

Data Collection and Management

Software for Data Processing, Visualization and Analysis at the French VMC

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CEESAR

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Autoworld, Brussels



www.eurofot-ip.eu

eur
FOT

Bringing intelligent vehicles to the road

Aim



raw data



aggregated data

- ⌘ **Trips Logs:** CAN, GPS, Video files
 - ▷ unstructured, in any kind of context, depends on vehicle/instrumentation level
- ⌘ **Context:** Experimental context database, Geographical database, Questionnaires

- ⌘ per trip attributes
- ⌘ events and per events attributes
- ⌘ situations and per situations attributes
 - ▷ reduced, structured, contextualized
 - ▷ accessible across all trips using relations

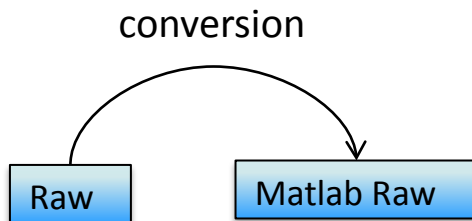
Process

Per-trip processing

Raw

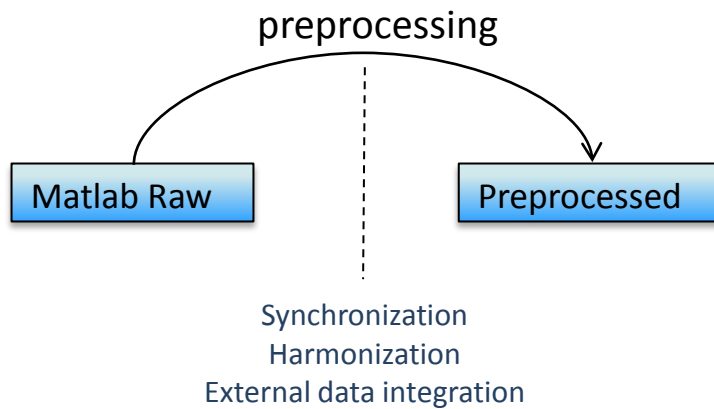
