In-Motion Analytics with InfoSphere Streams

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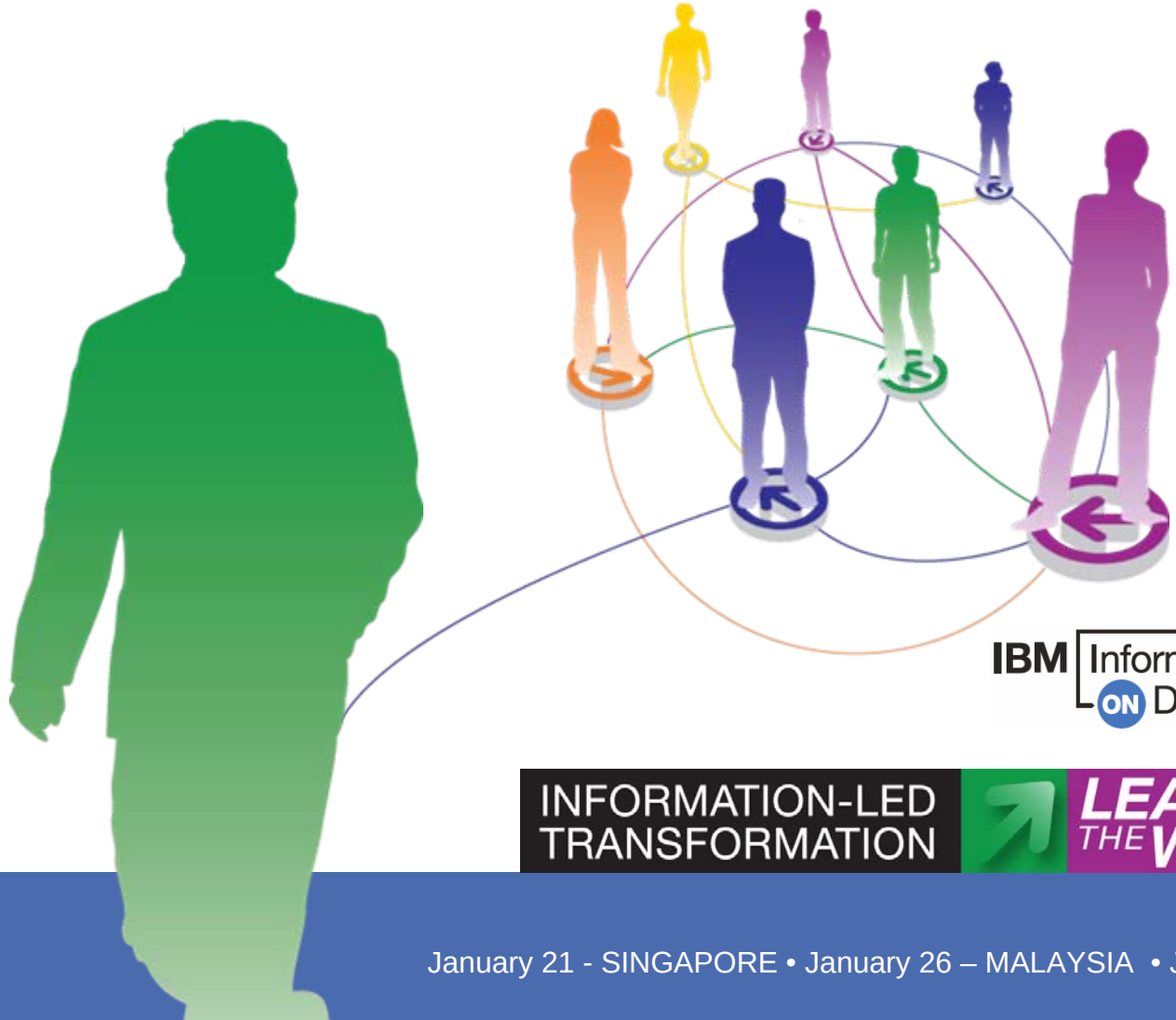


IBM Information On Demand 2010

INFORMATION-LED TRANSFORMATION LEAD THE WAY

Agenda..

- What
  - What is the need for Stream Computing?
  - What is meant by Stream computing?
- How
  - How is it different from existing technologies?
  - How does it ‘fit’ within existing information infrastructure?
  - How does it work?
- Where
  - Where is it currently deployed (references / use cases etc)?
  - Where to get further information?

