財務金融大數據分析
Big Data Analytics in Finance

Tamkang University
淡江大學

財務金融大數據分析課程介紹
(Course Orientation for Big Data Analytics in Finance)

1061BDAF01
MIS EMBA (M2322) (8605)
Thu 12,13,14 (19:20-22:10) (D503)

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淡江大學 資訊管理學系
http://mail. tku.edu.tw/myday/

2017-09-21

財務金融
大數據分析
Big Data Analytics in Finance

淡江大學106學年度第1學期
課程教學計畫表
Fall 2017 (2017.09 - 2018.01)

- 課程名稱：**財務金融大數據分析**
  (Big Data Analytics in Finance)
- 授課教師：戴敏育 (Min-Yuh Day)
- 開課系級：資管所碩專班 (TLMXJ1A)
- 開課資料：選修 單學期 3 學分 (3 Credits, Elective)
- 上課時間：週五 12,13,14 (Thu 19:20-22:10)
- 上課教室： D503 (淡江大學台北校園)

課程簡介

- 本課程介紹財務金融大數據分析基本概念與研究議題
- 課程內容包括
  - 金融科技商業模式
  - 人工智慧投資分析與機器人理財顧問
  - 金融科技對話式商務與智慧型交談機器人
  - 事件研究法
  - Python 財務大數據分析基礎
  - Python Numpy 大數據分析
  - Python Pandas 財務大數據分析
  - 文字探勘分析技術與自然語言處理
  - Python Keras 深度學習
  - TensorFlow 深度學習
  - 財務金融大數據深度學習
  - 社會網絡分析
  - 財務金融大數據分析個案研究

Course Introduction

- This course introduces the fundamental concepts and research issues of Big Data Analytics in Finance.
- Topics include
  - Business Models of Fintech
  - Artificial Intelligence for Investment Analysis and Robo-Advisors
  - Conversational Commerce and Intelligent Chatbots for Fintech
  - Event Study
  - Foundations of Finance Big Data Analytics in Python
  - Big Data Analytics with Numpy in Python
  - Finance Big Data Analytics with Pandas in Python
  - Text Mining Techniques and Natural Language Processing
  - Deep Learning with Keras in Python
  - Deep Learning with TensorFlow
  - Deep Learning for Finance Big Data
  - Social Network Analysis
  - Case Study on Big Data Analytics in Finance

課程目標
(Objective)

- 瞭解及應用財務金融大數據分析基本概念與研究議題。
  (Understand and apply the fundamental concepts and research issues of Big Data Analytics in Finance.)
- 進行財務金融大數據分析相關之資訊管理研究。
  (Conduct information systems research in the context of Big Data Analytics in Finance.)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
1	2017/09/21	財務金融大數據分析課程介紹 (Course Orientation for Big Data Analytics in Finance)
2	2017/09/28	金融科技商業模式 (Business Models of Fintech)
3	2017/10/05	人工智慧投資分析與機器人理財顧問 (Artificial Intelligence for Investment Analysis and Robo-Advisors)
4	2017/10/12	金融科技對話式商務與智慧型交談機器人 (Conversational Commerce and Intelligent Chatbots for Fintech)
5	2017/10/19	事件研究法 (Event Study)
6	2017/10/26	財務金融大數據分析個案研究 I (Case Study on Big Data Analytics in Finance I)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
7	2017/11/02	Python 財務大數據分析基礎 (Foundations of Finance Big Data Analytics in Python)
8	2017/11/09	Python Numpy大數據分析 (Big Data Analytics with Numpy in Python)
9	2017/11/16	Python Pandas 財務大數據分析 (Finance Big Data Analytics with Pandas in Python)
10	2017/11/23	期中報告 (Midterm Project Report)
11	2017/11/30	文字探勘分析技術與自然語言處理 (Text Mining Techniques and Natural Language Processing)
12	2017/12/07	Python Keras深度學習 (Deep Learning with Keras in Python)

課程大綱 (Syllabus)

週次 (Week)	日期 (Date)	內容 (Subject/Topics)
13	2017/12/14	財務金融大數據分析個案研究 II (Case Study on Big Data Analytics in Finance II)
14	2017/12/21	TensorFlow深度學習 (Deep Learning with TensorFlow)
15	2017/12/28	財務金融大數據深度學習 (Deep Learning for Finance Big Data)
16	2018/01/04	社會網絡分析 (Social Network Analysis)
17	2018/01/11	期末報告 I (Final Project Presentation I)
18	2018/01/18	期末報告 II (Final Project Presentation II)

教學方法與評量方法

- 教學方法

  –講述、討論、
  賞析、模擬、
  問題解決、實作

- 評量方法

  –實作、報告、上課表現

教材課本

- 教材課本
  - 講義 (Slides)
  - 財務金融大數據分析相關個案與論文 (Cases and Papers related to Big Data Analytics in Finance)

參考書籍 (References)

1. Doron Kliger and Gregory Gurevich (2014), Event Studies for Financial Research: A Comprehensive Guide, Palgrave Macmillan
2. Fabio Nelli (2015), Python Data Analytics: Data Analysis and Science using PANDAs, matplotlib and the Python Programming Language, Apress
3. Michael Heydt (2015) , Mastering Pandas for Finance, Packt Publishing
4. Yves Hilpisch, Python for Finance: Analyze Big Financial Data, OReilly Media
5. James Ma Weiming (2015), Mastering Python for Finance, Packt Publishing
6. Yuxing Yan (2017), Python for Finance, Second Edition, Packt Publishing
7. Paolo Sironi (2016), FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification, Wiley
8. Susanne Chishti and Janos Barberis (2016), The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries, Wiley

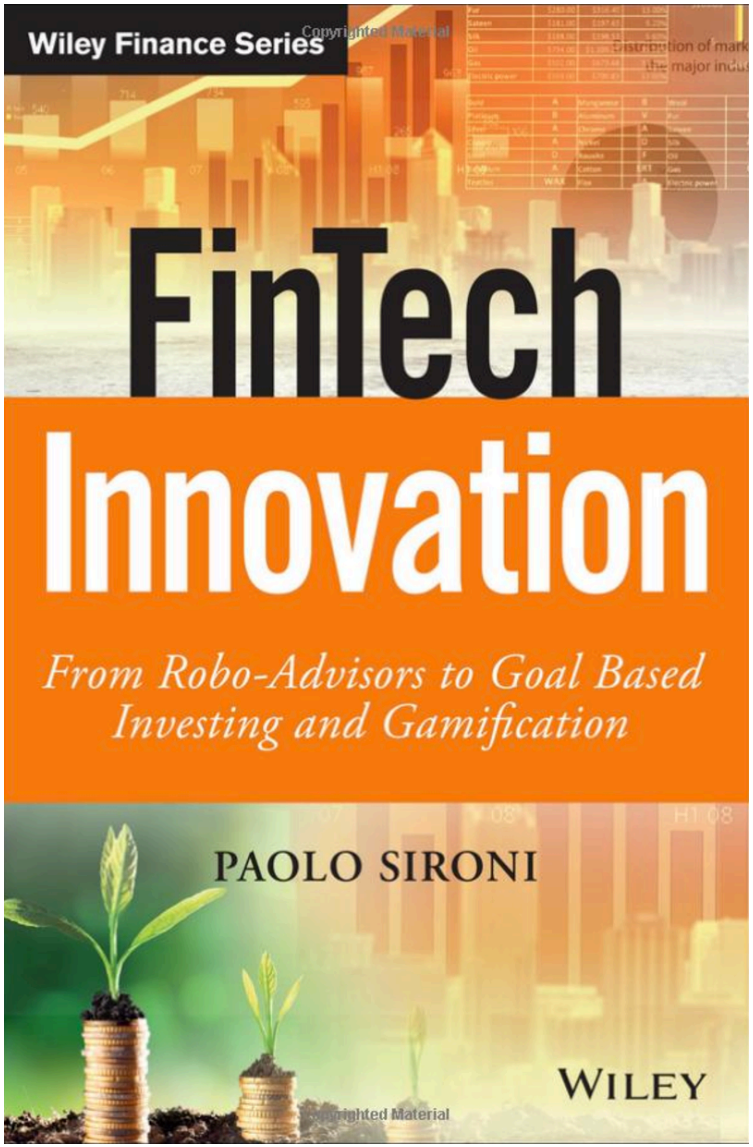
作業與學期成績計算方式

- 作業篇數
  - 3篇
- 學期成績計算方式
  - ☑期中評量：30％
  - ☑期末評量：30 ％
  - ☑其他（課堂參與及報告討論表現）： 40 ％

AI and Big Data Analytics in Finance

- 財務金融大數據分析
  - Big Data Analytics in Finance
- 投資大數據分析
  - Big Data Analytics in Investment
- 人工智慧與財務應用
  - Artificial Intelligence and Financial Application
- 人工智慧與投資分析
  - Artificial Intelligence and Investment Analysis

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



Source: https://www.amazon.com/FinTech-Innovation-Robo-Advisors-Investing-Gamification/dp/1119226988

Doron Kliger and Gregory Gurevich (2014),

Event Studies for Financial Research: A Comprehensive Guide,

Palgrave Macmillan

Source: https://www.amazon.com/Event-Studies-Financial-Research-Comprehensive/dp/1137435380/

事件研究法：
財務與會計實證研究必備

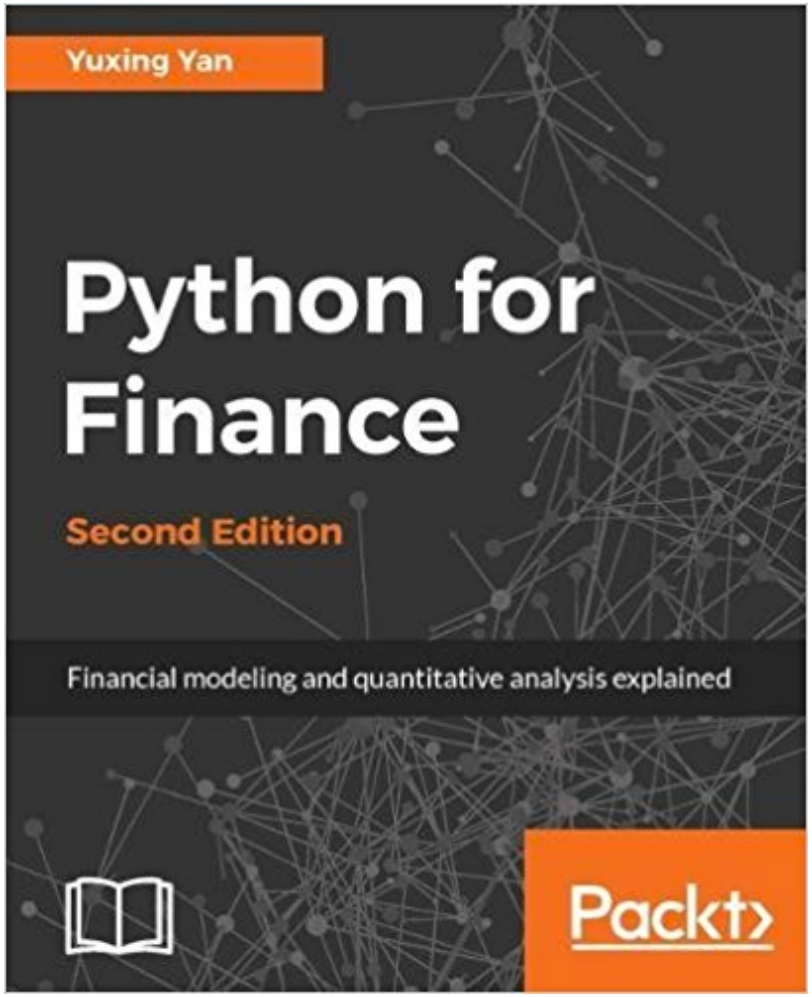
沈中華、李建然 (2000)

Source: 沈中華、李建然 (2000)，事件研究法：財務與會計實證研究必備，華泰文化

Yuxing Yan (2017),

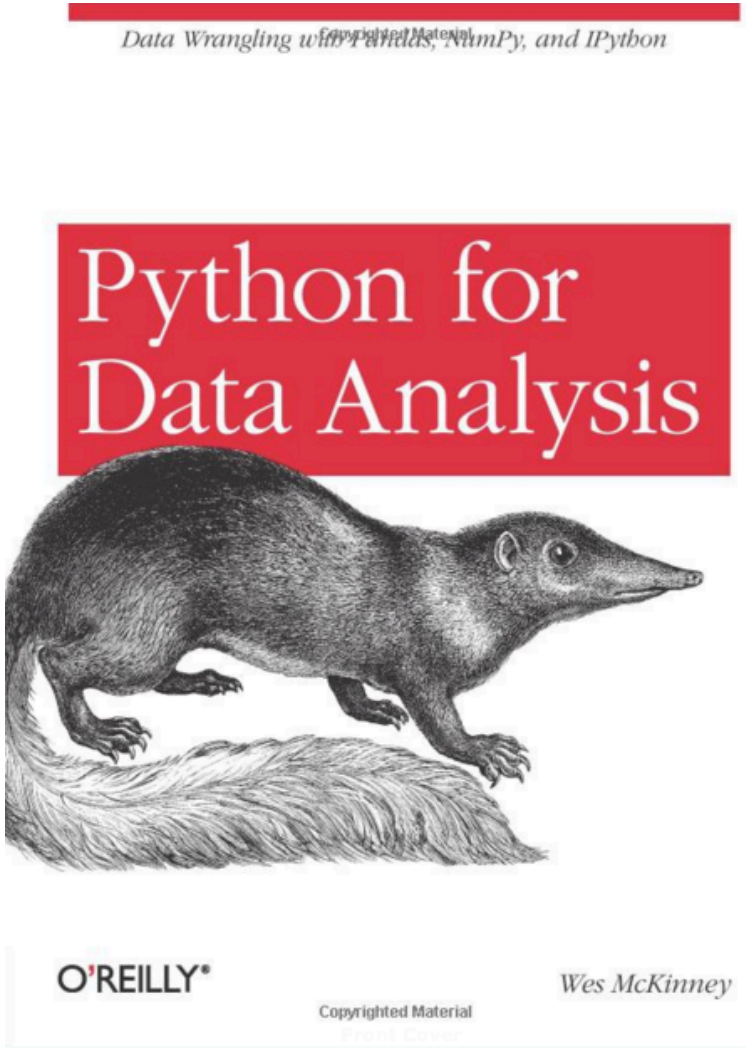
Python for Finance,

Second Edition, Packt Publishing



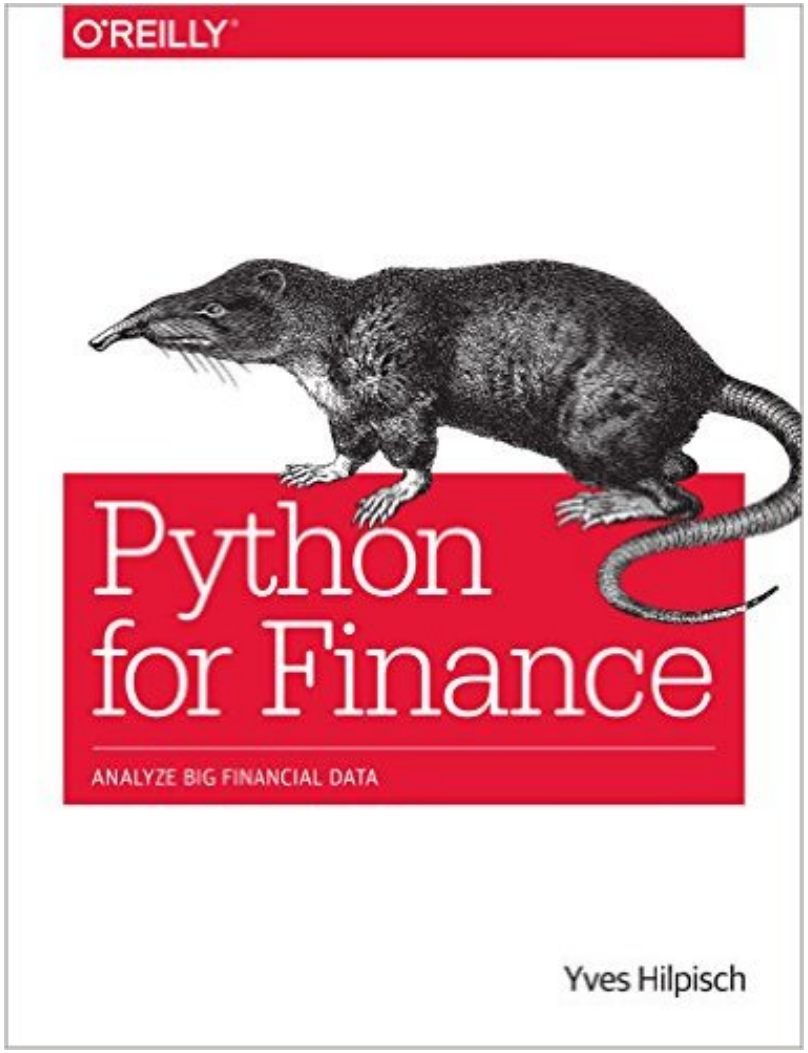
Source: https://www.amazon.com/Python-Finance-Second-Yuxing-Yan/dp/1787125696/