Process

Per-trip processing



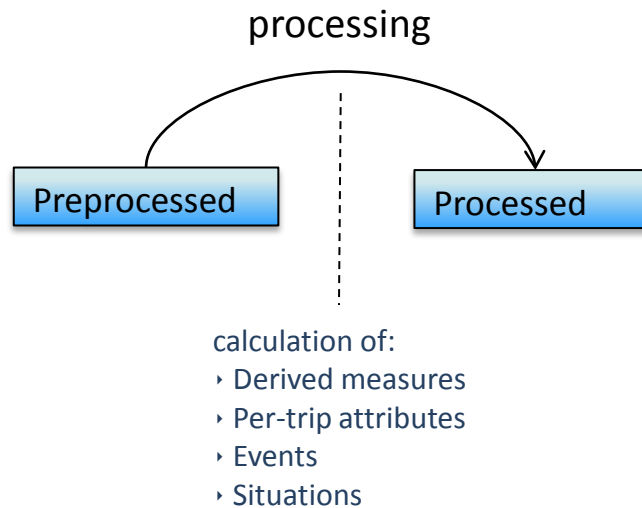
Process

Per-trip processing



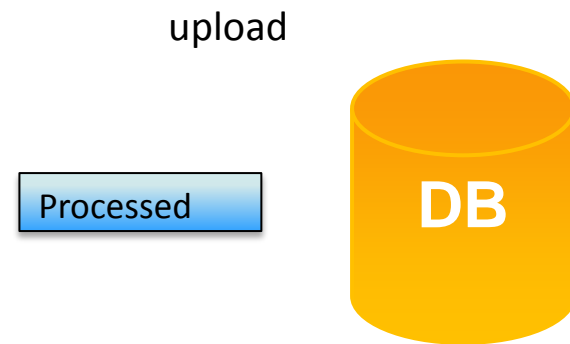
Process

Per-trip processing



Process

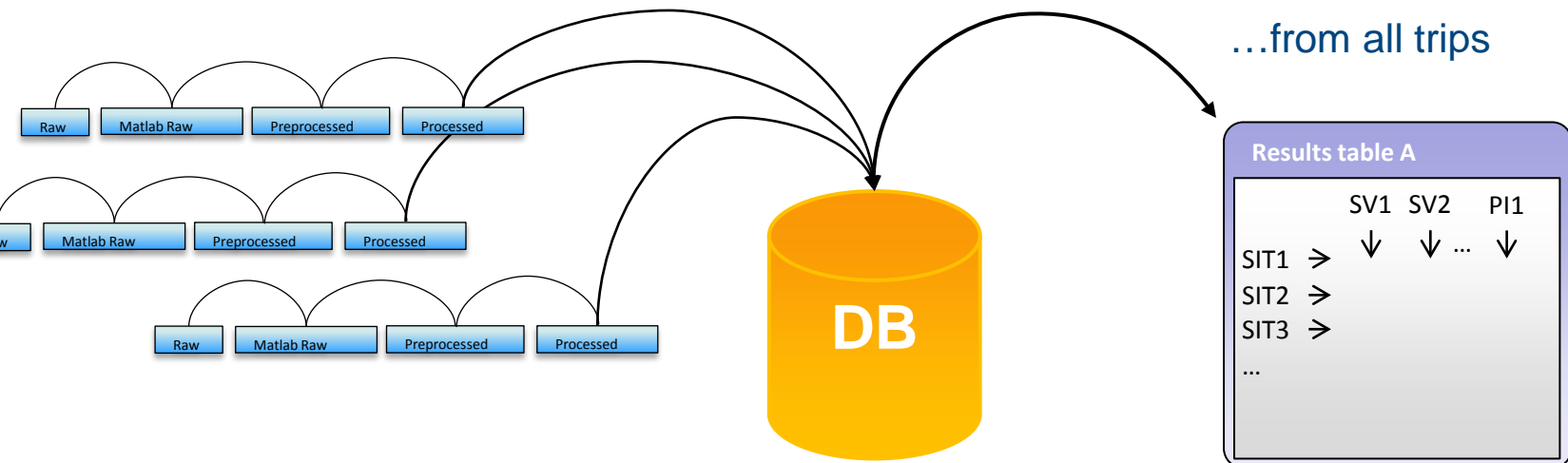
Per-trip processing



Process

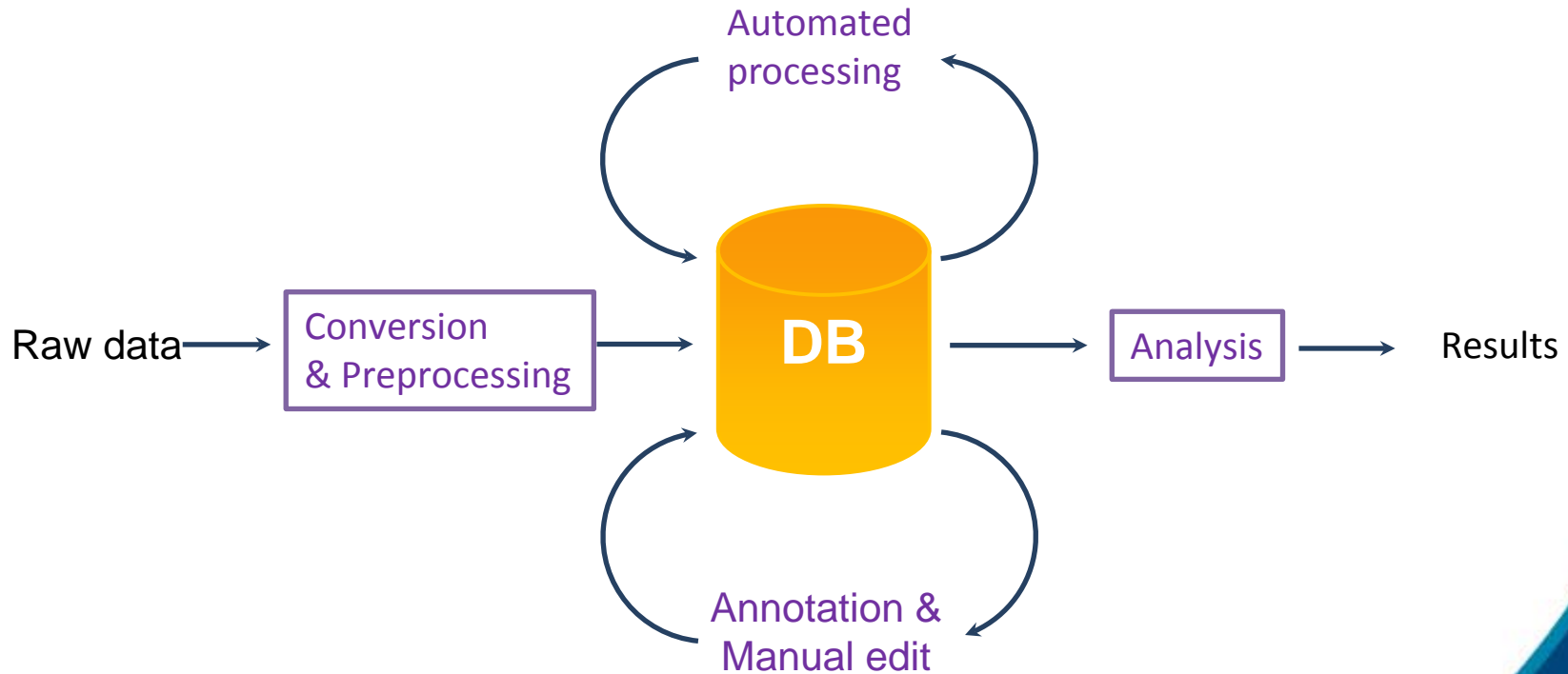
Per-trip processing

Transversal analysis



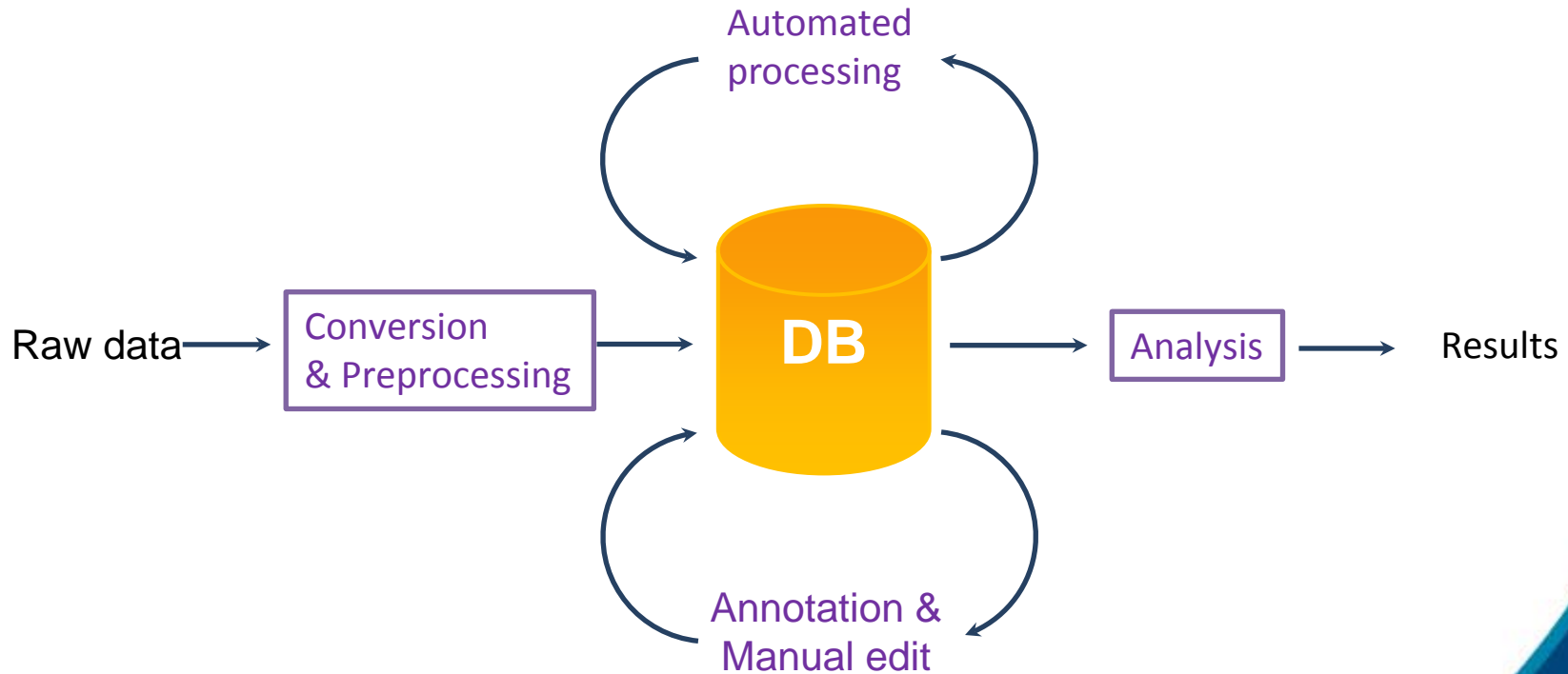
Challenges

No such a linear process...