What is driving the need for Real Time Analytic Processing

Volume

Variety

Velocity

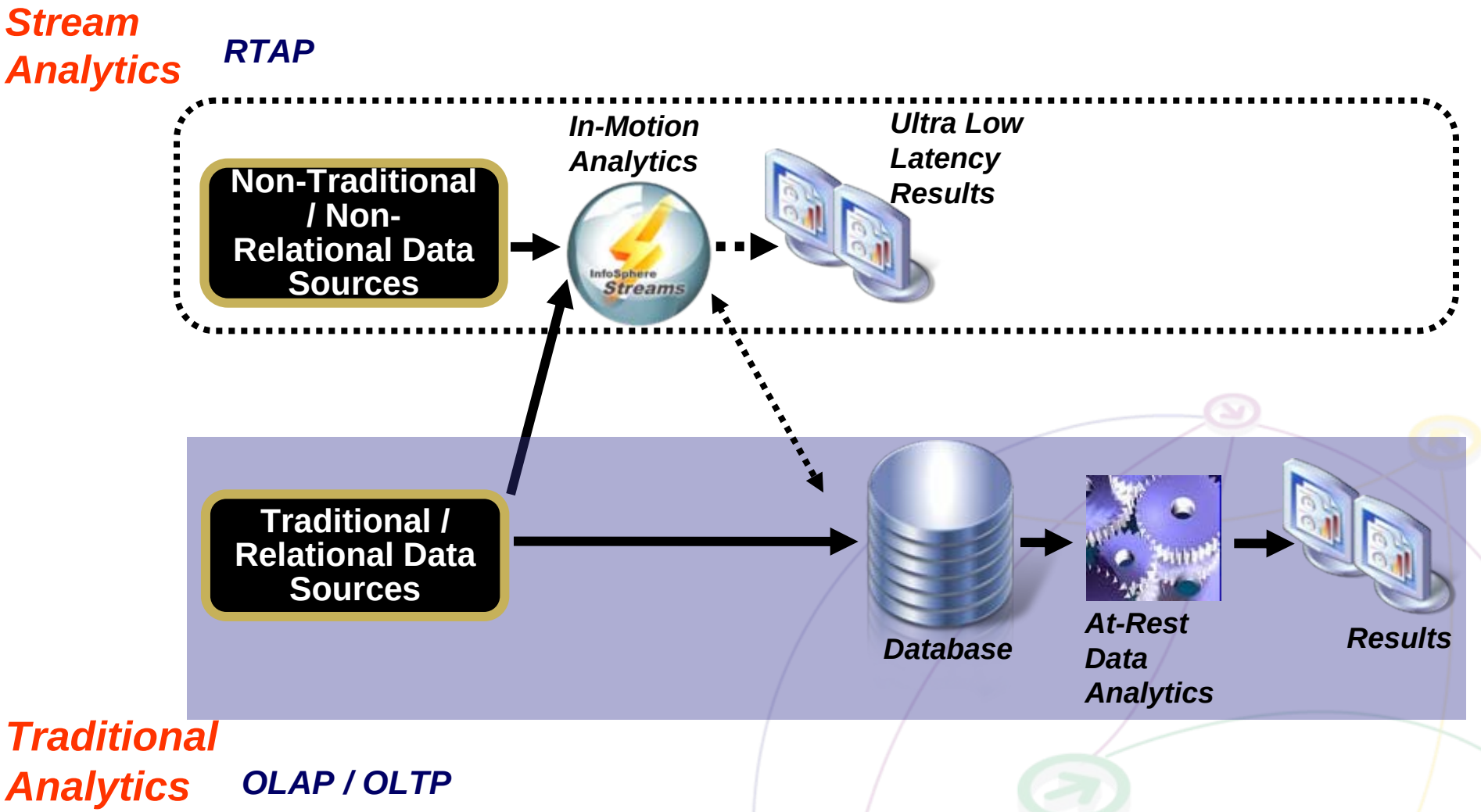
Where incremental innovations is insufficient…

When incremental improvement is impractical....

Invention is required

To match with performance of Blue Gene with traditional technology, the servers would occupy the space of several stadiums and required the power of a nuclear power plant.