Wes McKinney (2012), Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, O'Reilly Media



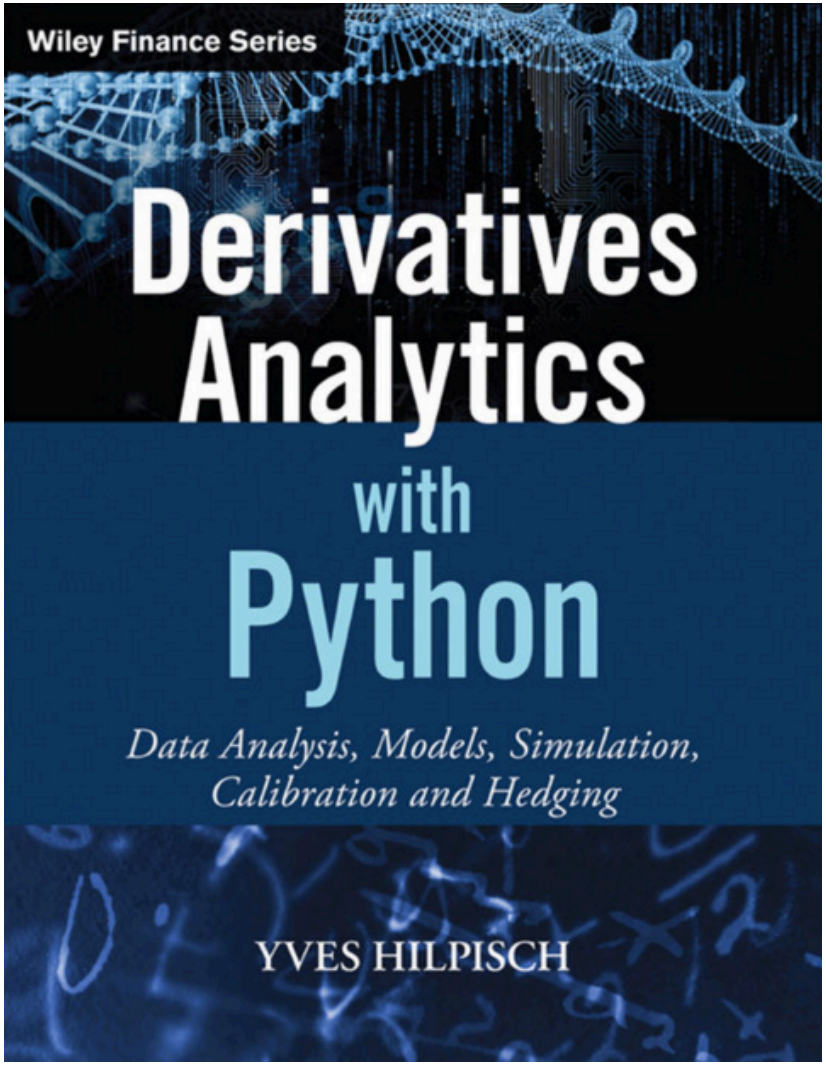
Source: http://www.amazon.com/Python-Data-Analysis-Wrangling-IPython/dp/1449319793/

Yves Hilpisch,
Python for Finance: Analyze Big Financial Data,
O'Reilly, 2014



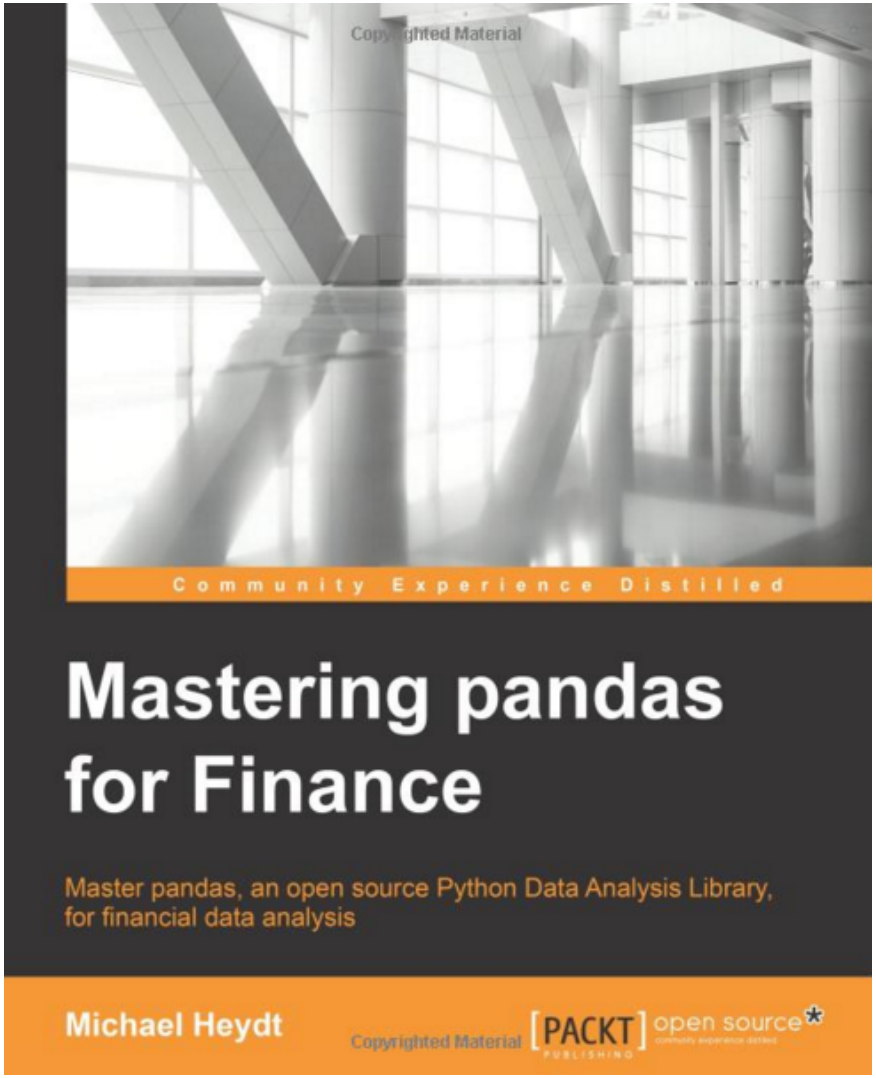
Source: http://www.amazon.com/Python-Finance-Analyze-Financial-Data/dp/1491945281

Yves Hilpisch (2015),
Derivatives Analytics with Python:
Data Analysis, Models, Simulation, Calibration and Hedging, Wiley

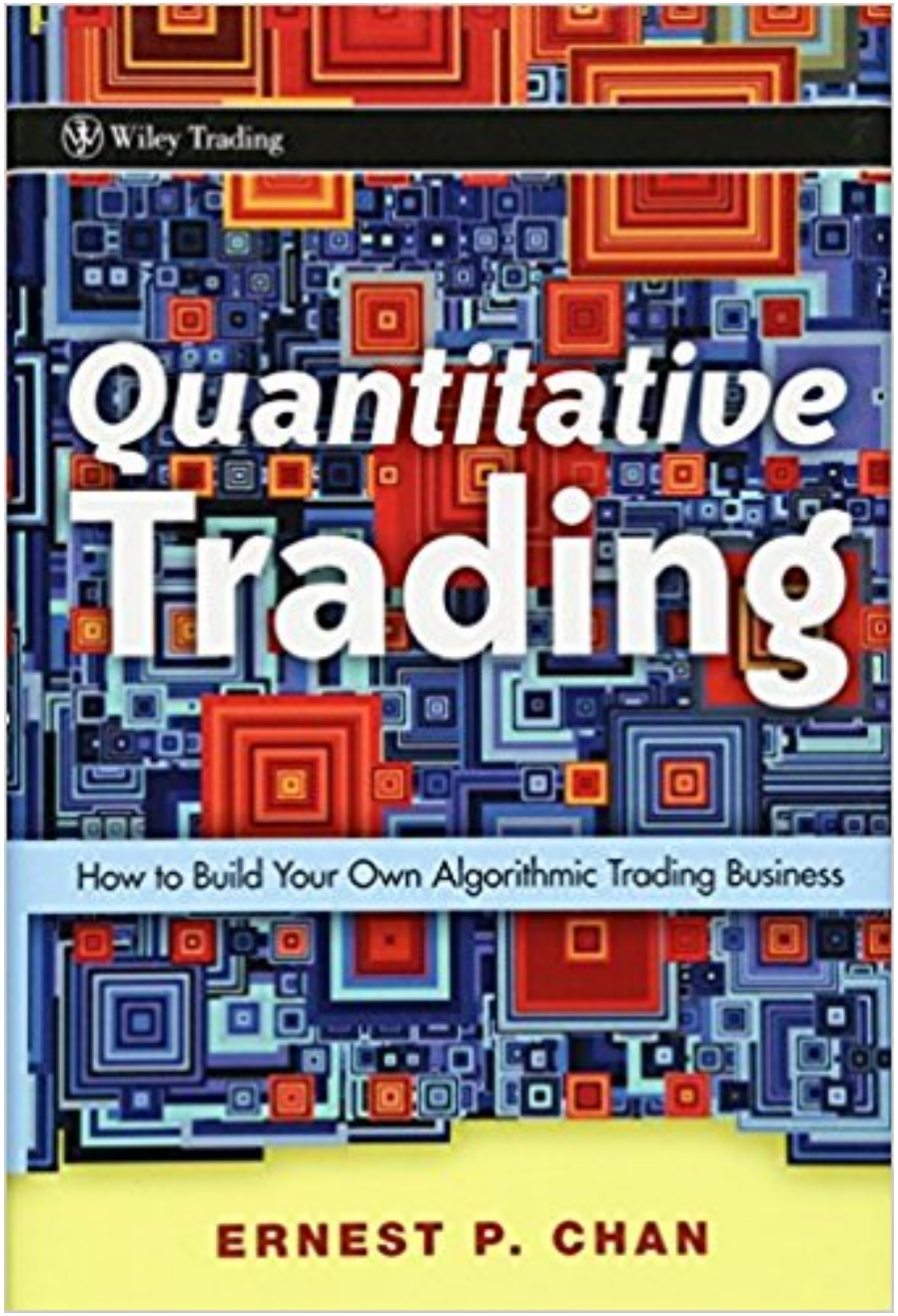


Source: http://www.amazon.com/Derivatives-Analytics-Python-Simulation-Calibration/dp/1119037999/

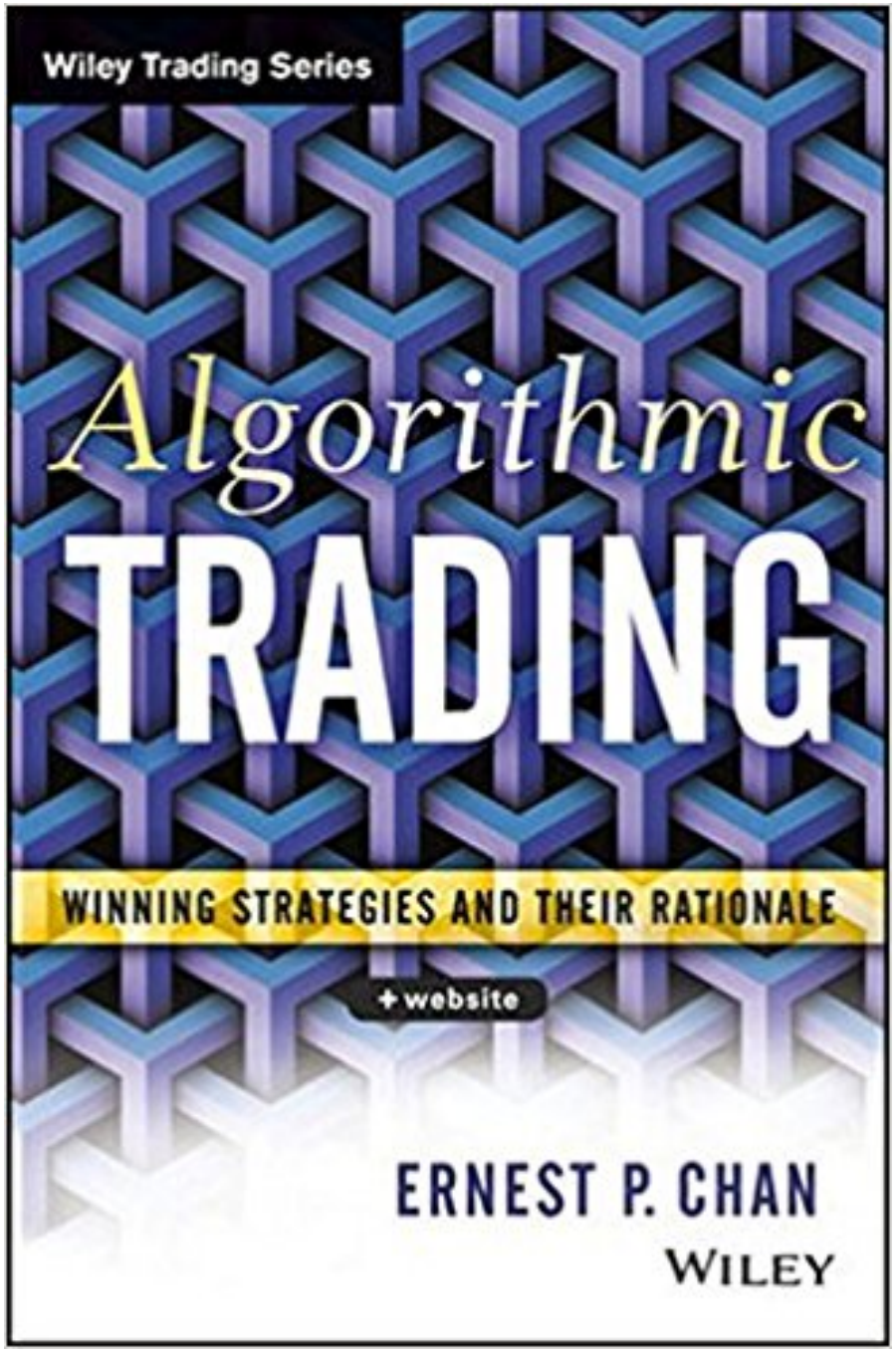
Michael Heydt ,
Mastering Pandas for Finance,
Packt Publishing, 2015



