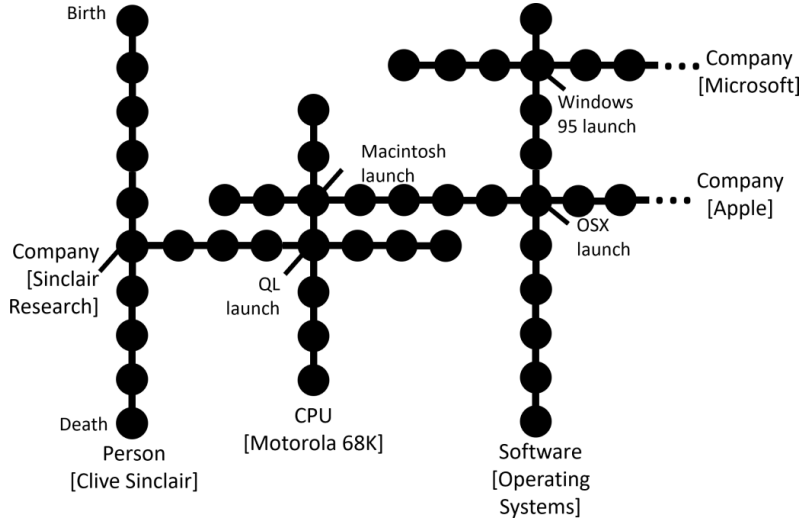
FOSDEM

Computer Museum NAM-IP

Trajectware - Timeline-Based Navigation across Computing Heritage



PONSARD Christophe NAM-IP

FOSDEM 22 – Retrocomputing – February 5 (online)

Context – NAM-IP Computer Museum

- Located in Namur/Belgium - 30’ from Brussels
  (worth a visit when FOSDEM is back at ULB or if you come in Belgium!) www.nam-ip.be
- Missions:
  - Preservation: safeguarding digital heritage, focus on local pioneers
  - Acquisition of artefacts, enriching collections
  - **Exhibitions: for all, specific animation, permanent/temporary**
  - Research: about machines, software, communities
- “Container design”, an historical parallel

Our problem – Providing Support for Exhibition

- Physical experience provided by an exhibition is <u>great</u>
  - Real hardware (outside/inside), possibly running (on emulator), advertisements
  - Scenography = immersion, grouping/sequencing to make sense, common thread,…

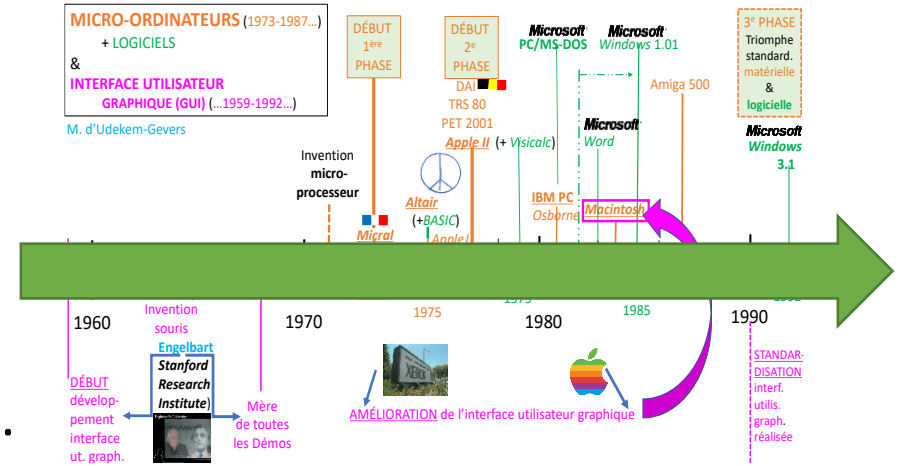
- But <u>limited</u> by physical media !
  - Explanatory poster = a selected viewpoint
  - Limited space = limited level of detail
  - Accessibility (FR/NL/EN need):
    - either one language for posters/video (subtitling)
    - or devote space(poster) /time (video)

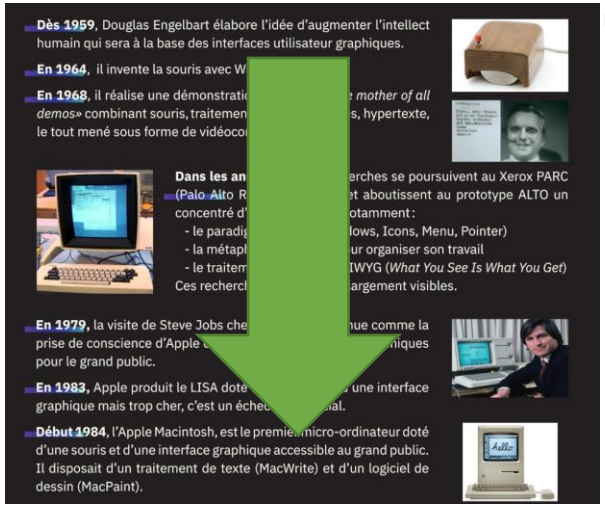
➔Idea to <u>complement</u> physical experience with an “digital experience”