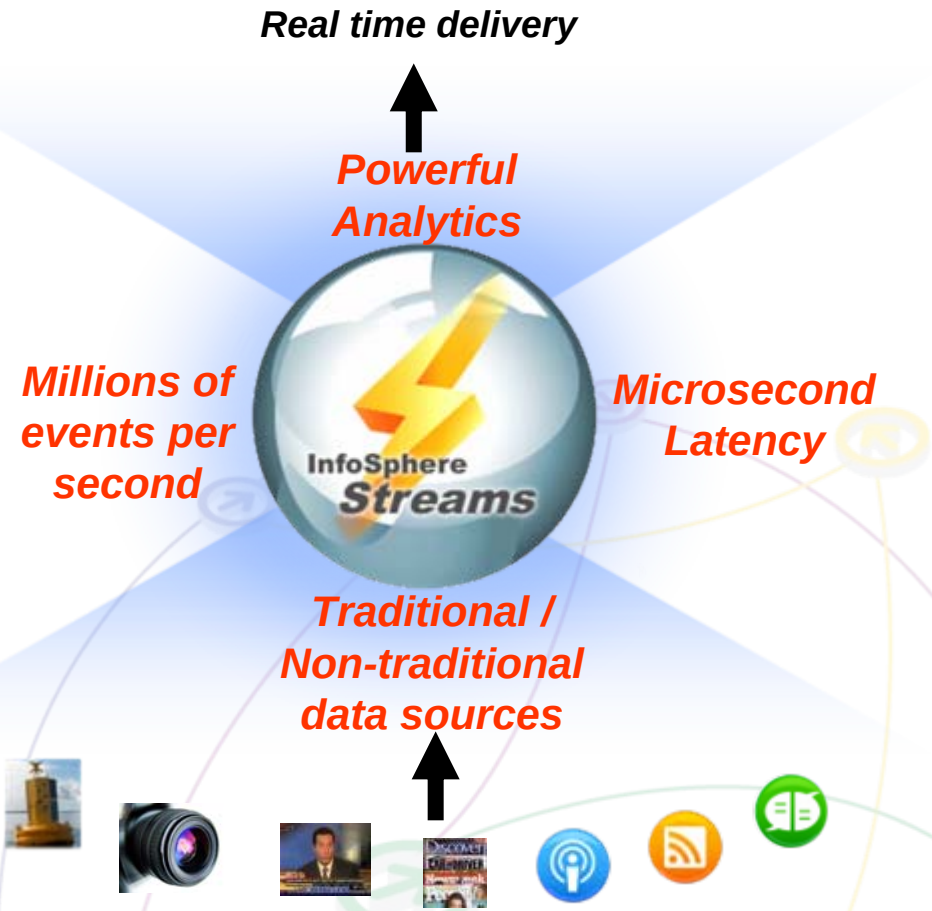
In-Motion Vs Traditional Analytics



Delivering 'Continuous Intelligence' with Powerful Analytics

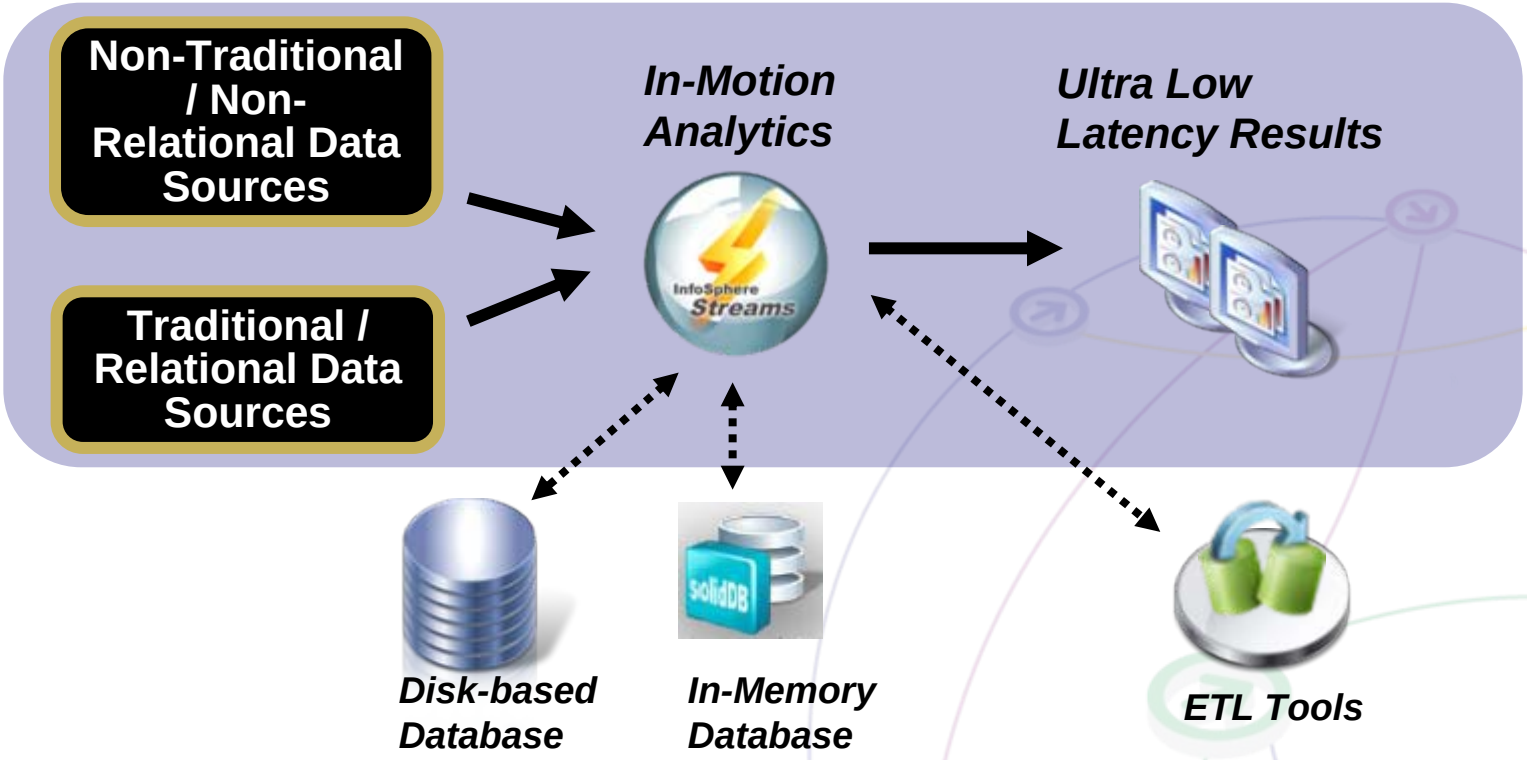
First of a Kind Security Trading application at TD Securities:

- *Peak throughput of 5 million messages per second*
- *Average end-to-end latency of 150 micro seconds*



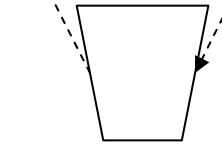
Streams also enables efficient Integration with Stored Data

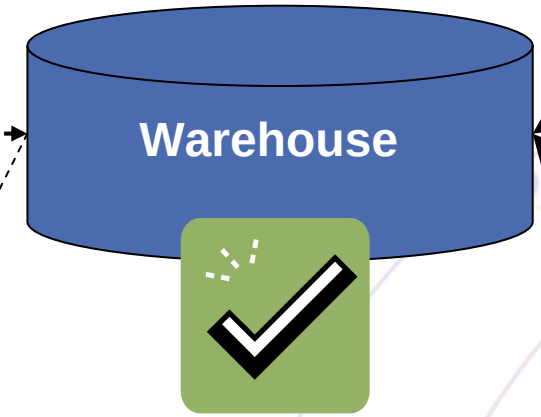
- Integration enables enrichment and persistence
- Support for disk based databases and in-memory databases like solidDB
- Supports standard JDBC/ODBC connect as well as Solid Accelerator API

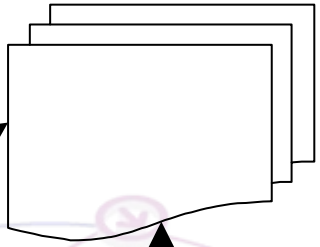


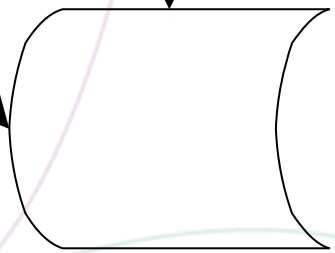
The need for Streams – a simple example

Business need: a retailer wants to do near real time analytics (on live POS transactions for the purpose of cross-sell and up-sell.









