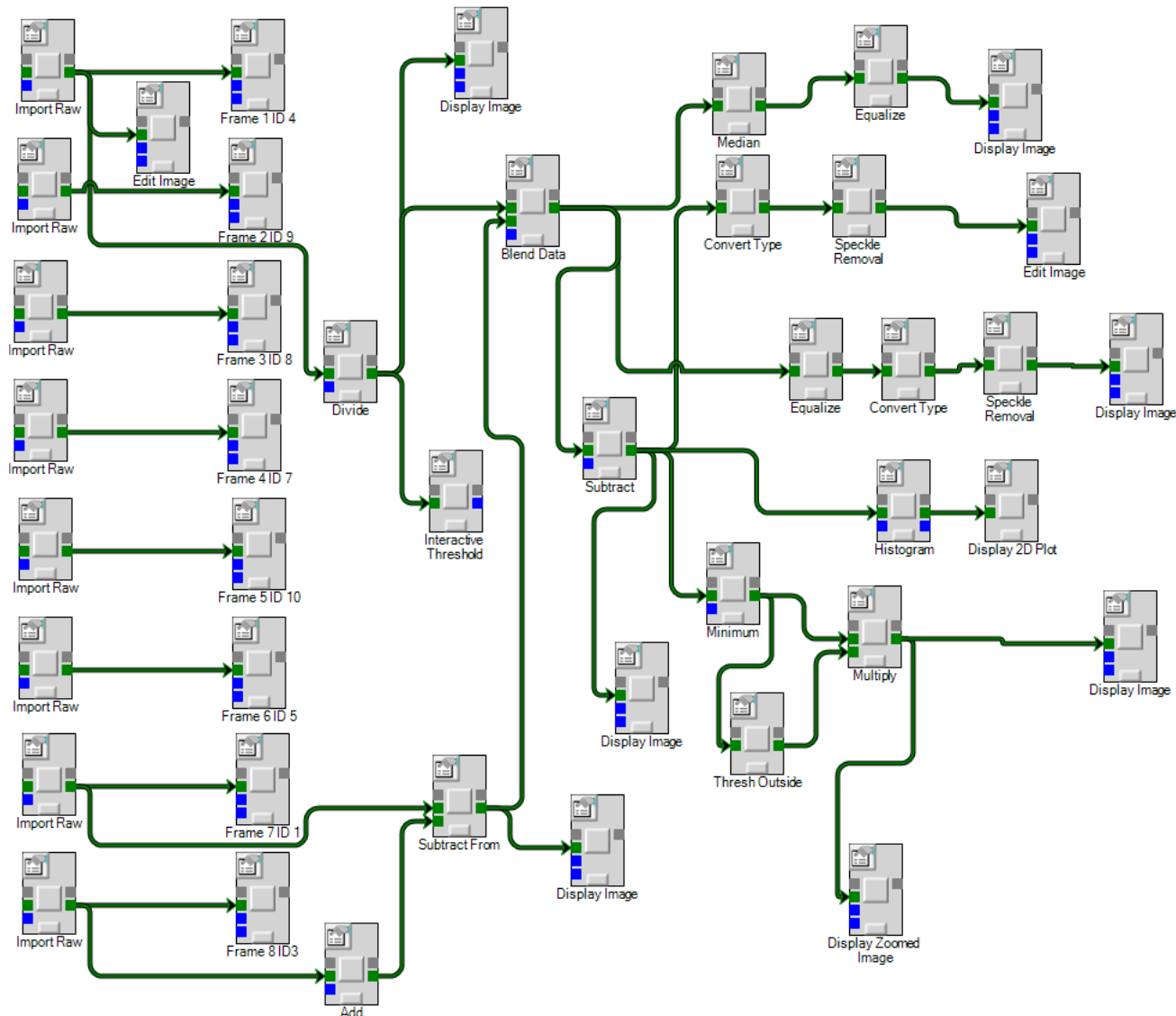
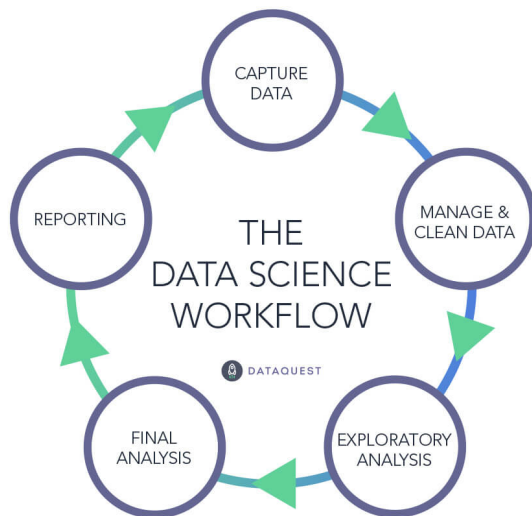




Formalisation des traitements et du processus d'analyse ?

Pascal.Dayre@enseeiht.fr



Pourquoi formaliser/modéliser un traitement ?

