



# 顛覆企業傳統ROI

## 資訊革新論壇 *The New ROI*

*Return on Information*

資訊創造報酬率，迎接ROI大革新

Silver Su 蘇友信, Advisory IT Specialist  
[silversu@tw.ibm.com](mailto:silversu@tw.ibm.com)



# 高速分析即時資料流

## IBM InfoSphere Streams



**顛覆企業傳統ROI**

**資訊革新論壇** *Return on Information* **The New ROI**

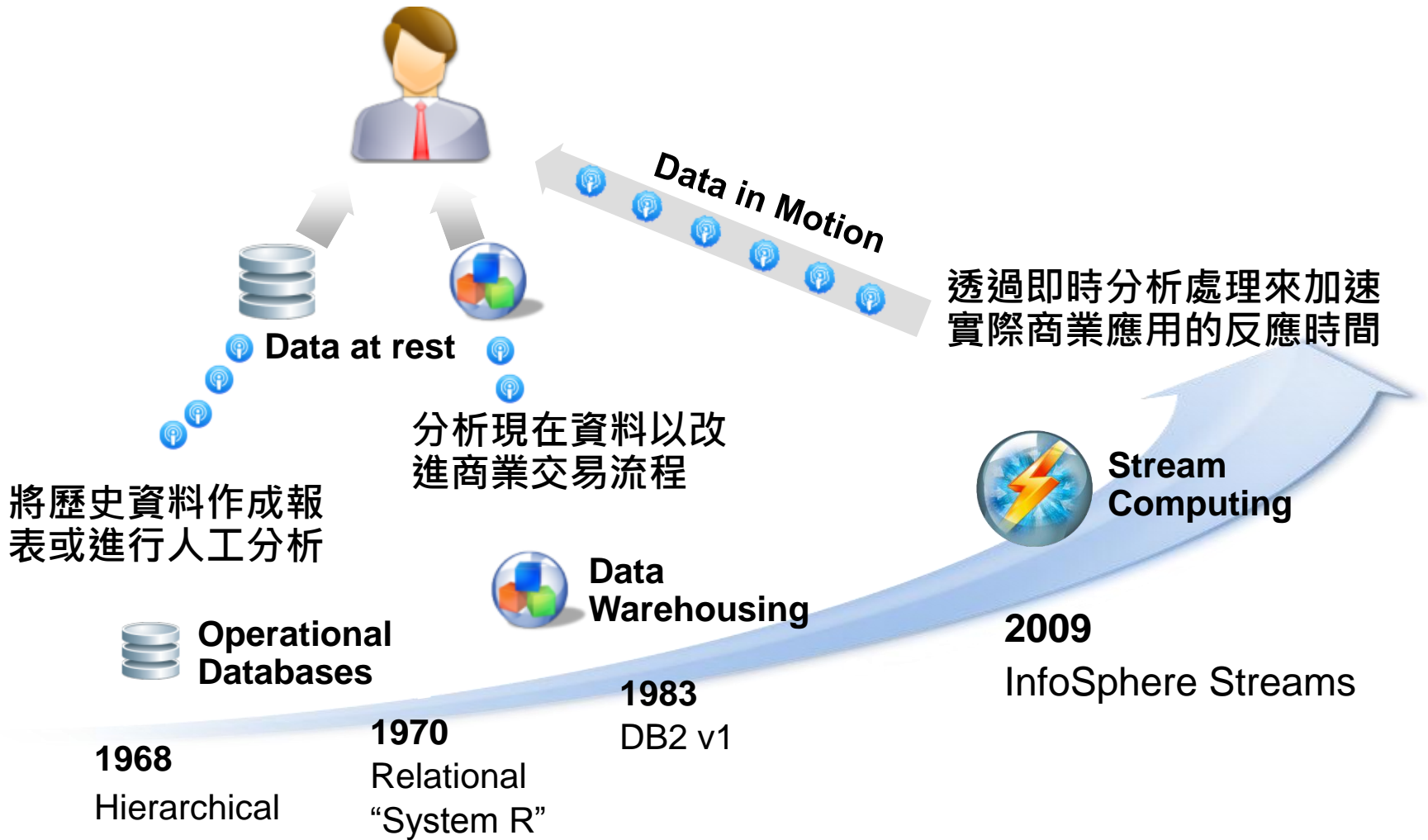
資訊創造報酬率，迎接ROI大革命

# Agenda

- 高速分析即時資料流
- 案例分享



# 新時代的來臨



顛覆企業傳統ROI

資訊革新論壇 *The New ROI*

資訊創造報酬率，迎接ROI大革新