Past Transactions

Current Promotions

<20 seconds

The need for Streams – a simple example

But, what if you wanted to add a lot more inputs (real time, non-traditional)??

- Live Weather
- Live Traffic
- How crowded it is ?
- Data from other stores
- TV News
- Stock Market
- Industry Source Data

Past Transactions

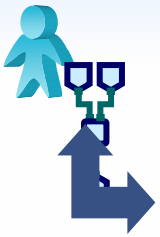
Current Promotions

<20 seconds

Traditional Information Architecture

Hours to days!

Business Intelligence



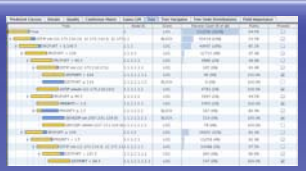
Incoming Data

Tekelec's 7000 Class 5 Packet Switch

Operational data

- Collection
- Cleansing
- Transforming

Business logic



Data warehouse

Data mining Warehouse

Adding Stream Processing…

Context

GPS Location, Transactions, Personal Health Monitor etc.

Incoming Data

Operational Data

Real-time Services

Data Mining Scoring Engine

Data summaries

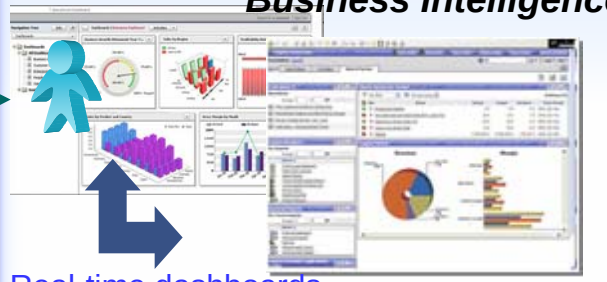
Online Monitoring

Online Learning with Offline Analytics

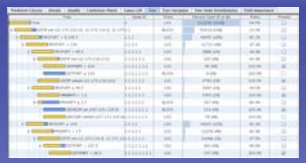
Collection
Cleansing
Transformation

Network Monitoring

Business Intelligence



Real-time dashboards



Data warehouse

Data mining Warehouse

IBM InfoSphere Streams v1.2

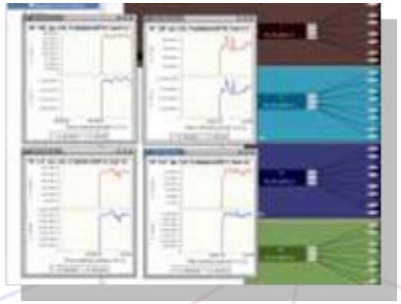
Development Environment

- Eclipse based IDE
- StreamSight
- Stream Debugger

Runtime Environment

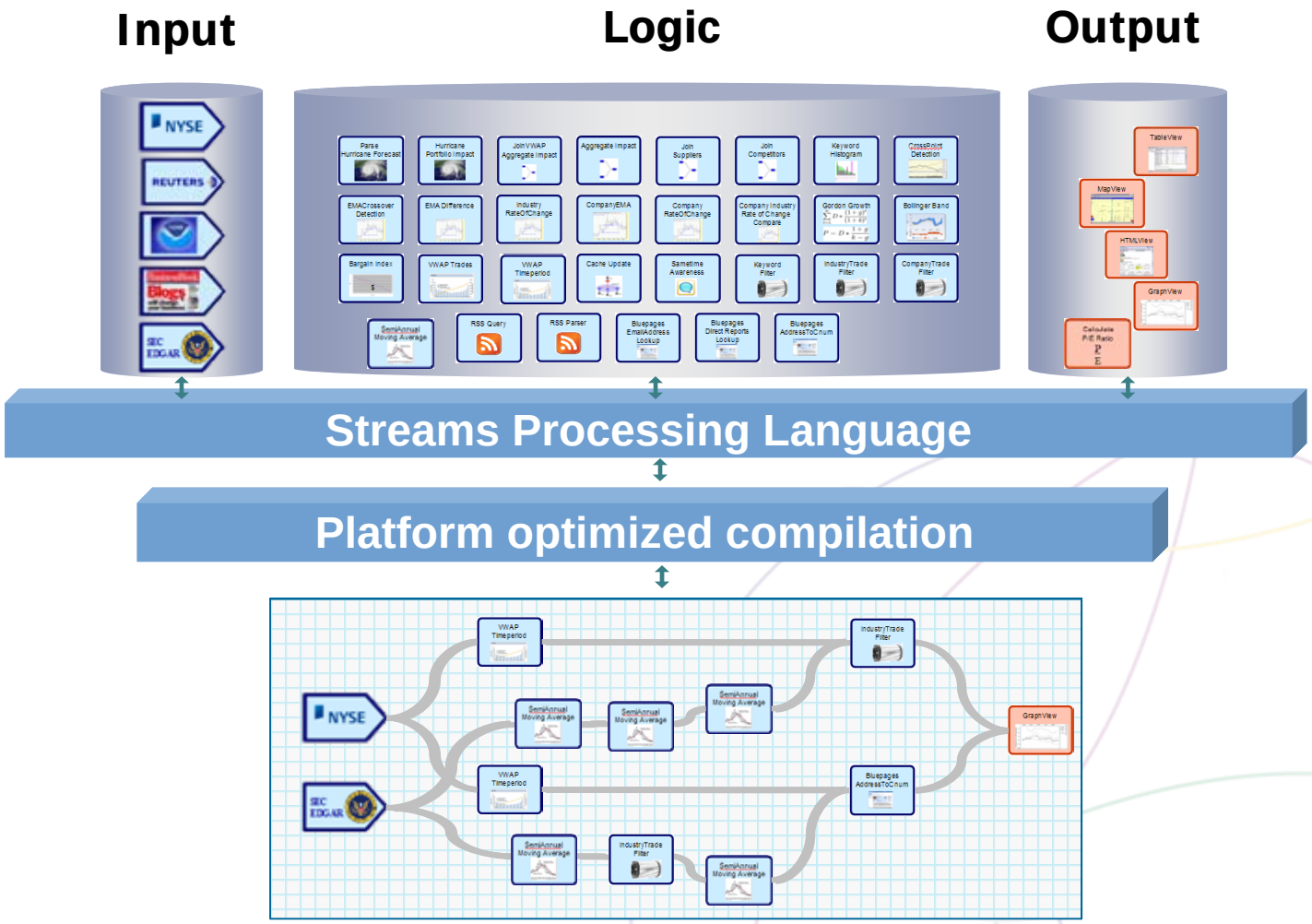
- RHEL v4 or v5
- SELinux
- x86 multicore hardware
- Up to 125 servers