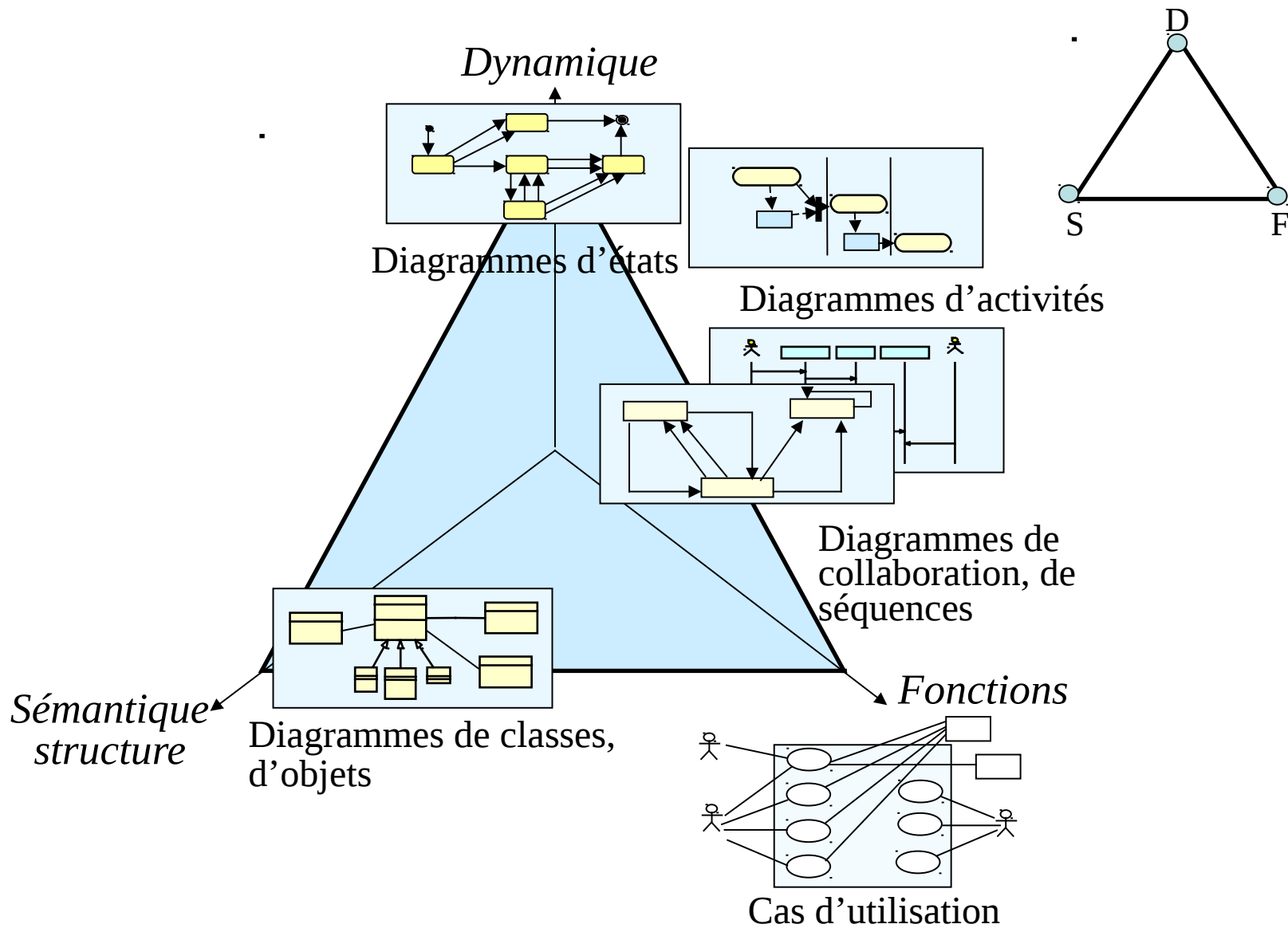
- Pour l'identifier.
- Pour l'expliciter.
- Pour l'exécuter.
- Pour le reproduire.
- Pour passer à l'échelle avec plus de données.

Comment formaliser/modéliser un traitement?

- Nous utiliserons:
 - Les processus : « Enchaînement ordonné de faits ou de phénomènes, répondant à un certain schéma et aboutissant à quelque chose » Larousse
 - Les workflow : flux de travaux, processus
- Dans le domaine du logiciel :
 - Diagramme d'activité UML
 - Diagrammes BPMN

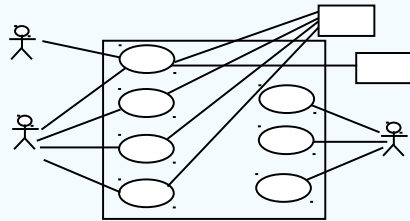
UML pour la modélisation du logiciel

Les modèles de base UML pour la modélisation du logiciel

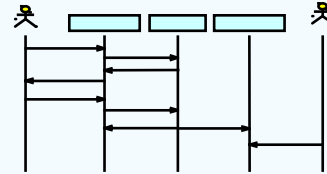


Synthèse sur les diagrammes UML

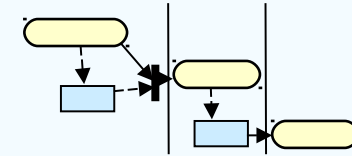
Niveau métier (système en boîte noire, processus)



Cas d'utilisation

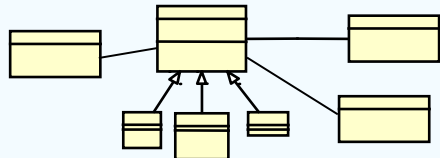


Diagrammes de séquences système

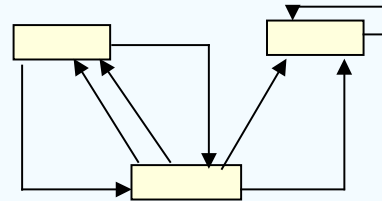


Diagrammes d'activités

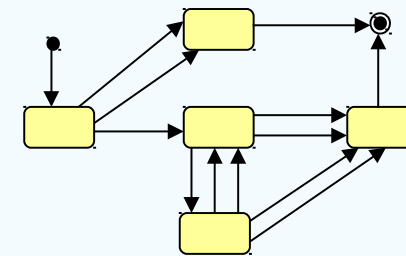
Niveau analyse et conception



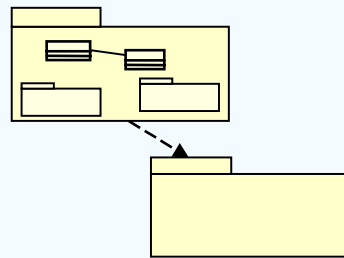
Diagrammes de classes, d'objets



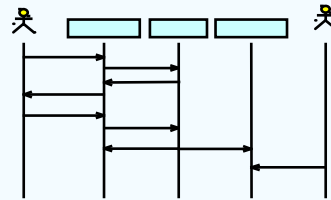
Diagrammes de collaboration



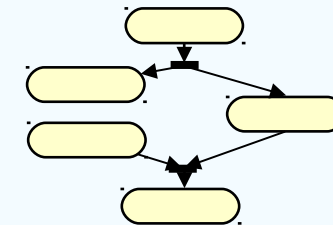
Diagrammes d'état



Diagrammes de paquetages



Diagrammes de séquences



Diagrammes d'activités

Vision structurelle +
lien avec les fonctions

Flux de données et de
contrôle entre objets

Vision dynamique +
lien avec les fonctions

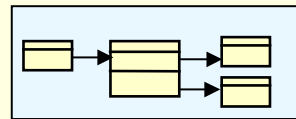
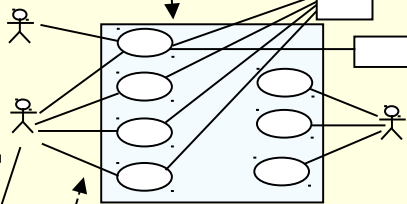
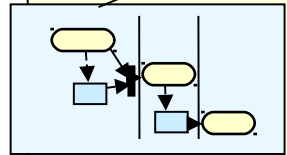
Les activités de modélisation

Processus d'informatisation :

- modèle du domaine
- processus métier
- ...

