LIRIS

CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE UMR 5205

Anatomy of a Visualization-On-Demand Server

A Service Oriented Architecture to Visually Explore Large Data Collections

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INSA LYON

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Bio/Background

- LIRIS – *Information Systems & Image Laboratory*
  - **+280 researchers**
  - **Located in Lyon, France**
  - **More info: http://liris.cnrs.fr/**

- Project's areas of research:
  - **Information Visualization (Infovis)**
  - **Human/Computer Interactions (HCI)**
  - **Personalization**

- Project goal: ***Reusing user characteristics to build novel visual interactive environments.***

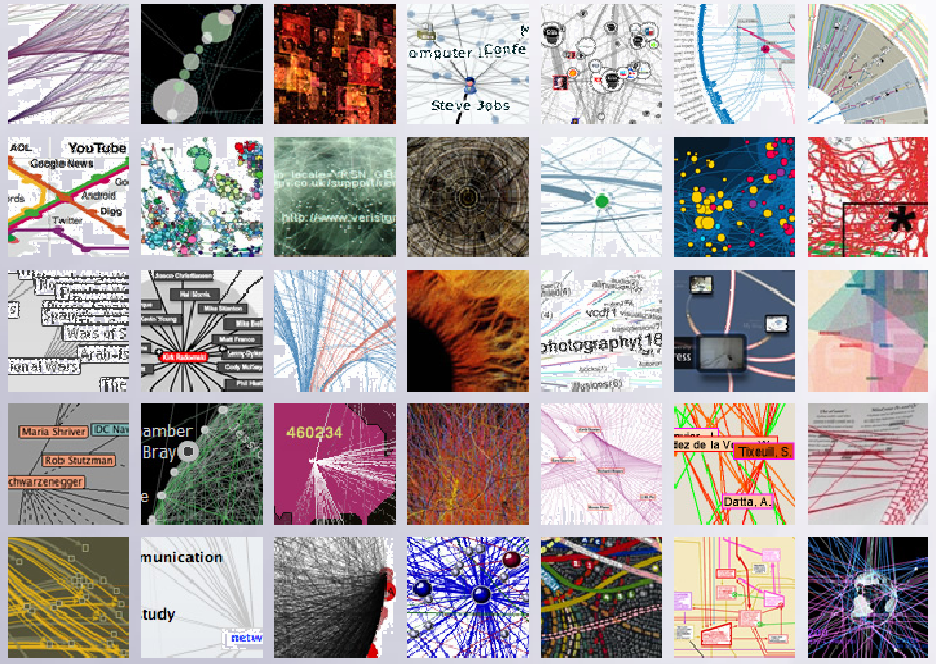
- Funded by French Ministry of Research 2006-2009

Context – **Infovis/HCI**

Producing (interactive) visual representations of abstract data to reinforce human cognition and perception

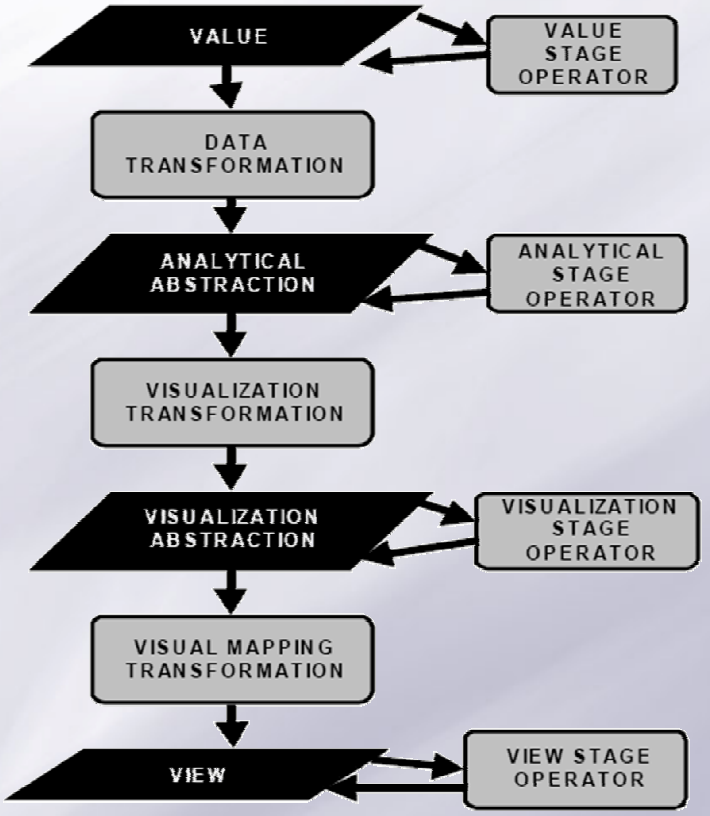
http://www.infovis-wiki.net/

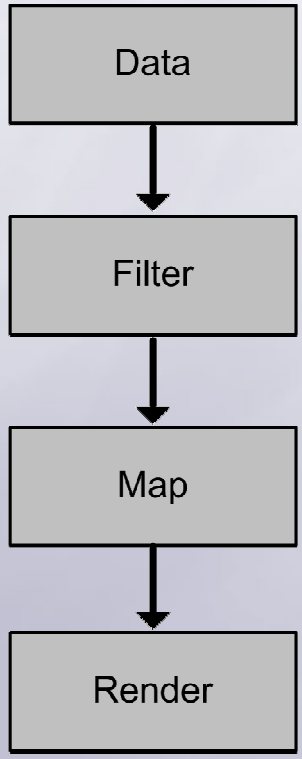
- **Pluri-disciplinary**
- **Successful Cases**
  - **Finance**
  - **Log monitoring**
  - **Social Network Analysis**
  - **Visual Data mining**
  - **..**



http://www.visualcomplexity.com/

Context – **Infovis/HCI Data Pipeline**





Data (*query result..*)