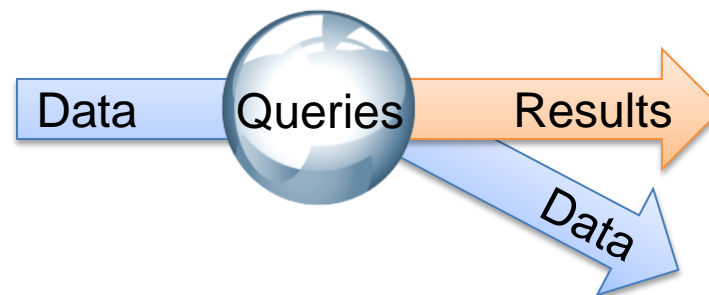
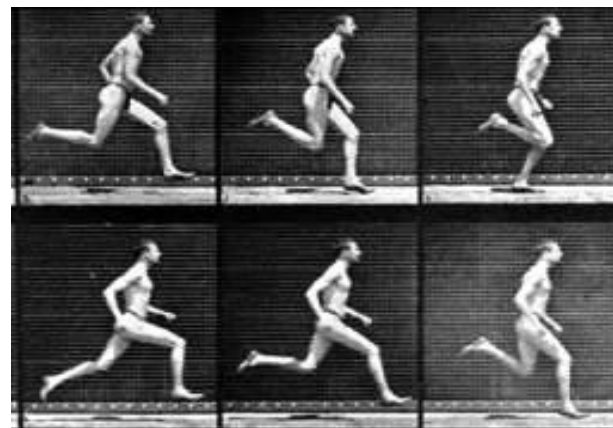


# 打破傳統思維

## 傳統的運算思維



## 江河運算的思維



# 海量資料的 3V 思維

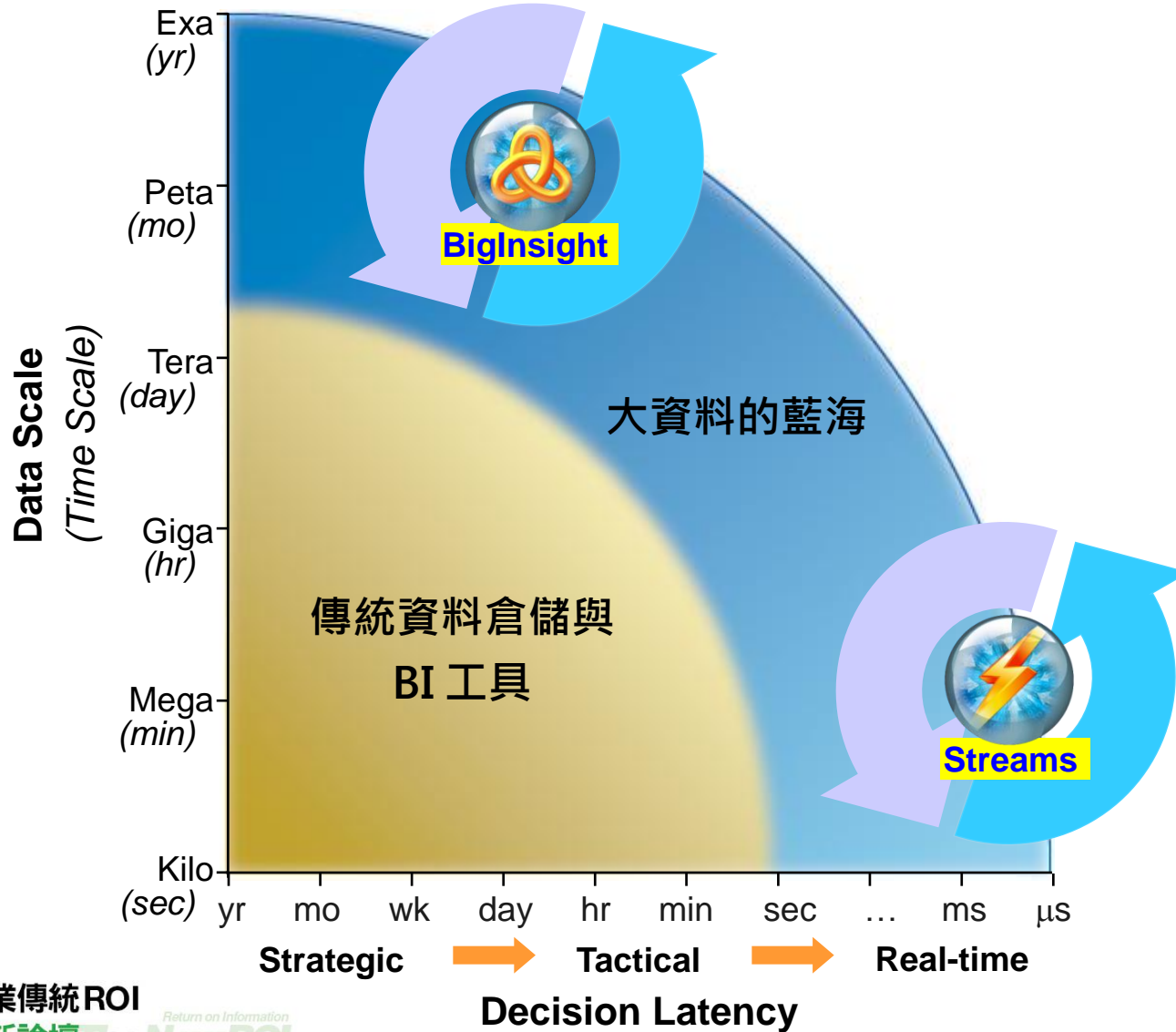


- Velocity
  - $10^{-6}$  秒為單位的處理速度
- Variety
  - 任何形式的資料
    - 聲音、影像、地理資訊等
  - 任何方式的分析
    - Data Mining 等
- Volume
  - Terabytes per second
  - Petabytes per day





# InfoSphere Streams 定位



顛覆企業傳統ROI

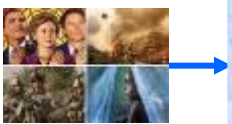
資訊革新論壇 *Return on Information* **The New ROI**