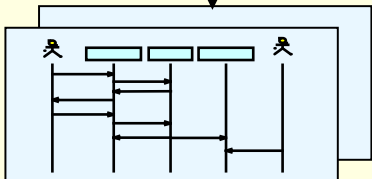
Analyse du contexte, cahier des charges, spécifications

Analyse des processus, identification des services



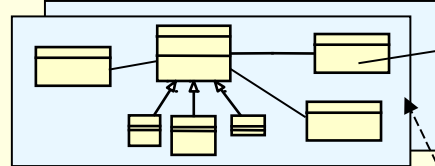
Modèle du domaine (objets métiers)

Analyse des scénarios par cas, flux d'informations

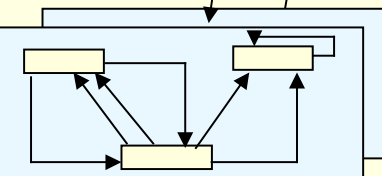
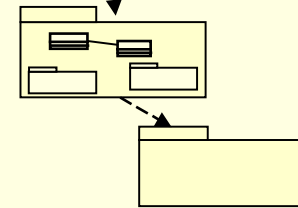


Analyse du système, niveau conceptuel

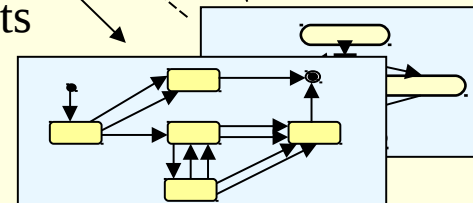
Identification des classes participantes



Structuration en paquetages



Coopération d'objets



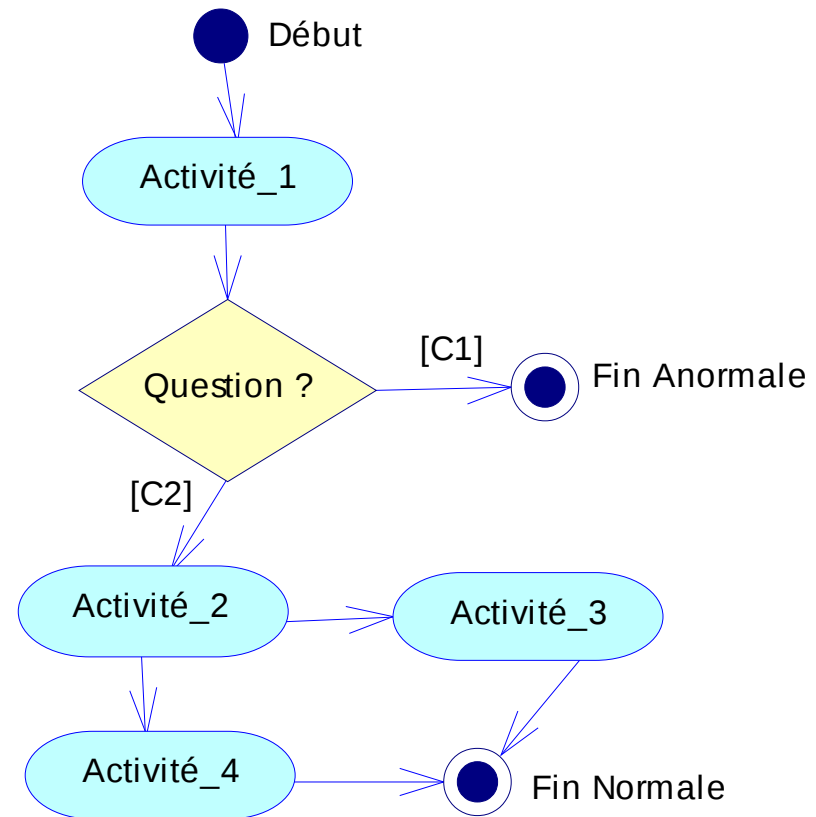
Aspects dynamiques

//de

Diagramme d'activité UML pour la modélisation des processus (point de vue de la MOE)

Les diagrammes d'activités

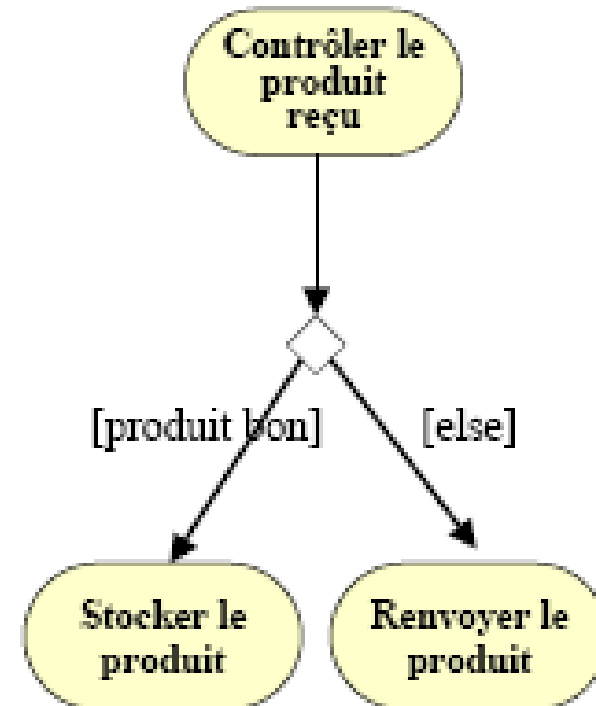
- Le diagramme d'activités UML est un diagramme dynamique
 - Montre les flots de contrôle existant entre les activités
- Le diagramme d'activités UML est composé
 - Des activités
 - Des transitions entre activités avec éventuellement des conditions (mutuellement exclusive)
 - Des branchements conditionnels (Décision)
 - D'un début et de une ou plusieurs fins



Les diagrammes d'activités

Noeuds de décision

- Une transition entrante et plusieurs transitions sortantes
- Expression logique (Condition) sur chaque transition sortante
- Les conditions doivent être exclusives et couvrir toutes les possibilités