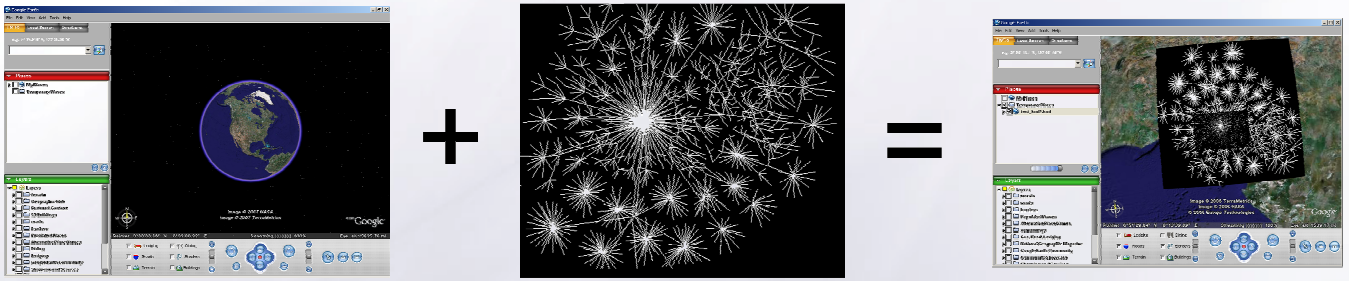
Selection (*keyword..*)

Layout (*graph..*)

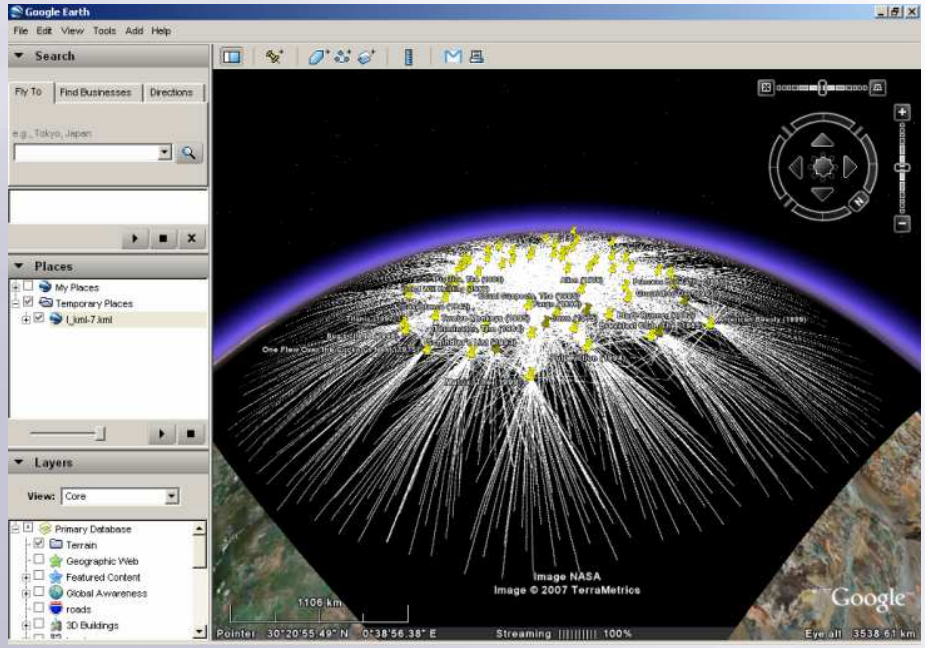
Rendering (*image..*)