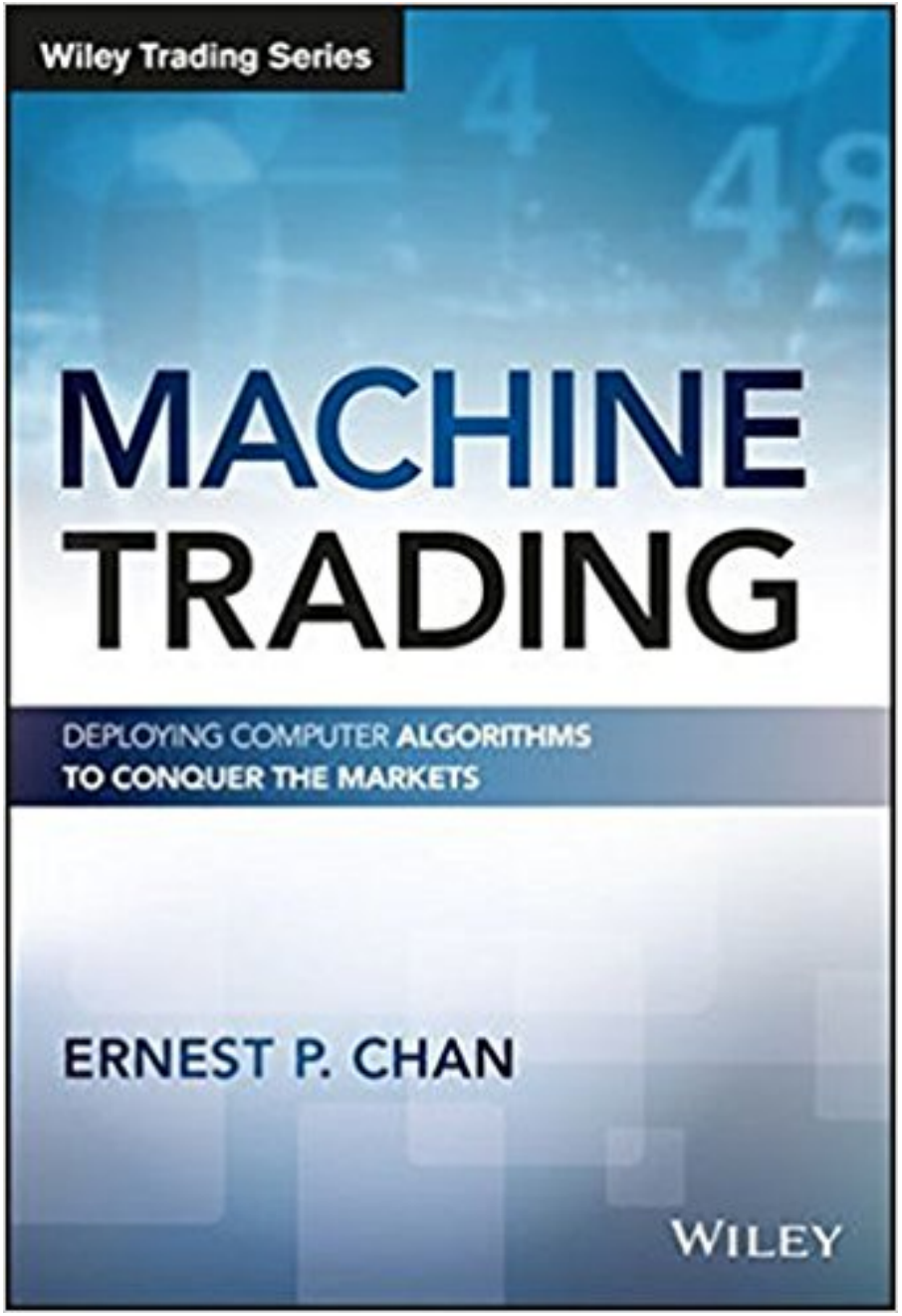
Source: http://www.amazon.com/Mastering-Pandas-Finance-Michael-Heydt/dp/1783985100



Source: Ernie Chan (2008), “Quantitative Trading: How to Build Your Own Algorithmic Trading Business”, Wiley



Source: Ernie Chan (2013), “Algorithmic Trading: Winning Strategies and Their Rationale”, Wiley



Source: Ernest P. Chan (2017), “Machine Trading: Deploying Computer Algorithms to Conquer the Markets”, Wiley

FinTech

Financial Technology

FinTech

Financial Technology
FinTech

"providing
financial services
by making use of
software and
modern technology"

Source: https://www.fintechweekly.com/fintech-definition

Financial Services

Financial Services

Source: http://www.crackitt.com/7-reasons-why-your-fintech-startup-needs-visual-marketing/

Financial Revolution with Fintech

Source: http://www.hedgethink.com/fintech/european-fintech-top-100/

FinTech: Financial Services Innovation

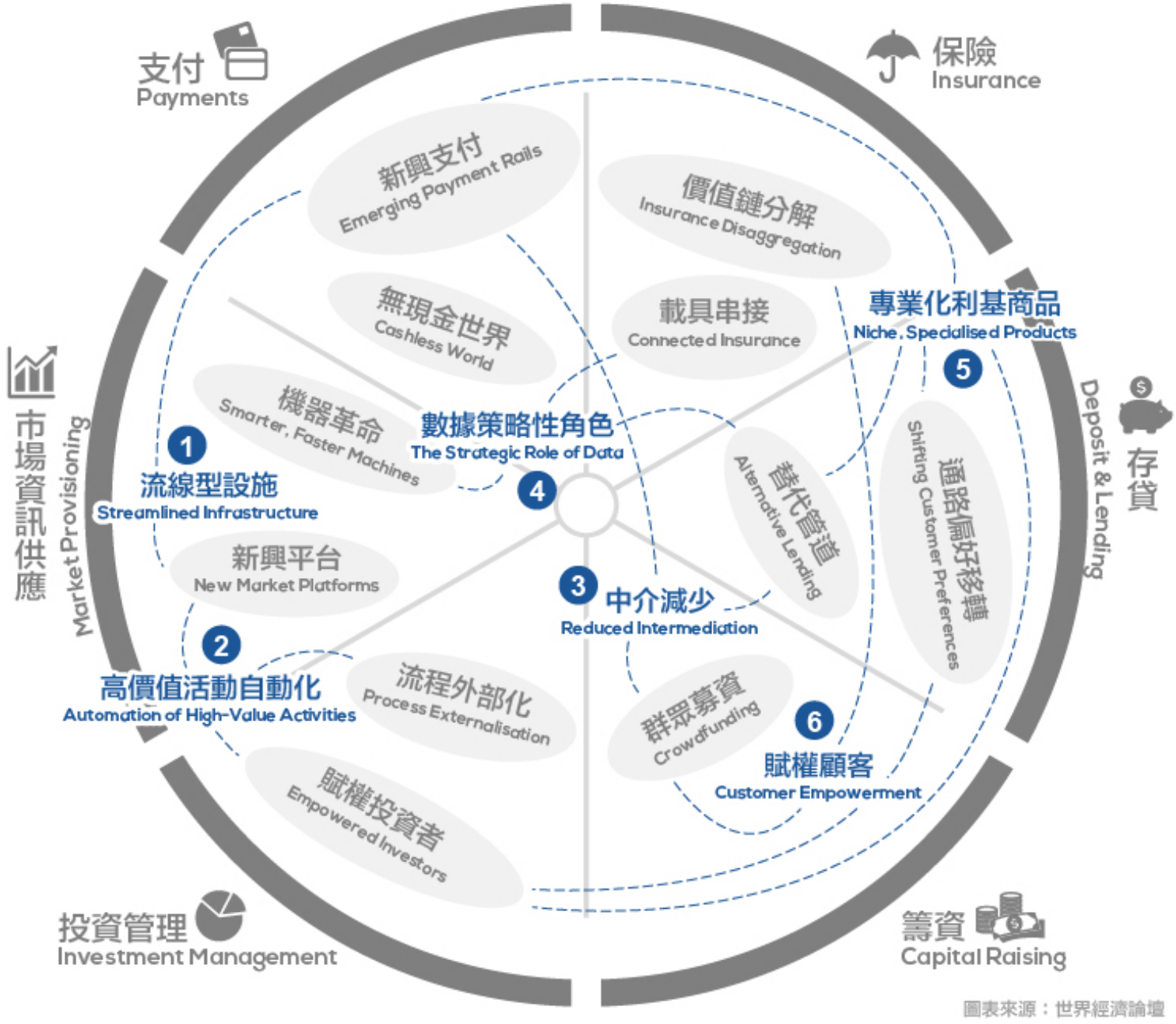
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

FinTech:

Financial Services Innovation

1. Payments
2. Insurance
3. Deposits & Lending
4. Capital Raising
5. Investment Management
6. Market Provisioning

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf



圖表來源：世界經濟論壇

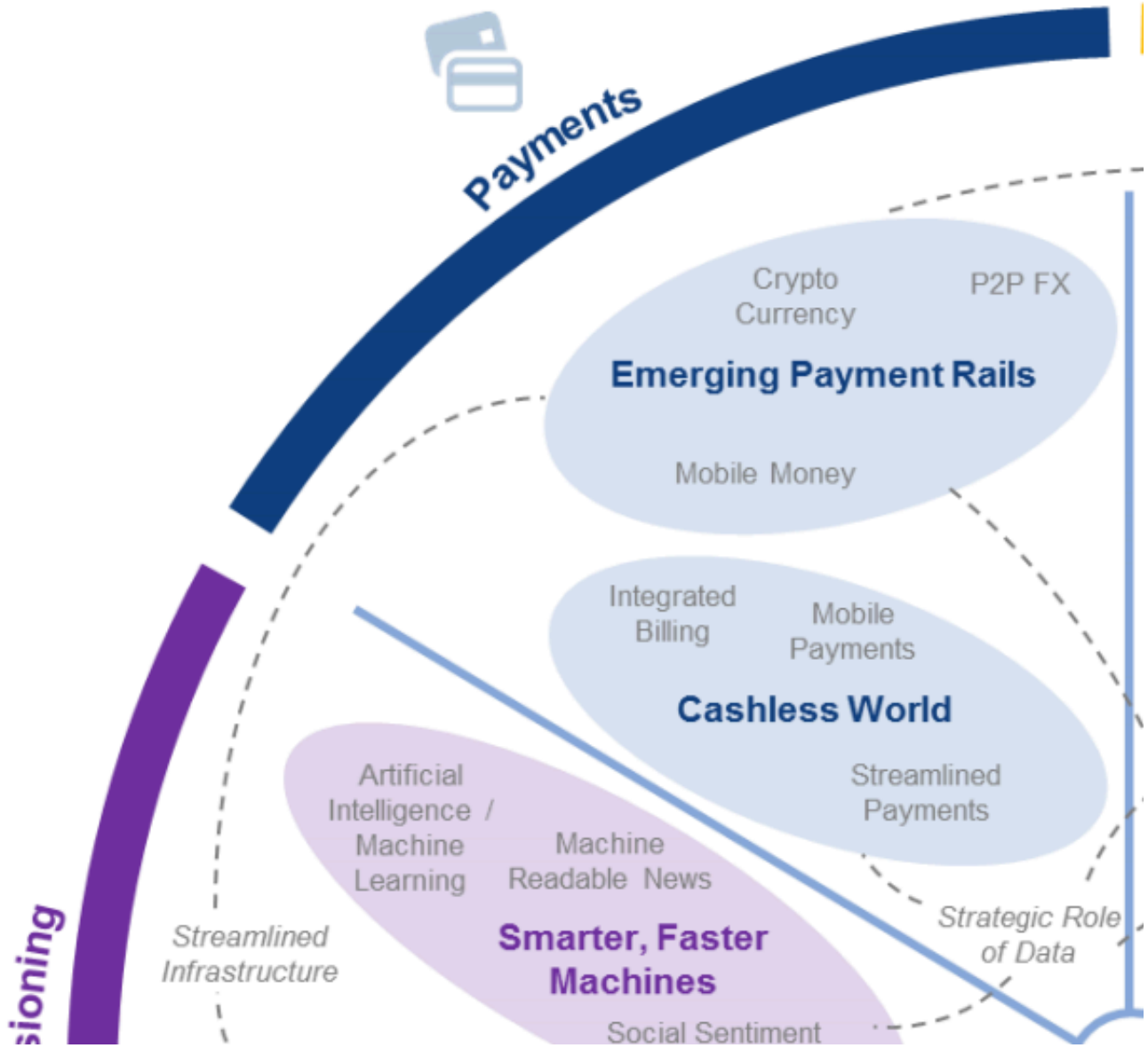
Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

FinTech: Financial Services Innovation

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

1 FinTech: Payment



Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

1

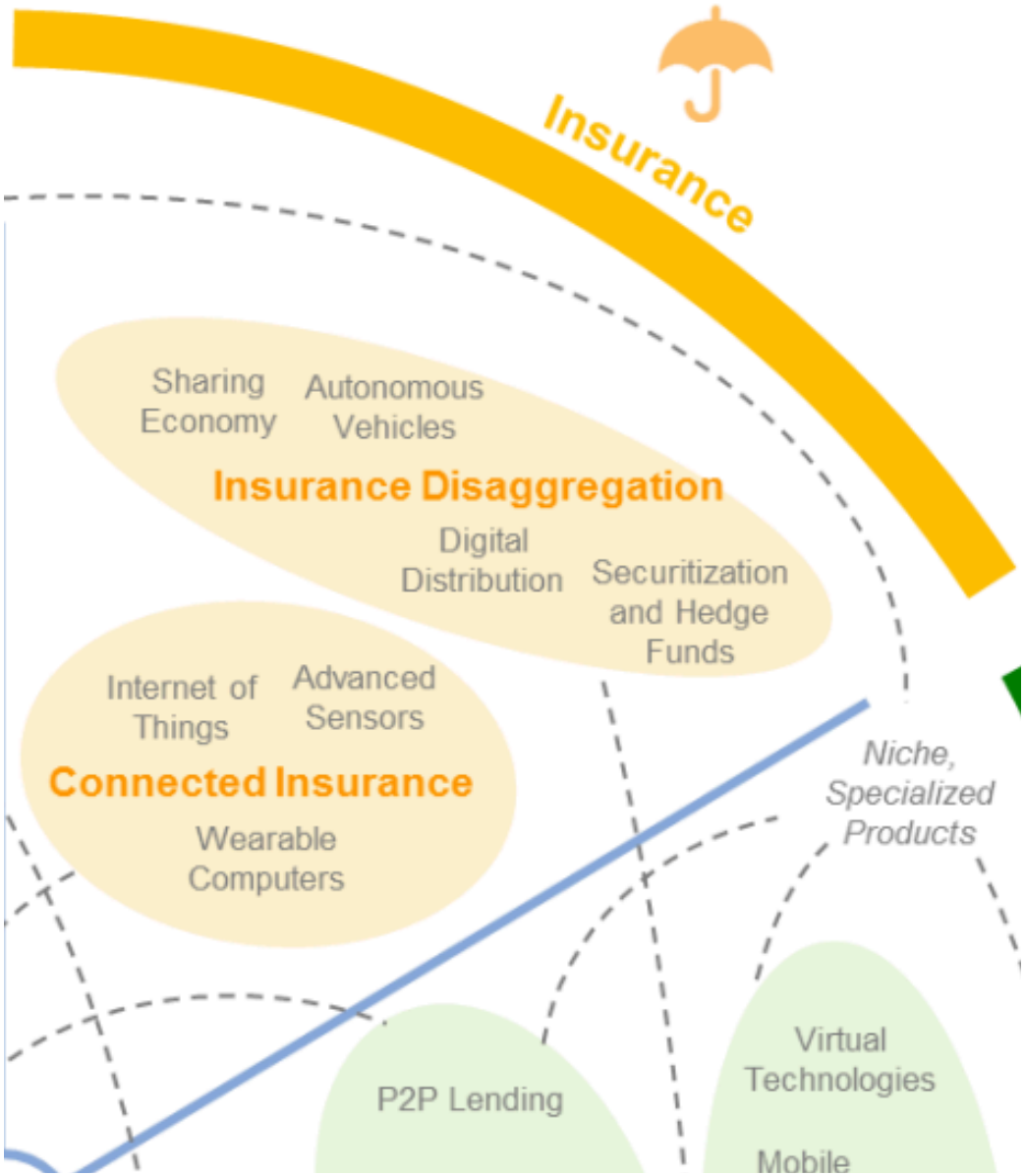
FinTech: Payment Cashless World Emerging Payment Rails

