

Aggregating media fragments into collaborative mashups: Standards and a prototype

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CrossLinks project is grounded in several use cases:

- Work Context storage and sharing
 - Disaster management
- Story telling
 - Data journalism
- Metadata augmentation
 - Digital media archiving

It's all about **stitching together** heterogeneous **data fragments** into meaningful and **contextualized** patchworks

1. Enable identification and linking of **fragments** of online media resources
 - Unstructured as video, audio, text, ...
 - Structured as XML, tabular, ...
2. Devise an abstract model and **representation** format(s) for data mosaics
3. Implement a **platform** for authoring, storage, sharing and visualization

Formalizing fragments

- URI spec leaves the fragment part unspecified
- Several standardization efforts exist regarding specific mime types
 - MediaFragments (W3C Recommendation)
 - Focused on temporal (`#t`) and pixel space fragments (`#xywh`)
 - Dedicated to audio/video media
 - text/csv fragments (IETF Draft)
 - Defines `#col, row, cell`
 - text/plain fragments (IETF RFC 5147)
 - Defines `#line`

Other mainstream usages

- #page for PDF resources
- #<id> implicit id fragment used in HTML, RDF, ...

Formalizing fragments

- But no harmonized definition of fragments for all media types
- Also, need to decouple media types from fragment dimensions
 - XML, PDF, MPEG, CSV, ...
 - vs
 - Text, Time, Spatial, ...

Identified dimensions

- Textual
 - Line numbers and char offset
- Temporal
- Pixel space
- Tabular
- Geospatial space
 - Proposing `#bbox`
- Tree path
 - Proposing `#xpath`

Formalizing fragments

	Id	Text	Time	Pixel	Spatial	Tabular	Tree
html	✓						✓
text/plain		✓					
pdf	✓	✓					
video/*			✓	✓			
audio/*			✓				
image/*				✓			
geotiff				✓	✓		
kml	✓		✓		✓		✓
csv						✓	
json							✓

Data mosaics: representation

- Abstract model basically a set of annotations organized in a folder-like structure
- Annotations can link any resource fragment to another (or to inline content), with
 - author
 - semantic type
 - free form tags

Data mosaics: representation

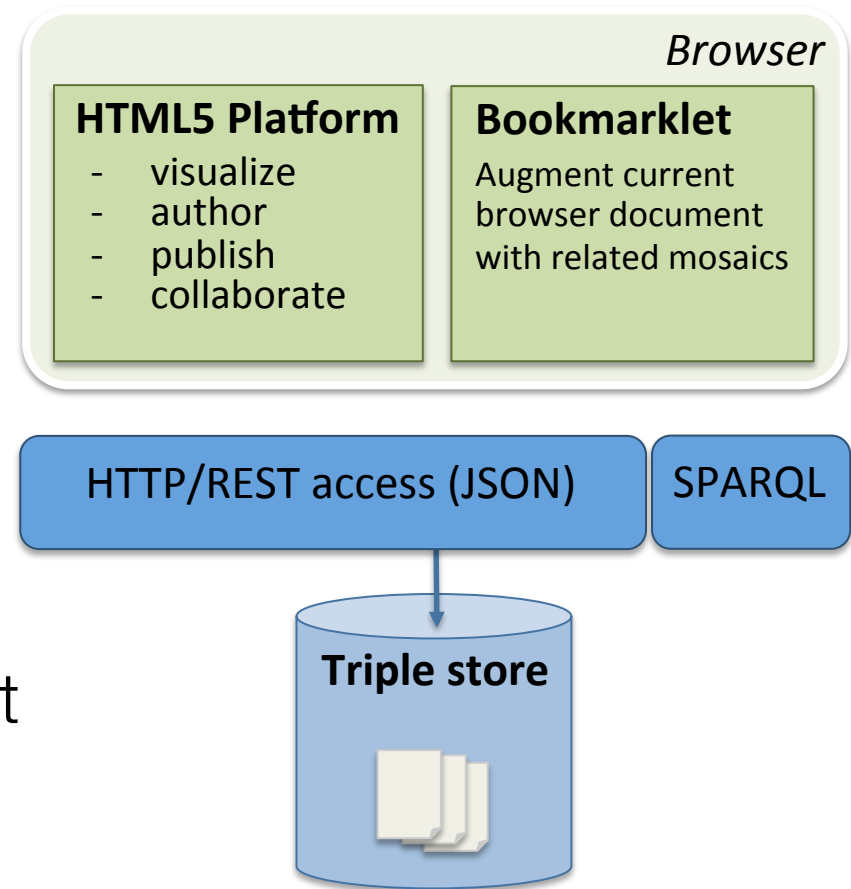
- JSON-based encoding
 - More convenient for browser-based apps
 - Easier to get acquainted with for target audience
- RDF-based representation also available