- Mandatory in order to produce any visually interactive environment

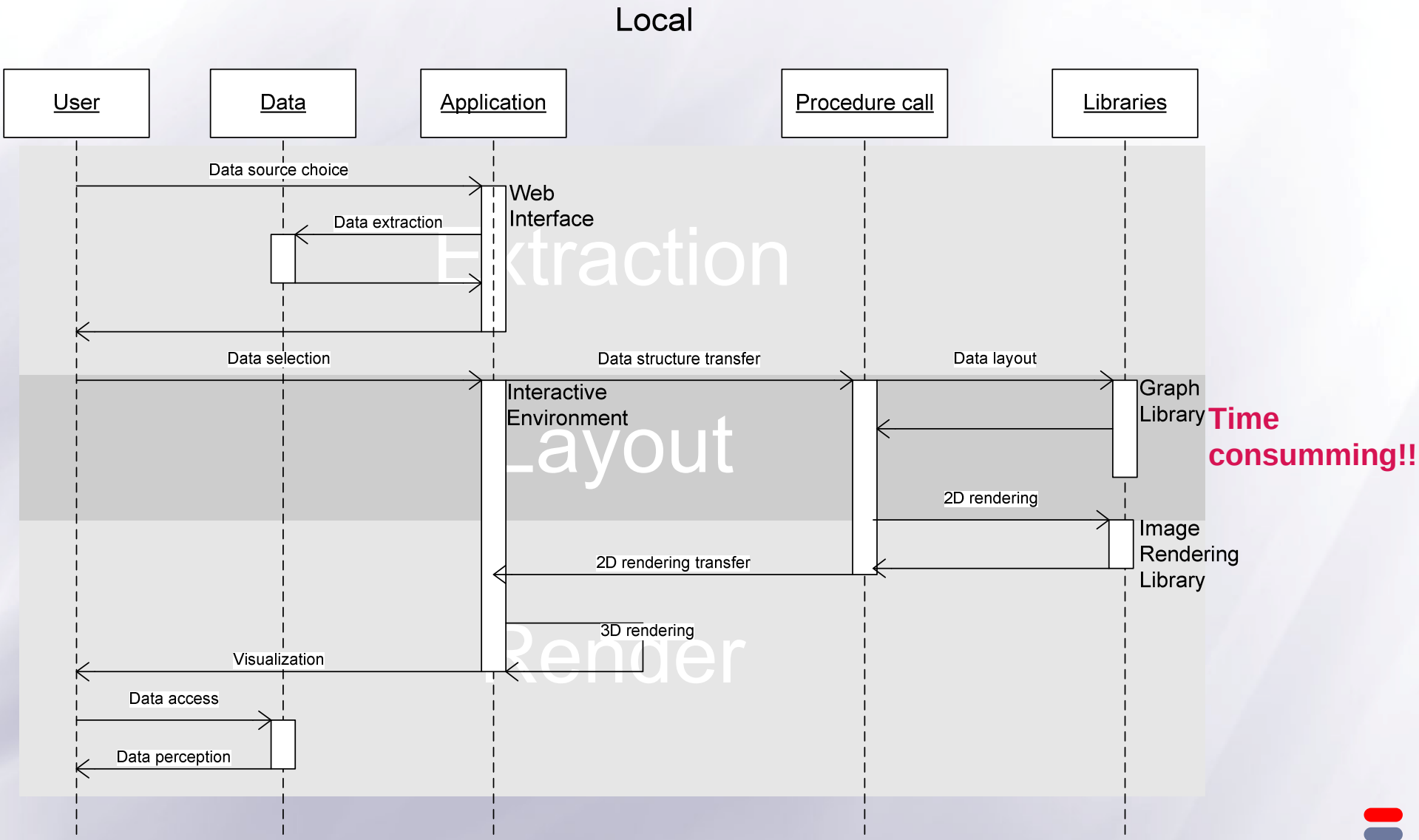
Example – **IMDB Visualization**



- **+10 000 movies**
- **Edges are movies and keywords**
- **Auto-organized graph layout**
- **Multi-resolution approach**
- **Details on demand**



Sequence diagram



Context – **Global trends**

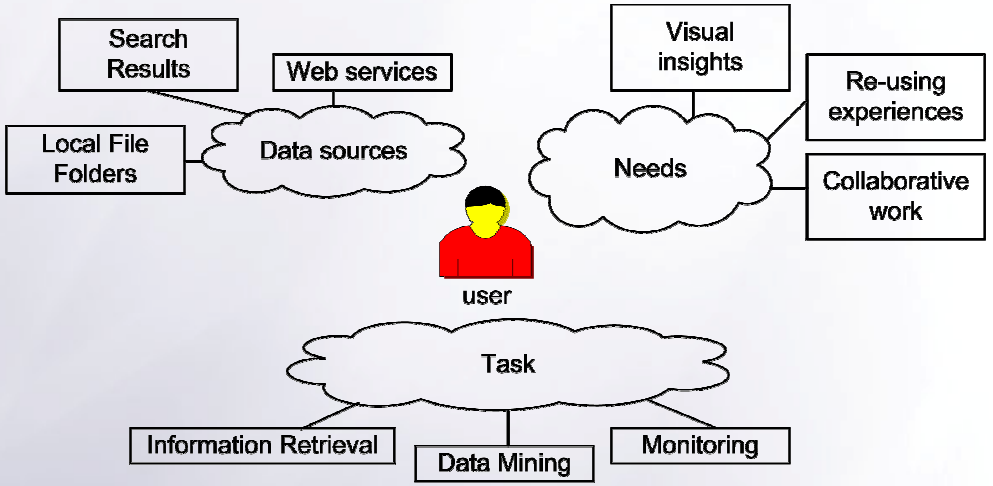
- **We live in an open Information Society**
  - Relentless information volume **and** size increase
  - Broad**er** range of users

+ Brand New usages

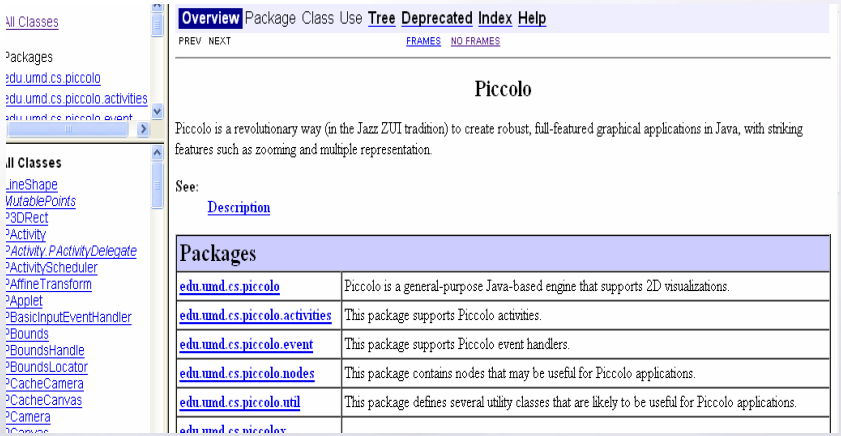
  - Anywhere, anytime, device, context.
  - Web 2.0 – users becomes producers

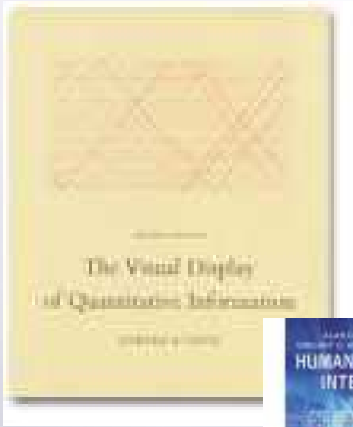
= How to survive or be reactive enough in such an environment?