資訊創造報酬率，迎接ROI大革命

# How Streams Works



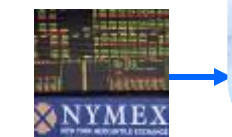
通訊資訊



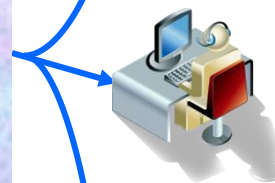
電影資訊



氣象資訊



財經資訊



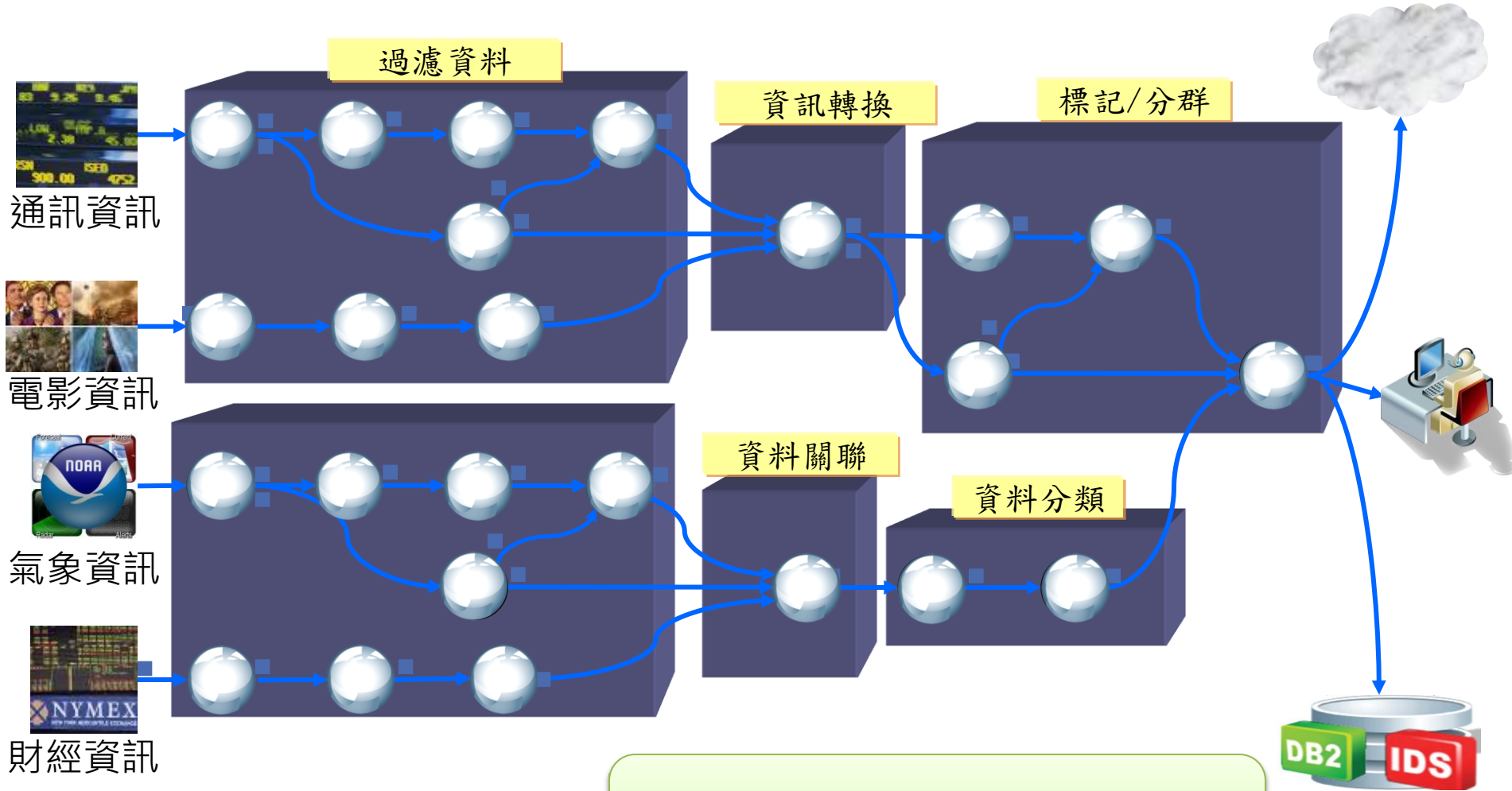
顛覆企業傳統ROI

資訊革新論壇 *Return on Information* **The New ROI**

資訊創造報酬率，迎接ROI大革新



# How Streams Works



1. 分散式運算 (Distributed Computing)
2. 平行化運算 (Parallelized Computing)



