How to represent the medical annotations ?

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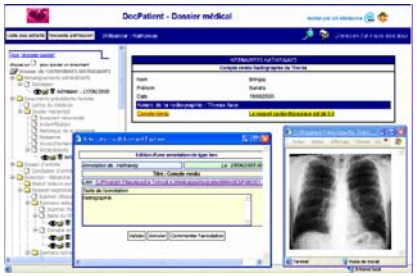
Introduction/Background: DocPatient Project

- **Initial report:**
  - Need of annotations to support the collaboration of the health care professionals in the documents of the health record

- **Methods:**
  - Study of the existing electronic annotation tools and comparison of their functionalities with the paper medical practices of annotations
  - Selection/Implementation of 6 functionalities in a model
  - Evaluation of the model with health care professionals



- **Results:** Specification of an annotation tool dedicated to the electronic health record to **support collaborative practices** [1]

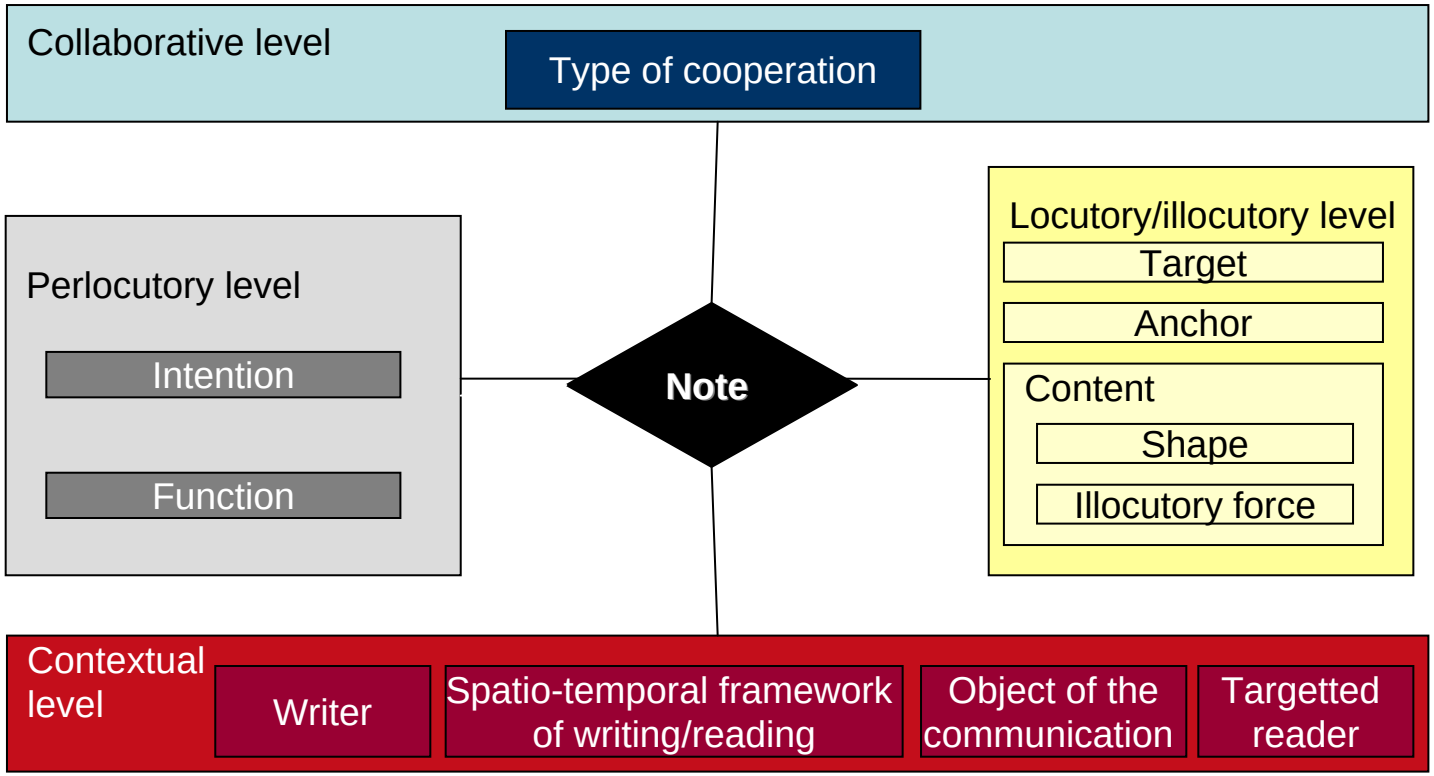
- **Need: <u>A better description of these annotations to represent and display them in our system</u>**

Introduction/Background: Collaboration with LAMIH

- **Initial report:**
  - Need of a description of the medical information

- **Results:**

4 levels to describe medical information [2]