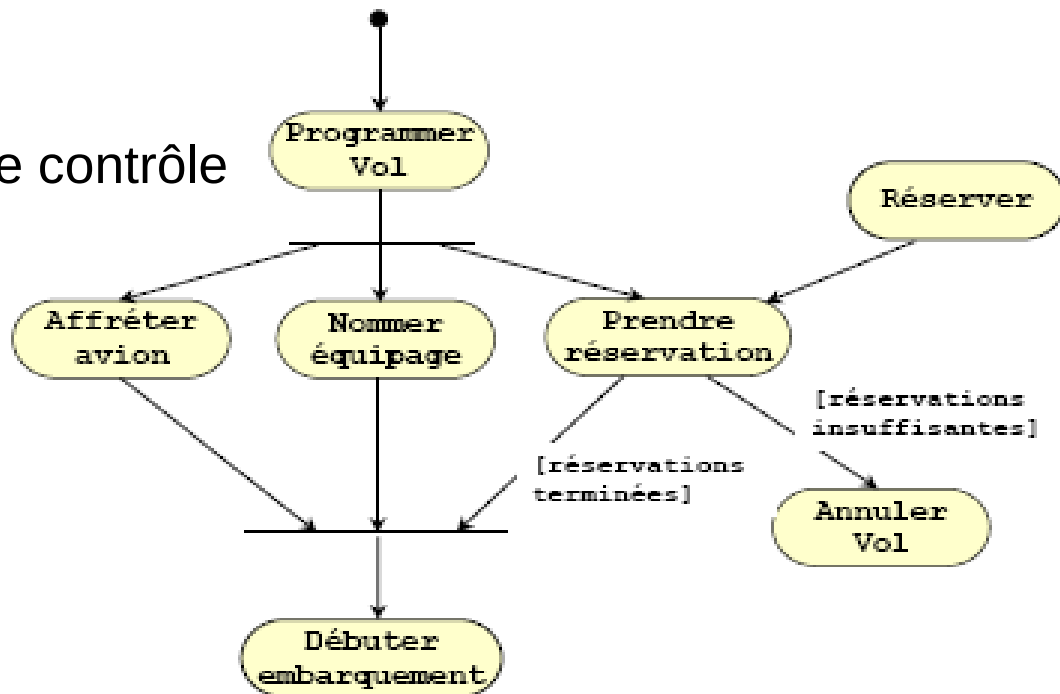


Les diagrammes d'activités

Concurrence et synchronisation

- Barre de synchronisation : indique le parallélisme

- séparation des flots de contrôle

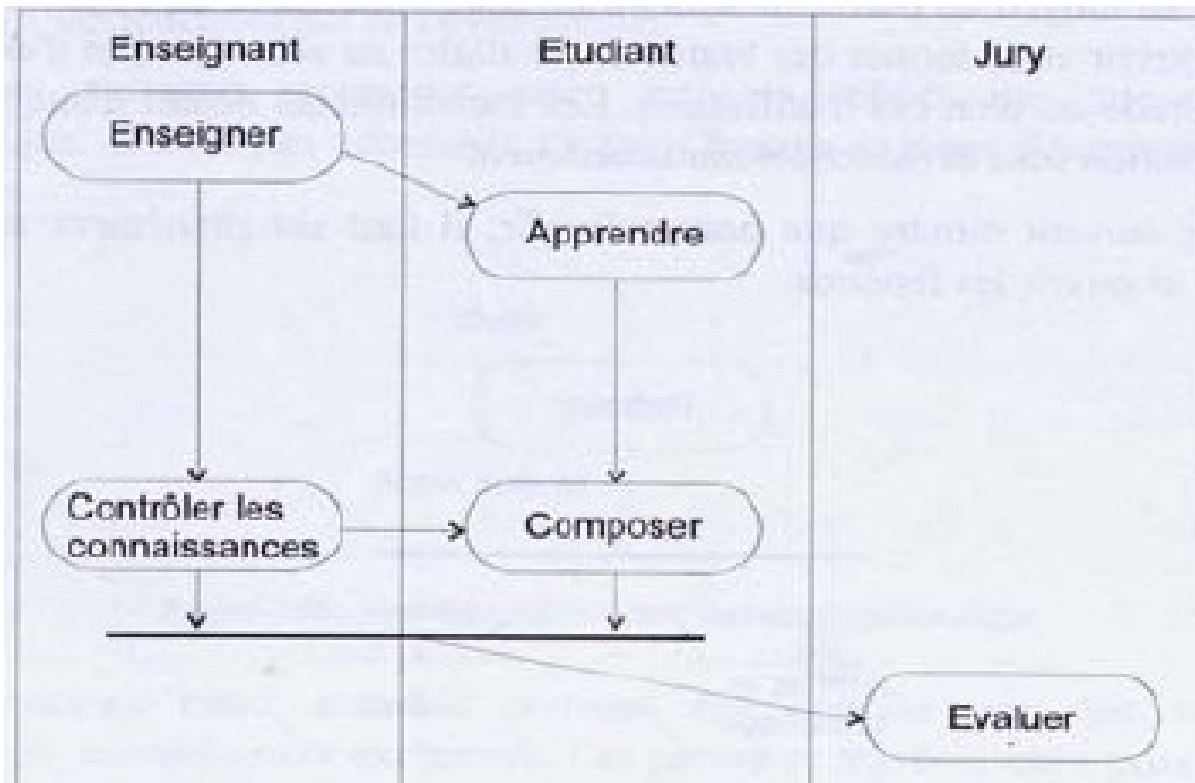


- rendez-vous

Les diagrammes d'activités

Couloir d'activités

- Introduction des acteurs responsables de chaque activité

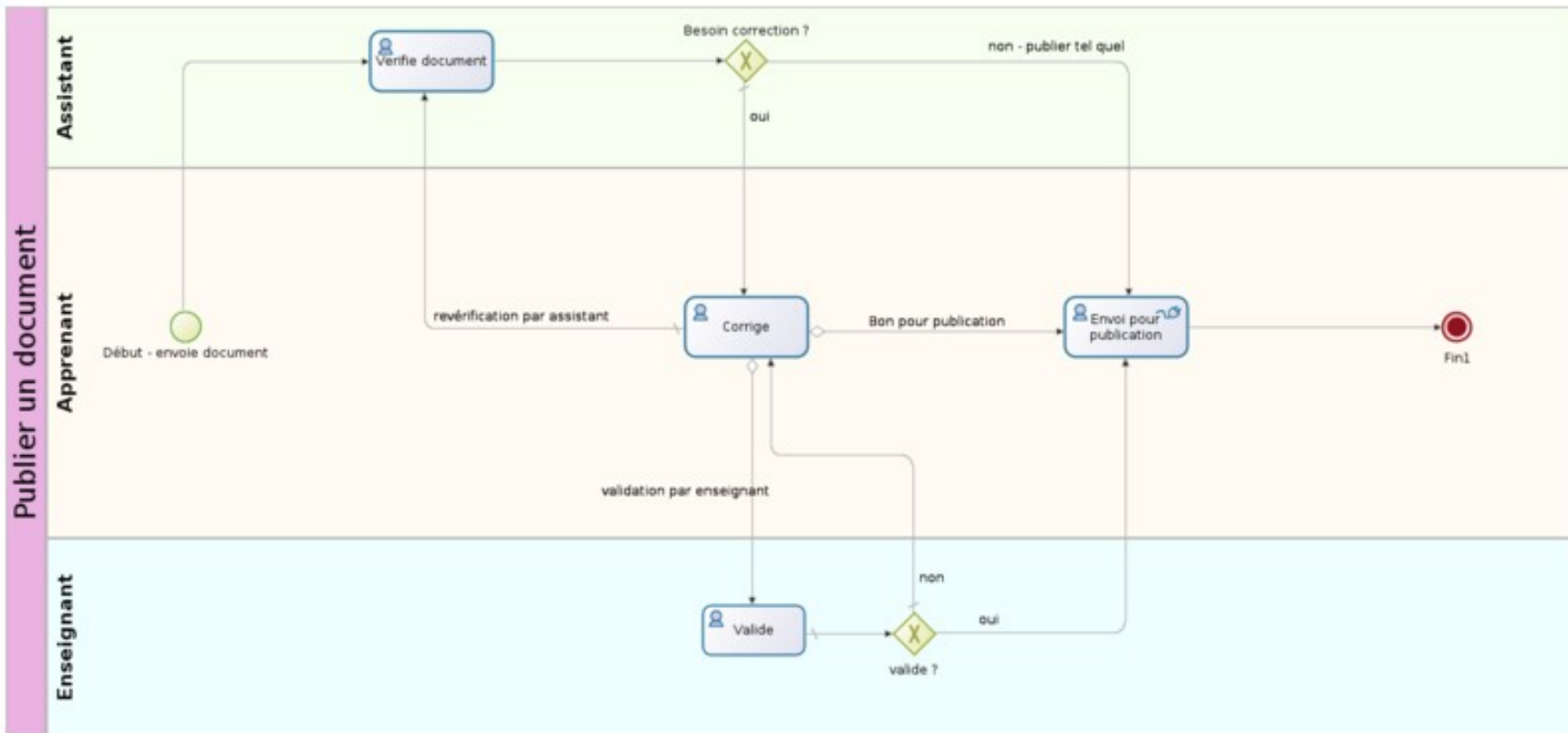
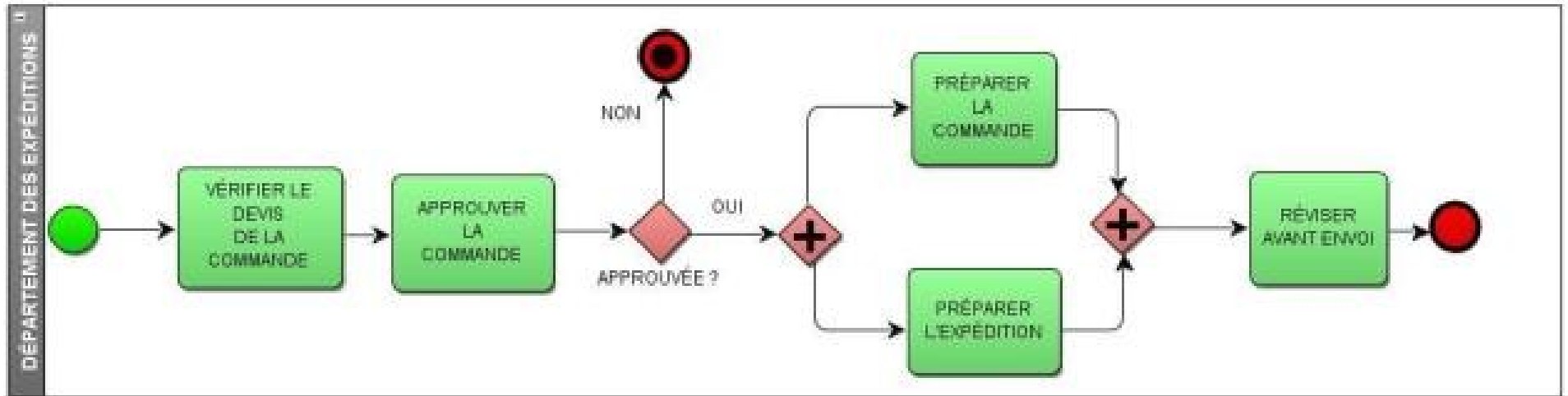


Business Process Model and Notation (BPMN)

- représentation graphique pour la spécification des processus métier
- pour le développement orienté processus

<http://devlog.cnrs.fr/jdev2017/t6> Informatisation orientée processus métiers (illustration par BPMN) - Sébastien Mosser (Université Cote d'Azur).

Workflow BPMN



Activities

Task
A Task is a unit of work, the job to be performed. When marked with a \oplus symbol it indicates a **Sub-Process**, an activity that can be refined.

Transaction
A Transaction is a set of activities that logically belong together; it might follow a specified transaction protocol.

Event Sub-Process
An Event Sub-Process is placed into a Process or Sub-Process. It is activated when its start event gets triggered and can interrupt the higher level process context or run in parallel (non-interrupting) depending on the start event.

Call Activity
A Call Activity is a wrapper for a globally defined Task or Process reused in the current Process. A call to a Process is marked with a \oplus symbol.

Activity Markers

Markers indicate expected behavior of activities:

- \oplus Sub-Process Marker
- \circlearrowleft Loop Marker
- \equiv Parallel MI Marker