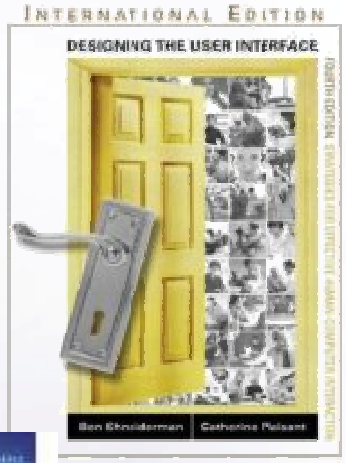
  - **Developper**
  - **Researcher**
  - **User**

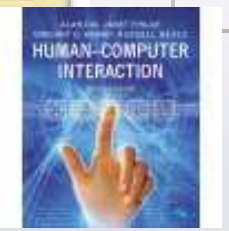


Study Case – **Developer**



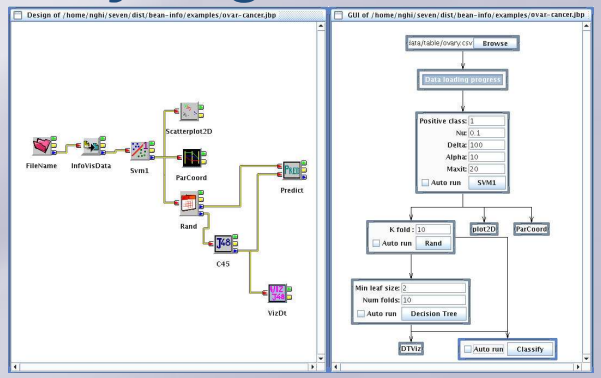






http://www.cs.umd.edu/hcil/jazz/

- Conferences Articles (CHI, Infovis, Vis, ..)
- **Diversity is good.. but requires variety of skills (=time=€)!**



V4Miner pour la fouille de données
Thanh-Nghi Do and Jean-Daniel Fekete

We are stuck with private and local environments

Study case – **Researcher**

How to evaluate of a single step of the flow?

FROM:…

Dear all,

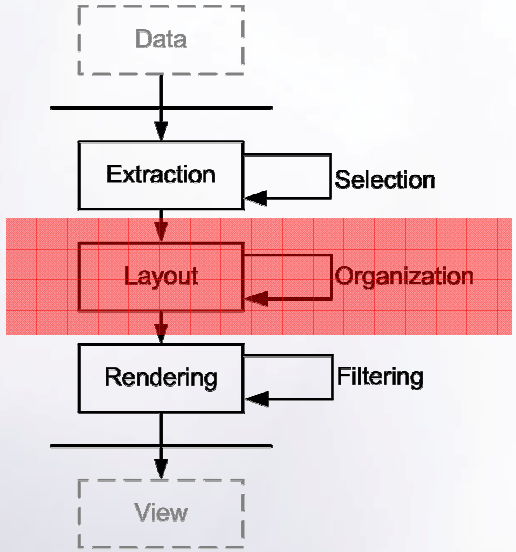
It is our pleasure to announce our latest software release for cohesive subgraph visualization available for download at:

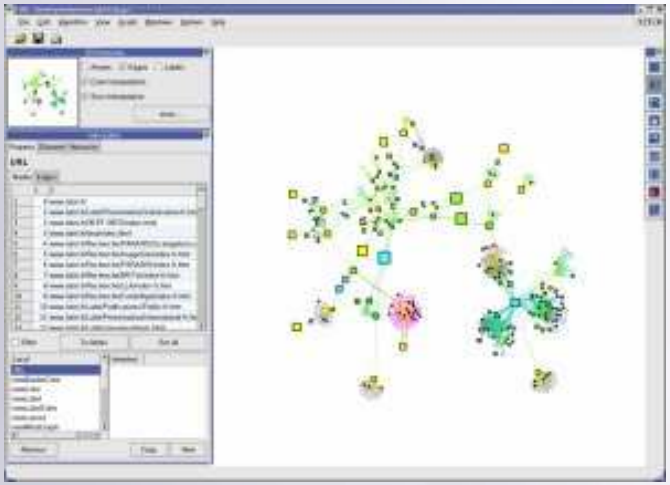
http://www.comp.nus.edu.sg/~atung/csv_binary.zip

This is an implementation of our algorithm described in [1] and have potential application for visualizing large graphs like social network, protein-protein interaction graphs etc.

Regards,
….

