MUCOSA-PREDICT Clinical Data Reformatting for Analysis

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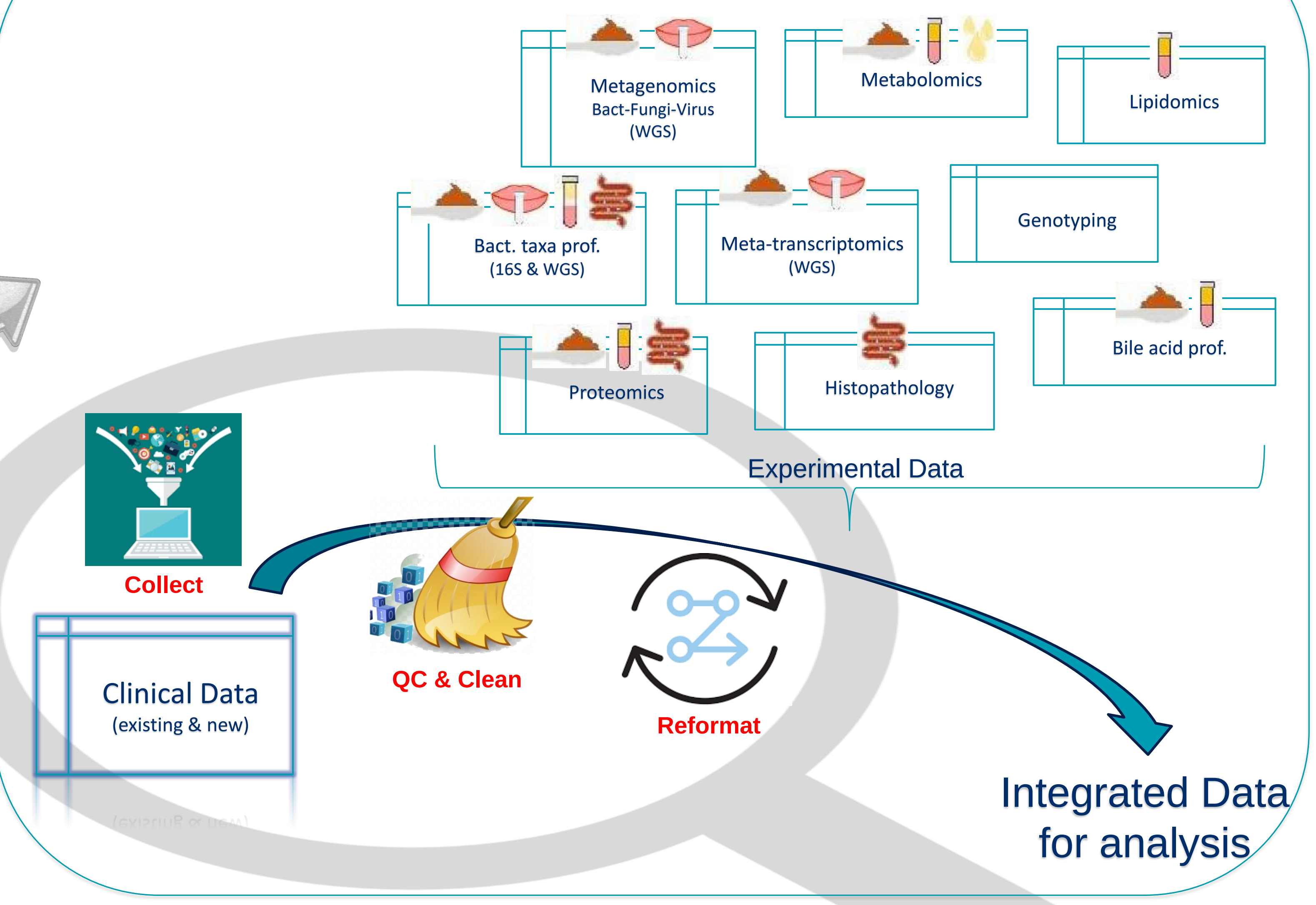
INTRODUCTION

Clinical data management is of major importance for the success of a project such Microb-Predict. Successful clinical data leveraging in R&D includes:

- Data collection using a common format for all centers and controlled vocabularies, addressed by WP1 "Clinical, genetic, expositional and geographic characterization of existing data“,
- Quality control with data sanity checks and data consolidation,
- Data reformatting to enable analysis with experimental data.

The goal of this work was to move the MUCOSA-PREDICT clinical data from a **patient visit oriented format** to a **format suitable for analysis**.