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

2

FinTech: Insurance



Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

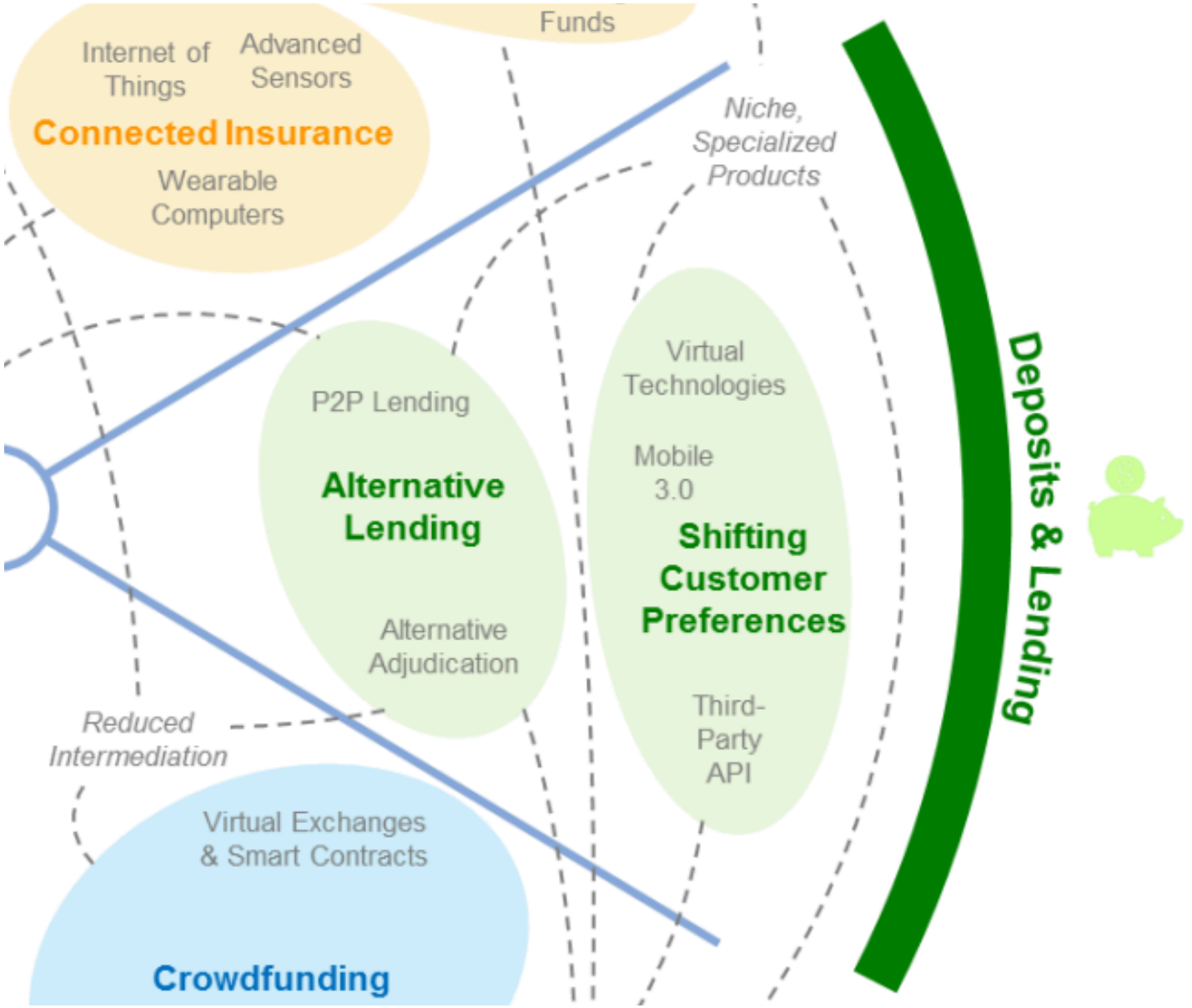
2

FinTech: Insurance
Insurance Disaggregation
Connected Insurance

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

3 FinTech: Deposits & Lending



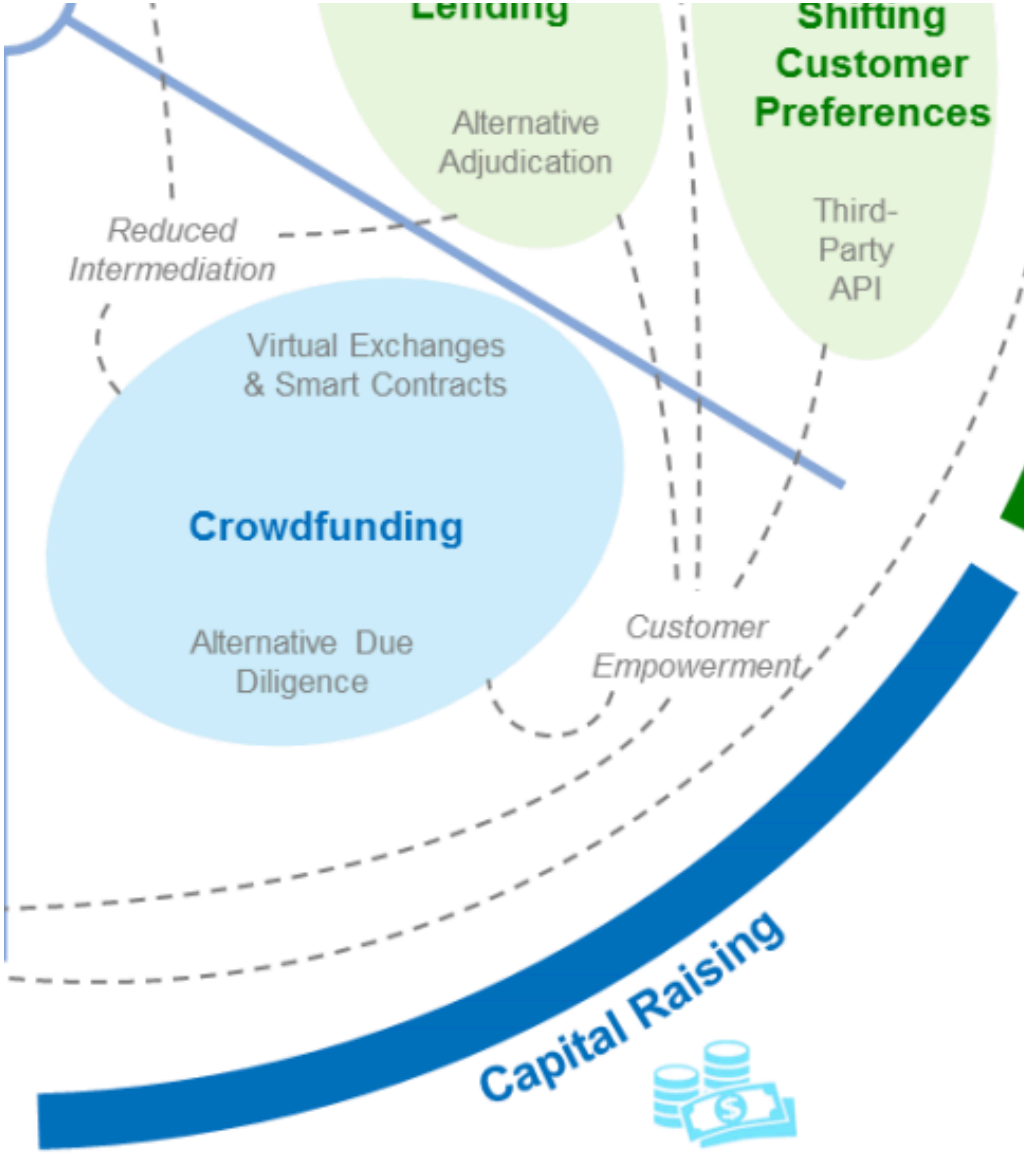
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

3 FinTech: Deposits & Lending
Alternative Lending
Shifting Customer Preferences

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

4 FinTech: Capital Raising



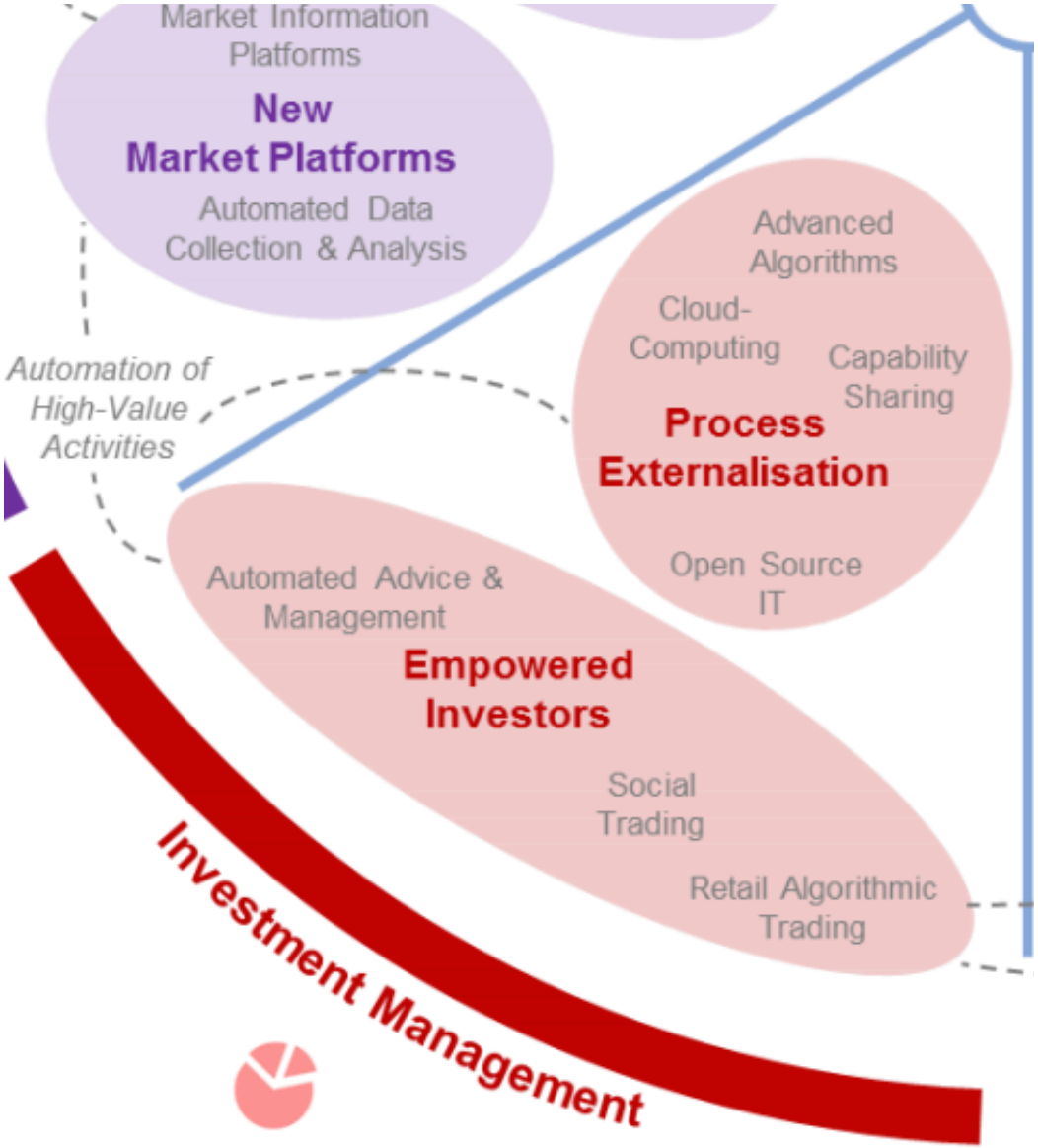
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

4 FinTech: Capital Raising Crowdfunding

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

5 FinTech: Investment Management



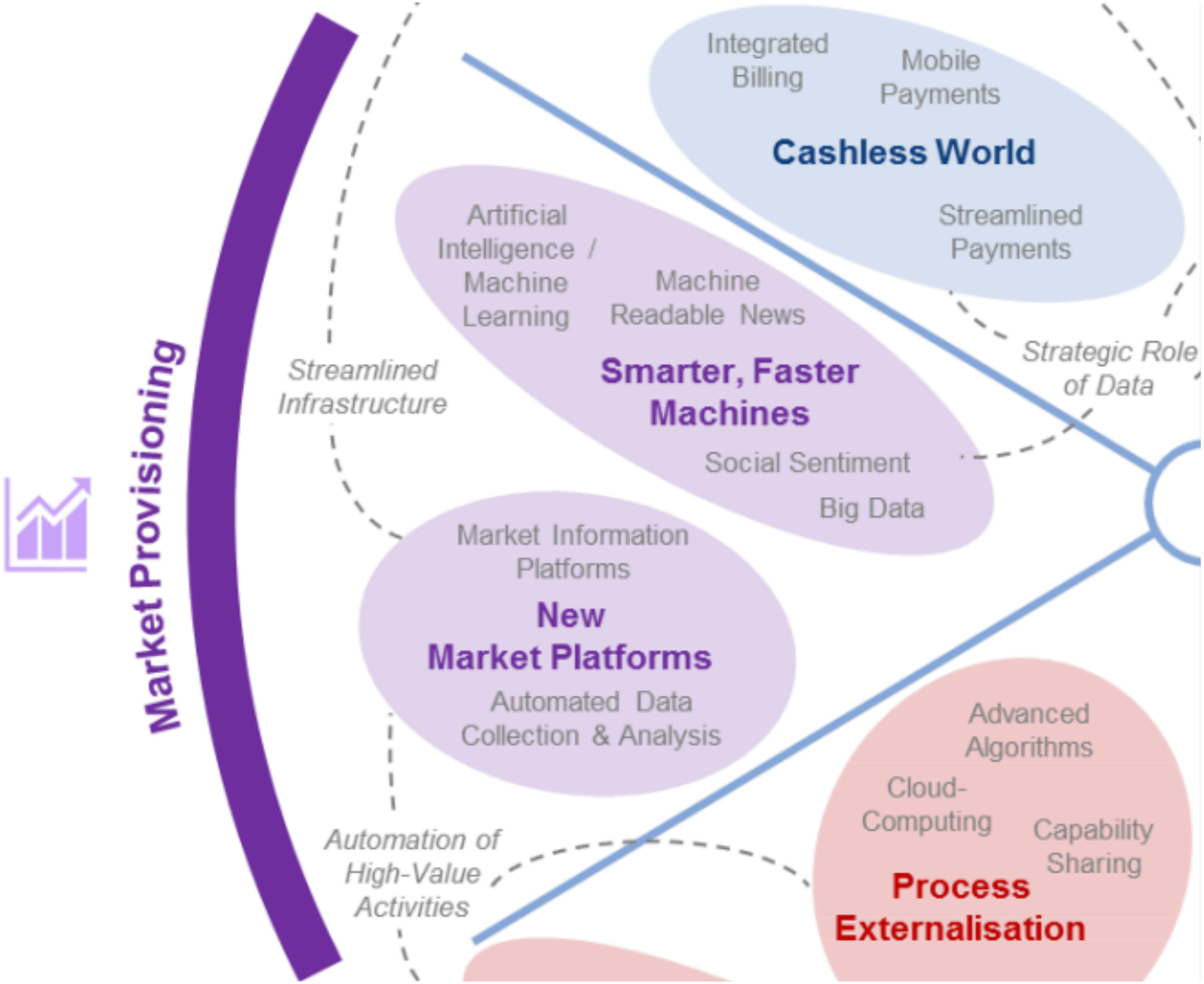
Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