Toolkits & Adapters

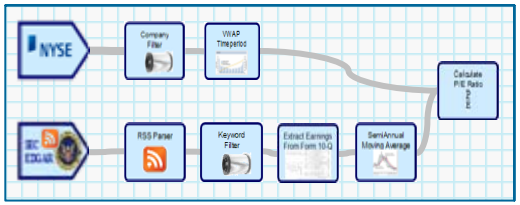


- Financial Analytics Toolkit
- Connectors to data sources
- Math and Text functions
- Operator Library

Streams Programming Model

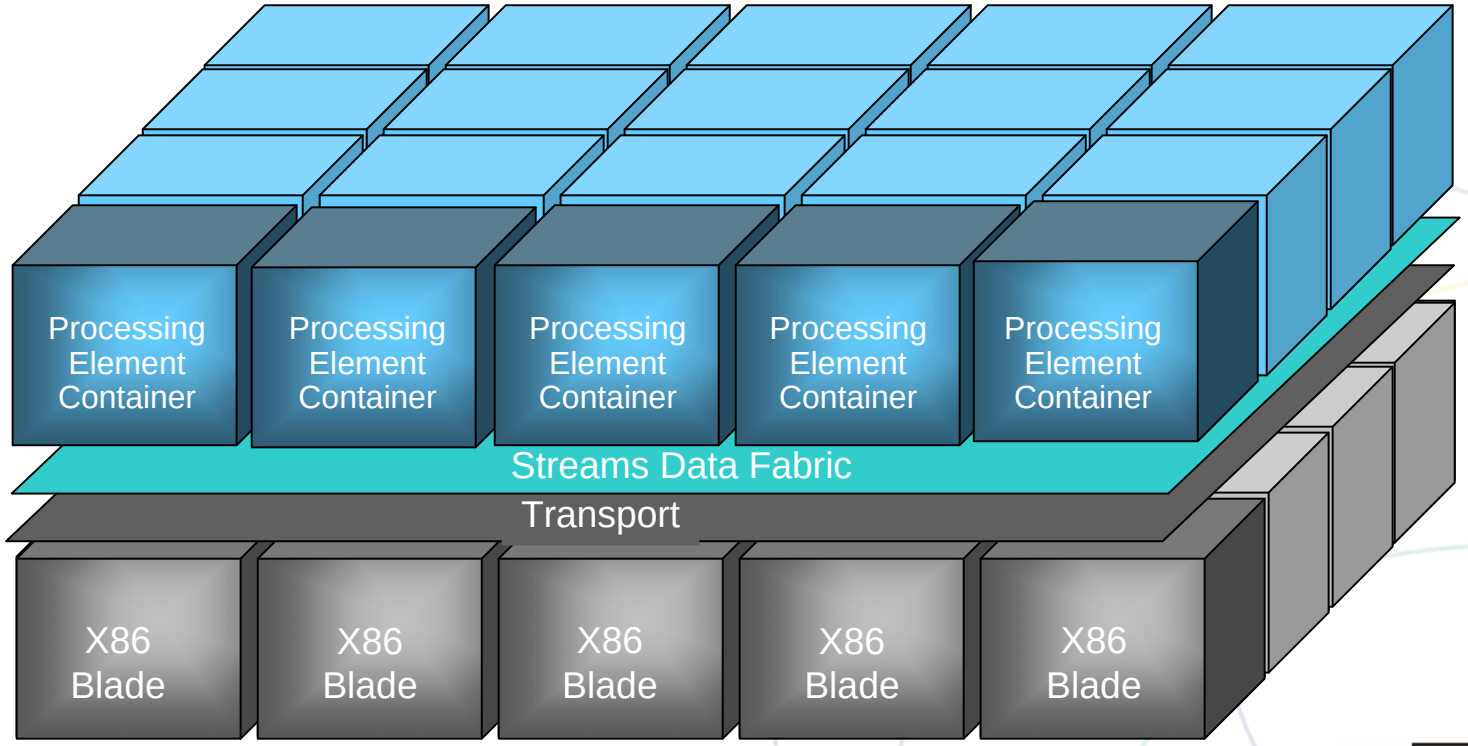


Streams Runtime Illustrated



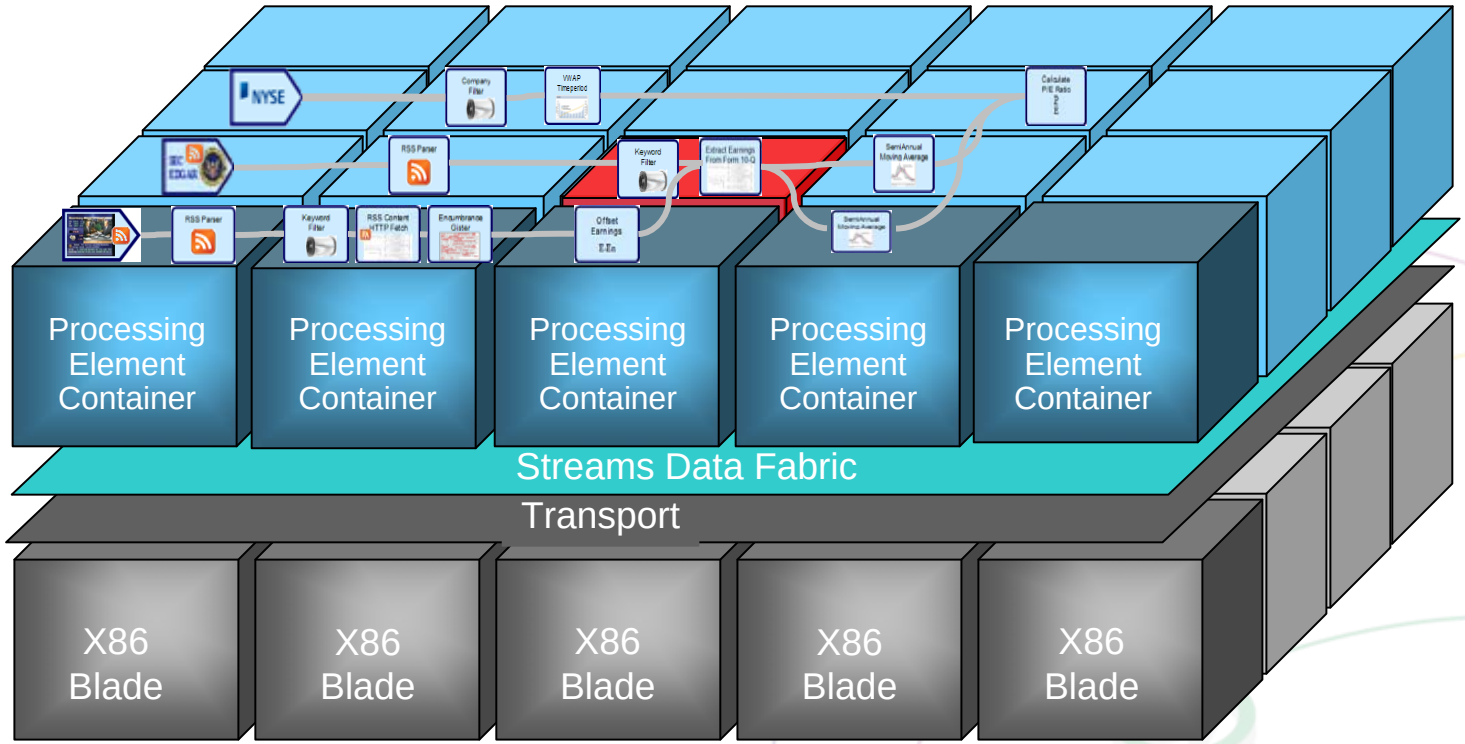
Optimizing scheduler assigns operators to processing nodes, and continually manages resource allocation

Runs on commodity hardware – from single node to blade centers to high performance multi-rack clusters



Streams Runtime Illustrated

