI of 60 days with Lexicon-based Trading



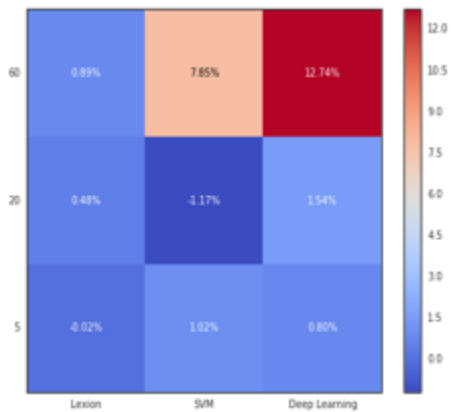
# ROI Heatmap of Lexicon-base Trading



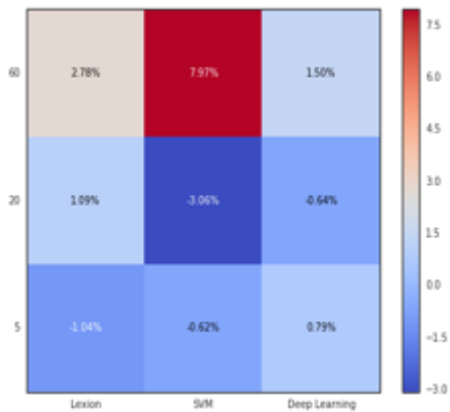
# ROI Heatmap of Trading with Deep Learning Approach



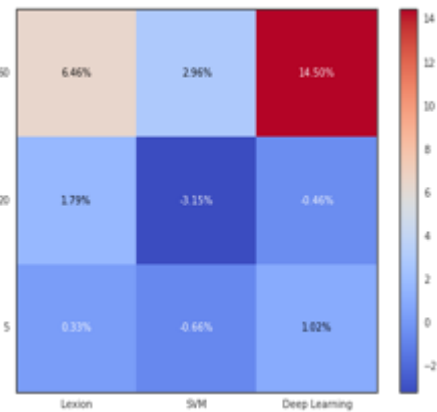
# Comparison of ROI Heatmap from Various Finance News Media



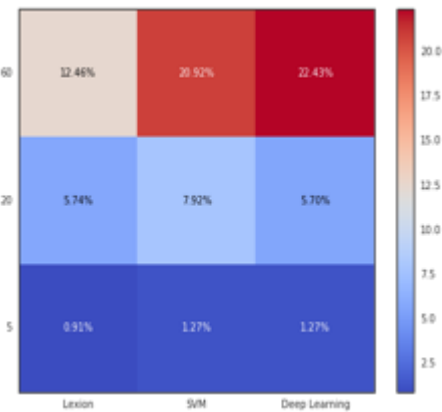
NowNews



AppleDaily



LTN



MoneyDJ

# Conclusions



# Findings

- We proposed **analytical methods** with **deep learning** in **financial news sources** on the **stock price trend forecasts**.
- The results showed that the source of financial news media for the exclusive domain of **Finance and Economics**, revealed its investment information representing a reference value.

# Contributions

- The different news media release financial news different from its reference value level messages containing investment, as investors choose **finance message referenced sources**.
- The prediction accuracy will be **improved** via a prediction model of the **deep learning**.

# Managerial Implications

- Different news media with their own characteristics and specializations.
- The values of the financial information may be different due to the following reasons:
  - Company's **business principles**.
  - Edition team's specializations and their knowledge of industry.
  - Journalist's habits and preferences in **wording**.
  - **Sensitivity** of **financial market trends** of the Media.

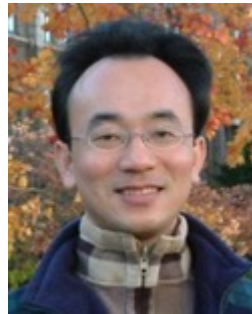


# Q&A



**Tamkang  
University**

## Deep Learning for Financial Sentiment Analysis on Finance News Providers



**Min-Yuh Day**



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# Summary

- FinTech
- Robo-Advisors
- Financial Sentiment Analysis

# References

- Susanne Chishti and Janos Barberis (2016), “The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries”, Wiley.
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- Rubino, J. (2016). My Favorite Robot. *CFA Institute Magazine*, 27(3), 43-46.
- Min-Yuh Day and Chia-Chou Lee (2016), "Deep Learning for Financial Sentiment Analysis on Finance News Providers", The 7th International Workshop on Mining and Analyzing Social Networks for Decision Support (MSNDS 2016), San Francisco, California, USA, Aug 18-21, 2016, in Proceedings of the 2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2016), San Francisco, California, USA, Aug 18-21, 2016.