[1] Nan Wang, Srinivasan Parthasarathy, Kian-Lee Tan, Anthony K. H. Tung. "CSV: Visualizing and Mining Cohesive Subgraphs". Accepted and to appear in ACM SIGMOD'08, Vancouver, Canada. http://www.comp.nus.edu.sg/~atung/publication/sigmod08_csv.pdf



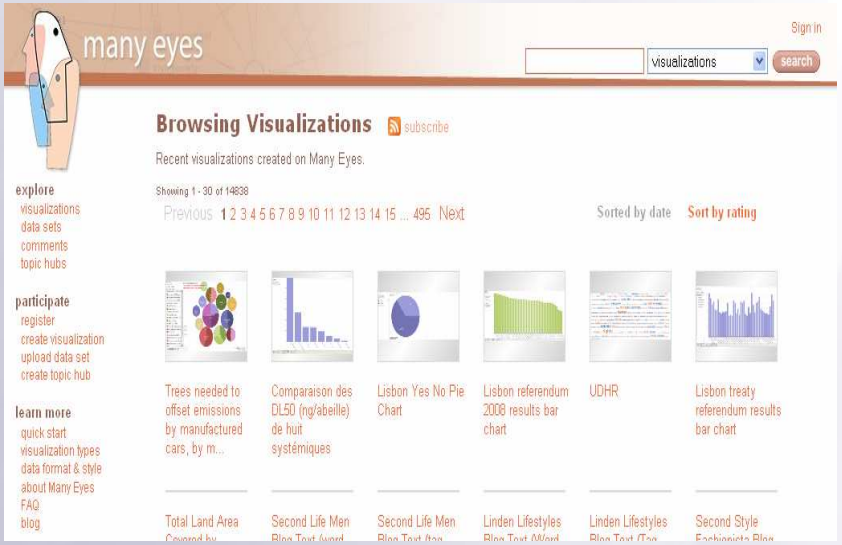


http://tulip.labri.fr/

Study case – **User**

- CHI 2008 Panel: **The Next Challenge: from Easy-to-Use to Easy-to-Develop. Are You Ready?**

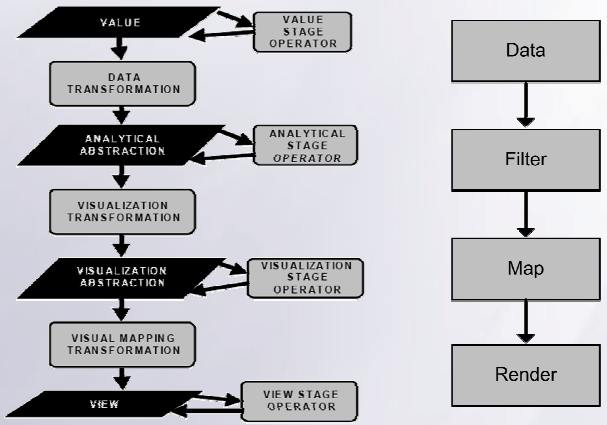
The main challenge of next years is to allow users of software systems, who are non-professional software developers, to create, modify or extend software artefacts.



http://services.alphaworks.ibm.com/manyeyes/

Study Case – **Summary**

- **Why not letting people focus on what they are good at?**
  - **Developer:** programming, code reusing in multi-environment
  - **Researcher:** test/evaluate contribution in a complete dataflow
  - **User:** become producers



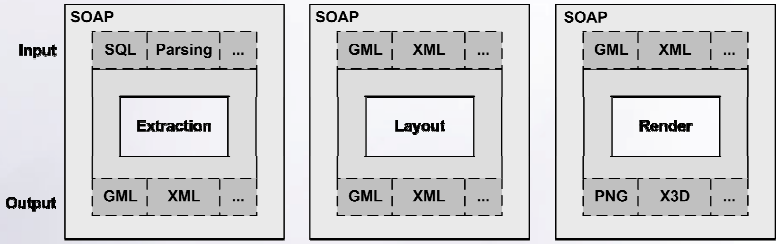
- How to make it less monolithic? And reuse parts assembled in another way? How to reuse existing solutions without starting again a new development cycle?

Our approach

Visualization as a service

Our approach – (still early work)

- Cutting the data pipeline into smaller independent steps
  - Steps become reusable black boxes
  - Input/Output publication