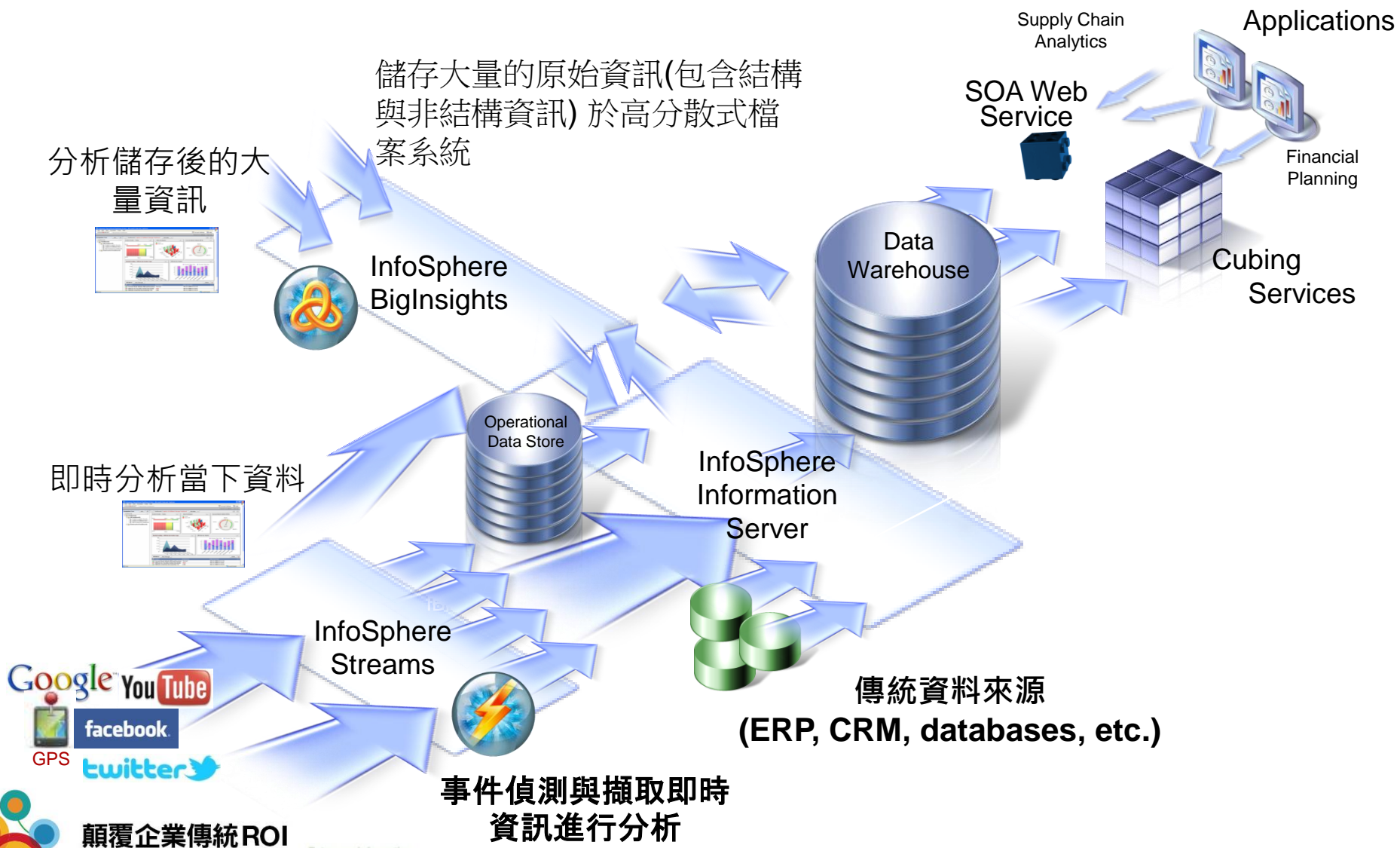
顛覆企業傳統ROI

資訊革新論壇 *The New ROI*

資訊創造報酬率，迎接ROI大革命

Return on Information

# Streams 與現有系統結合



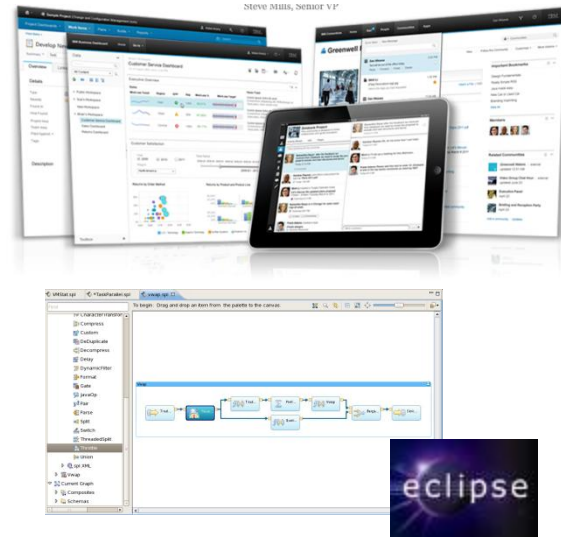
顛覆企業傳統ROI

資訊革新論壇 *Return on Information* The New ROI

資訊創造報酬率，迎接ROI大革命

# InfoSphere Streams 3.1

## Development Tools



- Eclipse IDE
- Web console
- **Drag & Drop editor**
- Instance graph
- **Streams visualization**
- Streams debugger

## Runtime Environment



- Clustered runtime for near-limitless capacity
- RHEL v5.3 and above
- CentOS v6.0 and above
- SUSE v11 and above
- X86 & Power multicore hardware
- InfiniBand support
- Ethernet support

## Toolkits & Accelerators



- **Big Data, CEP, Database, Data Explorer (Big Data), DataStage, Finance, Geospatial, Internet, Messaging, Mining, SPSS, R, Standard, Text, Teradata and Astrer, TimeSeries** toolkits
- **Telco & Social Media accelerators**



