Université de **La Rochelle**

Needs & solutions
for visual rich publication to be
indexable, accessible, searchable

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Problematics

↗ The content of comics, mangas, bandes dessinées is rich

Problematics

↗ The content of comics, mangas, bandes dessinées is rich

HOWEVER

↗ Their description is usually semantically poor
- > Metadata provided by publishers are limited
  - – Title, Author(s), Editor, …
- > Difficulty to provide a wide description of the content
  - – Time consuming
  - – No rules in the publishing standards for semantic information (geometric, textual, …)

CONSEQUENTLY

↗ Indexing of the content is limited
↗ Easy and efficient access to the content seems utopian

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Extracting the semantic content from Comics/Manga/BD

WHY

↗ New devices allow new interactions

> Definition of new tools

But :

> Need to index precisely the content

HOW

↗ Manual indexing is impossible

> Time consuming

↗ Automatic Indexing ?
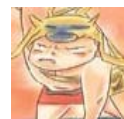
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Extracting the semantic content from BD/Comics/Manga

↗ Comic book analysis is not a trivial problem !

Documents with printing of variable quality, and color or line-based drawings

Images mixing graphic elements and text

Large variability in the representation of objects (panels, text, balloons, characters)

Need to develop robust approaches using Machine Learning and Artificial Intelligence based approaches for
- Information extraction
- Content understanding
- Content indexing

Extracting the semantic content from BD/Comics/Manga

↗ **Basic element extraction**
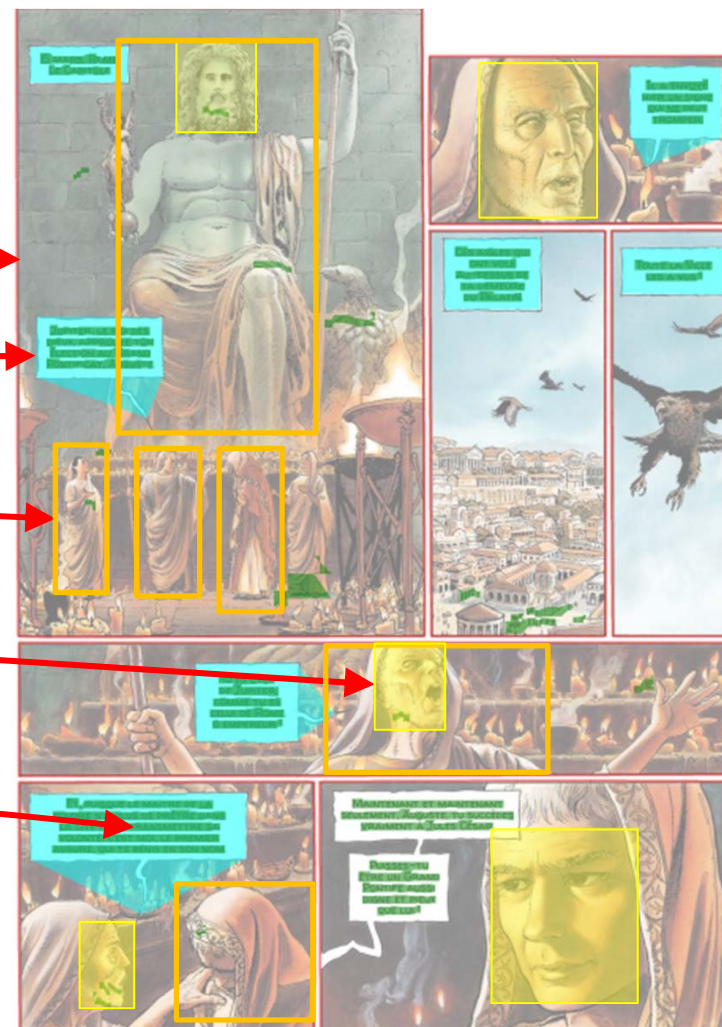
1. Panel

2. Balloon

3. Character

4. Face

5. Text

6. ....