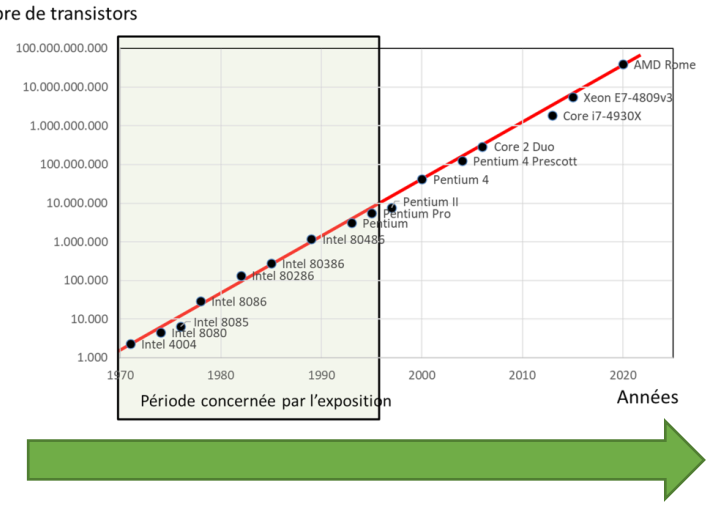
- Mobile application: easy to deploy and use
- More detailed content: pictures, videos, off-line or online, multiple languages
- <u>Dynamic perspective:</u> discover make your own connections
  - across artefacts, themes, actors,…
- Could be used before/during/after physical experience
  ➔requires links with physical experience (especially in “during” case)
- Beyond this support to visits : could be used as <u>learning/research tool</u>

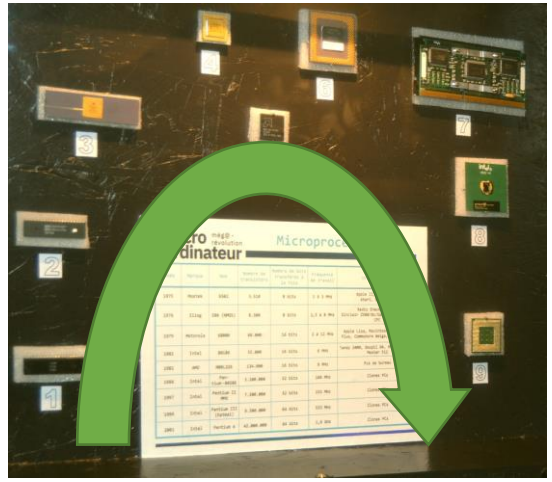
Why Selecting a Timeline Approach ?

- In our case… timelines are everywhere (explicitly or implicitly)
  - Chronological sequencing of the exhibition
  - Main tread = co-emergence and cross-fertilisation of user interfaces and micro-computers
  - Many posters with milestones: GUI, games, Moore's law…
  - Panel with major CPU









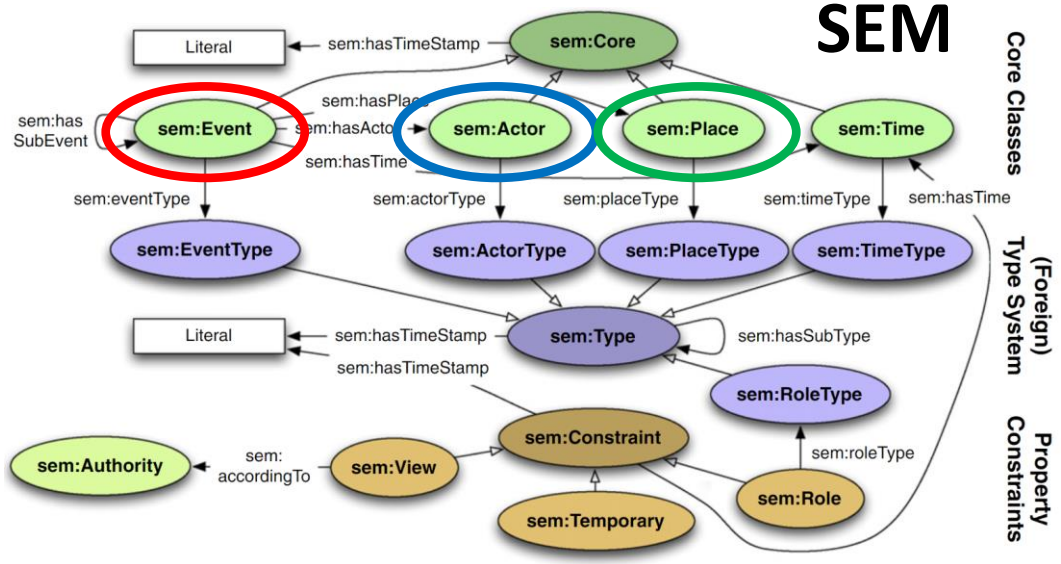
- More views, more connections possible/interesting !
- Probably also valid for other (technological) museums

Process

- Understanding the need [done]
- Understanding what to capture/structure
  ➔ conceptual modelling, ontologies
- Front-end focus, all-in-one off-line app
  ➔ delivery need for temporary exhibition: multilingual, available content
  ➔ generalisation in mind
- Elaboration phase
  ➔internal linking (automated)
  ➔more elaborated navigation scenarios
  ➔back-end extraction, on-line mode, Open API design
- Next steps…