- \equiv Sequential MI Marker
- \sim Ad Hoc Marker
- \triangleleft Compensation Marker

Task Types

Types specify the nature of the action to be performed:

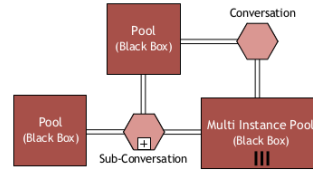
- \square Send Task
- \square Receive Task
- \square User Task
- \square Manual Task
- \square Business Rule Task
- \square Service Task
- \square Script Task

- Sequence Flow**
defines the execution order of activities.
- Default Flow**
is the default branch to be chosen if all other conditions evaluate to false.
- Conditional Flow**
has a condition assigned that defines whether or not the flow is used.

Conversations

- \hexagon A **Conversation** defines a set of logically related message exchanges. When marked with a \oplus symbol it indicates a **Sub-Conversation**, a compound conversation element.
- \hexagon A **Call Conversation** is a wrapper for a globally defined Conversation or Sub-Conversation. A call to a Sub-conversation is marked with a \oplus symbol.
- \parallel A **Conversation Link** connects Conversations and Participants.

Conversation Diagram



Choreographies

Participant A
Choreography Task
Participant B

Participant A
Sub-Choreography
Participant B
Participant C

Participant A
Call Choreography
Participant B

A **Choreography Task** represents an Interaction (Message Exchange) between two Participants.

A **Sub-Choreography** contains a refined choreography with several Interactions.

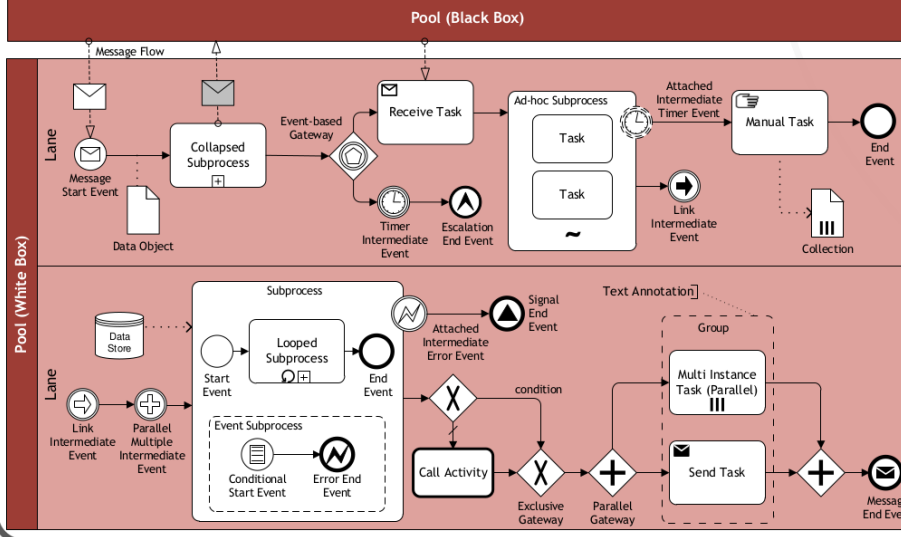
A **Call Choreography** is a wrapper for a globally defined Choreography Task or Sub-Choreography. A call to a Sub-Choreography is marked with a \oplus symbol.