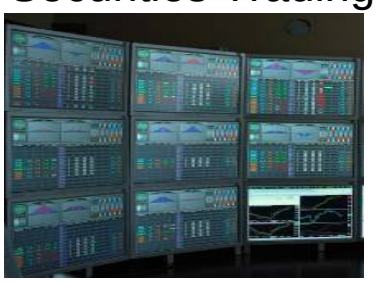
Can adapt to changes in resources, workload, data rates



‘Smart’ applications are fast emerging

Healthcare

Securities Trading



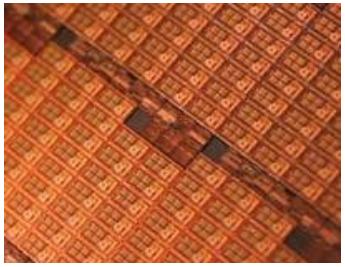
Environment

Law Enforcement

Radio Astronomy

Telecom

Manufacturing



Smart Traffic

Smarter Utilities

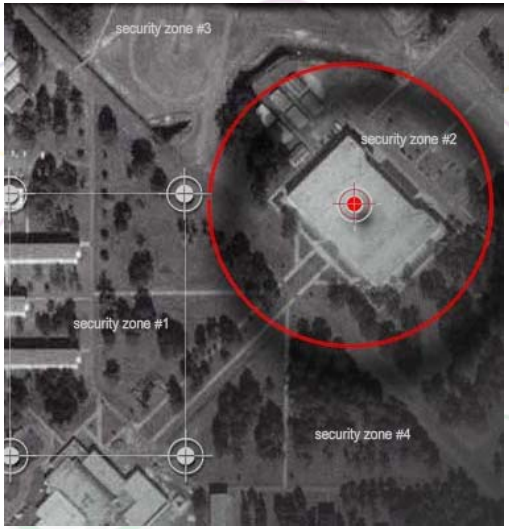
Telecom

- Real Time CDR Processing
- Real Time Geo Spatial analysis
- Applications:
  - Churn Prediction
  - Profitability Management
  - Real Time Promotions
  - Misuse and theft prevention
  - Value add services