(Meta-)Models /Ontologies of Historical Concepts

SEM



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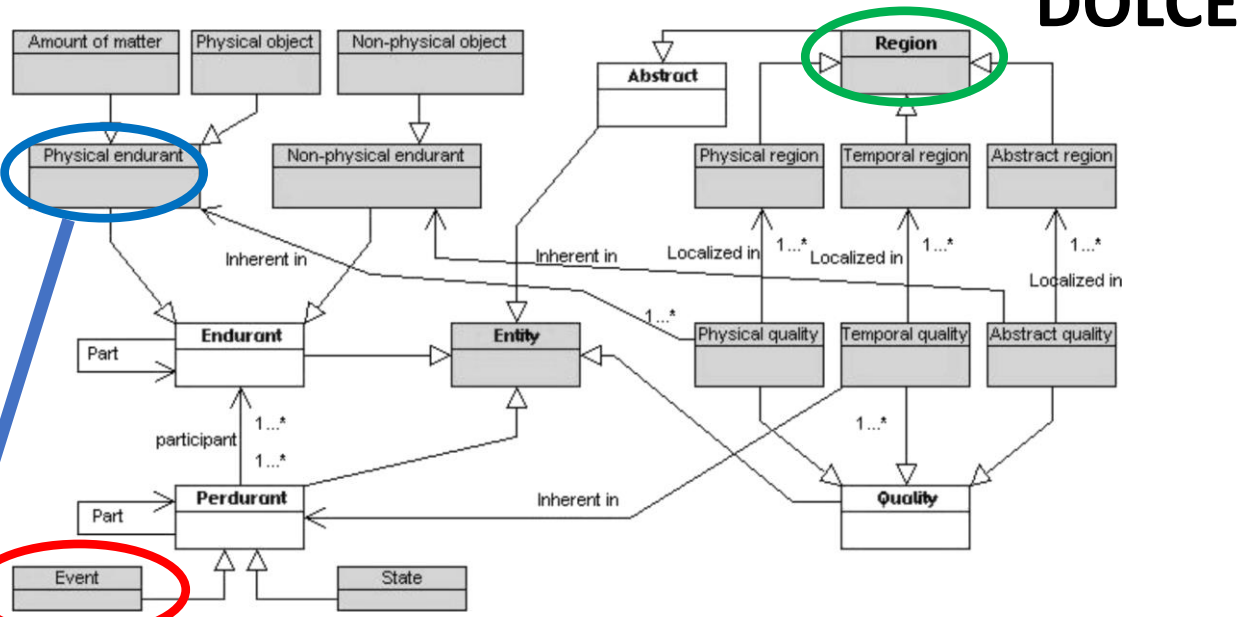
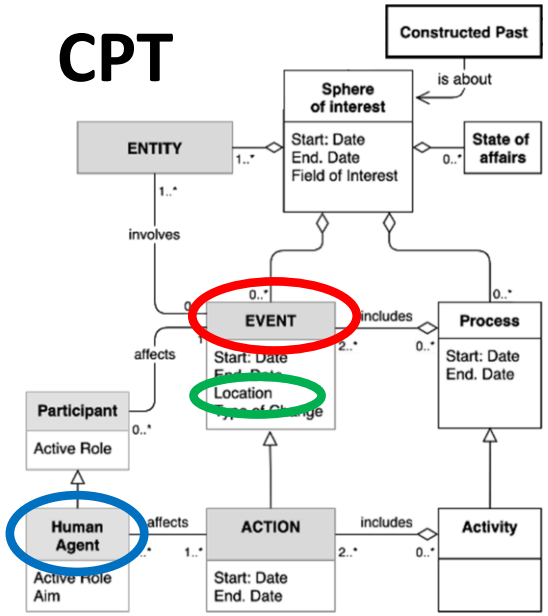
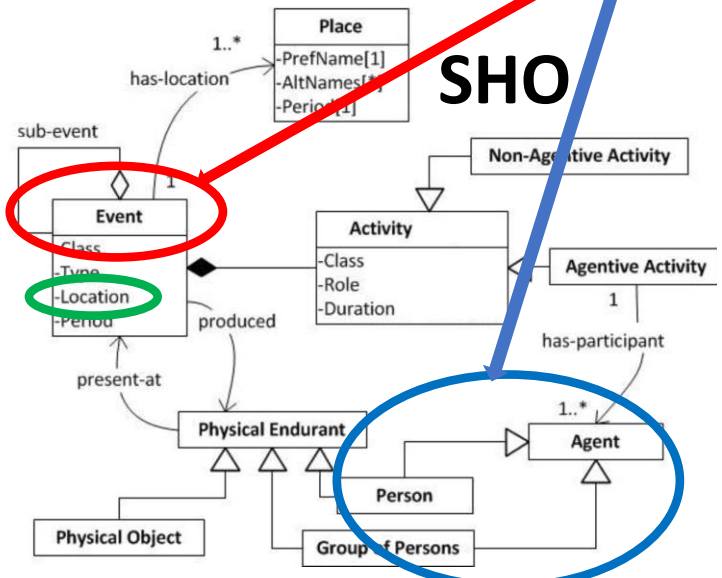