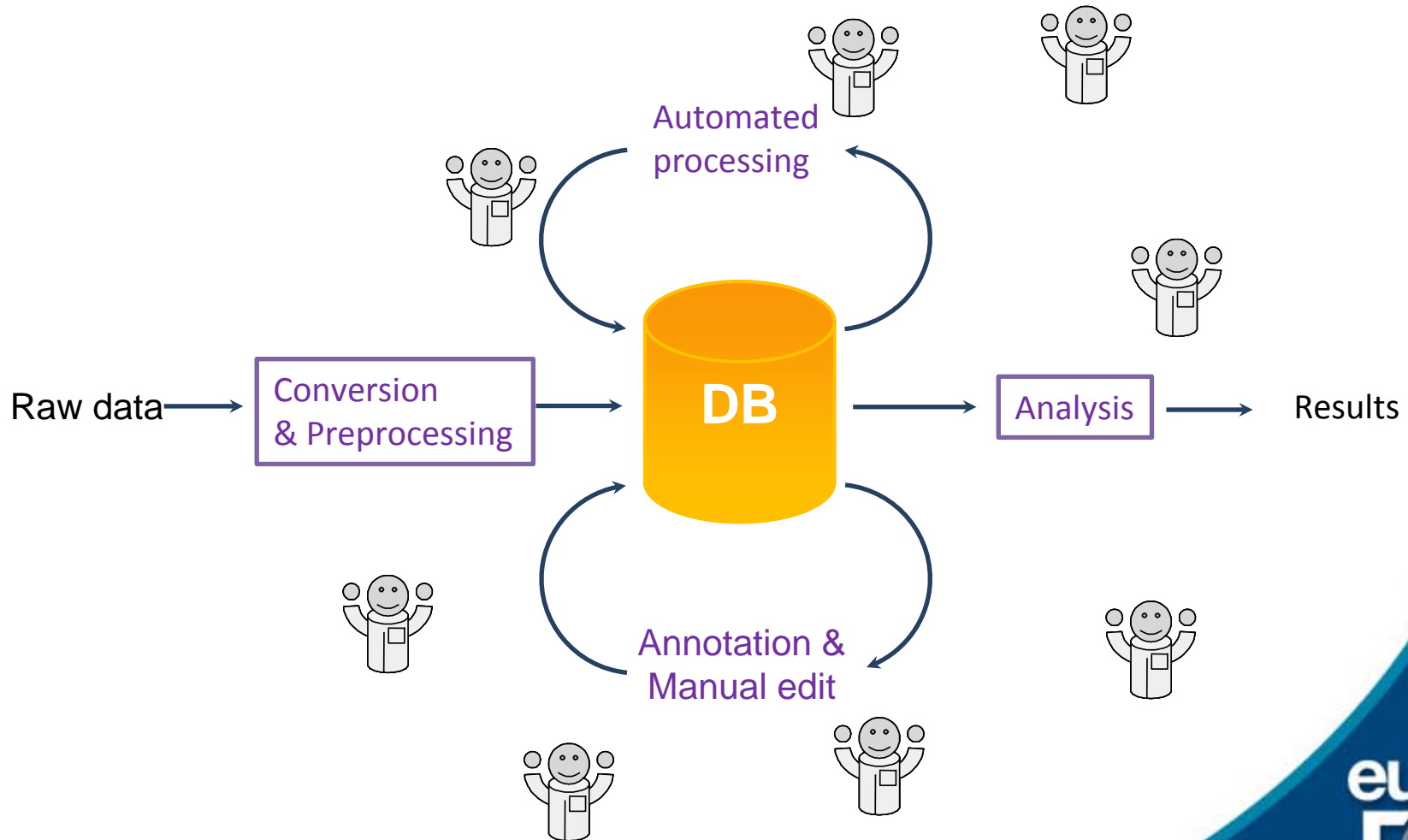
Challenges

Dataset is huge... and unpredictable !