Main objective

- Extract all interesting information

Extracting the semantic content from BD/Comics/Manga

↗ **Semantic content extraction**

1. Recognize the text
   ➔ Full text indexing

2. Detect the reading order

3. Link between speech balloon and character
   ➔ Who is speaking ? What does he say ?

4. Recognize Character
   ➔ Who is this man ? Woman ? Animal ? Super Hero ? ...

5. Recognize object, place of the action, ...

Main objective

   - Understand the content of the scene
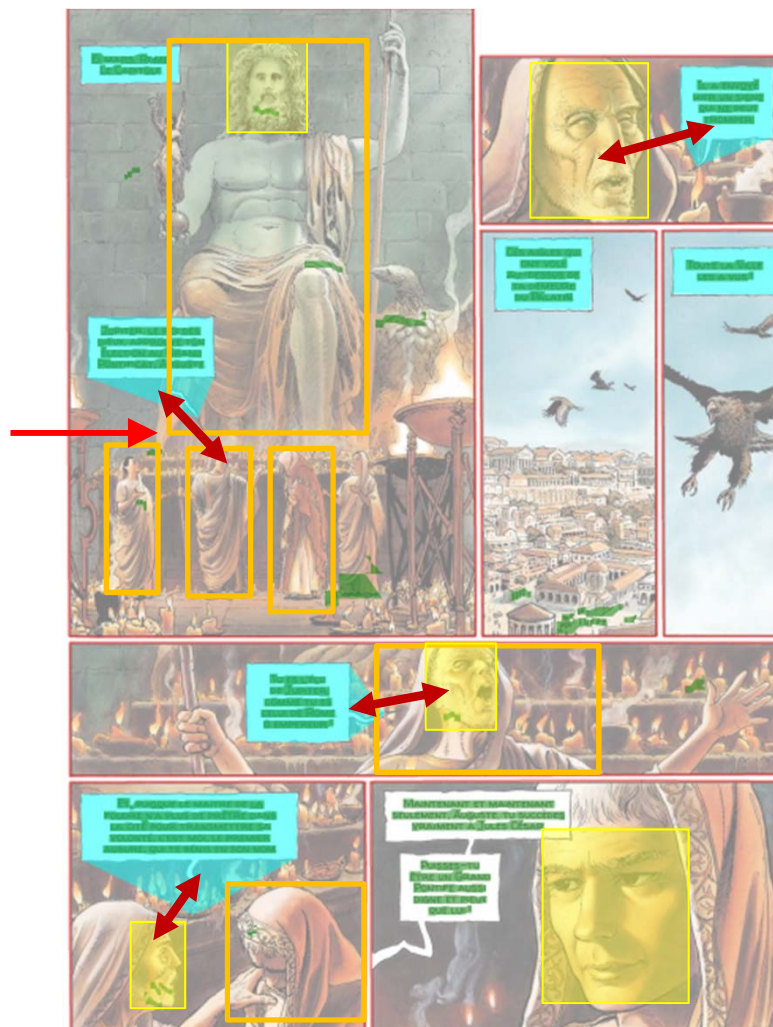
Extracting the semantic content from Comics/Manga/BD

↗ **Researches concern**

> Digitized comics
> Born digital comics

↗ **Development of machine learning/ AI approaches**

> Variability of artistic styles
> Differences between American comics, Mangas, franco-Belgium Bandes Dessinées, …

➜ Extraction of the semantic content

Question

➜ How to store/index the semantic description ?

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Need of a semantic description of the comics

MAIN ASSESSMENT

↗ The complexities of sequential art require a very rich language for efficient access to the content
  > keyword searches,
  > interactions with the user on new devices,
  > ...

RELATED WORKS

↗ Researchers interested in comics have proposed tools and data formats to enrich their object of study

↗ Concerned areas : literary and media studies, art history and linguistics, cognitive and computer science

↗ Examples :
  > « ComicsLM » for describing comic books plate's content [2001]
  > « CBML : Comic Book Markup Language » propose advanced metadata to describe the comic books. [2012]
  > « ACBF : Advanced Comic Book Format » focus on the encoding of digital comic books....

These 3 examples are based on a XML syntax

Comic Book Markup Language

↗ **Proposed by John Walsh in 2012**

> References :

- Walsh, J.A.: *Comic Book Markup Language : An Introduction and Rationale*. Digital Humanities Quarterly (DHQ), volume 6, (1), page 1-50 , 2012
- http://dcl.slis.indiana.edu/cbml/

↗ **CBML**

> is an advanced description language

> use an XML syntax

> but it is an Extension of TEI (*Text Encoding Initiative*)

↗ **CBML extends the TEI vocabulary**

> by defining comics specific tags in addition to the existing TEI encoding.