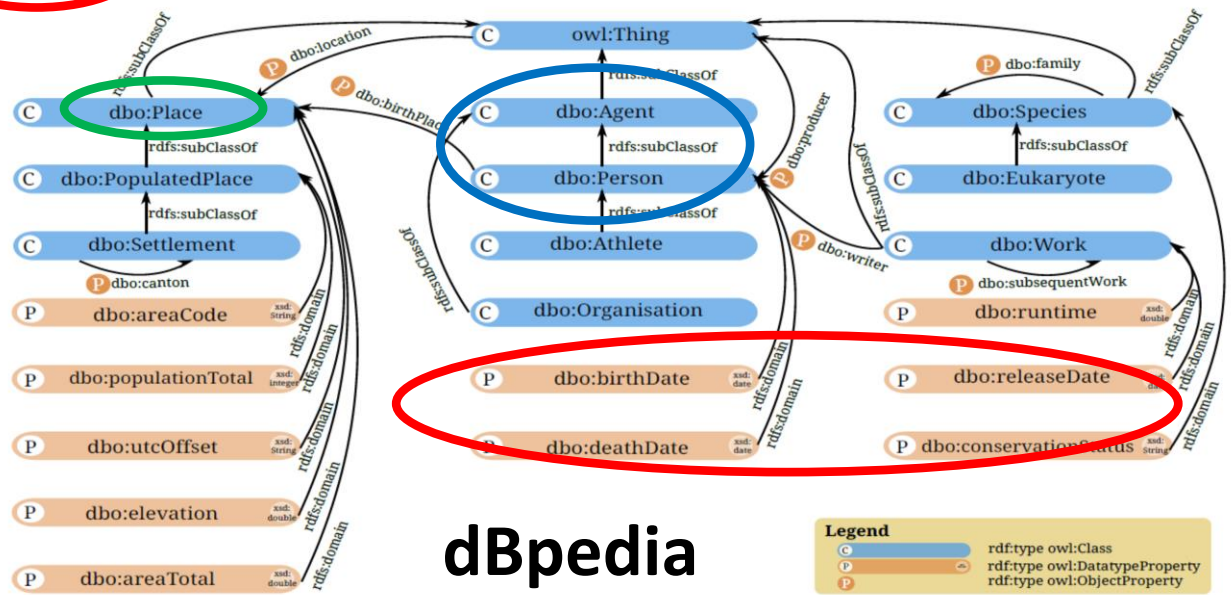
CPT



SHO

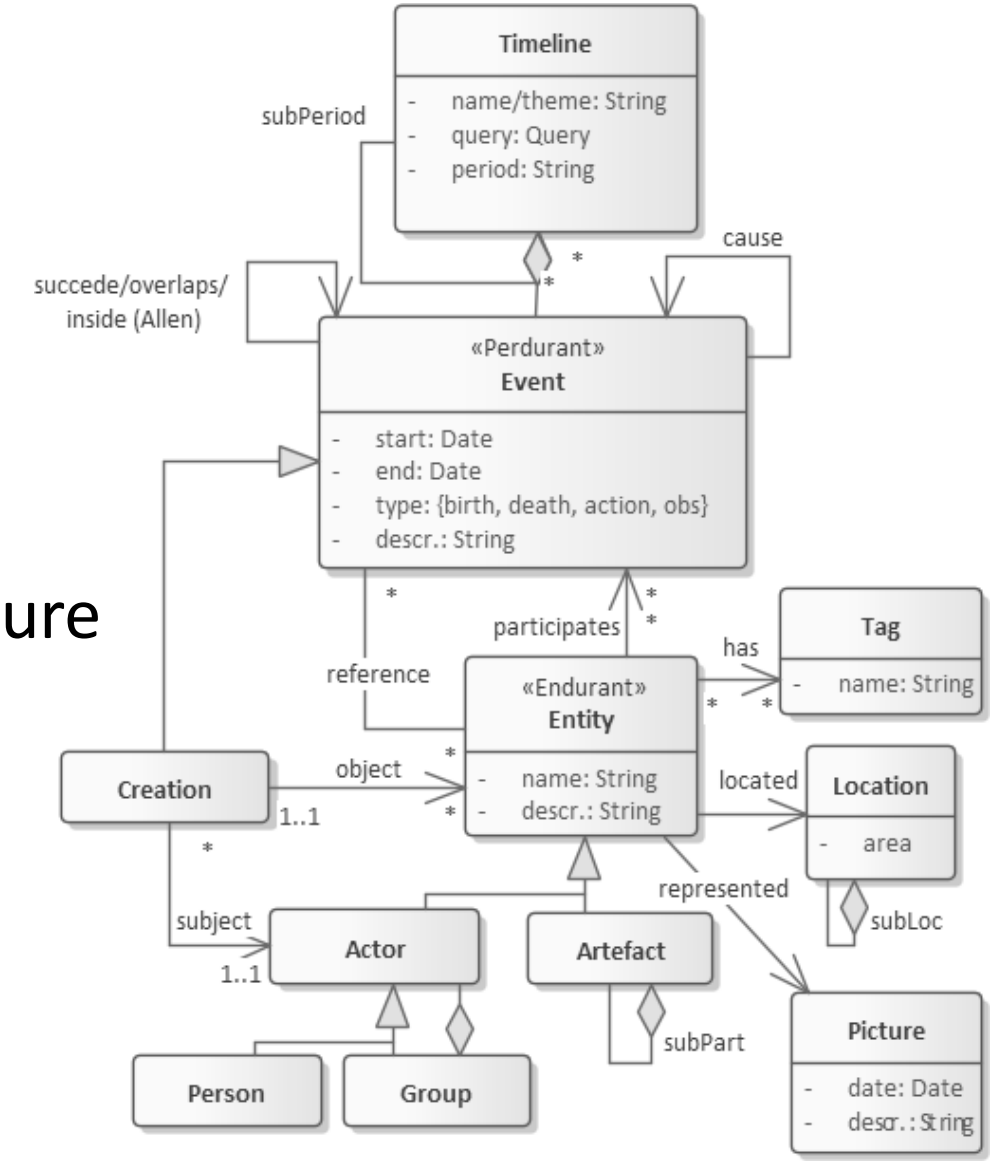


dBpedia



Our (inspired) modelling framework

- Timeline first class concept
- Rely on Endurant/Perdurant (stereotype)
- Generic « tagging » for extensibility
- Multiple aggregation levels on time/actors/artefacts
- App to Physical mapping: id, location, picture