Analysis with Microb-Predict Clinical Data



METHODS AND RESULTS

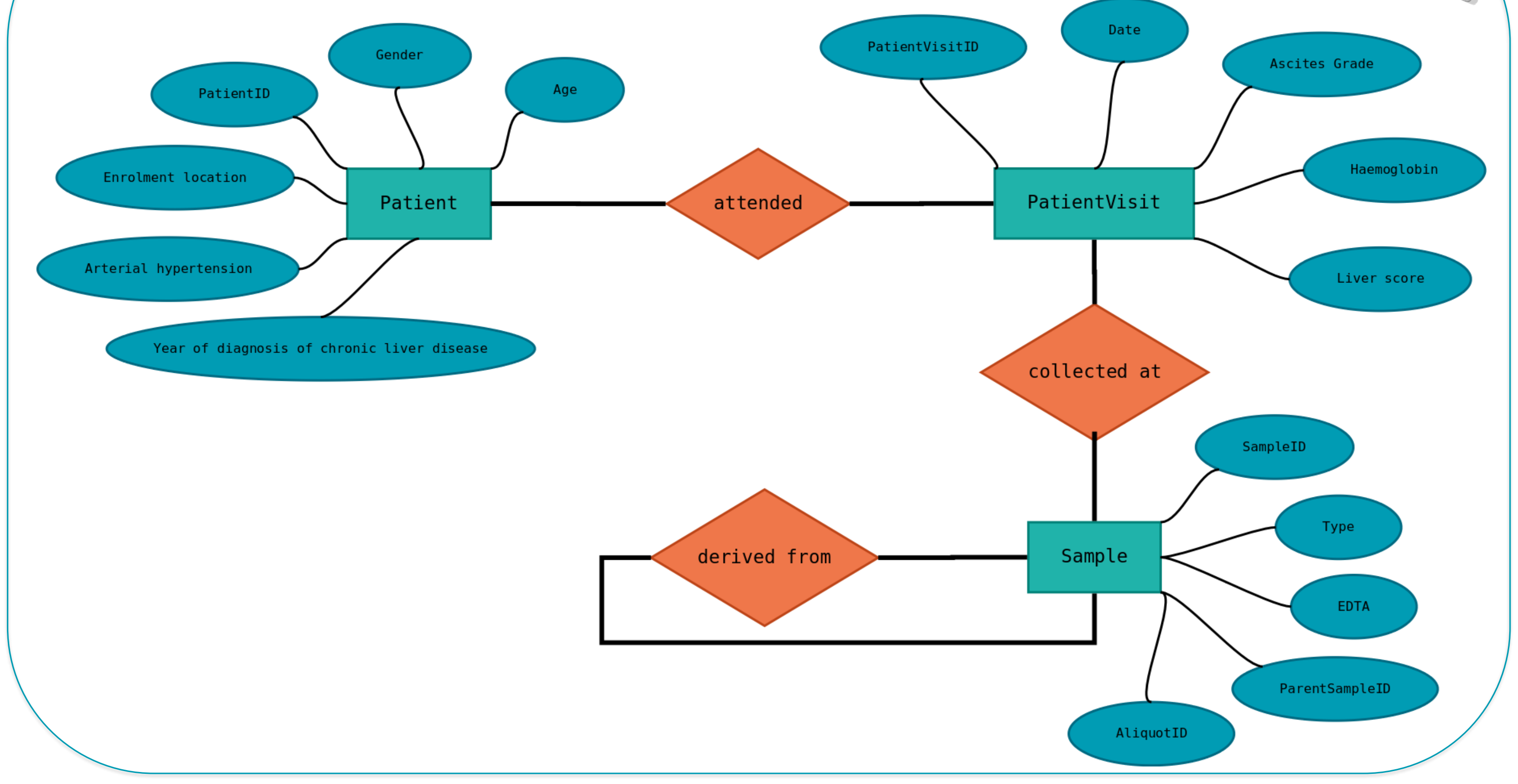
1. Data Modeling

In data management, an Entity Relationship model, also called “ER model” is composed of 3 main components:

- **entities**: « things of interest
- **attributes** for each entity: « features »
- **relationships** between entities

A simple Entity Relationship modeling allowed the identification of 3 main entities (🟩): patient, patient visit and sample.
Each clinical parameter was mapped to 1 entity to become an entity attribute (●).
Relationships between entities (◆) were determined as follow: a patient attends at least 1 patient visit; samples can be collected from the patient (feces, blood, saliva, etc.) at a patient visit; a sample can derive from another sample to produce aliquots.