顛覆企業傳統ROI

資訊革新論壇 *The New ROI*

資訊創造報酬率，迎接ROI大革命

Return on Information

# 案例分享

## 電信業

- 根據設備、感測器和 GPS 輸入進行的運營和故障分析



## 製造業

- 分析製造過程，提升生產良率



## IT 系統

- 針對多個交易系統進行的交易日誌分析



## 交通運輸

- 天氣和交通狀況偵測城市的交通運作情形



## 國家安全防護

- 透過影像及時判斷是否為犯罪者



## 醫療照護

- 分析偵測病患的設備儀器



## 公用事業

- 天氣對發電的影響分析
- 智慧電錶資料分析



## 金融服務

- 改善了風險決策
- 客戶看法分析 AML





# 案例分享 - 電信業



顛覆企業傳統ROI

資訊革新論壇 *Return on Information*  
**The New ROI**

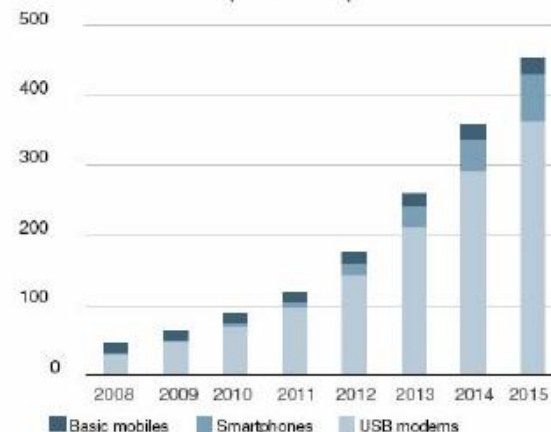
資訊創造報酬率，迎接ROI大革命

# 電信業 – 新的契機

## ● 行動網路應用崛起

- 智慧型手機與行動應用的興起，讓行動網路需求將在未來 6 年內成長 10~30 倍
- 因應網路需求，將過去語音導向的設備的需求，轉換為網路導向的設備

Mobile traffic per customer by device  
(Mb/month)



■ Source: ABI research





# 電信業 – 新的挑戰



# 電信業 – 新的看法



Source: Analytics: The real-world use of big data, a collaborative research study by the IBM Institute for Business Value and the Saïd Business School at the University of Oxford. © IBM 2012



顛覆企業傳統ROI

資訊革新論壇 *The New ROI*

資訊創造報酬率，迎接ROI大革命

*Return on Information*

## 電信業 – 使用情境

- 提升系統即時處理能力、帳務系統即時運算來確保營收
- 即時預測客戶群的流失，以提供更好的促銷活動
- 即時的詐欺行為偵測
  - 詐騙簡訊防範、大量網路訊息推撥
- 即時情境偵測促銷
  - 地理位置為基礎的促銷
  - 瀏覽網站行為分析促銷
- 即時網路和語音設備流量監控



Real-Time 商機





# Asian Telco reduces billing costs and improves customer satisfaction

## Capabilities Utilized

- *Stream Computing*
- *Analytic Accelerators*

## Results

- Real-time mediation and analysis of **5B CDRs per day**
- Data processing time reduced from **12 hrs to 1 min**
- **Hardware cost reduced to 1/8<sup>th</sup>**
- Proactively address issues (e.g. dropped calls) impacting customer satisfaction





# Major U.S. Wireless Telco Increases Revenue and Improves Customer Satisfaction

## Capabilities Utilized

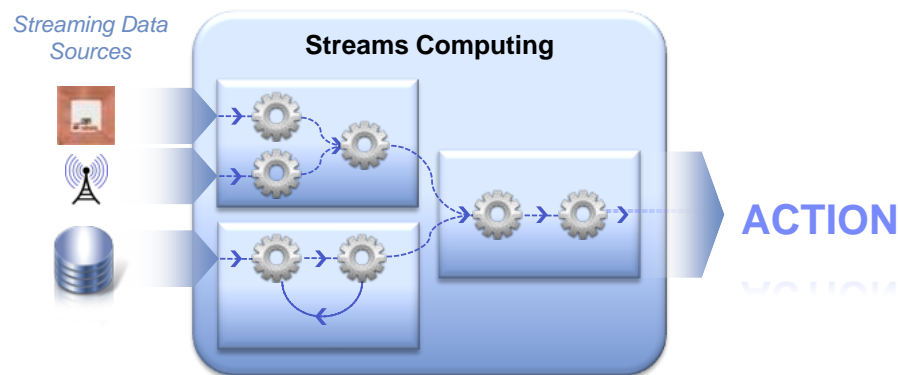
- *Streams*
- *Hadoop System*
- *Data Warehouse Analytics Appliance*
- *IBM Pure Data for Analytics*

## Results

- **Over 90% reduction** in time to merge/load call record data
- **Over 90% reduction** in storage
- **Increased network quality, improved customer satisfaction, reduced churn**

# 電信業 – 效益

- 電信業者透過 **Streams** 實作出一套處理與分析通聯資訊、網路使用資訊與文字服務資訊 (xDR) 的即時解決方案
  - 降低 **91%** 於合併不同來源與格式資訊的處理時間
  - 降低 **92%** 於載入大量資訊的時間 (從原先 **95 分鐘** 降低至 **8 分鐘** 完成)
  - 降低 **93%** 的儲存空間需求
  - 降低 **85%** 的伺服器使用需求與採購成本
- 電信業需要一套能分析每秒 **25M** 資訊的解決方案，**In-motion** 分析是唯一能滿足此需求的選擇
  - 即使未來資訊量將大幅度成長，**InfoSphere Streams** 仍能提供趨近於線性成長的擴充性
  - “Streams handled at least an order of magnitude **more events per second on the same hardware than competitors.**” (Telco’s Chief Architect)