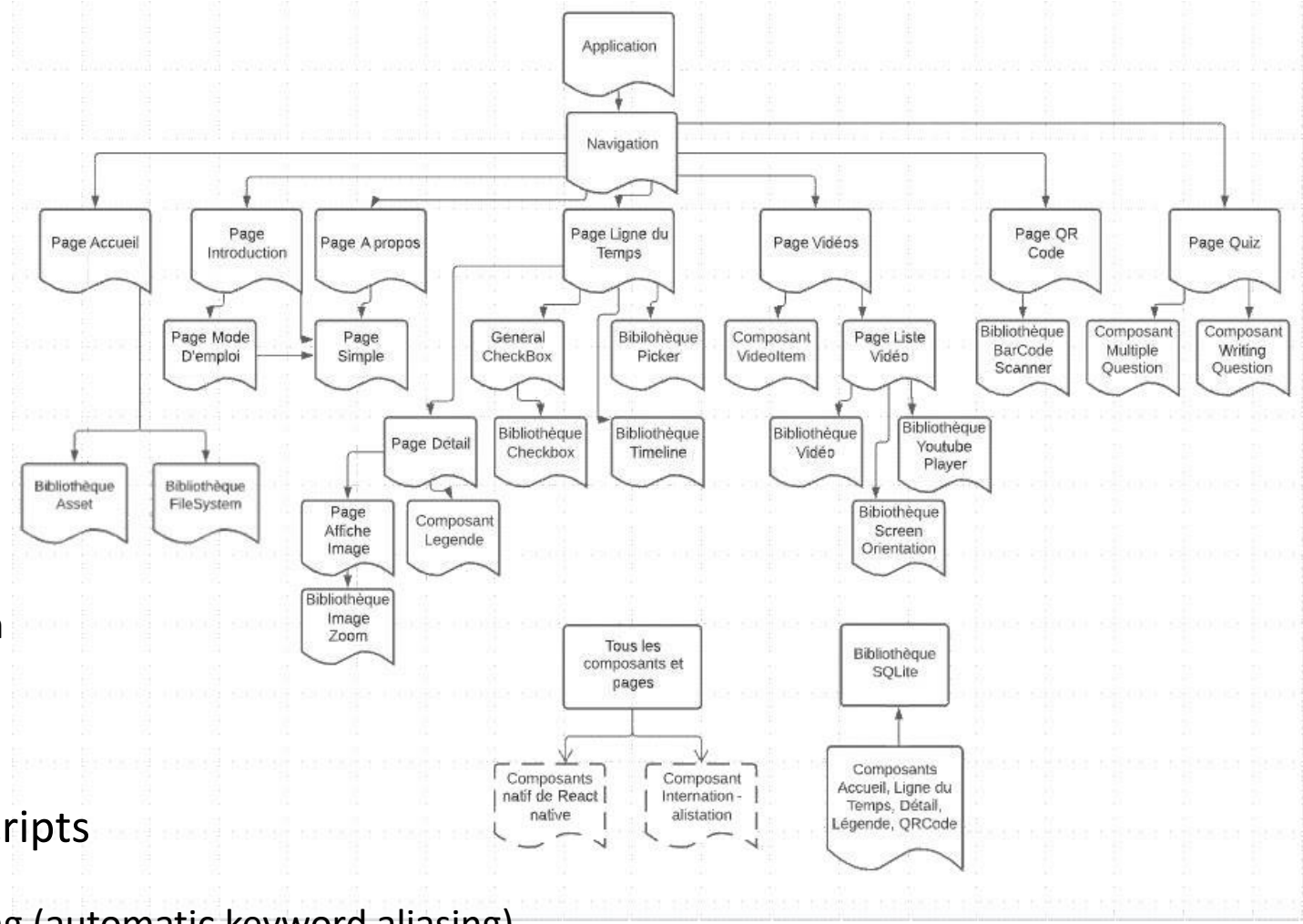
All-in-one Off-line Application

- Selecting an Open-Source Framework:
  - Criteria:
    - cross-platform
    - scalability
    - Learnability
    - component Library
    - Perennity
    - Internationalisation
  - Candidates:
    - Flutter (Dart)
    - **React-Native (js)**
    - Ionic/angular (js)
    - Solar2D (Lua)