Choreography Diagram

Multiple Participants Marker denotes a set of Participants of the same kind.

Message a decorator depicting the content of the message. It can only be attached to Choreography Tasks.

Collaboration Diagram



Events

	Start	Intermediate	End					
	Standard	Event Sub-Process Interrupting	Event Sub-Process Non-Interrupting	Catching	Boundary Interrupting	Boundary Non-Interrupting	Throwing	Standard
None: Untyped events, indicate start point, state changes or final states.								
Message: Receiving and sending messages.								
Timer: Cyclic timer events, points in time, time spans or timeouts.								
Escalation: Escalating to an higher level of responsibility.								
Conditional: Reacting to changed business conditions or integrating business rules.								
Link: Off-page connectors. Two corresponding link events equal a sequence flow.								
Error: Catching or throwing named errors.								
Cancel: Reacting to cancelled transactions or triggering cancellation.								
Compensation: Handling or triggering compensation.								
Signal: Signalling across different processes. A signal thrown can be caught multiple times.								
Multiple: Catching one out of a set of events. Throwing all events defined.								
Parallel Multiple: Catching all out of a set of parallel events.								
Terminate: Triggering the immediate termination of a process.								

Data

- A **Data Object** represents information flowing through the process, such as business documents, e-mails, or letters.
- A **Collection Data Object** represents a collection of information, e.g., a list of order items.
- A **Data Input** is an external input for the entire process. A kind of input parameter.
- A **Data Output** is data result of the entire process. A kind of output parameter.
- A **Data Association** is used to associate data elements to Activities, Processes and Global Tasks.
- A **Data Store** is a place where the process can read or write data, e.g., a database or a filing cabinet. It persists beyond the lifetime of the process instance.

Gateways

- Exclusive Gateway**
When splitting, it routes the sequence flow to exactly one of the outgoing branches. When merging, it awaits one incoming branch to complete before triggering the outgoing flow.
- Event-based Gateway**
Is always followed by catching events or receive tasks. Sequence flow is routed to the subsequent event/task which happens first.
- Parallel Gateway**
When used to split the sequence flow, all outgoing branches are activated simultaneously. When merging parallel branches it waits for all incoming branches to complete before triggering the outgoing flow.
- Inclusive Gateway**
When splitting, one or more branches are activated. All active incoming branches must complete before merging.
- Exclusive Event-based Gateway (Instantiated)**
Each occurrence of a subsequent event starts a new process instance.
- Complex Gateway**
Complex merging and branching behavior that is not captured by other gateways.
- Parallel Event-based Gateway (Instantiated)**
The occurrence of all subsequent events starts a new process instance.

Swimlanes

Pools (Participants) and Lanes represent responsibilities for activities in a process. A pool or a lane can be an organization, a role, or a system. Lanes subdivide pools or other lanes hierarchically.

Message Flow symbolizes information flow across organizational boundaries. Message flow can be attached to pools, activities, or message events. The Message Flow can be decorated with an envelope depicting the content of the message.

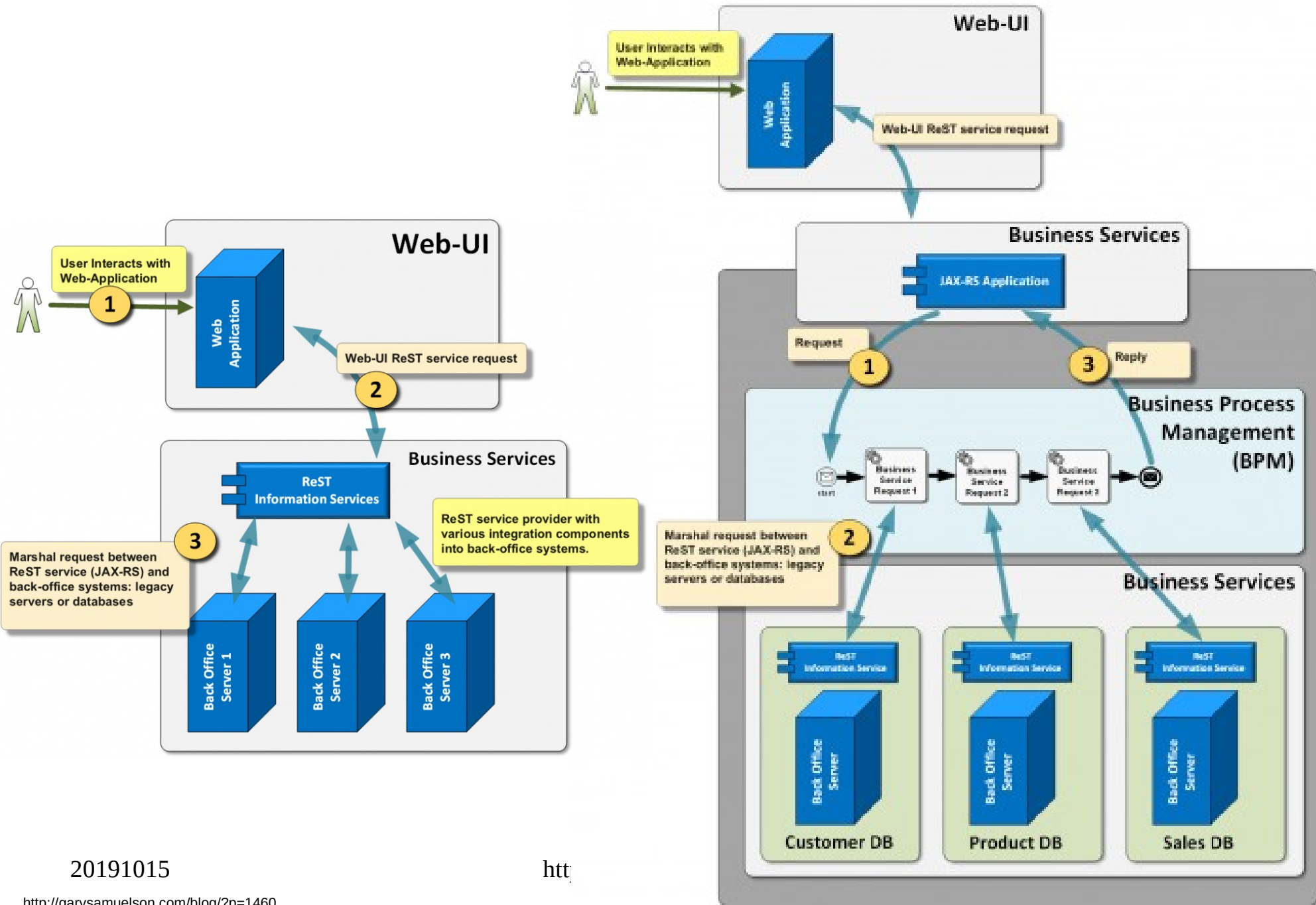
The order of message exchanges can be specified by combining message flow and sequence flow.