Smarter Surveillance and Intrusion Detection

TerraEchos

- State-of-the-art surveillance system for US Navy based on Streams platform
- Acoustic signals from buried fiber optic cables are monitored, analyzed and reported in real time for necessary action
- Currently designed to scale upto ‘000s of parallel streams of raw binary data



Predictive Analytics using InfoSphere Streams in a neo natal ICU helps detect life threatening conditions upto 24hrs earlier

- Real Time analytics and correlations on physiological data streams
  - *Blood pressure, Temperature, EKG, Blood oxygen saturation etc.,*
- Early detection of the onset of potentially life threatening conditions
  - *Upto 24 hours earlier than current medical practices*
  - *Early intervention leads to lower patient morbidity and better long term outcomes*
- Technology also enables physicians to verify new clinical hypotheses

UOIT
CHALLENGE INNOVATE CONNECT

‘World’s fastest’ options trading prototype

TD Bank Financial Group

- Identify and execute trades
- Process over 5M events per second with average latency of 150 microseconds
- Expand to incorporate content feeds, news text, audio, video, to establish greater context for better decisions

CIO TD Bank ***"TD Bank Financial Group worked with IBM Research to develop a first-of-a-kind architecture capable of consuming, analyzing and acting on real-time market data while maintaining sub-millisecond response times even under extreme data loads”***

What are analysts saying??

InfoSphere Streams Is A Game Changer

The future is here and it might be time to re-think the way we do business... by joining the stream.

IBM InfoSphere Streams Elevates CEP for Operational Intelligence

Q/A Session

Back Up

Real Time Marine Mammal Position and Behavior Modeling

Analytics & Sensors

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InfoSphere Streams

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Advanced Acoustical Analytics

=

- Filter wind & wave noise
- Model Marine Mammal environment
- Correlate to Galway Bay ecosystem

IBM

Marine Institute

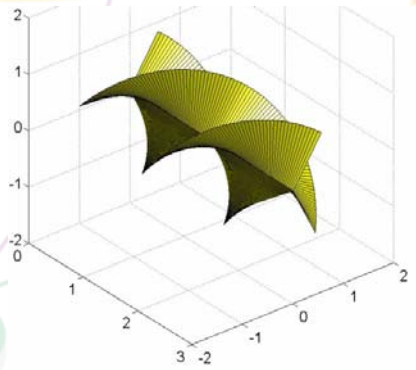
Real Time Detection and Management of Wildfires

- **Wildfire Management application**
  - Realtime US map of wildfire risk
  - Detect wildfire smoke
  - Task NOAA satellite and NASA UAV to monitor wildfire
  - Generate health alerts

‘Nowcasting’ Solar Storms: Swedish Institute of Space Physics

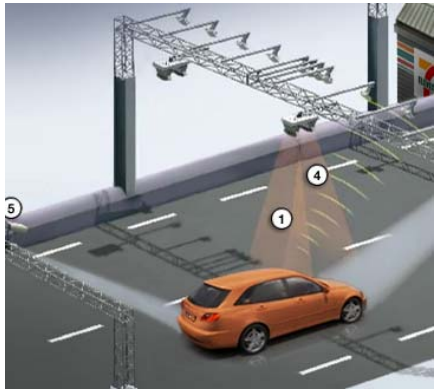
- **Harmful effects of Solar storms**
  - Electric Grid failures
  - Communication signal failures
  - Other biological effects..

- **8GB/Sec from each antenna needs to be analyzed**
  - Total = 1.3TB/sec and growing
  - Data Storage is not an option