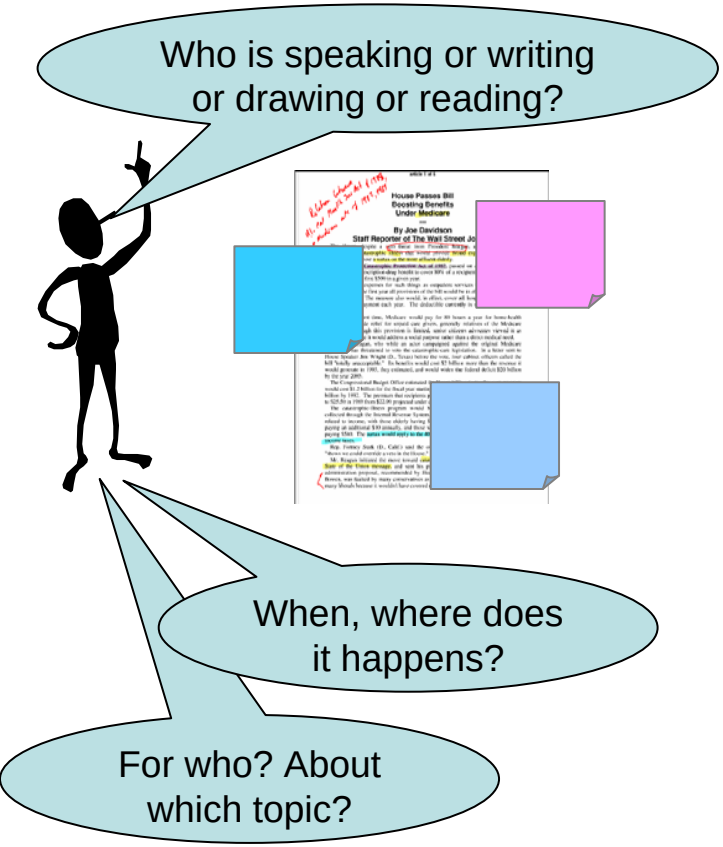


Objectives

- To improve collaborative practices
  - Need of a detailed description of the annotations for a better integration in the Electronic Health Records (indexing and layout according to various points of view)
  - Application of the model of the communication notes to the annotations of the health care records

Results: Contextual level

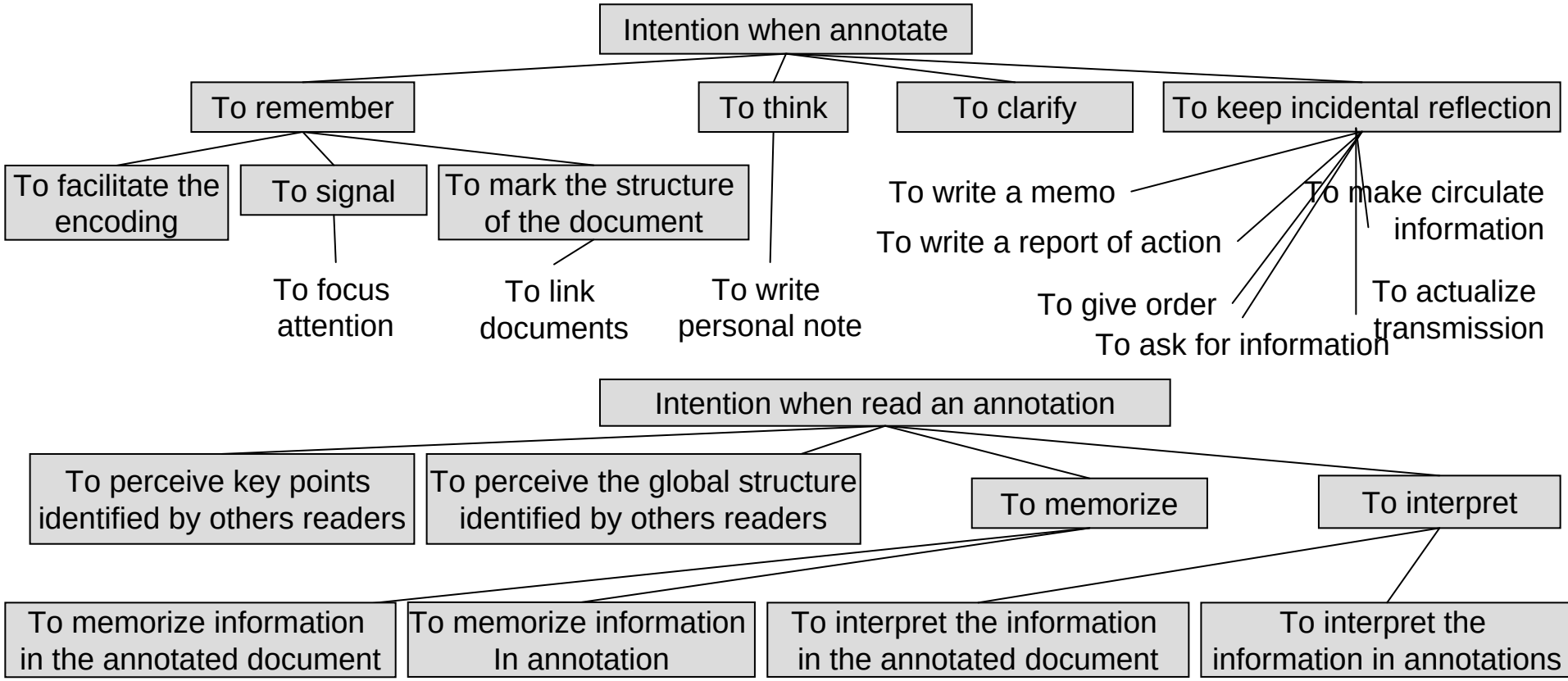
Contextual level: What is the context which leads the author to produce an annotation and what is the context which leads a reader to interpret it?