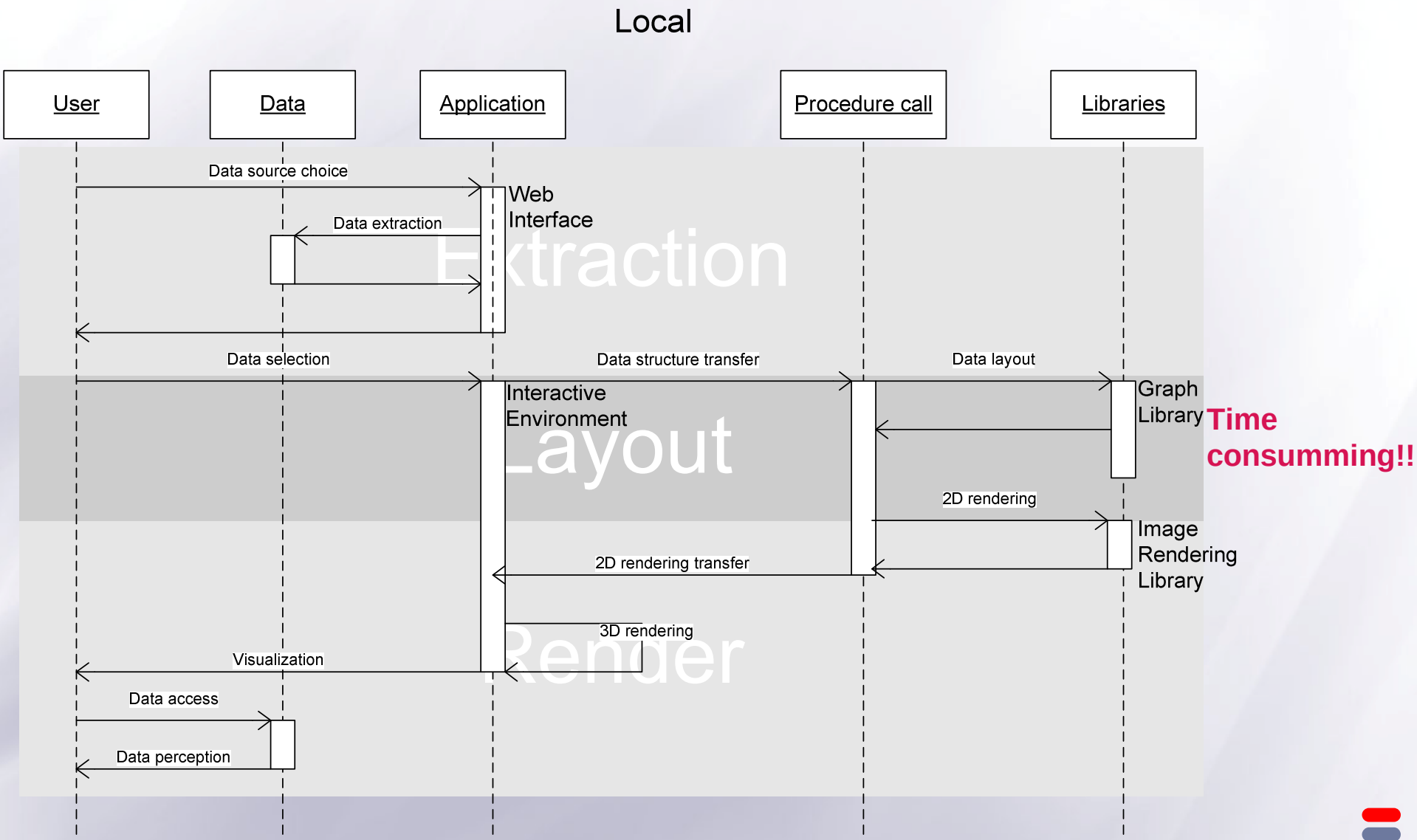


- Services are available at a remote location
  - Description of reliability, evaluation, ..
  - Centralization of computing efforts, maintenance, ..
  - Reusable regardless the context

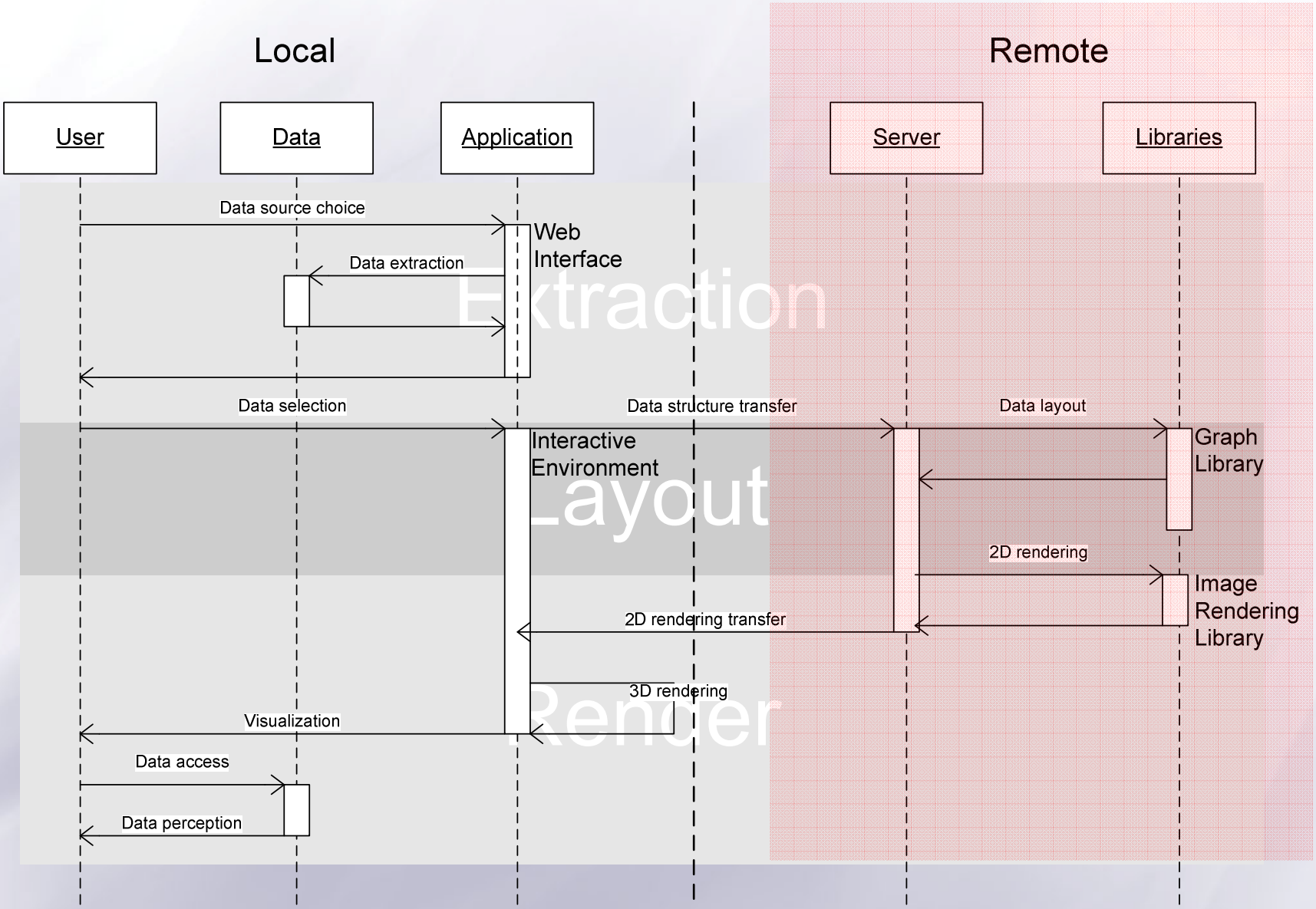
FROM private/tightly coupled knowledge **TO** **shareable one**