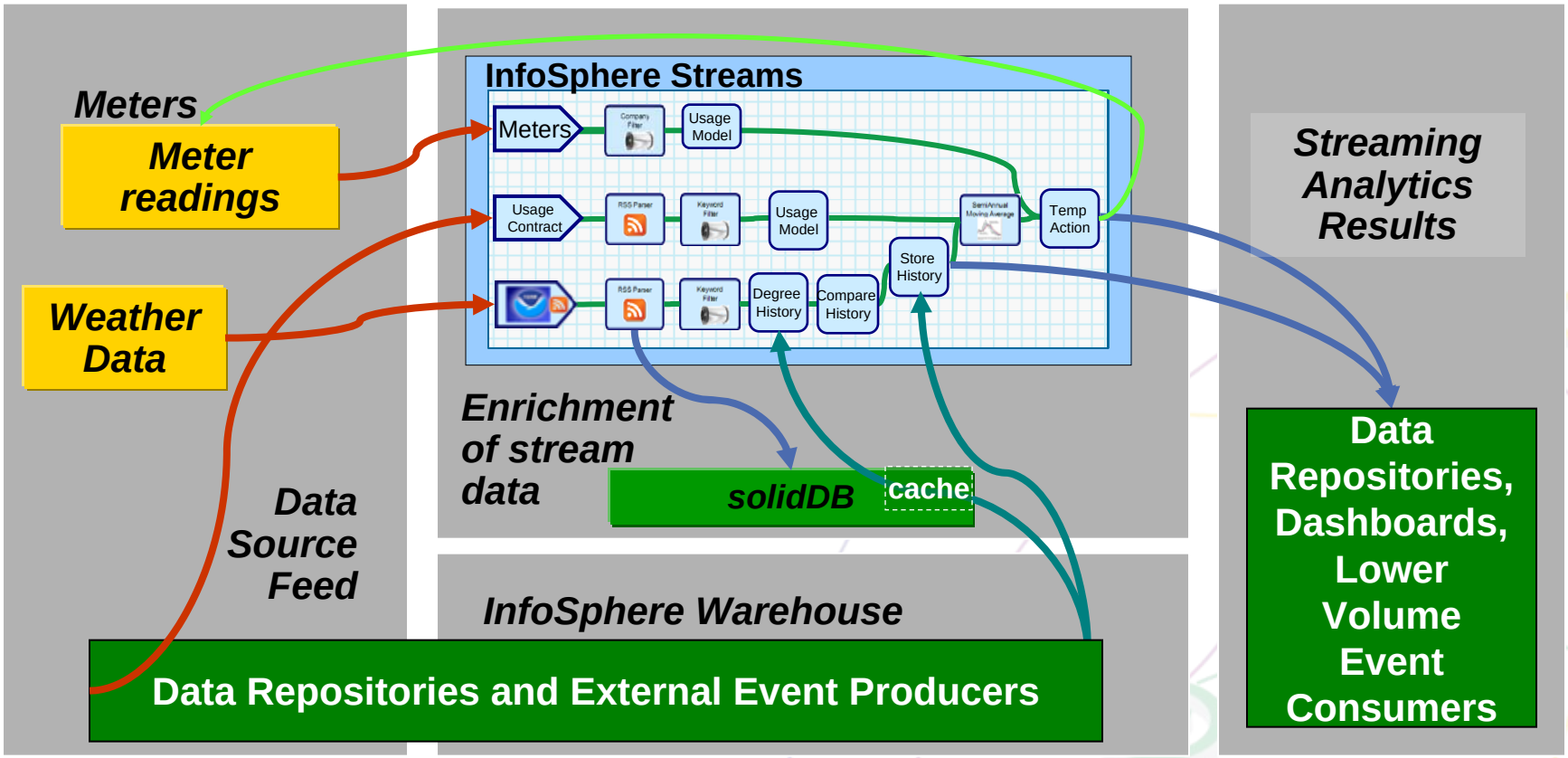
Traffic Control System in City of Stockholm: Version 2.0

- Data sources
  - GPS from 1000's taxis
  - Loop Sensors
    - Speed of traffic
    - Flow – density of traffic (cars per second)
  - CCTV video inside tunnels
  - Real Time Weather data
- Output
  - Travel time forecasts
    - Via SMS
    - Now, In 30 minutes, 1 hour, 2 hours etc
- Integrate with existing system



Smarter utilities

- Analysis of data from multiple sources
- Realtime decisions – lower voltage on high degree days

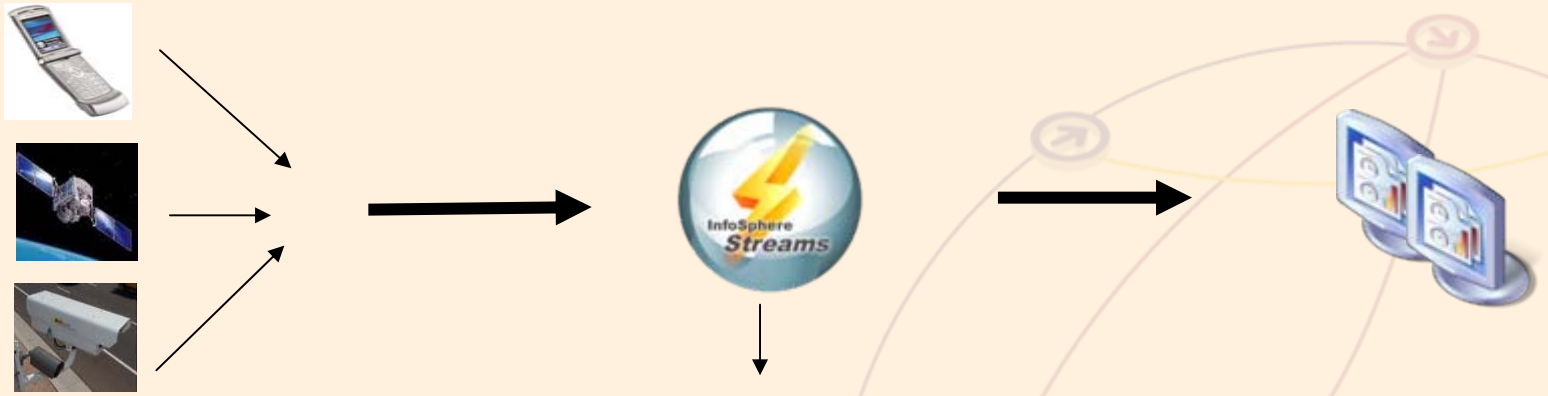


Government and Law Enforcement: e911 Support

Data from 911 calls, satellite feeds, imagery from city traffic cameras

Streams defines the geo spatial location of the call by running powerful analytics in real time using satellite communication link and draws in city camera feeds from around the area

Real time support for 911 dispatcher and field personnel



Data stored for future auditing and evidence requirements