# 案例分享 – 製造業



顛覆企業傳統ROI

資訊革新論壇 *Return on Information*  
**The New ROI**

資訊創造報酬率，迎接ROI大革命

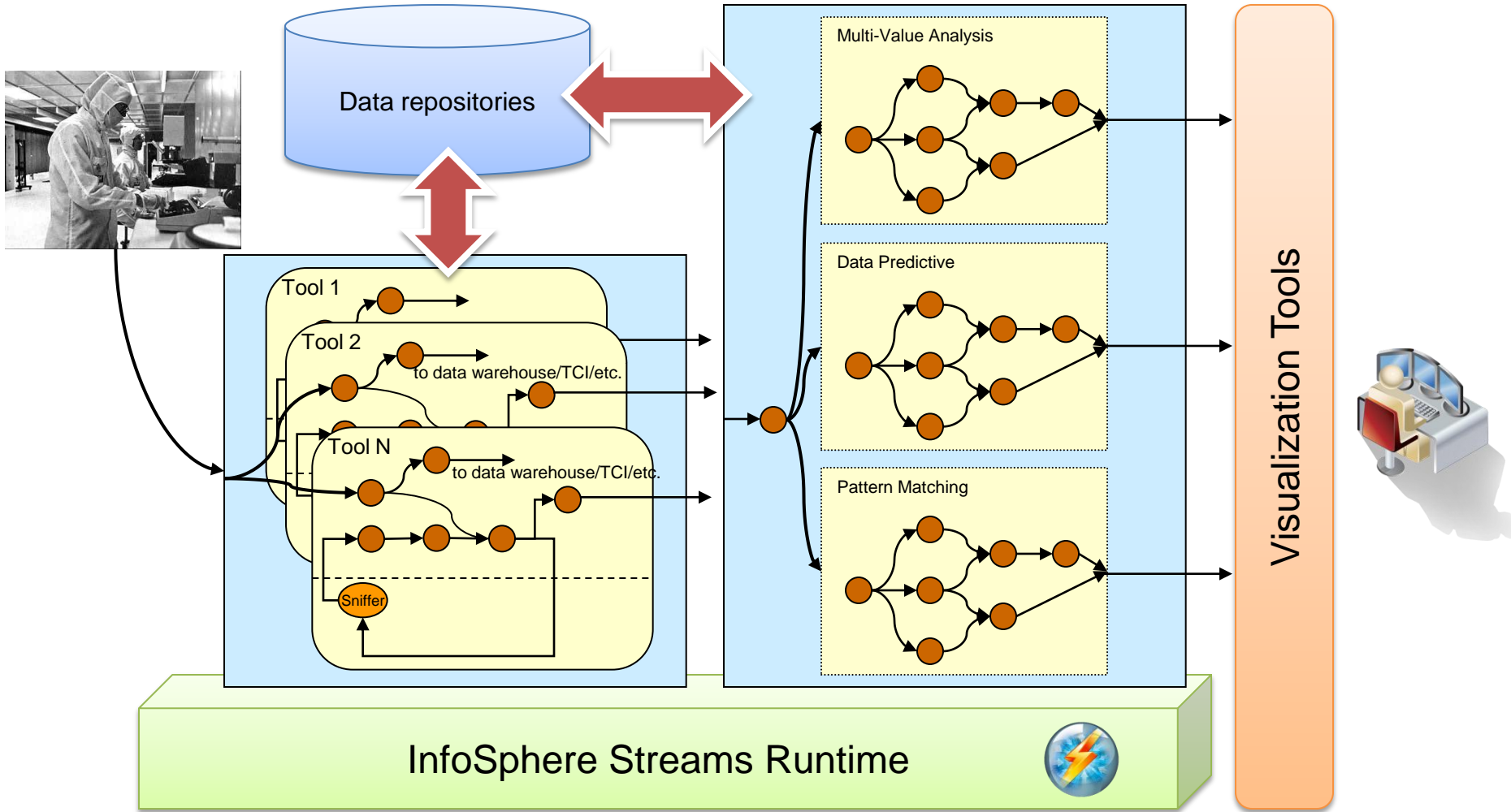
# 製造業 – 契機與挑戰

## 透過分析生產製造機台的 Raw Data 以提升製造生產良率

- 複雜且大量的即時機台流程與 Sensor 資訊
- 橫跨各處理步驟的關聯性分析
- 同時多變量分析
- 預測生產製造結果，即時預測良率

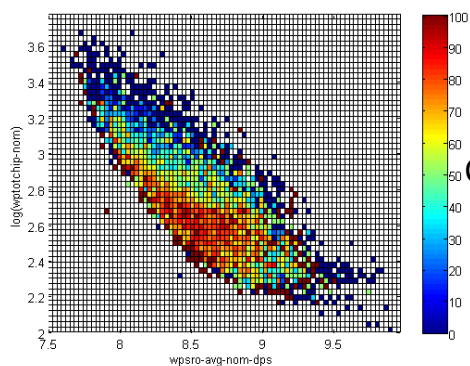


# 製造業 - 系統架構概念

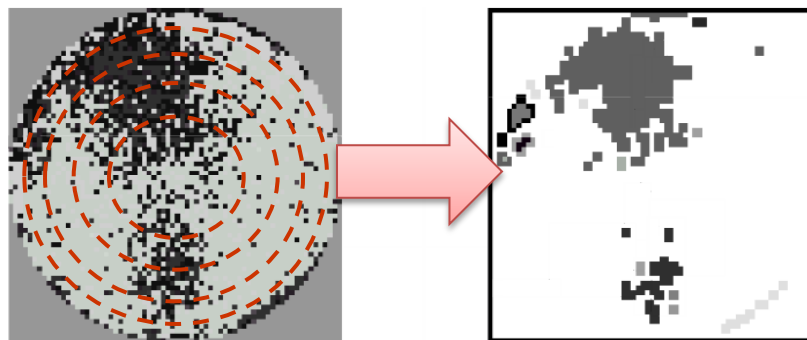
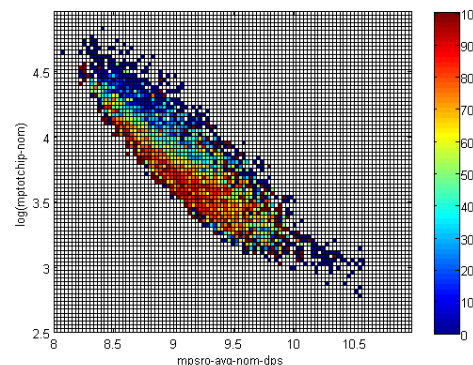


# 製造業 – 效益

- 生產良率預測
  - 50% 的預測資料達到 90% 的精準度
  - 找出 10% 可預測的生產參數，以最佳化預測結果