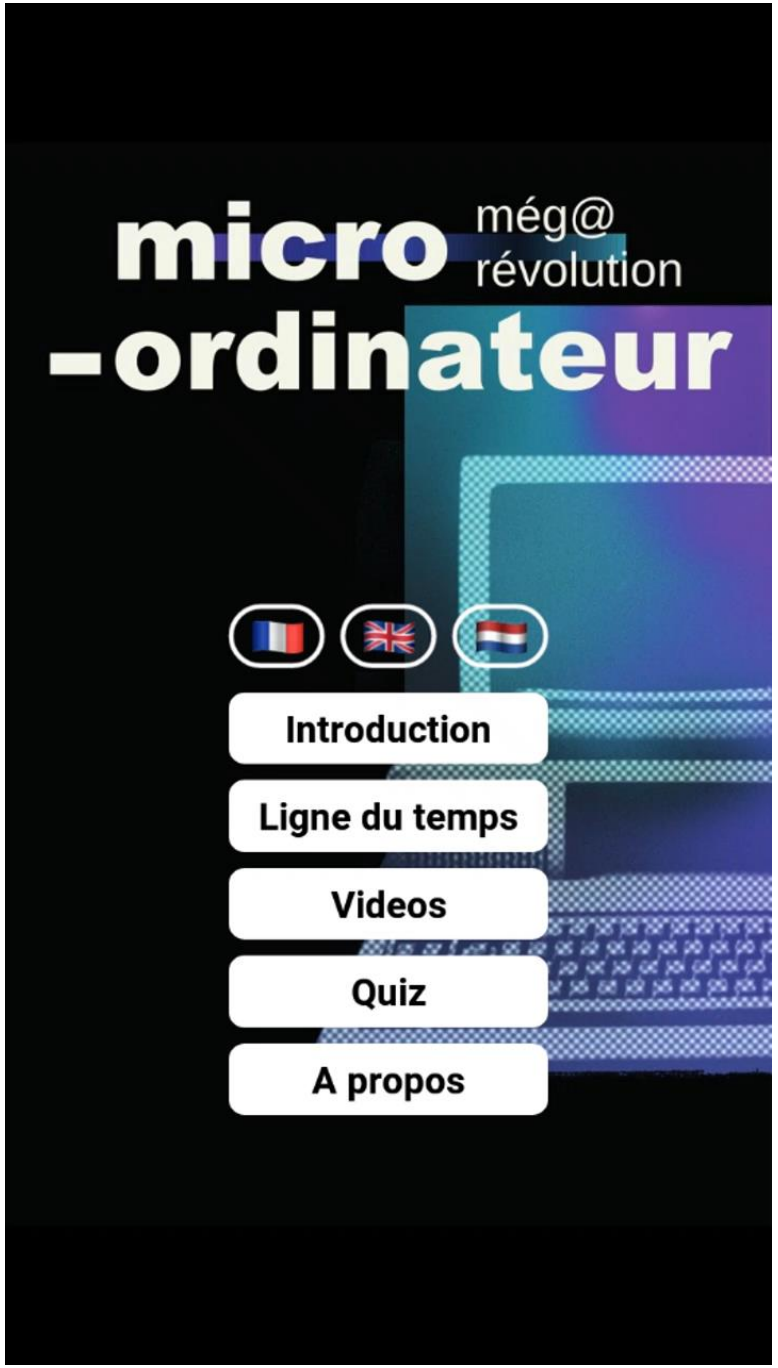
- Might evolve later (back-end ➔ multiple front-ends)

Architecture

- Page instances
  - Intro
  - Timeline
  - Video mngr
  - Quiz
  - …
- Components:
  - timeline
  - details
  - video
  - quiz/question
  - QR-code
  - database
  - …
- Management scripts
  - Translation
  - Internal linking (automatic keyword aliasing)
    e.g. “first Macintosh” = “Macintosh 128K”



DEMO TIME


micro
méga
révolution
-ordinateur
Introduction
Ligne du temps
Videos
Quiz
A propos