- ***Spatio-temporal framework of creation/reading:*** at a particular date, in the patient's room, in the physician's office...
- ***Annotator:*** writer who belongs to the medical team (physician, nurse, fellow...)
- ***Targeted readers:*** the annotator himself, one or several member of the medical team, the family...
- ***Potential readers:*** as the Health Record remains in the patient's box, all the medical workers
- ***Real readers:*** targeted, potential or ***collateral readers*** (readers who have not been envisaged by the annotator e.g. computer scientist who studies the Health Records)
- ***Object of communication***, a topic (patient's state, care planning)

Results: Perlocutory level

Perlocutory level: In which way does the author want his annotation to be used and how the reader finally uses it?



Results: Locutory/illocutory level

Locutory/illocutory level: What are the means used by the author's annotation to transmit his message? How does the reader interpret it? Which target? Anchor? Form? Illocutory force?

- ***Target:*** collection of documents, a document, a part of a document (a paragraph, an image…), or another annotation
- ***Anchor:*** link between the annotation and the target (a line, a surrounded sentence…)
- ***Contents:*** trace of one of the mental representations of the annotator elaborated about the target
- ***Shape:*** a layout added to the content (bold, colored sentences...)

This table gives the percentages of the practitioners who use annotations by professions and by types of annotations

	Physician	Fellow	Nurse	Ad agent
Post-it	80%	80%	80%	100%
Comment	100%	80%	100%	60%
Mark	100%	80%	80%	100%
Personal note	100%	100%	40%	100%

Results: Locutory/illocutory level

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This table classifies the types of annotation according to the classification of speech acts mainly used to formulate the content

- ***Illocutory force [4]:*** action associated to the speech act (directive, commissive, declaration, representative)

Personal annotations which can be published	
Memo	Directives, Commissives
Personal note	Declarations
Report of action	Declarations
Link between documents	Representatives, Declarations
Emphase of information	Representatives, Declarations
Annotations writen to be published	
Order	Directives, Commissives
Transmission	Representatives, Directives
Request for information	Directives
Circulation of information	Declarations

Result: Collaborative levels

Collaborative level: This level exists only if the annotation is produced in the context of collaborations. What is the impact of the annotation on these activities? The reader integrates the annotation in his own tasks and he interprets it according to the various levels of collaboration mentioned by [5]

- **Example:** a physician sticks a post-it "Blood Gas in 2 hours"
  - **Action level :**
    - When the physician sticks the post-it, he deliberately ***creates a local interference*.**
    - A nurse reads this annotation and ***detects the interference*.** She had scheduled the bath at the same time.
    - She ***identifies the goal of the annotator*.** He wants to supervise the evolution of the blood gas.
    - She ***solves the local interference*** by delaying the child's bath.

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- **Example:** a physician sticks a post-it "Blood Gas in 2 hours"
  - **Planning level :**
    - The nurse ***updates her representation*** of the child. She understands that the physician wants new blood gas because the child is ill.
    - She also ***updates her representation of the controlled process*** (the evolution of the child's state)
    - and *her* ***representation of the controlled activity*** (the cares given to the child). For that, she readjusts her ***representation of the common goal*** (to keep the child in a stable state), of the ***common plan*** (the blood gas have priority on the other cares) and of the ***distribution of the tasks*** (she must prepare the child and the material for the physician).

- **Complexity of the collaborative activities:** A fellow analyses the same comment from another point of view and consequently, this note induces others collaborative activities.

Discussion, Conclusion and Prospects

- **Usefully managing and laying out annotations** is a challenge because their informal and unforeseeable nature makes them difficult to handle.
- Their **description according to multiple points of views** is a solution to consider their multiple facets.
- When an annotation is described according to different the items of our model, an agent (man or machine) has the necessary knowledge to effectively use, exchange and lay out it.
- A detailed modeling of these annotations allows not only their computerization but also their integration in the complex process of medical information management.
- This **representation is coherent with the implementation of our annotation tool** dedicated to the Electronic Health Record and will be easily integrated.
- Moreover, this **representation is also satisfactory in respect of the evaluation** carried out with the Health Care Professionals.
- The originality of our modeling comes from the way we take into account of some **collaborative knowledge** which are not often used to build collaborative tools in medical situations.

References

- **References**
  - [1] S. Bringay, J. Charlet, and C. Barry, Annotations for the Collaboration of the Health Professionals. Proceedings AMIA 2006. Washington, 91-95.
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  - [3] J. Austin, How to Do Things with words, Oxford: Clarendon Press, 1962.
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