Correlation across tests ⇒ prediction possible



顛覆企業傳統ROI

資訊革新論壇 *The New ROI*

資訊創造報酬率，迎接ROI大革命

*Return on Information*



# 案例分享 – 金融服務



顛覆企業傳統ROI

資訊革新論壇 *Return on Information*  
**The New ROI**

資訊創造報酬率，迎接ROI大革命

## 金融服務 – 挑戰與契機

- 投資市場的變化快速
- 即時分析與反應交易市場的需求
- 擷取多來源資訊並即時分析市場資訊，以反應投資策略並降低投資風險



顛覆企業傳統ROI

資訊革新論壇 *Return on Information* **The New ROI**

資訊創造報酬率，迎接ROI大革新



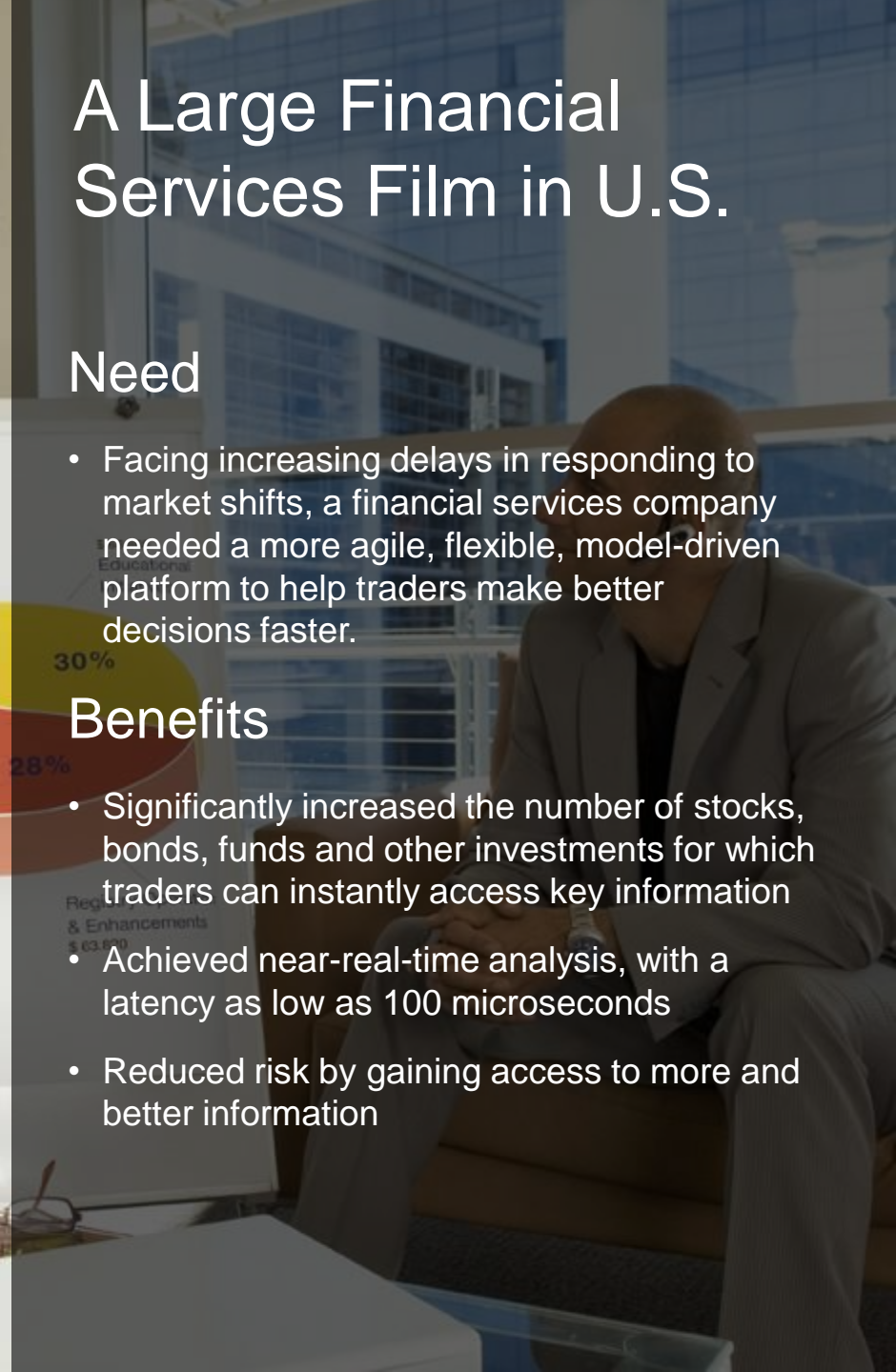
# A Large Financial Services Firm in U.S.