5 FinTech: Investment Management Empowered Investors Process Externalization

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

6 FinTech: Market Provisioning



Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

6 FinTech: Market Provisioning Smarter, Faster Machines New Market Platforms

圖表來源：Fugle團隊整理

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

Fintech Business Models Innovation

The Future of Financial Services

Industry Leaders

- Oversight, guidance and thought leadership from **16 C-suite executives and 25 strategy officers of global financial institutions**

Innovators

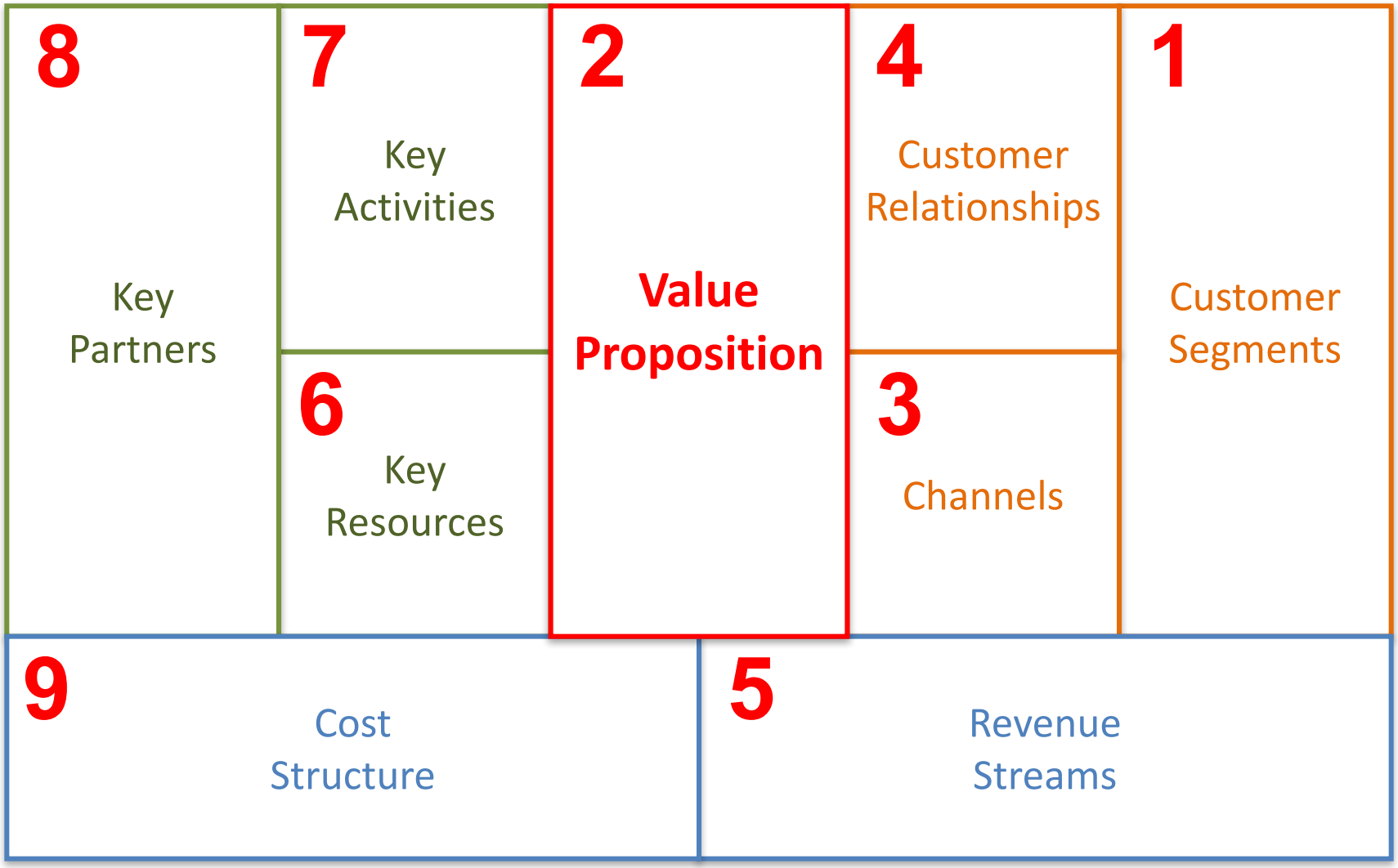
- In-person and phone interviews with **100+ innovative new entrants** and **subject matter experts**

Source: World Economic Forum (2015), The Future of Financial Services, http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

Business Model

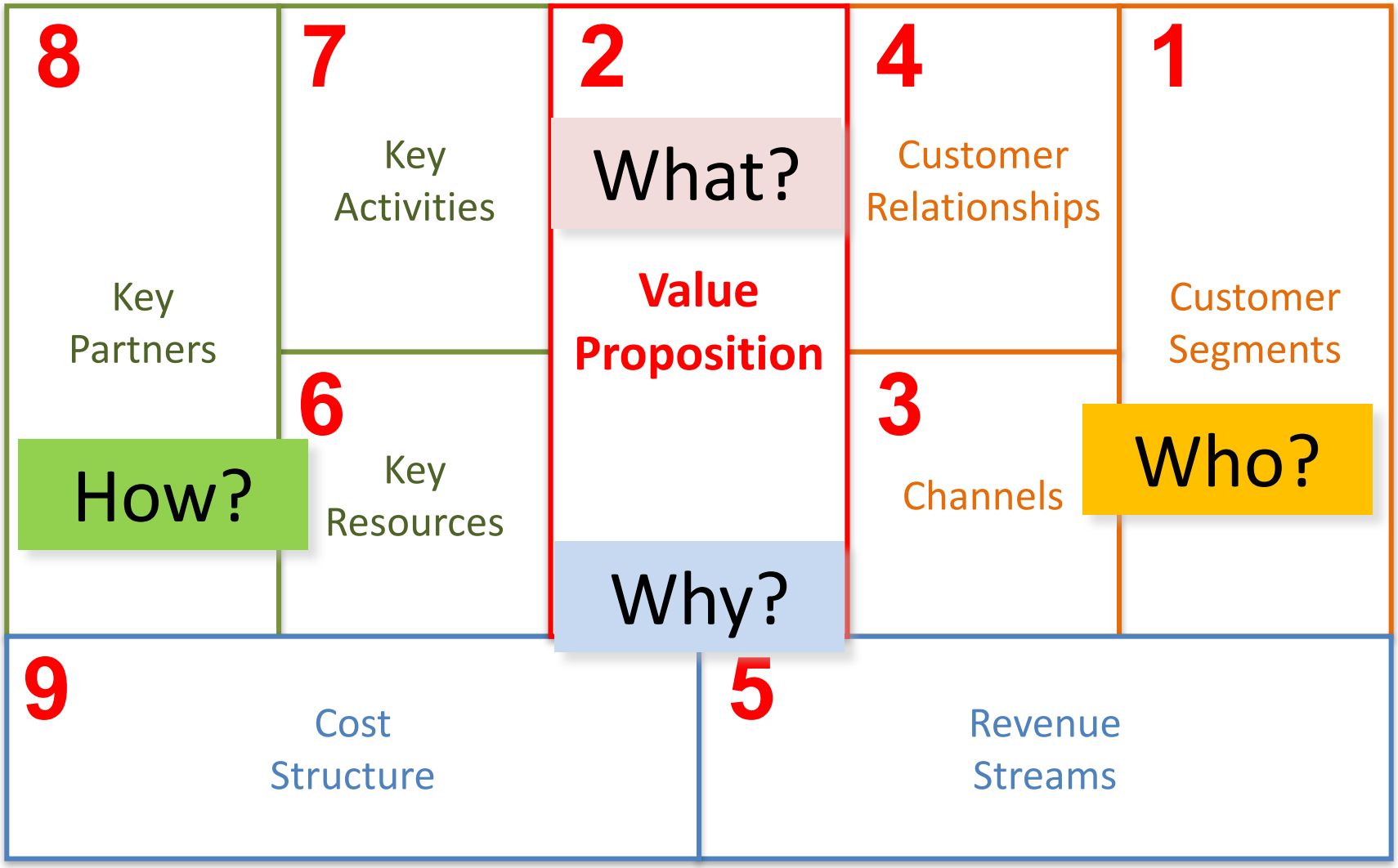
Value

Business Model



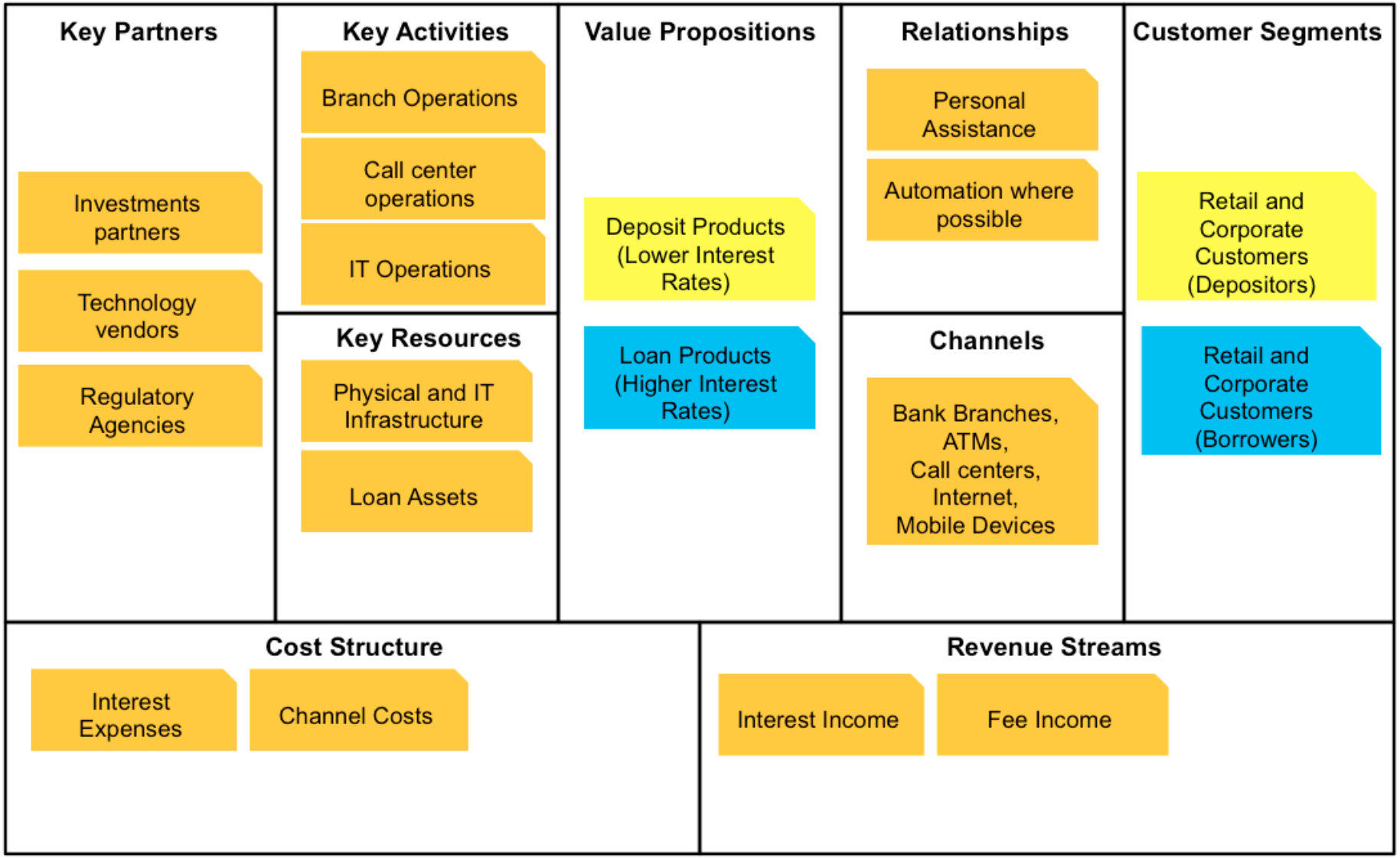
Source: Alexander Osterwalder & Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