Feedback on the Current Application

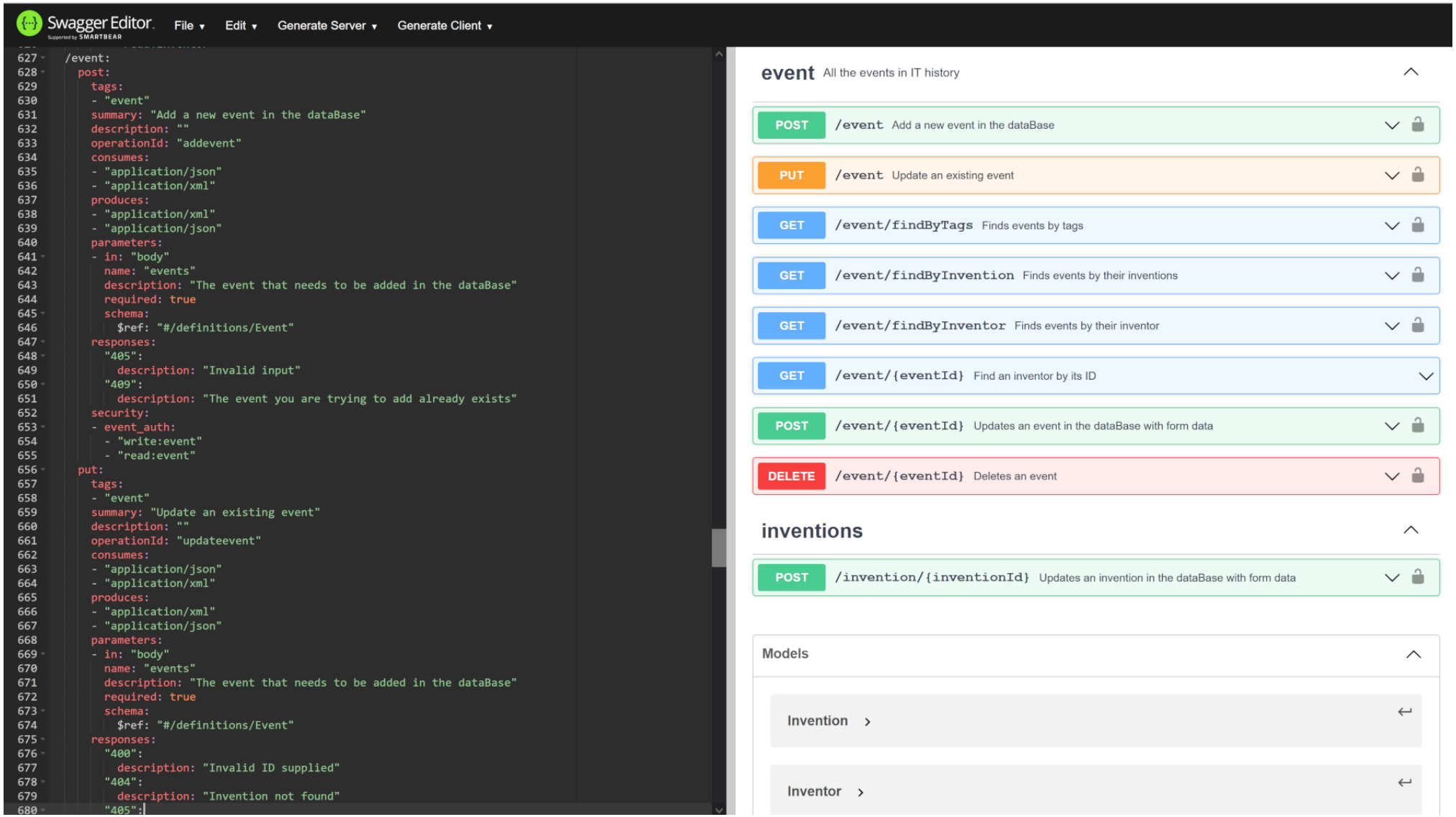
- Good points
  - Very nice experience and user feedback
  - Resource bundling/translation process quite easy
  - Very good scalability (efficient state update, lazy loading…)
    ➔ large timeline tested

- Known issues
  - Off-line mode not great in React-Native
    - Reading a local HTML page mostly “statically linked” to resource via tables required some ad-hoc solution (page template)
    - Loading a sqlite DB locally requires some web library actually requiring an (unnecessary) WIFI connection !
  - Expo Go
    - Great for testing but sometimes requires cache clearing/refresh
    - Not all libraries will work
  - Large footprint of “all-in-one” solution (200 MB)
  - Static relational schema

Elaboration – Dynamic On-line Backend

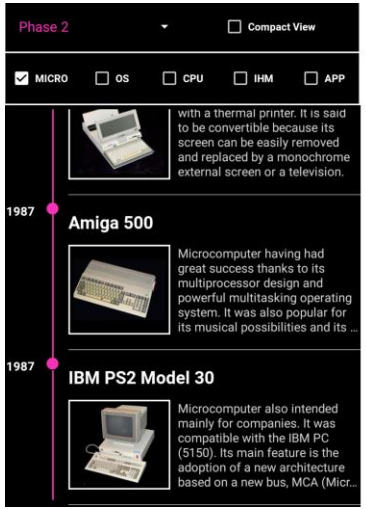
- Access to heavy resources: high resolution pictures, videos
- Access to dynamic timeline, through queries on conceptual resources:
  - actor(s) at different granularity levels:
    - life of a person (e.g. Clive Sinclair)
    - evolution of a group (FSF)
    - or a company (Commodore International)
  - object(s), at different granularity levels:
    - precise history of a specific object (e.g. the design of the LISA computer)
    - family of objet w.r.t. specific criteria, micro-computers of a specific period, manufacturer, using a specific CPU,...
  - temporal, spatial or thematic contexts respectively through
    - Event (dates)
    - Location
    - Tag characteristics.