↗ **For example, additional tags are proposed for**

> Panel, balloon, caption, div

> Advertisement

> Sound effects

Comic Book Markup Language

↗ Example of a description of a page with CBML

Samson story in Fantastic
Comics #15 (February 1941)

```
<cbml:panel type="title"  xmlns:cbml="http://www.cbml.org/ns/1.0">
 <head>Samson and David</head>
 <cbml:caption rendition="#uc"> Out of the mists of history
   comes the mighty Samson--
   like his famous ancestor,
   Samson pits his temendous
   strength against the forces
   of evil and injustice--Mu…
   high priest of evil, plots
   against civilization…
 </cbml:caption>
 <bibl> By—
 <author>Alex Boon</author>
 </bibl></cbml:panel>
<div type="panelGrp" xml:id="eg_002">
 <cbml:panel n="1" characters="#david #samson">
  <cbml:balloon who="#david" type="speech"> What a funny looking truck
    outside here… Never saw one like it before!  </cbml:balloon>
  <cbml:balloon who="#samson" type="speech"> That's strange! What's it look like?
   </cbml:balloon></cbml:panel>
 <cbml:panel n="2" characters="#samson #david">
  <cbml:balloon type="speech" who="#samson"> You're right--I never
    saw one like this before!   </cbml:balloon>
  <cbml:balloon type="speech" who="#david"> Wonder what it's doing here?
   </cbml:balloon></cbml:panel>
 <cbml:panel n="3" characters="#samson #david">
<fw type="pageNum" place="lower-left">1</fw></cbml:panel>
 …..
</div>
```

Comic Book Markup Language

↗ Example of a description of a panel with CBML

```
<cbml:panel
n="5"
characters="#cap #anon_man"
ana="#actiontoaction"
xml:id="eg_000"
xmlns:cbml="http://www.cbml.org/ns/1.0">
<cbml:caption>
Cap acts quickly to tranquilize the gun-happy pedestrian...
</cbml:caption>
<cbml:balloon xml:id="eg_007"
type="speech" who="#cap">
A little <emph rendition="#b">sleep</emph>
will do wonders for you!
</cbml:balloon>
<sound>SPLAT!</sound>
<cbml:balloon type="speech" who="#anon_man">
Ugh!
</cbml:balloon>
</cbml:panel>
```


The fifth panel of page 6, from Captain America #193 (January 1976), edited, written, and drawn by Jack Kirby.

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Comic Book Markup Language

↗ Advantages : description of

> Basic elements (panel, balloon, character)

> Characteristics of some elements (ex : speech balloon, caption)

↗ The text

> Names of the characters

> Sound effects...

> ...

↗ Drawbacks

> The description is purely semantic,

> No information on location of the items

> Some specificities of comics has not been include (tail of balloon, double page, face ...)