Data mosaics: representation

```
{
  "name": "Haiti Earthquake",
  "content" : [
    {
      "name": "Haiti: Disaster To Development",
      "src": "http://youtu.be/hRBhygKEow",
      "annotations": [
        {
          "src": "#t=6,16",
          "target": "http://www.time.com/time/specials/packages/article/0,28804,1953379_1953494_1955284-1,00.html#xpath=//ARTICLE[...]",
          "name": "7.0 Earthquake"},
        {
          "src": "#t=17,24",
          "target": "http://www.time.com/time/specials/packages/article/0,28804,1953379_1953494_1955284-1,00.html#xpath=//ARTICLE[...]",
          "name": "1.5 million displaced"}
      ]
    },
    {
      "name": "Time article: Aftershock",
      "src": "http://www.time.com/time/specials/packages/article/0,28804,1953379_1953494_1955284-1,00.html",
      "annotations": [
        {
          "src": "#xpath=//ARTICLE[@id='article-12345']/DIV[2]/DIV/DIV/P[3]/text(),788,//ARTICLE[@id='article-12345']/DIV[2]/DIV[...]",
          "name": "6.1 Aftershock",
          "target": "http://comcat.cr.usgs.gov/earthquakes/feed/search.php?maxEventLatitude=19&minEventLatitude=17&minEventLon...",
          "targetMimeType": "application/csv",
          "vizConfig": {
            "timeCol": 0,
            "hasHeaders": true,
            "timeFormat": "%Y",
            "skipRows": "1"
          }
        },
        {
          "src": "#xpath=//ARTICLE[@id='article-12345']/DIV[2]/DIV/DIV/P[3]/text(),28,//ARTICLE[@id='article-12345']/DIV[2]/DIV[...]",
          "name": "Seismic area",
          "target": "http://apollopro.erdas.com/erdas-apollo/vector/USGS_SHAKEMAP#bbox=-75.4332,15.626967,-69.516533,21.293633",
          "targetMimeType": "application/vnd.ogc.wms_xml"}
      ]
    }
  ]
}
```

Implementation: Architecture

- Triple store
- REST-based interface
 - JSON encoding
- SPARQL endpoint
 - fine-grained queries of the data mosaics graphs
- web portal
 - Authoring & Management
- Bookmarklets
 - Overlays resources with annotations



- Seamless integration in regular browser flow
 - viewing: offers augmented view on annotated resources
 - authoring: helps users capture comments and train of thought while browsing
 - browse the annotation graph in a natural way
- Collaborative annotations
 - All entities (mosaics, resources, annotations) have authors and timestamps

Supported media and fragments

	Id	Text	Time	Pixel	Spatial	Tabular	Xpath
html	✓						✓
text/plain		✓					
pdf	✓	✓					
video/*			✓	✓			
audio/*			✓				
image/*				✓			
geotiff				✓	✓		
kml	✓		✓		✓	✓	(✓)
csv						✓	
json							✓

- Platform meant to be extended
 - Custom viewers
 - Extra mime types

E.g. YouTube, SlideShare
- Boils down to implementing
 - HTML5 portraying
 - Fragment resolution, display and capture