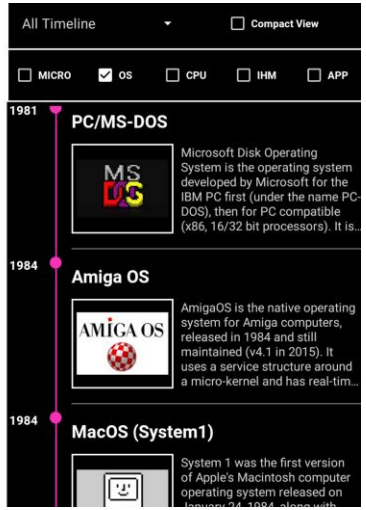
Open API Design ➔ on-going implementation

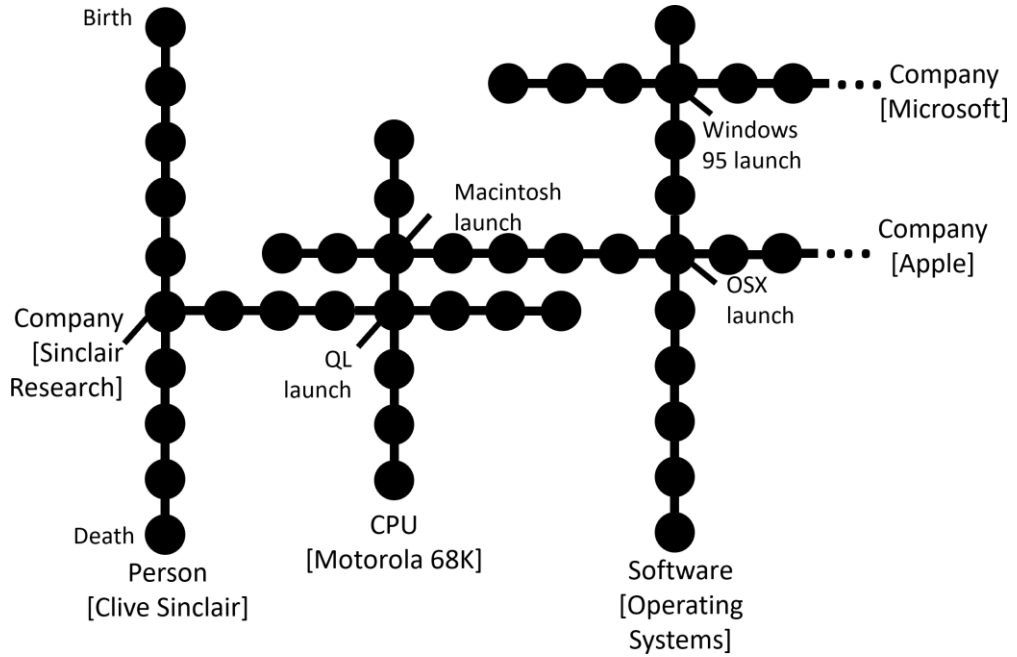


Elaboration – Flexible Navigation Front-end

- Idea: allow to “jump” from one timeline to another (like switching metro)
- E.g. micro ➔ Amiga 500 ➔ OS context
  ➔ Commodore context
- “Pivoting” operation on
  - event pivoting between related entities or features
    e.g. see above
  - time zoom in/out based on a defined period
    e.g. micro computers ➔ “early phase”
  - actor zoom in/out, from person level to company
    e.g. Clive Sinclair ➔ Sinclair Research
  - object zoom in/out
    e.g. down to version level and up to product family
  - relations inclusion, possibly iterative/closure
    e.g. to look for event causes/consequences
  - combining multiple timelines, either merged or keeping them visually separated (+ synergies)
    e.g. GUI // micro-computers







Elaboration - Tentative Information Extraction

- Query using SPARQL on OpenLink Virtuoso (DBPedia endpoint)

```
SELECT DISTINCT ?date ?name (GROUP_CONCAT(DISTINCT ?founder; SEPARATOR=", ") AS ?founders)
WHERE {
  ?company foaf:name ?name.
  ?company dbo:industry dbr:Computer_hardware.
  ?company dbo:foundedBy ?founder.
  ?company dbo:foundingYear ?date.
  ?company dbo:abstract ?abstract
  FILTER langMatches(lang(?abstract),'en')
  FILTER(?date >= "19750101"^^xsd:date)
}
ORDER BY ASC(?date)
```

- Results

SPARQL | HTML5 table

date	name	founders
"1975"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Microsoft Corporation"@en	http://dbpedia.org/resource/Bill_Gates, http://dbpedia.org/resource/Paul_Allen
"1976"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Apple Inc."@en	http://dbpedia.org/resource/Ronald_Wayne, http://dbpedia.org/resource/Steve_Jobs, http://d
"1976"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Matrox Electronic Systems"@en	http://dbpedia.org/resource/Lorne_Trottier
"1976"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Vector Graphic"@en	http://dbpedia.org/resource/Lore_Harp_McGovern, http://dbpedia.org/resource/Robert_Harp
"1976"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Acer Inc."@en	http://dbpedia.org/resource/Stan_Shih
"1979"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Convergent Technologies"@en	http://dbpedia.org/resource/Allen_Michels
"1979"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Core International, Inc"@en	http://dbpedia.org/resource/Hal_Prewitt
"1979"^^<http://www.w3.org/2001/XMLSchema#gYear>	"Pravetz computers"@en	http://dbpedia.org/resource/Ivan_Marangozov

To Conclude

Computer Museum NAM-IP

- Timeline concept rich to support museum guide
  - Good feedback on our current exhibition
  - Plan to extend it to permanent exhibition

- Concept might be generalised
  - other museums, although underlying ontology focused to “technological” museum
  - research/learning purposes

- Try it, give feedback / ideas / contributions welcome !
  - https://github.com/NAMIP-Computer-Museum/guideApp
  - christophe.ponsard@gmail.com

- Also try the Quiz (sorry in French, not yet translated)
  but questions to be generated from knowledge base soon ;-)