Business Model



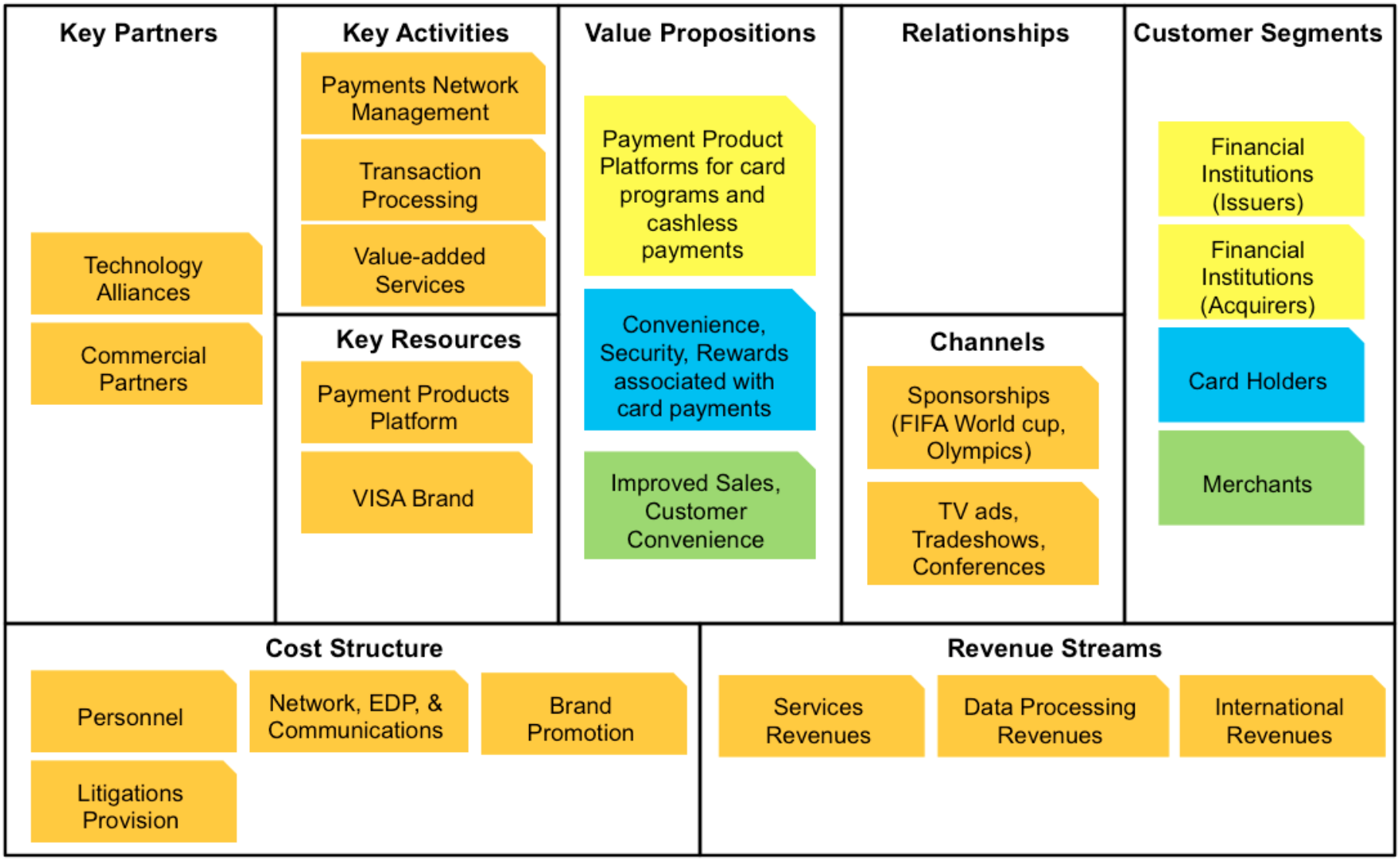
Source: Alexander Osterwalder & Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 2010.

Business Model of Banking companies



Source: http://bmimatters.com/tag/business-model-canvas-examples/

VISA – Leader in Global Payments Industry



www.businessmodelgeneration.com

Source: http://bmimatters.com/tag/business-model-canvas-examples/

Business Models Innovation

Why Business Model Innovation

Target Market

Revenue Mechanism

Value Proposition

Value Network (Ecosystem)

Value Chain

Competitive Strategy

Source: Chesbrough, Henry. "Business model innovation: it's not just about technology anymore." Strategy & leadership 35, no. 6 (2007): 12-17.

Business Model Innovation

Adding new activities

Linking activities in novel ways

Changing one or more parties that perform any of the activities

Source: Amit, Raphael, and Christoph Zott. "Creating value through business model innovation." *MIT Sloan Management Review* 53, no. 3 (2012): 41.

Business Model Innovation

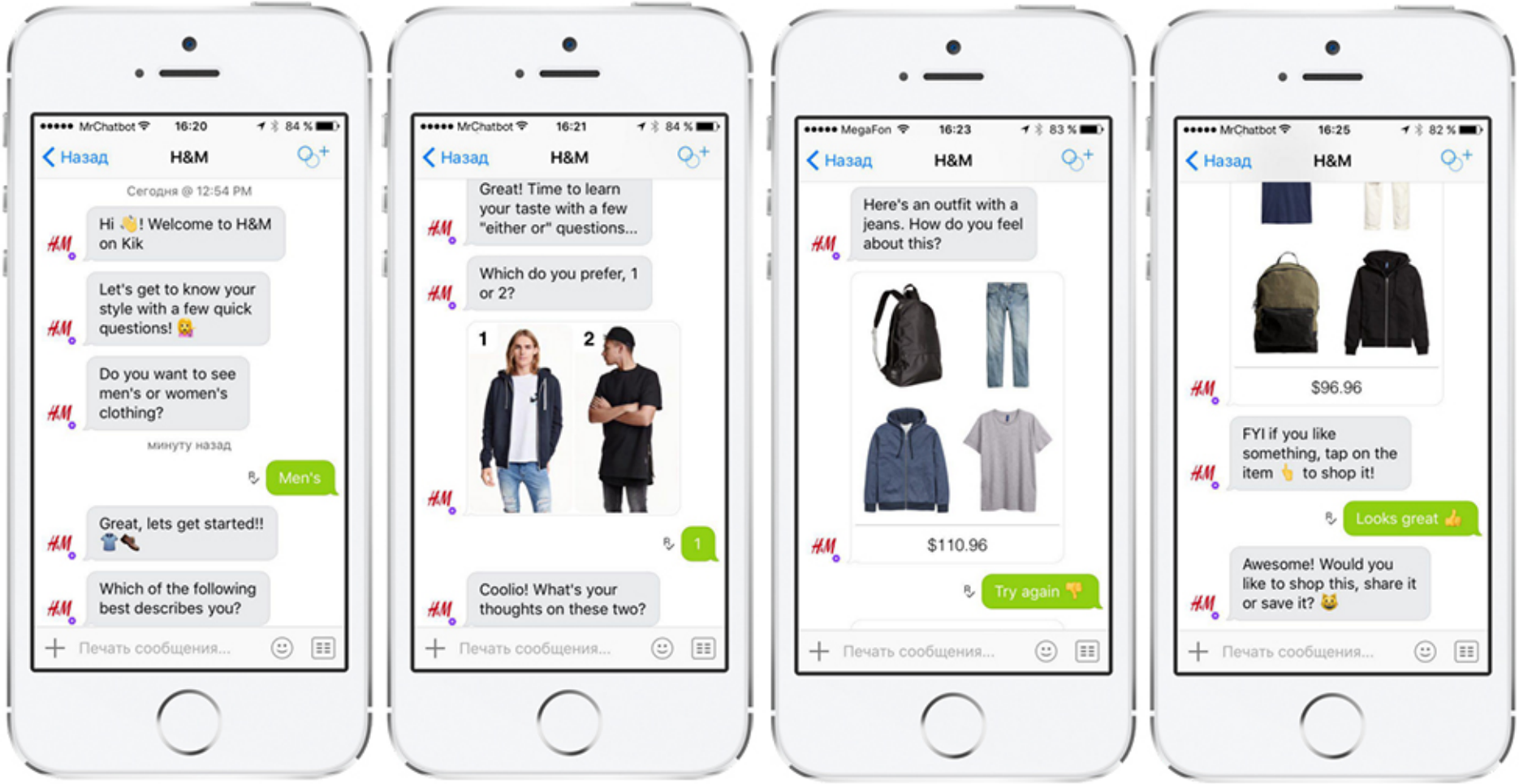
1. What customer **needs** will the **new business model** address?
2. What **novel activities** could help satisfy those needs
3. How could the activities be **linked** in novel ways?
4. What should perform the activities? What novel governance arrangements can be found?
5. How will **value** be **created** for each stakeholder?
6. What **revenues models** can be adopted to complement the business model?

Source: Amit, Raphael, and Christoph Zott. "Creating value through business model innovation." *MIT Sloan Management Review* 53, no. 3 (2012): 41.

From E-Commerce to Conversational Commerce: Chatbots and Virtual Assistants

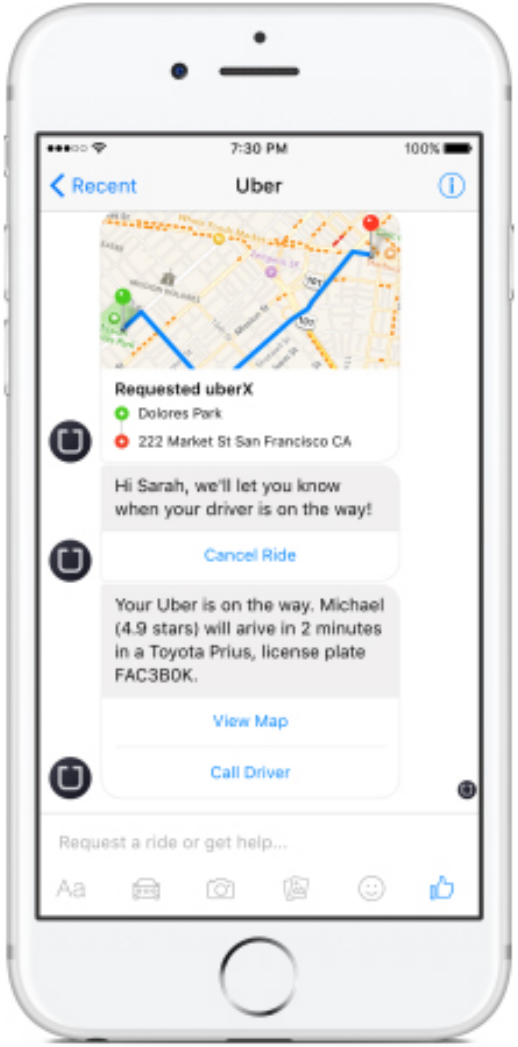
Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

H&M's chatbot on Kik



Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

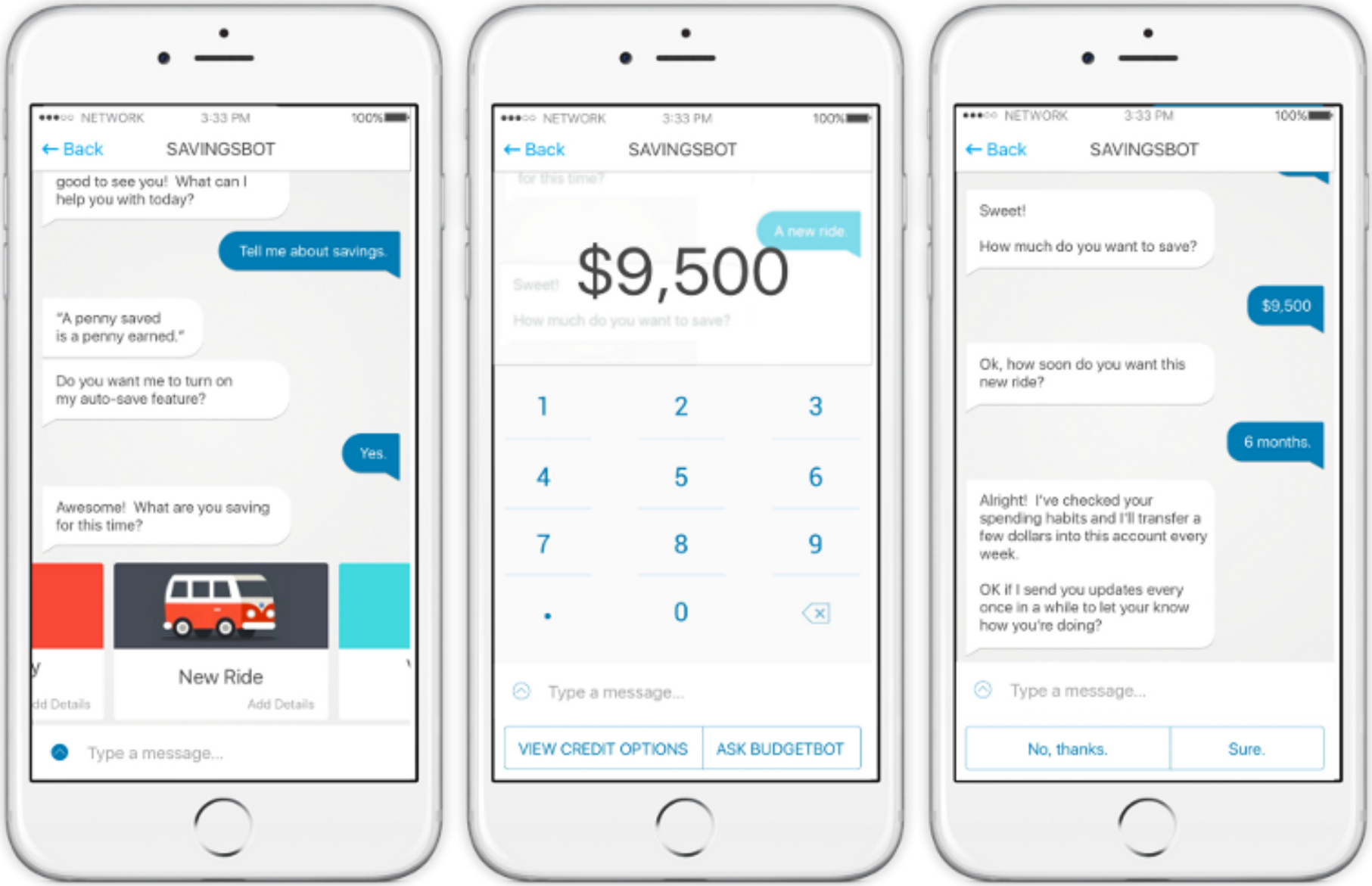
Uber’s chatbot on Facebook’s messenger



Uber’s chatbot on Facebook’s messenger
- one main benefit: it loads much faster than the Uber app

Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

Savings Bot

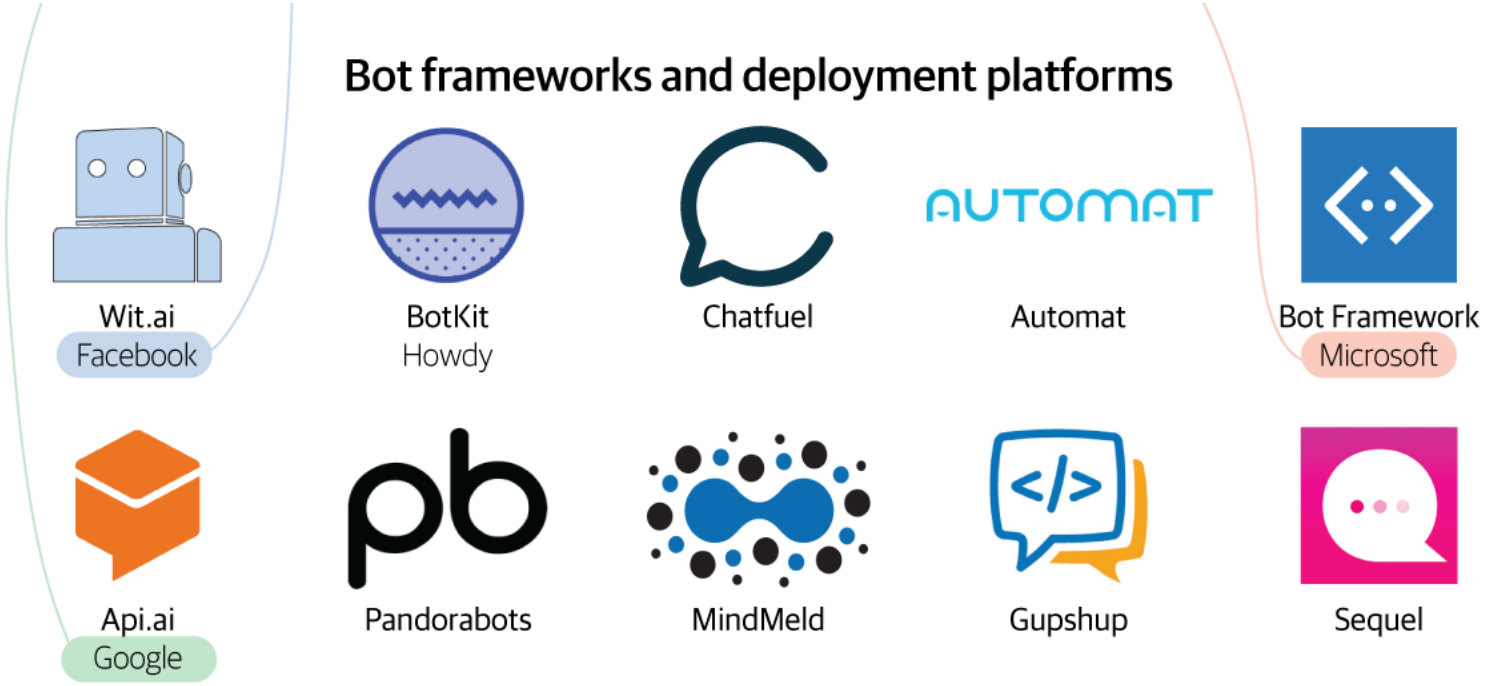


Source: https://chatbotsmagazine.com/artificial-intelligence-ai-and-fintech-part-1-7cae1e67dc13

The bot platform ecosystem
and the emerging giants

Nearly every large software company has announced some sort of bot strategy in the last year. Here's a look at a handful of leading platforms that developers might use to send messages, interpret natural language, and deploy bots, with the emerging bot-ecosystem giants highlighted.