Example - Authoring

DateTime	Latitude	Longitude	Depth	Magnitude	MagType	NbStations	Gap	Distance	RMS	Source	EventID	Version
2010-01-12T21:53:10.060+00:00	18.443	-72.571	13	7	mwc	500	23		0.97	pde	pde20100112215310060_13	1.3634E+12
2010-01-12T22:00:41.490+00:00	18.387	-72.784	10	6	mwc	196	24		0.84	pde	pde20100112220041490_10	1.3634E+12
2010-01-12T22:07:02.040+00:00	18.463	-72.626	10	5	mb	32	84		1.05	pde	pde20100112220702040_10	1.3634E+12
2010-01-12T22:09:11.620+00:00	18.446	-72.642	10	4.1	mb	22	55					
2010-01-12T22:12:04.650+00:00	18.452	-72.513	10	5.7	mb	201	23					
2010-01-12T22:52:51.260+00:00	18.437	-72.848	10	4.7	mb	26	51					
2010-01-12T23:07:03.740+00:00	18.522	-72.585	10	4.6	mb	30	51					
2010-01-12T23:12:03.990+00:00	18.402	-72.513	10	5.3	mb	260	23					
2010-01-12T23:26:05.850+00:00	18.472	-72.575	10	4.3	mb	36	51					
2010-01-12T23:27:36.860+00:00	18.542	-72.768	10	4.7	mb	81	42					
2010-01-12T23:35:39.210+00:00	18.382	-72.868	10	4.6	mb	60	25					
2010-01-12T23:47:38.100+00:00	18.423	-72.861	10	4.5	mb	42	49					
2010-01-13T00:10:19.150+00:00	18.488	-72.644	10	4.3	mb	34	51					
2010-01-13T00:23:13.200+00:00	18.499	-72.792	10	4.5	mb	20	56					
2010-01-13T00:23:55.580+00:00	18.394	-72.662	10	4.2	mb	39	31					
2010-01-13T00:42:48.990+00:00	18.472	-72.918	11.9	4.3	mb	45	64					
2010-01-13T00:43:27.280+00:00	18.482	-72.469	10	5	mb	258	23					
2010-01-13T00:59:05.050+00:00	18.354	-72.807	10	5.2	mwc	191	26					
2010-01-13T01:05:48.610+00:00	18.539	-72.649	10	4.5	mb	86	24					
2010-01-13T01:14:53.790+00:00	18.45	-72.935	10	4.4	mb	42	49					
2010-01-13T01:16:50.980+00:00	18.425	-72.814	10	5.1	mb	230	23					
2010-01-13T01:24:31.990+00:00	18.47	-72.818	10	4.6	mb	81	49					
2010-01-13T01:32:44.220+00:00	18.42	-72.861	10	5.6	mwc	305	23					
2010-01-13T01:36:31.370+00:00	18.404	-72.826	10	5.6	mwc	301	27					
2010-01-13T01:50:00.040+00:00	18.432	-72.879	10	4.3	mb	80	49					
2010-01-13T01:55:16.000+00:00	18.337	-72.842	10	5.1	mwc	201	25		1.01	pde	pde20100113015516000_10	1.3634E+12
2010-01-13T01:57:34.550+00:00	18.393	-72.884	10	5.4	mwc	325	23		0.88	pde	pde20100113015734550_10	1.3634E+12
2010-01-13T02:17:56.270+00:00	18.513	-72.937	10	4.6	mb	142	24		1.11	pde	pde20100113021756270_10	1.3634E+12
2010-01-13T02:24:17.630+00:00	18.3	-72.946	10	4.2	mb	32	56		0.99	pde	pde20100113022417630_10	1.3634E+12
2010-01-13T02:26:33.670+00:00	18.443	-72.828	10	4.7	mb	156	49		0.94	pde	pde20100113022633670_10	1.3634E+12
2010-01-13T02:43:47.160+00:00	18.469	-72.962	10	4.7	mb	169	25		0.98	pde	pde20100113024347160_10	1.3634E+12
2010-01-13T02:54:19.140+00:00	18.426	-72.921	10	4.4	mb	134	49		1	pde	pde20100113025419140_10	1.3634E+12
2010-01-13T03:13:26.870+00:00	18.542	-72.636	10	4	ml	19	84		0.97	pde	pde20100113031326870_10	1.3634E+12
2010-01-13T03:17:11.500+00:00	18.414	-72.958	10	4.6	mb	117	49		1	pde	pde20100113031711500_10	1.3634E+12
2010-01-13T03:31:57.190+00:00	18.323	-72.871	10	4.7	mb	164	25		0.86	pde	pde20100113033157190_10	1.3634E+12
2010-01-13T03:53:49.370+00:00	18.435	-72.9	10	4	mb	26	73		0.98	pde	pde20100113035349370_10	1.3634E+12
2010-01-13T04:29:49.020+00:00	18.446	-72.941	10	4.5	mb	27	66		1.08	pde	pde20100113042949020_10	1.3634E+12
2010-01-13T04:37:50.890+00:00	18.465	-72.777	10	4.5	mb	47	49		1.35	pde	pde20100113043750890_10	1.3634E+12