- **Visualization On-Demand (analogy to VoD)**
  - Reuse VoD architectures contribution
  - Quality of visualization (QoViz)

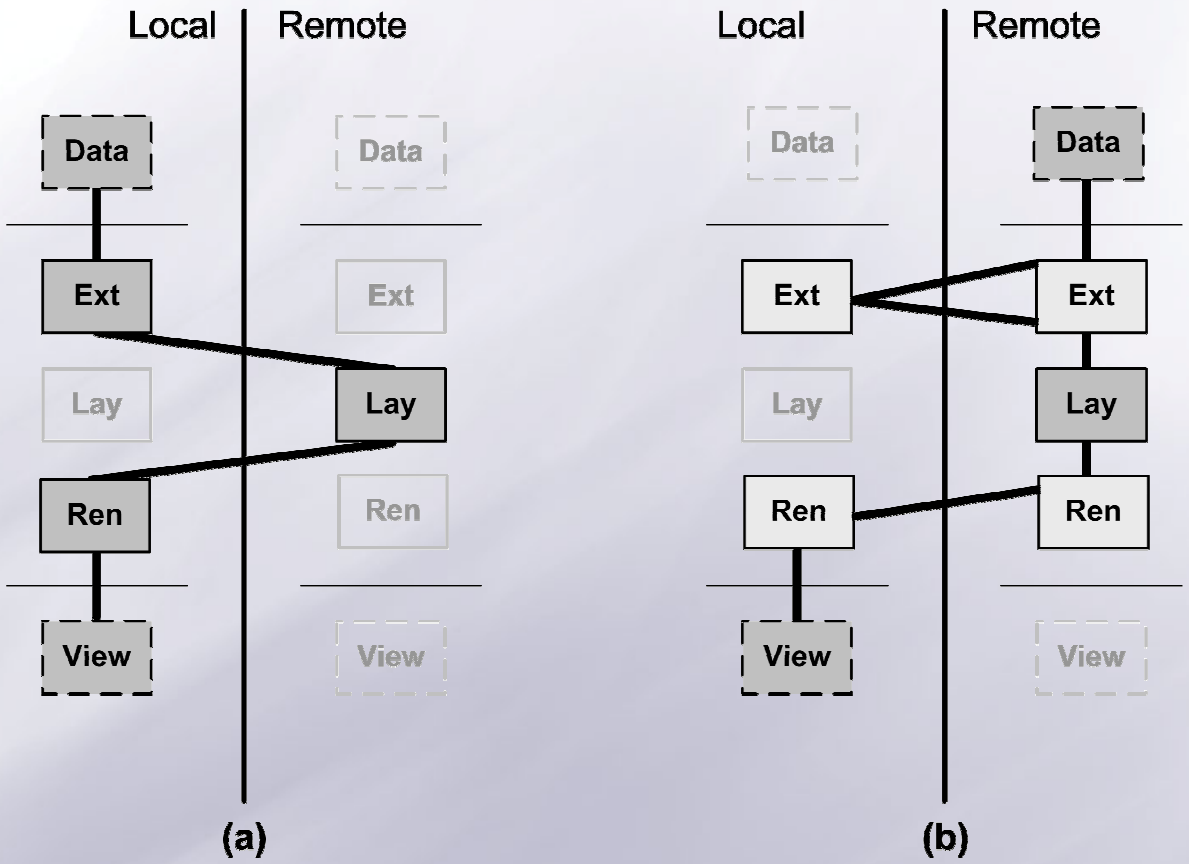
From local functions..



… to remote services



All is about tradeoff



Main Issues become :

- Tradeoff between **local** and **remote (computation time, bandwidth, availability, ..)**
- **New Tools :** *API, playground, application samples.*