© 2011

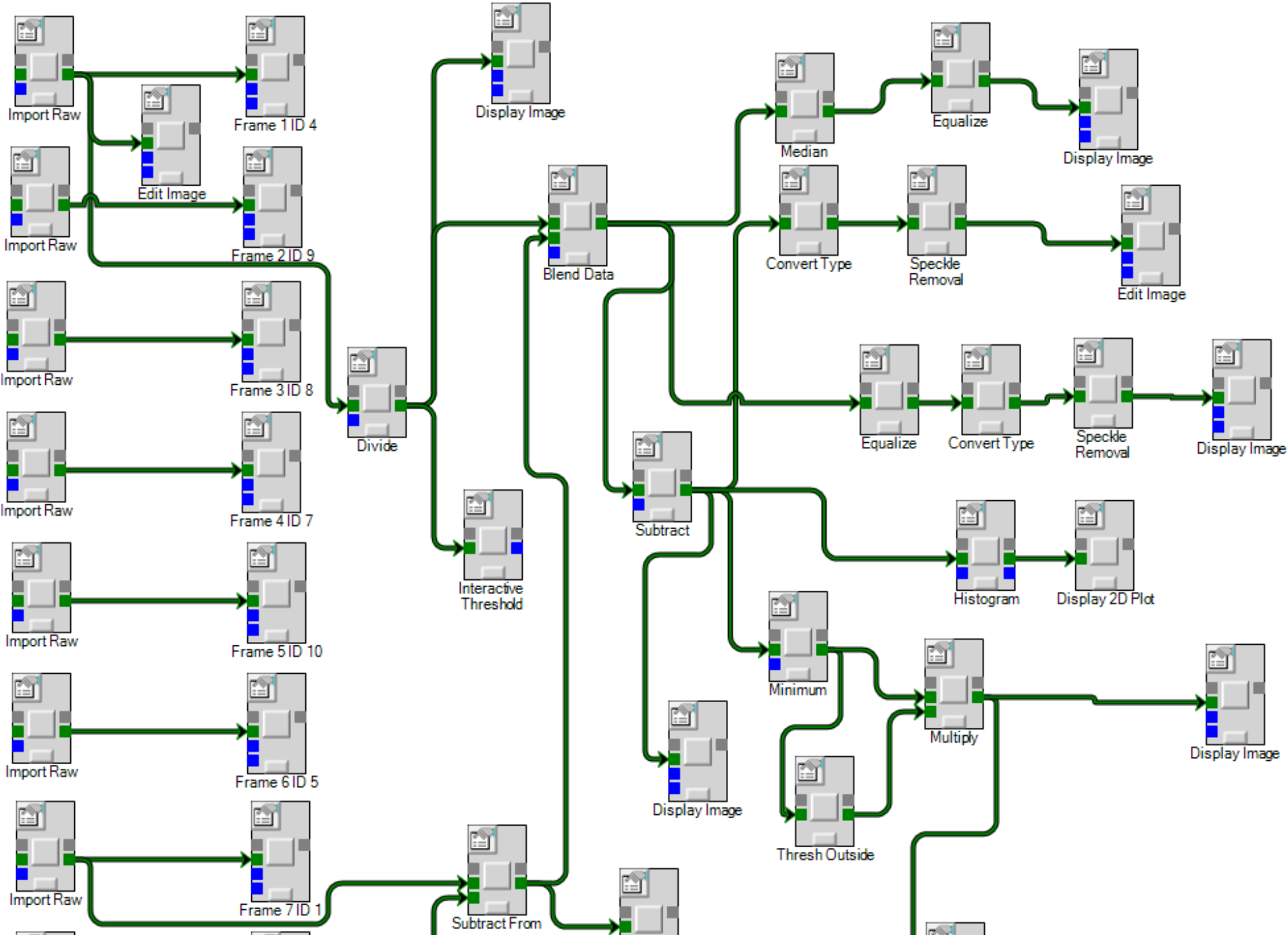
Moteur d'exécution de workflow

https://fr.wikipedia.org/wiki/Liste_des_moteurs_de_workflow

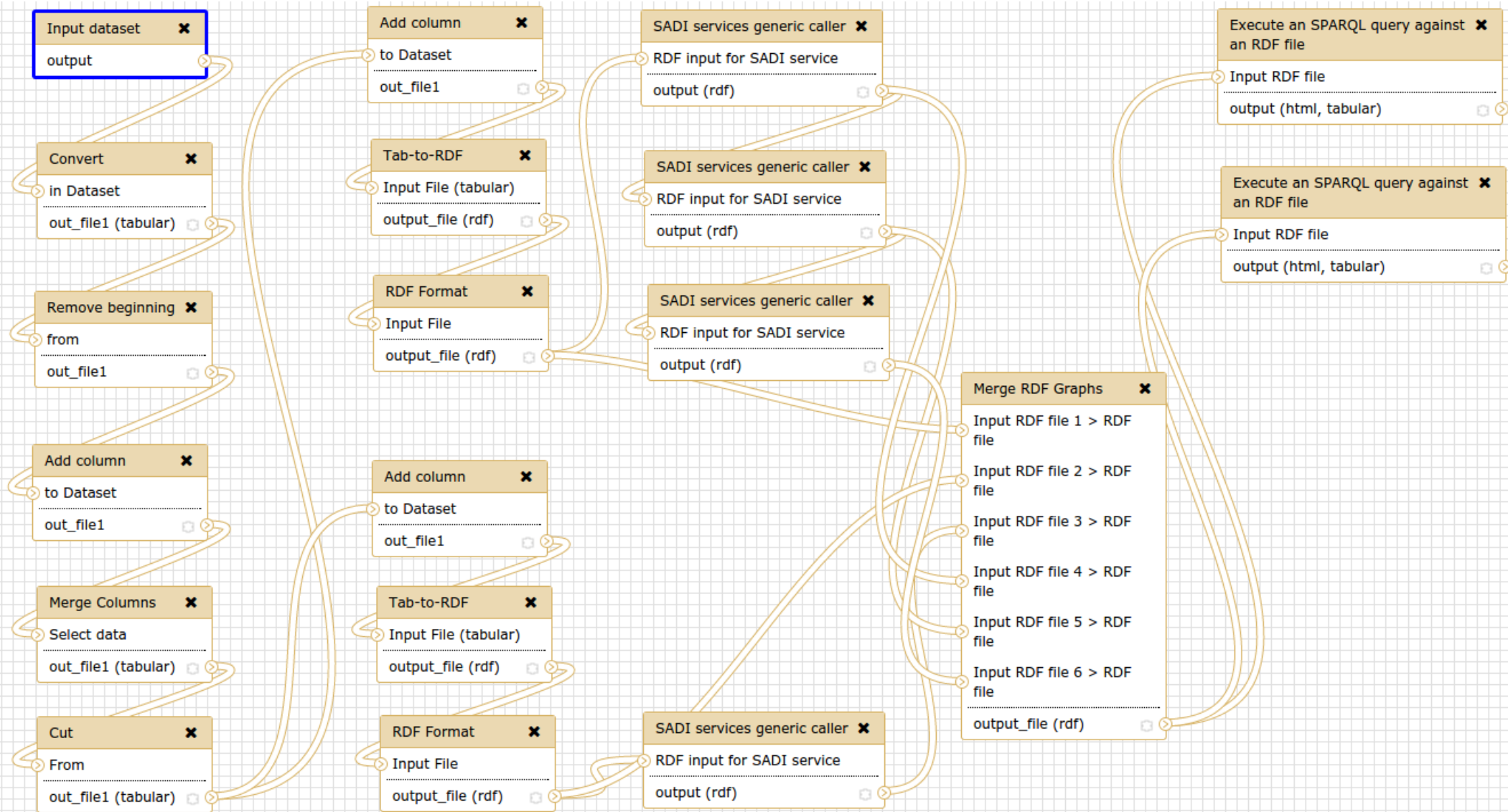
Moteur BPMN (BPEL)



