Python & Finance: US Gov Mandates, Financial Modeling, and Other Snakes in the Grass

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Premise

• “Open” Gov’t Data needs “Open” Tools

• Tool Vendors need Open Source technologies
  – Expedite delivery of consumption tools to market
  – Ensure consistency in interpretation of the data
  – Ensure equal access to tools across the supply chain

• Open Government Data Case Study :
  – Financial Content at US SEC
• Disclaimer:
  – I am not an accountant, a regulator, a quant or a statistician, I will talk about financial content in lay terms
  – I am an open standards geek, a dynamic languages evangelist and an open data advocate
Full Disclosure

• Furthermore,
  – I work for ActiveState
    • Dynamic language Experts
  – I sit on the XBRL-International Steering Committee
    • More on that later
  – And I tweet with multiple personalities..
    • @activestate, @pythondj and @xbrlspy
    • So follow me at your own risk..
So what is eGov?

- the way in which government has to adapt itself to a world in which most people regularly use the internet.
  - [http://poit.cabinetoffice.gov.uk/poit/](http://poit.cabinetoffice.gov.uk/poit/)
Motivation

transparency and engagement
  holding government accountable and promoting choice
  by informing citizens

efficiency and enhanced public services
  enabling re-use of information within the public sector

innovation and economic growth
  encouraging and supporting data-driven innovation

January 2009

- President Obama issued a memo on transparency directing his top officials to develop plans for an Open Government Directive to promote transparency, participation, and collaboration.
Growing availability of Open Gov Data

- US, UK, Australia, Netherlands, Denmark, Sweden, Spain ...
- Washington, Madrid, London, Vancouver, ...
Sharing is Caring, but
Publishing Data on Data.Gov

- XML
  - Industry, agency, project-specific
- PDF
- RDFa
- Shape
- Excel
Unraveling Open Data

• It’s more than just documents for people to read
• Need to enable machines to
  – traverse, aggregate, analyze, answer
• Tim Berners-Lee's vision of a “Semantic Web”
  – "Semantics", "Ontologies”
  – RDFa, Linked Data
More Context

• Open government data is a reality
  – “Open” doesn’t necessarily mean:
    • “Equal Access”
    • “Free”
    • “Transparent”

• Semantic Web is a vision
  – Should be nurtured, supported and encouraged

• But we’re in the middle of a Financial Crisis
  – We need to work with the tools we have now
But what if the data isn’t enough

• A little structure goes a long way if you combine it with
  – A human being with a lot of intelligence/domain knowledge
  – (tools, protocols, means of communication)
  – (browser, http, share)

• Complex legalese in Filings & Prospectuses
  – Logic embedded in them needs to be interpreted
Financial Content @ US SEC

A Case Study in 2 Phases

Part 1: Lessons Learned the hard way
Where were you in 1998?
Purpose of XBRL

- XBRL provides users with a standard format in which to prepare reports that can subsequently be presented in a variety of ways.
- XBRL provides users with a standard format in which information can be exchanged between different software applications.
- XBRL permits the automated, efficient and reliable extraction of information by software applications.
- XBRL facilitates the automated comparison of financial and other business information, accounting policies, notes to financial statements between companies, and other items about which users may wish make comparisons that today are performed manually.
What is XBRL?

**Label**
- cash
- CashEquivalentsAndShortTermInvestments

**Calculation**
- Cash = Currency + Deposits

**Presentation**
- US $
- FY2004
- Budgeted

**References**
- GAAP I.2.(a)
- Instructions
- Ad Hoc disclosures

**Formulas**
- Cash ≥ 0

**Contexts**
- Comptant et Comptant
- Equivalents
- Geld & Geld nahe Mittel
- Kas en Geldmiddelen
- 现金与现金等价物
- 現金及び現金等価物
- Деньги и их эквиваленты
- Гроші та їх еквіваленти

**Standardization**

**Validity**

April, 2009
Why did XBRL make sense for US SEC?

- *Responsible* Publishing of data
- *Easier* for people to consume financial data
- *Solve* some snags other approaches miss
10 years later:

US SEC RSS feeds the SEC web site:

- **http://www.sec.gov/Archives/edgar/usgaap.rss.xml** — This is a list of the most recent 100 Interactive Data documents submitted under the "Interactive Data to Improve Financial Reporting" rule (Release No. 33-9002) using US GAAP as the base taxonomy, **updated every 10 minutes**.

- **http://www.sec.gov/Archives/edgar/xbrlrss.xml** — This is a list of the most recent 100 XBRL documents in support of the Interactive Data Voluntary Program (Release No. 33-8529) using US GAAP as the base taxonomy, **updated every 10 minutes**.

- **http://www.sec.gov/Archives/edgar/xbrl-rr-vfp.rss.xml** — This is a list of the most recent 100 documents in support of the Extension of Interactive Data Voluntary Reporting Program on the EDGAR System to Include Mutual Fund Risk/Return Summary Information (Release No. 33-8823), **updated every 10 minutes**.

- **http://www.sec.gov/Archives/edgar/xbrl-rr.rss.xml** — This is a list of the most recent 100 Interactive Data documents submitted under the "Interactive Data for Mutual Fund Risk/Return Summary" rule (Release No. 33-9006) using RR 2010 as the base taxonomy, **updated every 10 minutes**.