## Need

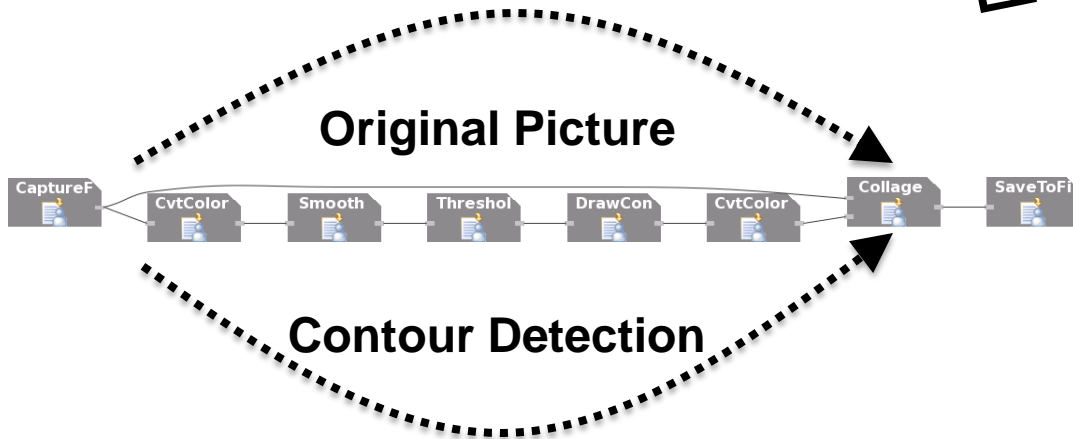
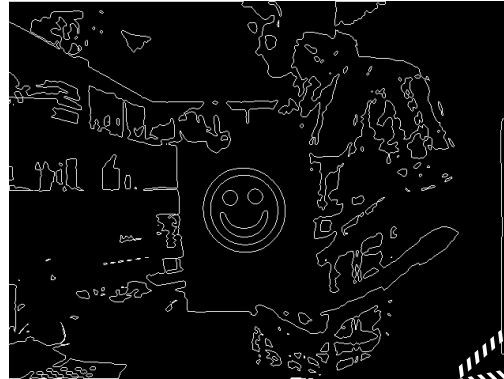
- Facing increasing delays in responding to market shifts, a financial services company needed a more agile, flexible, model-driven platform to help traders make better decisions faster.

## Benefits

- Significantly increased the number of stocks, bonds, funds and other investments for which traders can instantly access key information
- Achieved near-real-time analysis, with a latency as low as 100 microseconds
- Reduced risk by gaining access to more and better information



# 影像輪廓偵測



[Application]  
contours

[Program]

```
vstream IplImage(channels: Integer,
  depth: Integer,
  origin: Integer,
  width: Integer,
  height: Integer,
  data: ByteList)
```

```
stream vid(schemaFor(IplImage))
  := CaptureFromFile( ) [file: "$ENV{HOME}/demo3.m4v"; repeat:1] { }
  -> partition["P1"]
```

```
stream bw_vid(schemaFor(vid))
  := CvtColor(vid) [ ] { data := ~CV_BGR2GRAY() }
  -> partition["P1"]
```

```
stream smooth_bw_vid(schemaFor(vid))
  := Smooth(bw_vid) [iteration: 4] { }
  -> partition["P1"]
```

```
stream th_vid(schemaFor(vid))
  := Threshold(smooth_bw_vid) [max:255; threshold:125] { data := ~CV_THRESH_TOZERO( ) }
  -> partition["P1"]
```

```
stream cntr(schemaFor(vid))
  := DrawContours(th_vid) [ ] { }
  -> partition["P1"]
```

```
stream cntr_rgb(schemaFor(vid))
  := CvtColor(cntr) [channels:3] { data := ~CV_GRAY2BGR( ) }
  -> partition["P1"]
```

```
stream src_n_cntr(schemaFor(vid))
  := Collage(vid; cntr_rgb) [ ] { }
  -> partition["P1"]
```

```
Nil
  := SaveToFile(src_n_cntr) [filename: "$ENV{PWD}/demo3-out.mp4"; rate:15; fourcc:"fmp4"] { }
  -> partition["P1"]
```



**THINK**

**BIG**

**BIG**