Source: https://www.oreilly.com/ideas/infographic-the-bot-platform-ecosystem



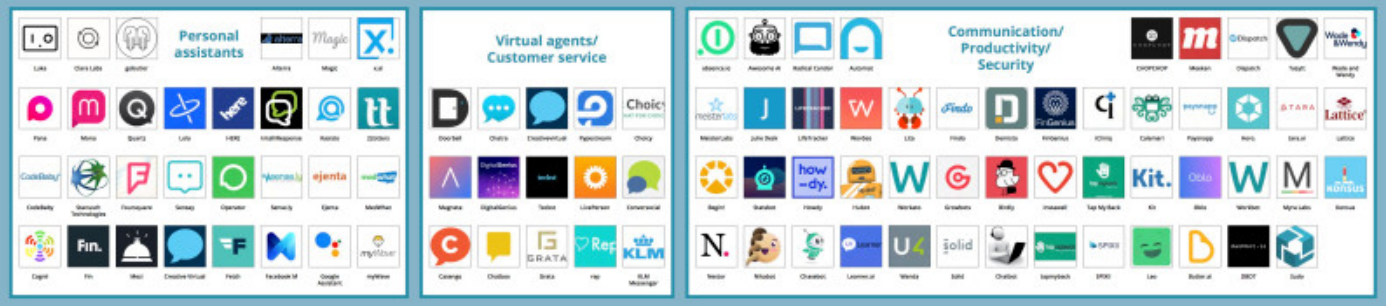
Source: https://www.oreilly.com/ideas/infographic-the-bot-platform-ecosystem

DESIGNED BY
JON CIFUENTES

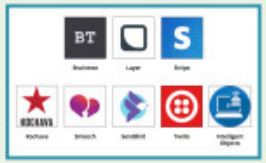
Bots Landscape

POWERED BY
VB | Profiles

Bots with traction

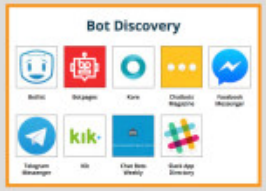


Connectors/ Shared Services

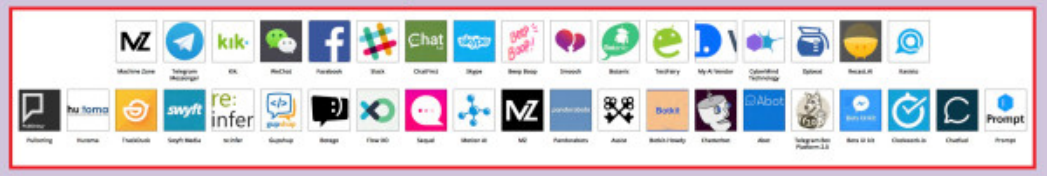


AI Tools: Natural Language Processing, Machine Learning, Speech & Voice Recognition

Bot Discovery



Bot developer frameworks and tools



Analytics

Messaging

Source: https://venturebeat.com/2016/08/11/introducing-the-bots-landscape-170-companies-4-billion-in-funding-thousands-of-bots/

RECAST.AI Messenger Bot Landscape

May 2017

Food

The Wine Pairer, Plum, Pescetarian Kitchen, Hungry, Foodie, Fitmeal, Entrée, Chatobook, Make My Sushi, Voome

Communication

Tangowork, Typeform, Anony, Tarjimly, Refugio, Rescue, Messenger Match, Sensay, LangLearnBot, Chat Club, Lingio Translate, Decodemoji, U-Report Global, Twiggo

Utilities

Poncho, Calcbot, Smokey, DotCom, Server Monsitoring, English Dictionary, Youtube Search, Idea Bot, QRobot, Instant Translator

Personal

M, Assist, Operator, Uber, Swelly, AskVoila, Ikea Build, Selectionnist, Bud Light Bot, Ask Gary Vee, Gidi, Visabot

Design

ColoretoBot, Connie Digital, AWWWARDS, Mr. Norman, Graphic Design, SnapBot

Analytics

SISENSE, Stockflare, PageInsights, DAM, BuzzLogger, Trading Bot

News

CNN, TIA, Digg, WSJ, Reddit Bot, Al Jazeera, Hacker News, Wired, The Guardian, France Info, Chatbots Mag, VentureBeat

Travel

Grindbase, KLM, British Airways, Space Explorer, AustrianAirlines, SnapTravel, Skyscanner, Kayak, Ticketbot, Rapido

Entertainment

Spotify, Kim Kardashian, La Bringue, 50 Cent, L'oquillo Fiel, Lindsay Lohan, Maroon 5, MTV News, Axwell Λ Ingrosso, RedBull TV, SantaBot, Star Wars Bot, Citron, Pokébot

Developer Tools

HackerOne, Wiredelta, Robbie, Zilly

Education

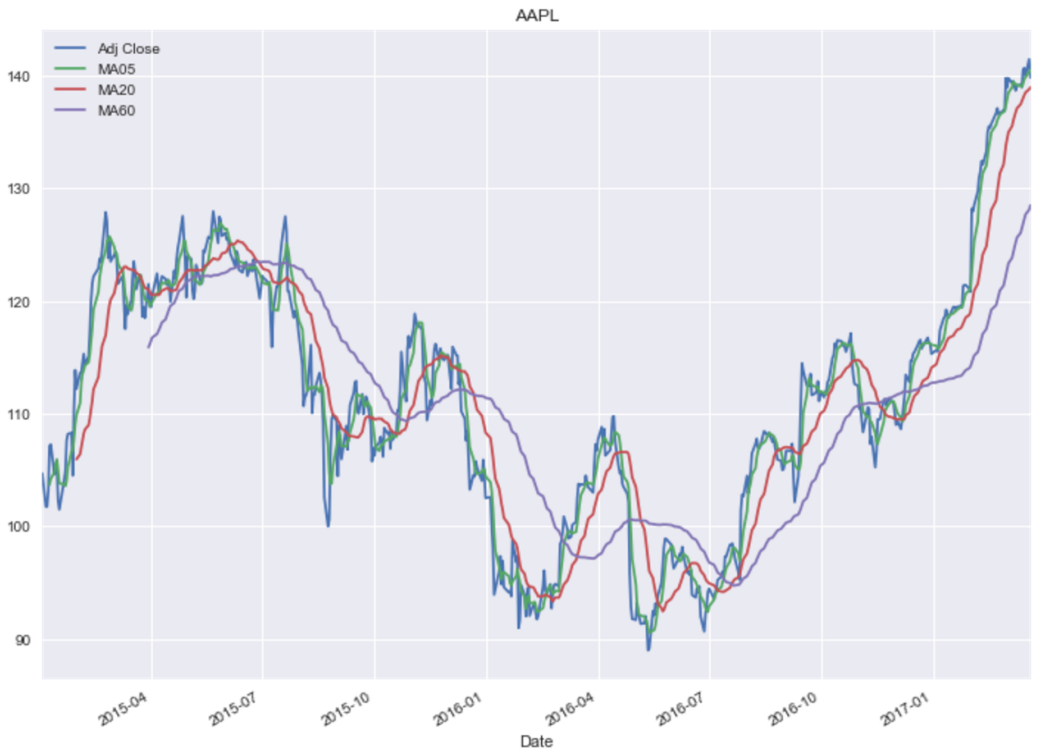
Genius, Kimchi, MemoryzerBot, Ainstein

Source: https://medium.com/@RecastAI/2017-messenger-bot-landscape-a-public-spreadsheet-gathering-1000-messenger-bots-f017fdb1448a /

Python Pandas for Finance

```
# simple moving averages
df['MA05'] = df['Adj Close'].rolling(5).mean() #5 days
df['MA20'] = df['Adj Close'].rolling(20).mean() #20 days
df['MA60'] = df['Adj Close'].rolling(60).mean() #60 days

df2 = pd.DataFrame({'Adj Close': df['Adj Close'],'MA05': df['MA05'],'MA20': df['MA20'], 'MA60': df['MA60']})
df2.plot(figsize=(12, 9), legend=True, title='AAPL')
df2.to_csv('AAPL_MA.csv')
fig = plt.gcf()
fig.set_size_inches(12, 9)
fig.savefig('AAPL_plot.png', dpi=300)
```



Source: https://mapattack.wordpress.com/2017/02/12/using-python-for-stocks-1/

Artificial Intelligence and Deep Learning for Fintech

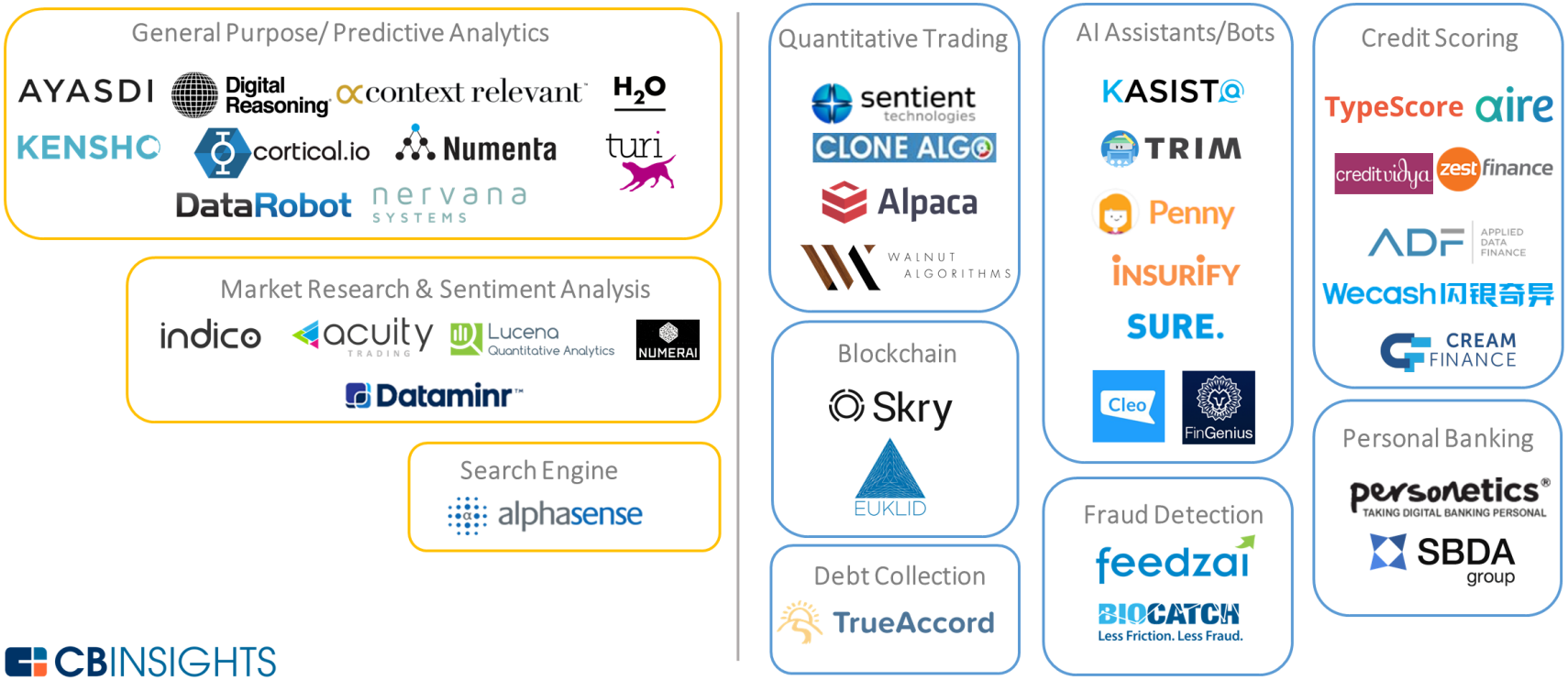
From Algorithmic Trading to Personal Finance Bots: 41 Startups Bringing AI to Fintech

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

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

AI in Fintech

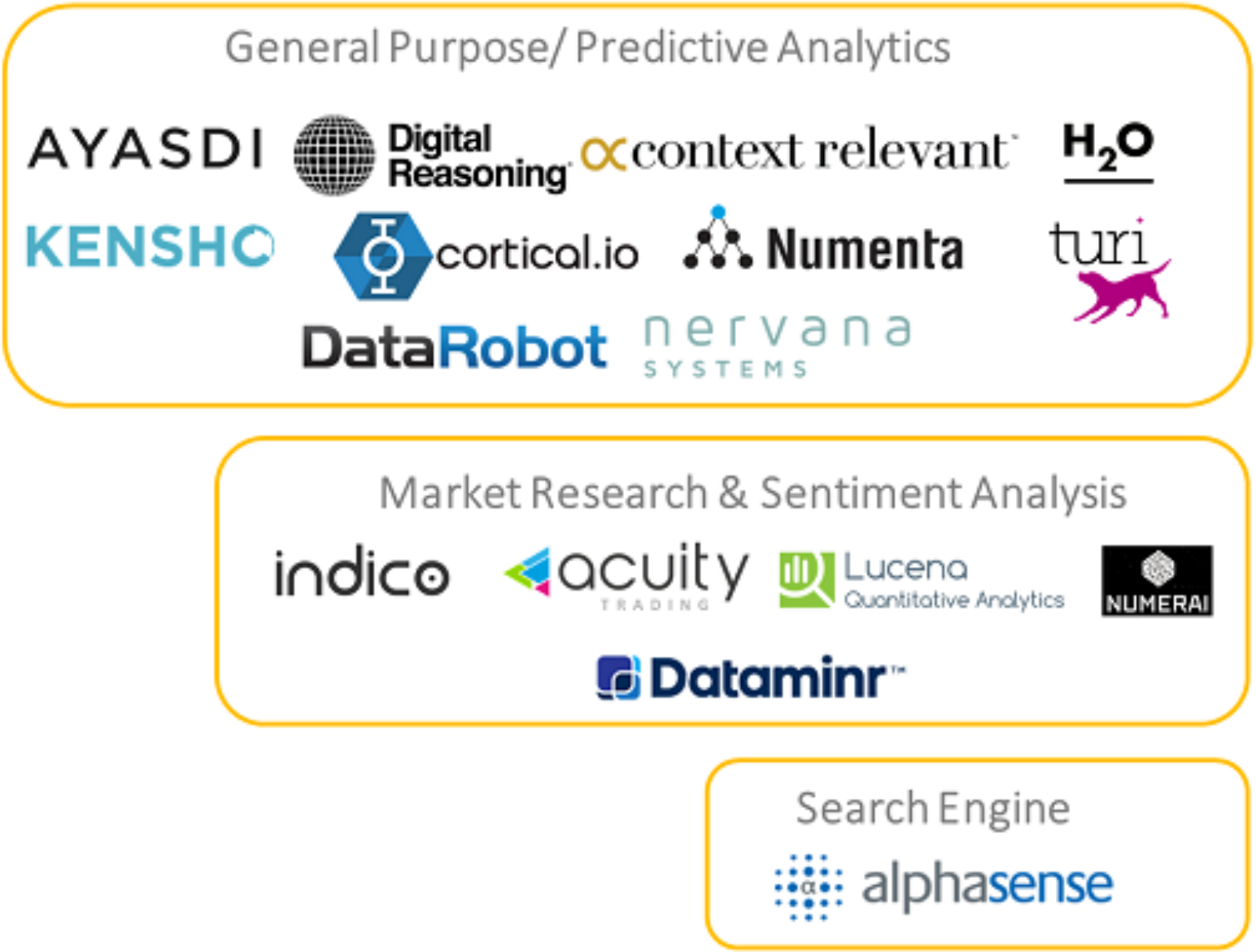
41 Startups Bringing Artificial Intelligence To Fintech