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CrossLns

↑ Edit Link

Edit Annotation

Haiti Earthquake

Time article: Aftershock

Fragment

Title

Descr

Target

Fragment

Example - Authoring

The image shows a video player interface. The video content depicts a street scene with significant damage, including a large tree leaning precariously and debris on the ground. A text overlay in the bottom left corner of the video reads "7.0 Earthquake". A dialog box titled "CrossLns" is open over the video, showing the following fields:

- Edit Annotation:** Haiti Earthquake (with a checkmark icon)
- Time article:** Aftershock
- Fragment:** (empty text field)
- Title:** (empty text field)
- Descr:** (empty text area)
- Target:** <http://www.time.com/time/special/>
- Fragment:** `xpath=//ARTICLE[@id='article-123'`

At the bottom of the dialog box are two buttons: "Link it!" and "Cancel". The video player controls at the bottom show a progress bar at 0:29, a volume icon, and a total duration of -3:49.

MAGNITUDE 7.0

Aftershock

By Bryan Walsh, Jay Newton-Small and Tim Padgett | Thursday, Jan. 21, 2010

Michaud Jonas returned to the ruins of the Palm Apparel factory to see if he could find his little sister's body — and, possibly, a job. Hundreds of workers were buried under the rubble of this T-shirt-manufacturing plant in the Port-au-Prince suburb of Carrefour, and Jonas' sister, 22, was one of them. The scent of decay around the neighborhood was overpowering. Yet though he mourned his loss — his brother and mother also died, when the family's home collapsed — he looked ahead. "Here was the worst place hit, so maybe it'll be the first place to recover," he said. "I need to find a job so I can help what's left of my family. They are depending on me."

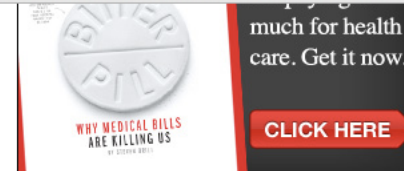
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(See TIME's exclusive photos of the earthquake's destruction.)



SHAUL SCHWARZ / REPORTAGE / GETTY FOR TIME

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Features

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[Photos: Scenes from Haiti's Cholera Outbreak](#)

[Video: The First Photographs from Port-au-Prince of the Haiti Earthquake](#)

[Video: Clinging to the Ruins of a Great Haitian School](#)

[Video: Haitian Amputees Find Hope in Soccer](#)

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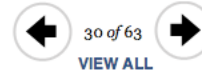


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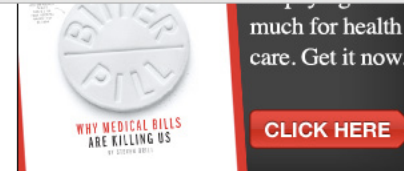
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CrossLns @pduchesne