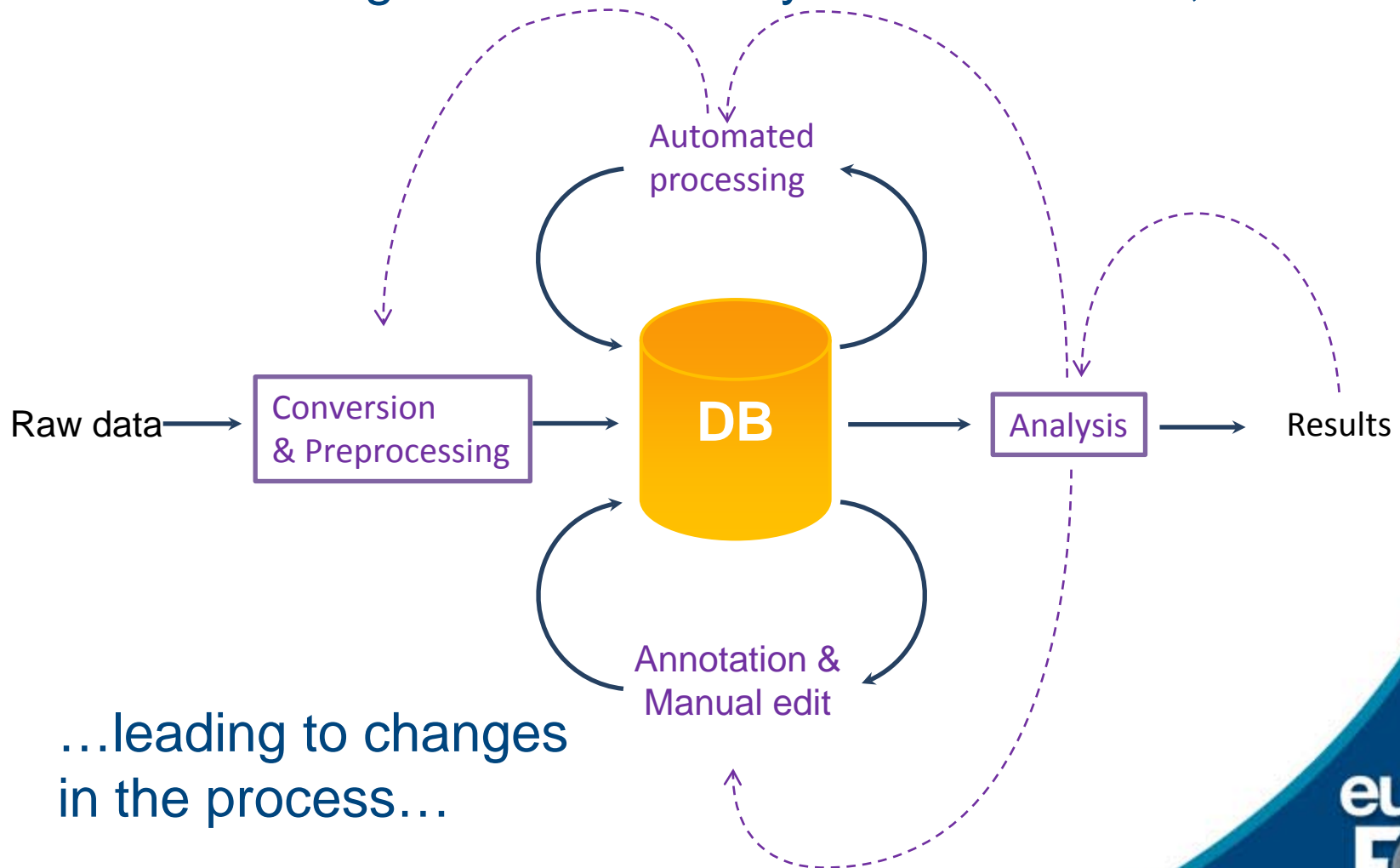
Challenges

All kinds of crazy people want to play with data...