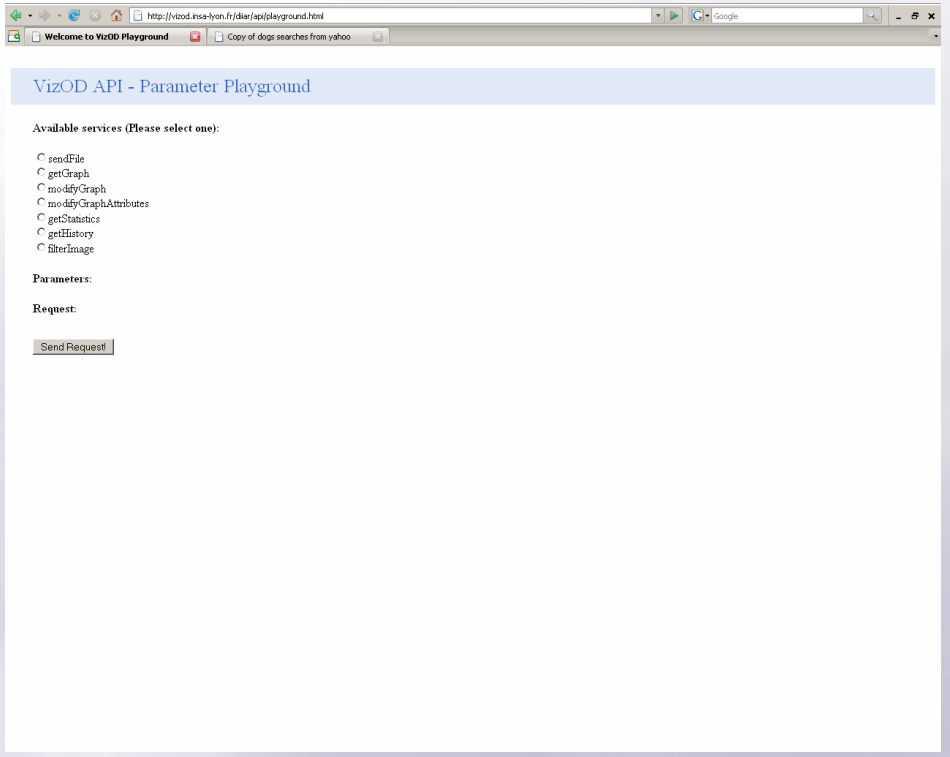
Implementation – **VizOD API**

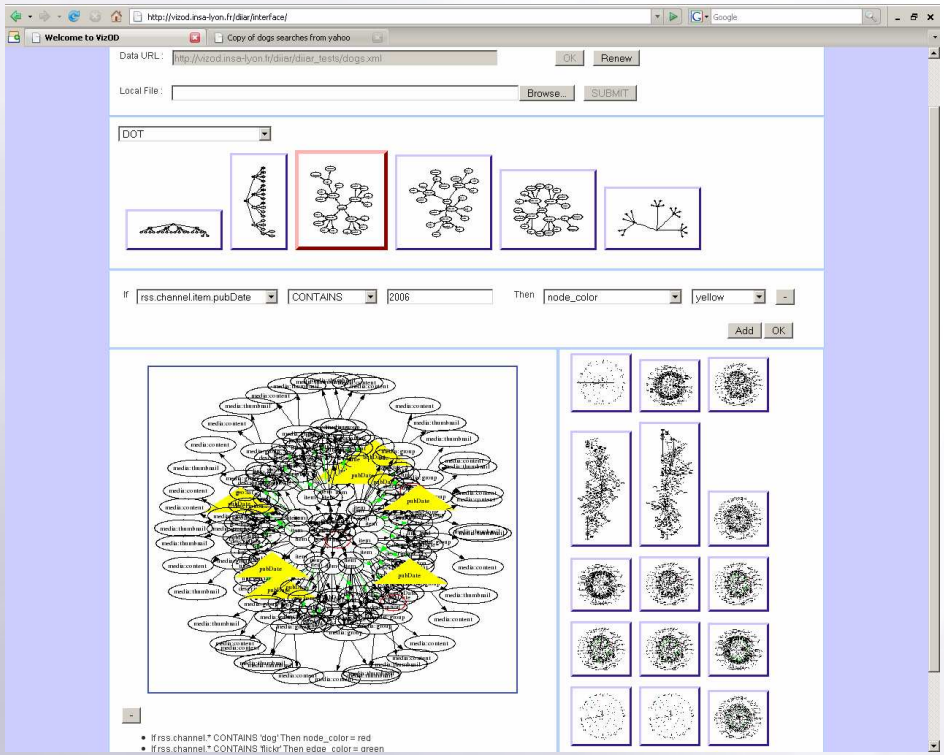
- **DEMO: API use**

- RPC Call
  - REST XML answer (ID graphml, URL des données)
  - HTTP GET and POST communication

    - sendFile: *sending data*
    - modifyGraph: *graph attributes modification*
    - getGraph: *graph retrieval*
    - getStatistics: *file size, computing time*
    - getHistory: *graph history, performed actions*
    - filterImage: *image analysis*

Implementation – **Playground**





- **Demo: create your own graph**

- Quickstart to the API
- Debugging interface

Conclusions

- Our contribution : **Visualization as a service (VizOD)**
  - A Information Systems paradigm applied to Infovis/HCI
    - Cross field approach
    - Let room to implementation! (such as a library, pattern, book, ..)
    - Knowledge reuse, fostering innovation

- Next step: ***Reusing user characteristics to build novel visual interactive environments***
  - We now have elements or “bricks” – needs for architects!
  - Towards a Visual User Profile (VizUP)

Perspectives

- Keep working on service formalization
  - RDF description
  - Mashup-like interface

- New *evaluation* methods?
  - How to evaluate the results? (forms? statistics? Long term evaluations?..)
  - How to reinforce the system?

- New *business* model?
  - Service can be of high add-value
  - Resource (such as Amazon Service)

Contribute!

- If you have a *brick (format conversion, graph layout algorithm, image analysis technique, ..)*
- If you want to assemble *bricks*
- If you want to evaluate *bricks* assembly
- …

Towards an *open* plateform

- Unique service directory
- Sharing library evaluation, mashups, ..

API Release : fall 2008

- Contact: **romain.vuillemot@insa-lyon.fr**

Thank You!

- Any question?