Entity Relationship data model



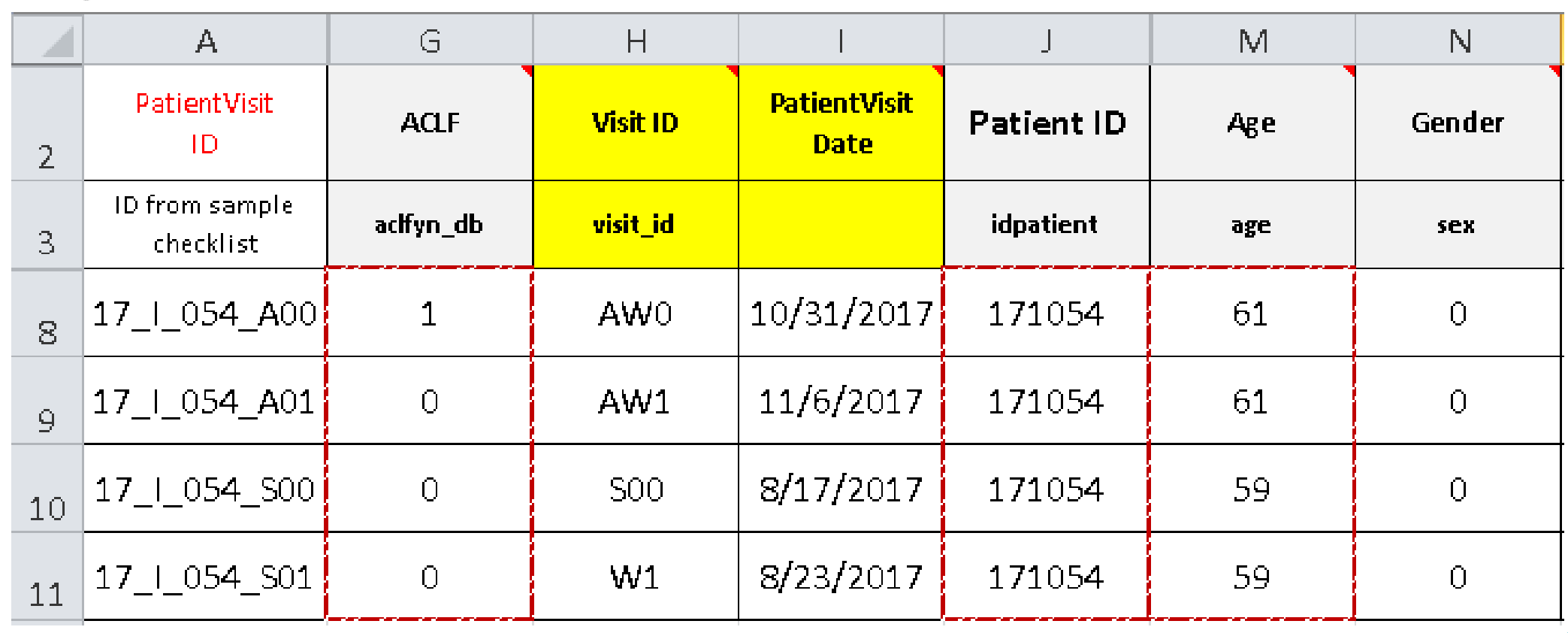
Reformatting process automation

original single
sheet format
python
3 entity
sheet format

2. Data Cleanup

With the ER model, a sample inherits from its patient visit information, which inherits from its patient information. This reduces information redundancy and has helped to implement a program that performs data sanity checks for entity attributes.
Inconsistencies detected this way were then checked and corrected in the original database.

Data cleanup example



	A	G	H	I	J	M	N
2	PatientVisit ID	ACLF	Visit ID	PatientVisit Date	Patient ID	Age	Gender
3	ID from sample checklist	aclfyn_db	visit_id		idpatient	age	sex
8	17_I_054_A00	1	AW0	10/31/2017	171054	61	0
9	17_I_054_A01	0	AW1	11/6/2017	171054	61	0
10	17_I_054_S00	0	S00	8/17/2017	171054	59	0
11	17_I_054_S01	0	W1	8/23/2017	171054	59	0

3. Data Reformatting

The cleaned data were finally reformatted in an Excel format handy for data analysis. The new format has 3 sheets corresponding to the 3 entities. Each column of an entity sheet corresponds to a clinical parameter (i.e. attribute).

The cleanup and reformatting steps were automated using python scripts and will be run on future clinical data versions.

CONCLUSIONS

- This modelling, cleaning and reformatting of the clinical data has allowed to:
  - ✓ Reduce redundancy: final Excel file size is ¼ of original Excel file size (300Kb vs 1.2Mb),
  - ✓ Improve data quality: 9 inconsistencies have been detected, manually checked and corrected in the original Excel file,
  - ✓ Facilitate data integration: linking analysed samples to the sample entity will allow retrieving both patient visit and patient related clinical data.
- **Both formats contain the exact same information and will co-exist for the consortium partners**, the choice of format is based on convenience.
- Additional data sanity checks could be implemented when appropriate to ensure the highest quality data for the Microb-Predict partners.
- There is still some work to link samples to data. Interested partners can contact us to complete this effort.

ACKNOWLEDGEMENTS

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