- Time article: Aftershock
- Quake aftershocks
- Seismic area
- 7.0 Earthquake
- 1.5 million displaced

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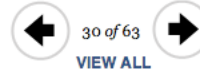
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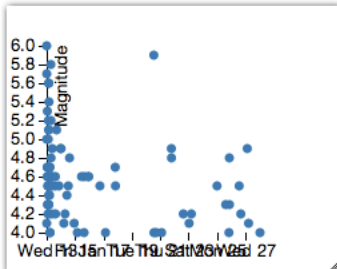
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◀ 30 of 63 ▶
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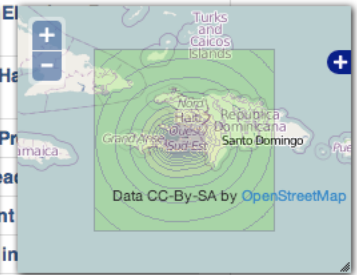
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Deck	Item
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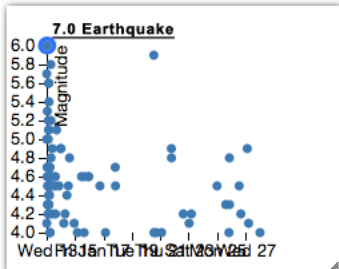
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More than 1.5 million Haitians lost their homes in the Jan. 12 quake, leaving even makeshift tents in scarce supply.

Haiti is a country in agony. More than a week after a 7.0-strength quake leveled Port-au-Prince and its surroundings, rescue teams kept combing the ruins. Some were miraculously found after days in the rubble — but hope was slowly dwindling. International help began to pour into Haiti, but with the capital and most political infrastructure destroyed, the aid wasn't nearly enough. Emergency medical teams operating out of shipping containers worked to save limbs and lives, and desperate requests went out to U.S. medical schools for more volunteers. More than 1.5 million Haitians are homeless, and the full death toll — perhaps 100,000 or more — remains unknown and may be unknowable, as tens of thousands of corpses were delivered to mass graves without ceremony. As if that weren't bad enough, a 6.1-magnitude aftershock rocked Haiti on Jan. 20, further rattling nerves. "This is really an unprecedented situation," says U.N. Secretary-General Ban Ki-moon. He feels it personally. The U.N. lost more than 40 people in the quake, the worst disaster the global body has suffered in its 65-year history. "It is overwhelming — overwhelming."

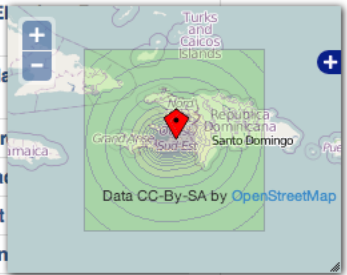
(See TIME's exclusive photos of the earthquake's destruction.)

Features

- Photos: Adopted Children Arrive in Haiti
- Photos: Scenes from Haiti
- Video: The First Prince of Haiti
- Video: Clinging to School
- Video: Haitian Amputees Find Hope in Soccer

CrossLks @pduchesne

- Time article: Aftershock
- Quake aftershocks
- Seismic area
- 7.0 Earthquake
- 1.5 million displaced



- Photos: Haiti's Tent Cities Brace for the Rainy Season
- Photos: Commerce Comes to the Aid of Haiti

- RDF/SPARQL exposure using well-known vocabularies
 - Open Annotations
 - Proposes a detailed model for annotations, compatible with this project
- Include visualization-specific config in data mosaics (esp. for CSV)
- Allow annotations filtering based on author, dates, semantic tags

- Some features would benefit from becoming mainstream browser features
 - Fragment resolution for supported mimetypes
 - Fragment selection
- Seamless integration of authoring/viewing avoids breaking train of thought → favors engagement and better captures domain knowledge
- Data mosaics act as exchangeable “mind map” containers, capturing contextual metadata in a domain-specific perspective, for a given use case

Thank you

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