CBINSIGHTS
www.cbinsights.com

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

Artificial Intelligence (AI) in Fintech



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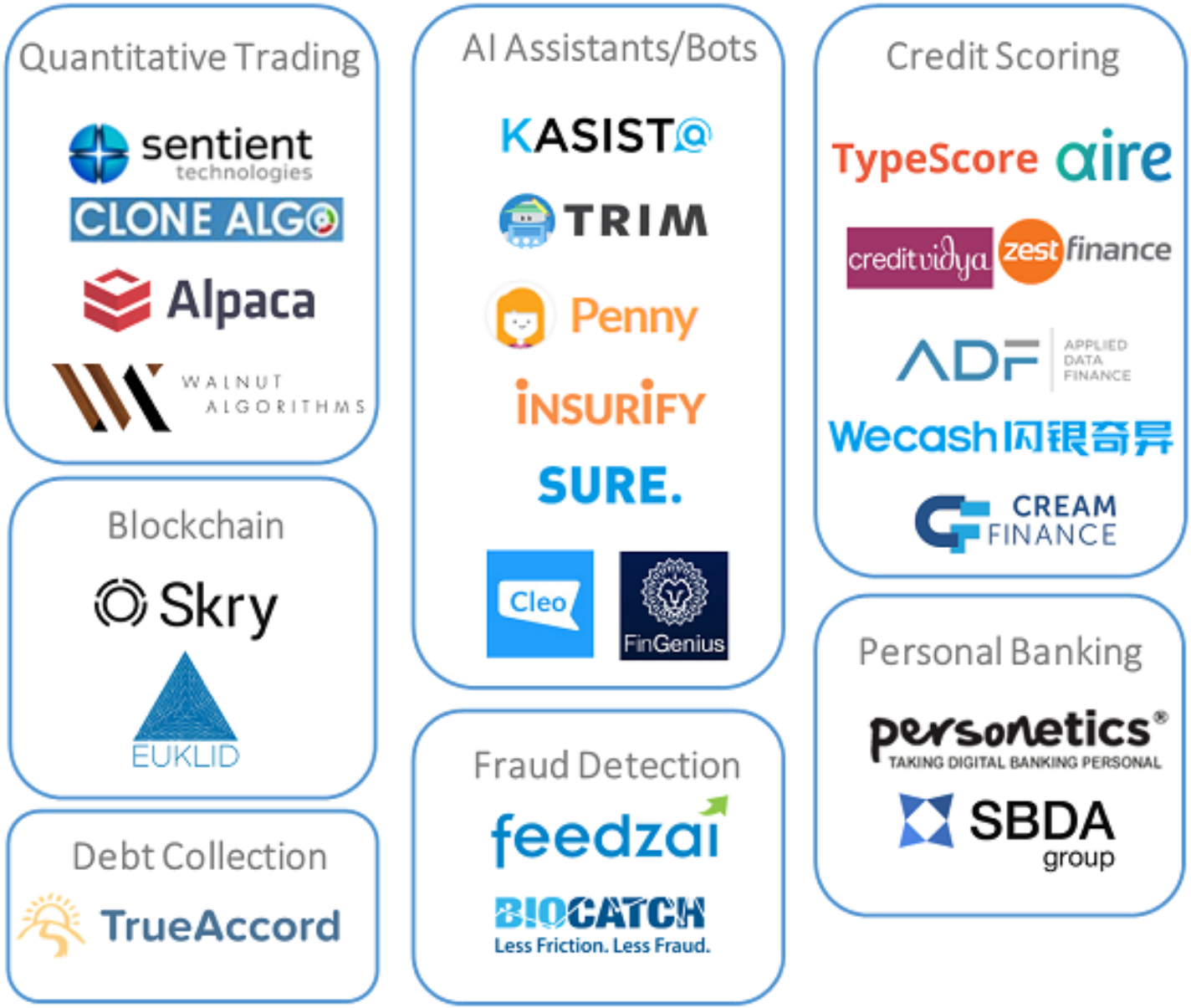
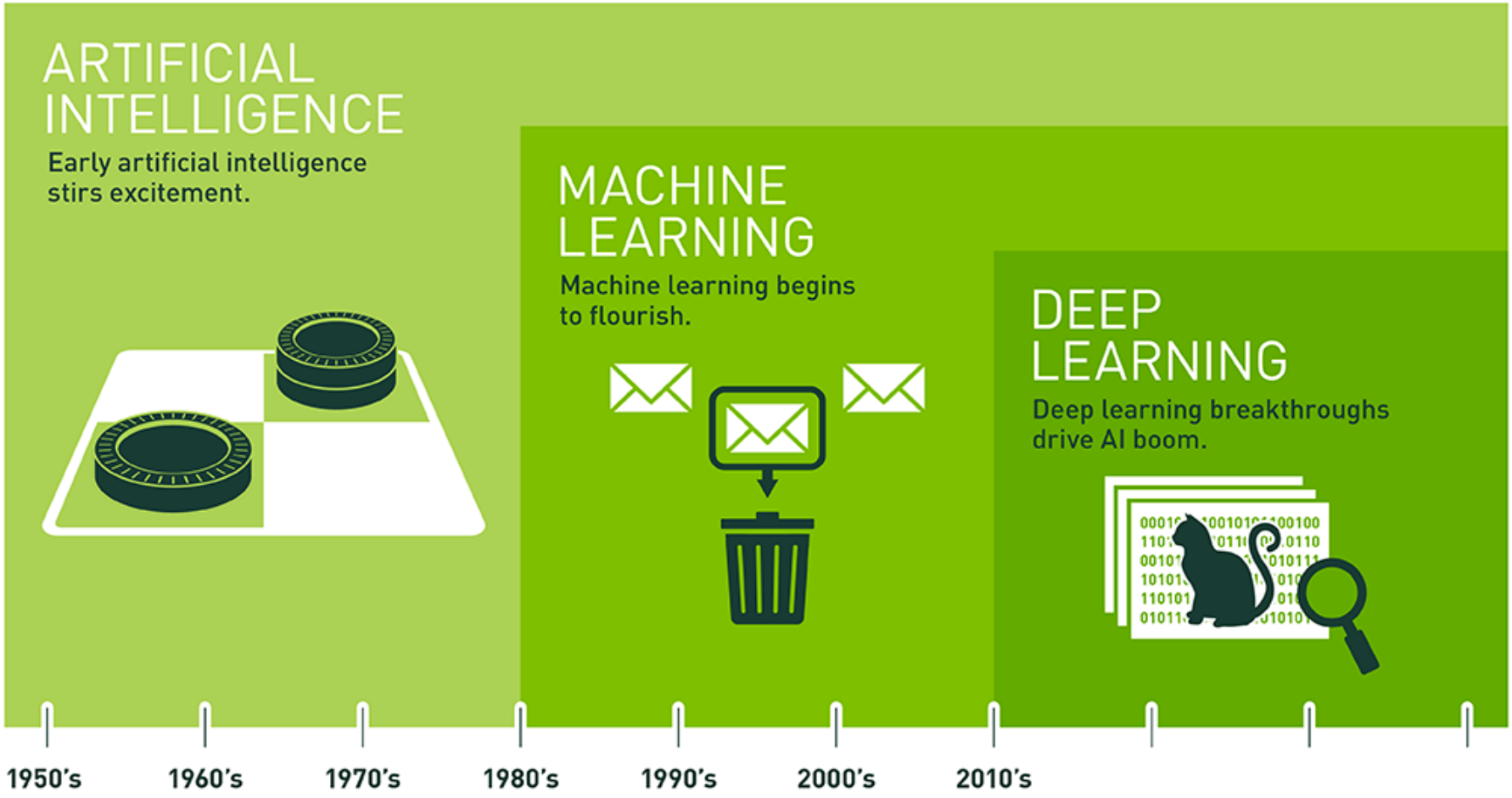
Artificial Intelligence (AI) in Fintech



Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

Artificial Intelligence
Machine Learning & Deep Learning

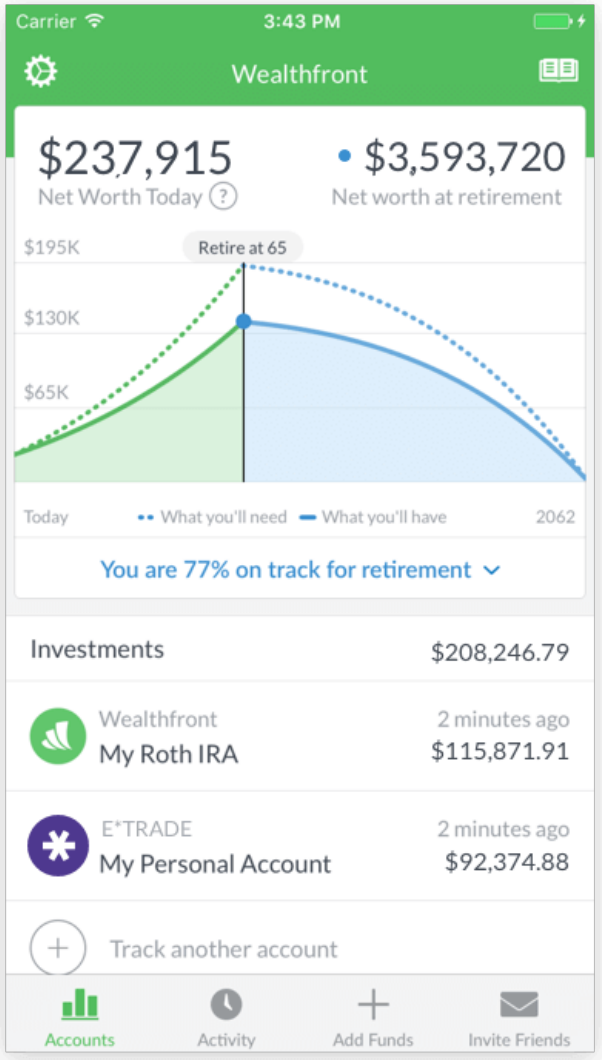


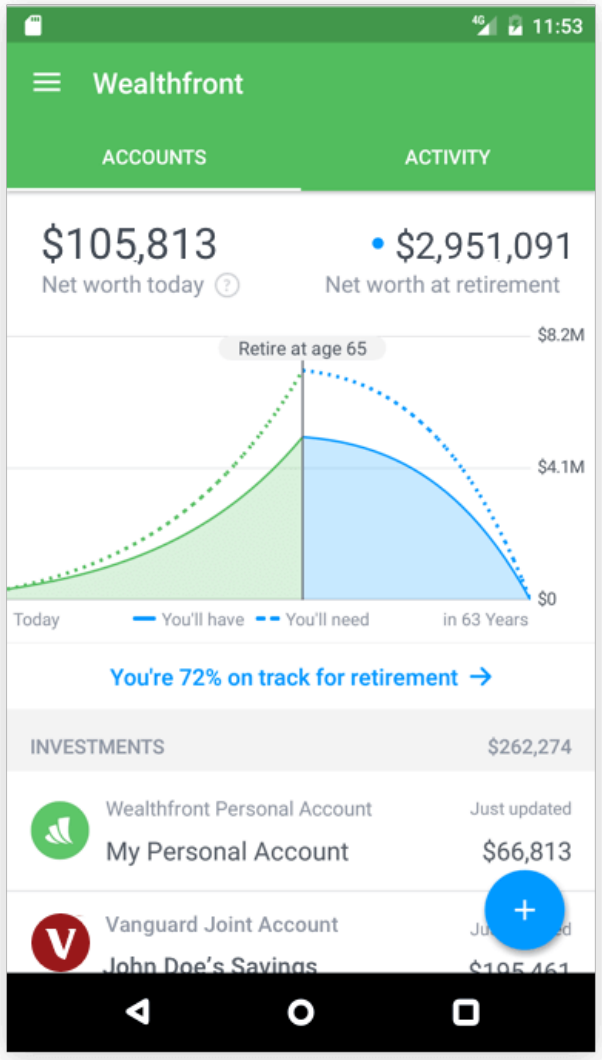
Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Source: https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/

wealthfront

Wealthfront Robo Advisor





Source: https://www.wealthfront.com/

財務金融大數據分析

Big Data Analytics in Finance

投資大數據分析

Big Data Analytics in Investment

人工智慧與財務應用

Artificial Intelligence and Financial Application

人工智慧與投資分析

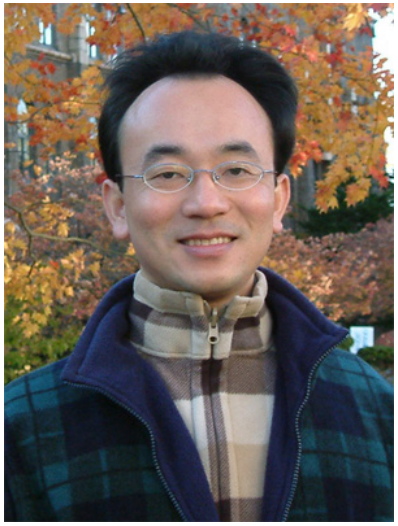
Artificial Intelligence and Investment Analysis

Summary

- This course introduces the fundamental concepts and research issues of Big Data Analytics in Finance.
- Topics include
  - Business Models of Fintech
  - Artificial Intelligence for Investment Analysis and Robo-Advisors
  - Conversational Commerce and Intelligent Chatbots for Fintech
  - Event Study
  - Foundations of Finance Big Data Analytics in Python
  - Big Data Analytics with Numpy in Python
  - Finance Big Data Analytics with Pandas in Python
  - Text Mining Techniques and Natural Language Processing
  - Deep Learning with Keras in Python
  - Deep Learning with TensorFlow
  - Deep Learning for Finance Big Data
  - Social Network Analysis
  - Case Study on Big Data Analytics in Finance

Contact Information

戴敏育 博士 (Min-Yuh Day, Ph.D.)



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