Challenges

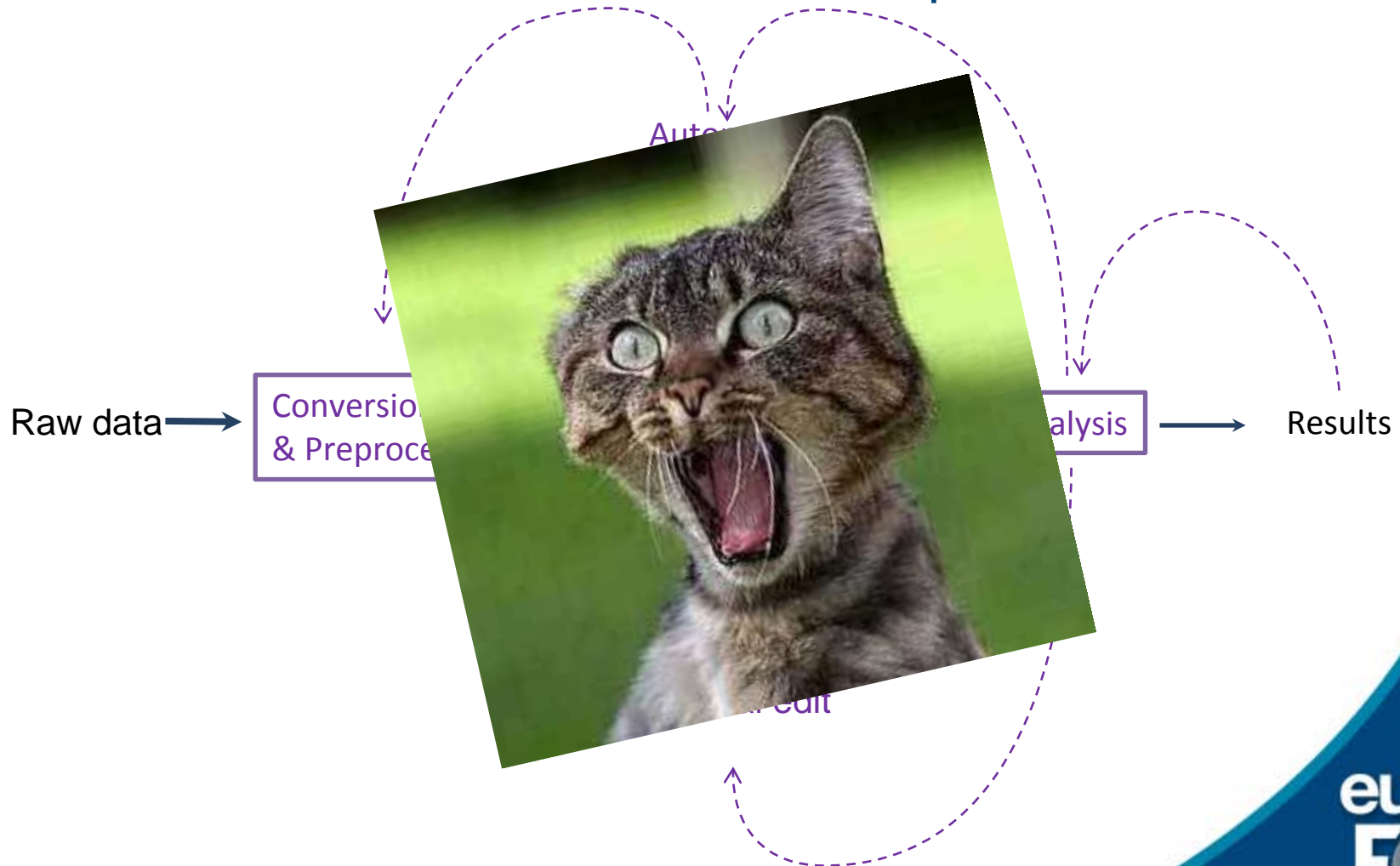
...And change idea when they see first results,