➔ Improvement of the CBML to describe more information

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Comic Book Markup Language

↗ Some improvements


```xml
<pb xml:id="page_4"/>
<div>

  <cbml:panel xmlns:cbml="http://www.cbml.org/ns/1.0" characters="#c1,#c2,#c3"
    height="712" width="706" x="3" y="98" n="0">

    <cbml:character who="#c1" height="958" width="304" x="53" y="109"></cbml:character>
      <cbml:face height="458" width="154" x="102" y="118"></cbml:face>
    <cbml:character who="#c2" height="762" width="314" x="245" y="354"></cbml:character>
      <cbml:face height="151" width="75" x="255" y="373"></cbml:face>
    <cbml:character who="#c3" height="888" width="230" x="530" y="160"></cbml:character>

    <cbml:balloon tailDirection="SE" tailTip="131,115" who="#c1"
      height="498" width="324" x="25" y="6" n="0">
      <p>
        THIS IS YOUR NEW
        NURSE -- MADGE HOWARD
        -- AUNT BESS !
      </p>
        <surface lrx="25" lry="106" ulx="349" uly="504">
          <zone points="334,184 333,192 340,192 ... 315,195 331,495 332,113 334,171 "/>
        </surface>
    </cbml:balloon>

    <cbml:balloon tailDirection="S" tailTip="432,218" who="#c2"
      height="593" width="384" x="222" y="106" n="1">
      <p>
        SHE'S TOO PRETTY! I
        DON'T LIKE PRETTY
        PEOPLE! THEY'RE TOO
        CONCEITED !
      </p>
        <surface lrx="1287" lry="1596" ulx="314" uly="505">
          <zone points="286,181 251,449 248,452 ... 251,550 248,509 251,512 "/>
        </surface>
    </cbml:balloon>
  </cbml:panel>
</div>
```
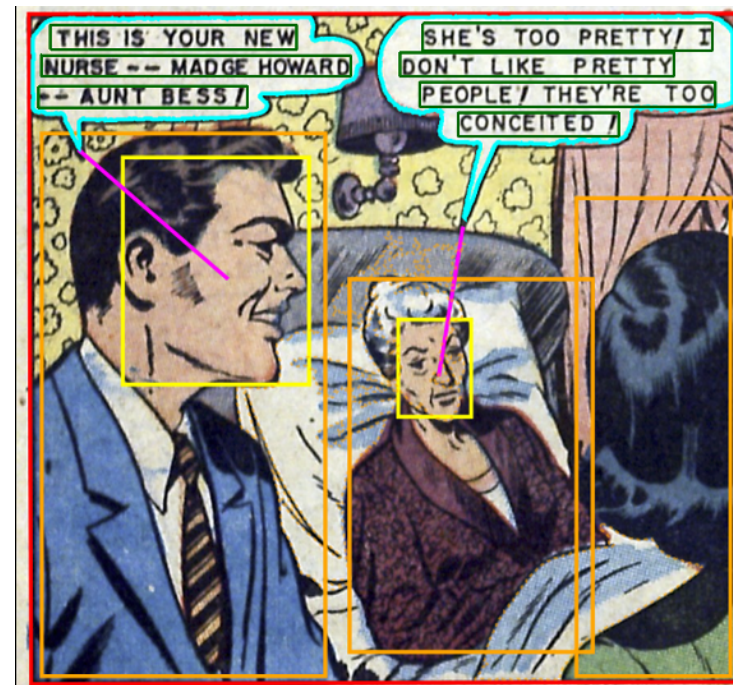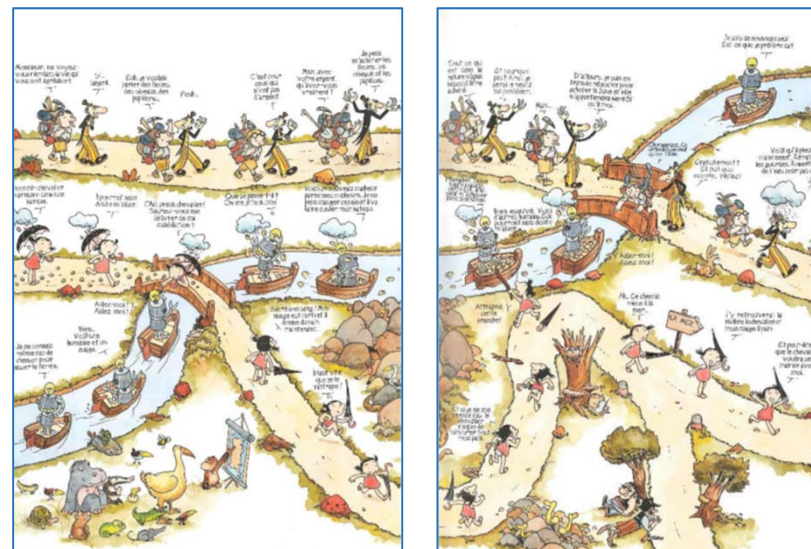
Comic Book Markup Language

↗ **Other improvements**

> Presence of double pages

> Reading direction (ex : Japanese top to bottom)

> Tail position and direction

> ...

> And so on...

↗ **Other drawbacks**

> CBML has been created to described digitized contents

➔ How to describe born-digital contents

    - Comics with several layers

    - Short animation

    - ...

➔ Need to define a standard able to take into account the specificities of both
digitized and born-digital comics

For which use ?

↗ New devices offer opportunities to propose news tools and services to the readers

- > Panels by Panels reading for any documents (digitized / born-digital)
- > Creating automatically sound effects (onomatopoeia)
- > Improve accessibility of the contents
    - – Text to speech ,
    - – Braille translation,
    - – Contrast enhancement of text,
    - – Colorization of text for dyslexic people
    - – ....
- > Interactive services between readers and the contents
    - – Contextual information on a characters, a place, …
    - – …

However

↗ All these new innovative services will be possible

- > If the automatic extraction is possible
- > If a standard is define to index precisely the content

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Conclusion

↗ The content of comics, mangas, bandes dessinées is rich

↗ New devices are an opportunity to offer a new way
to read and interact with comic content

↗ Born-digital comics can be very different from digitized comics

↗ Automatic analysis of comics is essential to allow massive indexing

➔ Need to develop specific algorithms bases on IA and Machine Learning

↗ CBML is used in our team But is this standard able to index correctly the content

➔ Need to define a standard to index precisely the content
in order to create new forms of digital books.

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Thanks you for your attention