- **http://www.sec.gov/Archives/edgar/xbrlrss.all.xml** — This is a list of up to 100 of all the latest filings containing XBRL tagged data, **updated every 10 minutes**.
It’s still a black box world

- Processing Financial Content
  - Requires specialized tools
  - proprietary processors
- Business Decisions are all about timing
  - Access to data to make decision that happen in *nano* seconds
  - driven by algorithmic, computerized trading.
Lesson Learned in First Phase: Open Data at US SEC

- Appearance of transparency
- Granting of Access was insufficient
- No Open Standard API for XBRL available (yet)
- Asynchronous access to data (latency)
Financial Content @ US SEC

A Case Study in 2 Phases
Leveraging Existing Open Technology
Off to the Next Crisis


Enter the Financial Ninjas

http://benbittrolff.blogspot.com/2008_12_07_archive.html
SEC Proposes Rules to Increase Investor Protections in Asset-Backed Securities

FOR IMMEDIATE RELEASE
2010-54

Washington, D.C., April 7, 2010 — The Securities and Exchange Commission today proposed rules that would revise the disclosure, reporting and offering process for asset-backed securities (ABS) to better protect investors in the securitization market.

Additional Materials

- Proposal on Asset-Backed Securities
- Submit comments on this proposal
- View comments received for this proposal

The proposed rules are intended to provide investors with more detailed and current information about ABS and more time to make their investment decisions. The proposed rules also seek to better align the interests of issuers and investors by creating a retention or "skin in the game" requirement for certain public offerings of ABS.

"The rules we are proposing stem from lessons learned during the financial crisis," said SEC Chairman Mary L. Schapiro. "These revise the regulatory regime for asset-backed securities to protect investors."

Asset-backed securities are created by buying and bundling loans — such as residential mortgage loans, commercial loans or student loans — and creating securities backed by those assets, which are then sold to investors. Often, a bundle of loans is divided into separate securities with different levels of risk and returns. Payments on the loans are distributed to the holders of the lower-risk, lower-interest securities first, and then to the holders of the higher-risk securities.

How a Deal Waterfall Works

- Imagine a bunch of bank accounts.
  - Cash can come in to the deal from various sources (mostly the collateral, but also interest on various balances, receipts from derivatives in the deal etc) and there are rules which say what cash goes into what account.

- For each account there is a waterfall that says how the money is paid out to various interested parties.

- The rules often include various trigger events which can change the order of priority of the payments etc.

- The whole thing is a state machine, but needs to be precise in every detail as generally once the deal is set up the trustees and managing agents have no discretion.

- They have to follow the script precisely as set out in the deal prospectus.

http://www.pylaw.org/demonstration.txt
The problem

- Industry participants have real problems deciding how the cash flow is allocated.
- This has very real settlement problems for holders of the securities and their custodians.
What the SEC asking for?

- Python code to document the waterfall model.
  - decision logic which determines the cash payouts made to all the securities attached to the a specific mortgage pool.
  - Depending on specific events the cash flows distributed to securities will change over time based on events occurring in the underlying portfolio.
- This is documented in the prospectus which can be > 600 pages of detailed legal language.
How Access to Financial Models helps..

- Anyone buying a Mortgage Backed Security needs to understand these documents to understand how changes in the mortgage portfolio will affect them.
- Today if you perform analysis on the mortgage portfolio,
  - you need to write a waterfall program to assess the impact on the security you own or plan to buy.
- There are proprietary analytic packages that do this, but to buy the model is expensive.
- In fact, the mortgage servicer will use this model to determine the cash flow every month.
- Having the model freely available means that these securities can be valued in a far more cost effective way.
  - You do not want to pay 100K USD for the model to find out the securities are fairly priced.
  - It also means you can run scenario’s on the portfolio and access the impact on the underlying securities in real time.
  - Even if the portfolio is trashed some securities may still come off fairly well.
- Today without a waterfall, it is hard for investors to price these securities which is probably one reason why the market of these securities is so illiquid.
Why Python makes sense for US SEC

- Open Freely Available now
- Available libraries for working with complex algorithms
  - Numpy, matplotlib
- Bindings exist for other proprietary numerical Financial libraries
- Already widely used for Financial Modeling
- Python is a very readable language.
- when coupled with the other proposal that detailed asset level data be also provided in machine readable (XML) format

If you build it, will they come?

• What’s Next?
  – Give Feedback to SEC Proposal

• What’s Missing?
  – Domain Expertise to build Consuming apps
  – Open Collaboration forums
    • Consuming Applications
    • Web Services
    • Open APIs
  – Funding to take the next steps
So why do you think nobody is building apps?

I don’t know, let’s hold a contest
What happens next ..

• Depends upon economics, politics, culture and technology
• Which could easily change in radical ways..
• Through an invention
• Through a insight into a practical application of an existing technology
Thank you

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ActiveState
The Dynamic Language Experts
We've got your universe covered!

6 Operating Systems
16 Architectures
+17,000 Packages/Modules
10 Major Language Releases