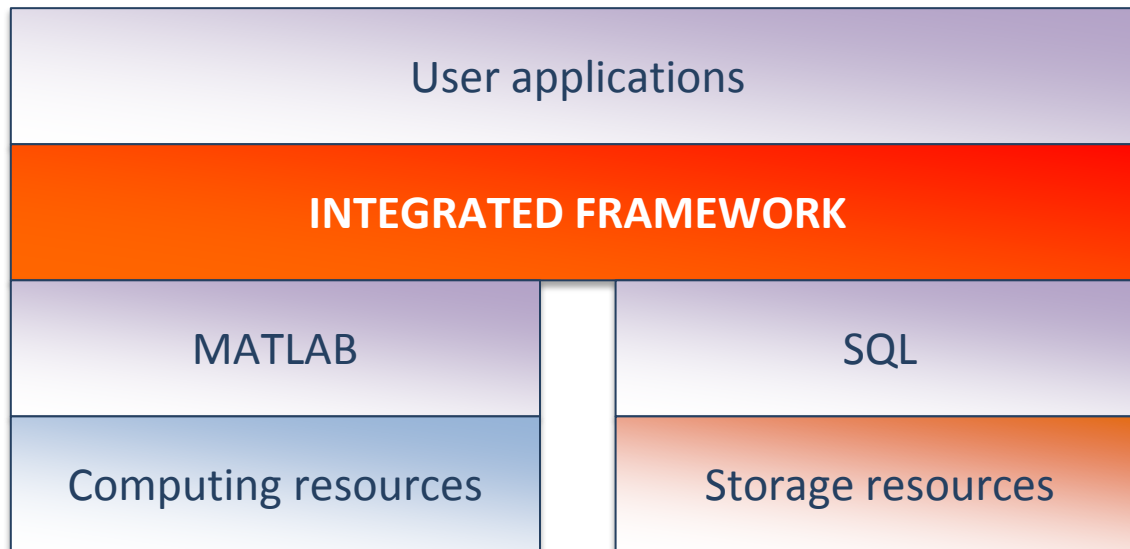
...leading to changes
in the process...

Challenges

While new data continues to be acquired !



The solution



Implementation

- ⌘ Complete process is described in a user-defined, evolving, data-model
- ⌘ Separates data management and scientific tasks
- ⌘ All interactions are done through GUIs or a public API
- ⌘ Versions & dependency control for each algorithm or entity definition
- ⌘ Controlled evaluation of scripts:
 - ▶ execution plan derived from dependencies / versions
 - ▶ sandboxed execution
 - ▶ logs & diagnostic connection
- ⌘ Database is automagically maintained by SQL interface
- ⌘ GUIs content and behavior based on data model

Achieves:

- ♂ **Reliability** « no human or programming error should affect and crash the whole system »
- ♂ **Efficiency** « avoid unnecessary calculations, allow reusability of algorithms »
- ♂ **Quality, consistency and traceability** « Ensure data consistency. Enforce traceability and documentation »
- ♂ **Interactivity** « allow feedback loops and modification of automatically computed entities »
- ♂ **Scalability** « computing should be parallelized »
- ♂ **Genericity** « we can use the same system to process data from different experiments »

GUIs

The image displays several software interfaces used in the euroFOT project:

- MATLAB 7.10.0 (R2010a):** Shows the command window with execution logs for nodes 'N_115' and 'N_116'. The script includes commands like `++> (o) Execution of node 'N_115', Situation : Motorway_FreeFlow_Car_TRNoSLCC_`.
- Trip Viewer:** Displays trip information for Trip Viewer - 23104 - 10-Jun-2011 08:43:38, Driver: 6, Phase: 2, Vehicle: 4. It includes a signal graph and a table of events and situations.
- Experiment Builder:** Shows a hierarchical tree of data objects and attributes. The 'Attributes: RoadType' window is open, showing details for 'RoadType' with a unit of '0:Motorway;1:Urban;2:Rural;3:Undefined;'. Other attributes include 'Generator Inputs', 'Generator Parameters', 'Refresher Inputs', and 'Refresher Parameters'.
- Trips Explorer (Process debugging):** Lists available trips (e.g., 23104) and filters for attributes like 'RadarFail' and 'NoFailure'. It also shows video folder settings and conversion dates.
- Video Viewer:** Displays four camera feeds: external front view, driver's perspective, interior dashboard view, and a close-up of the driver's feet.
- Map:** Shows a map of the Paris area with a red line indicating the vehicle's path. The map data is attributed to Google.
- Inspector:** Provides detailed data for a specific timestamp (1506.2 s) on 10-Jun-2011 09:08:44. It lists various attributes such as 'CC-SL_State', 'CC-SL_Speed', 'Vehicle_Speed', 'Engine_RPM', and 'Map_RoadType'.

8 Functionalities, 28 Partners, 1000 Vehicles

1 Field Operational Test, 8 Functionalities

28 Partners, 1000 Vehicles, 1 Field Operational Test

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