Khoros, les workflow de traitement d'image



Galaxy workflow



<https://etheleon.github.io/articles/Organising-DNA-sequencing-projects/>

<https://sepsis-omics.github.io/tutorials/modules/workflows/>

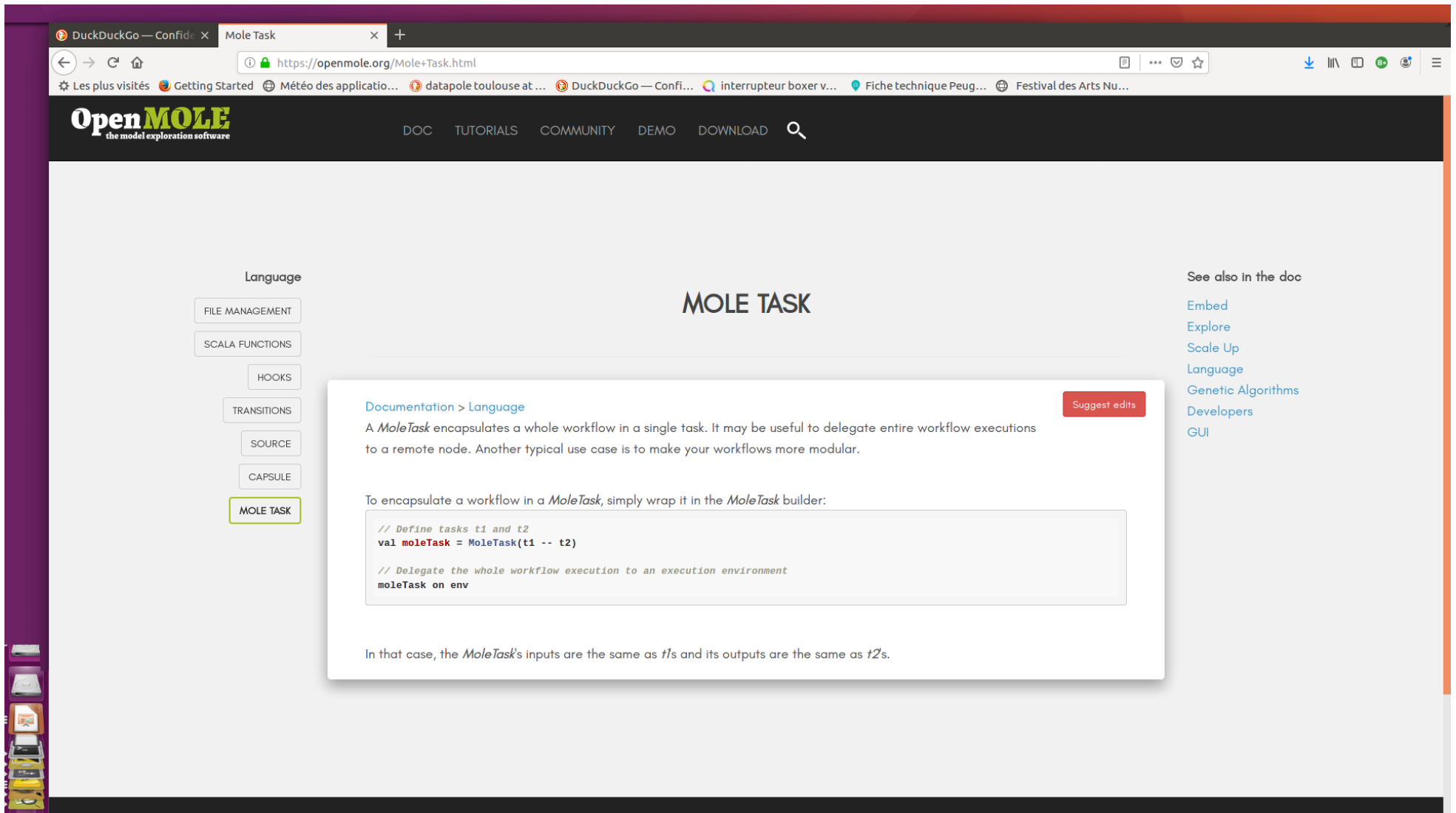
20191015

<http://devlog.cnrs.fr/apsem2019>

<https://galaxyproject.org/learn/advanced-workflow/>

Openmole, explore, diagnose and optimize your numerical model, taking advantage of distributed computing environments

- <https://openmole.org/Mole+Task.html>



The screenshot shows a web browser window displaying the OpenMole website. The browser's address bar shows the URL <https://openmole.org/Mole+Task.html>. The website's header includes the OpenMole logo and navigation links for DOC, TUTORIALS, COMMUNITY, DEMO, and DOWNLOAD. The main content area is titled "MOLE TASK" and contains the following text:

[Documentation > Language](#) [Suggest edits](#)

A *MoleTask* encapsulates a whole workflow in a single task. It may be useful to delegate entire workflow executions to a remote node. Another typical use case is to make your workflows more modular.

To encapsulate a workflow in a *MoleTask*, simply wrap it in the *MoleTask* builder:

```
// Define tasks t1 and t2
val moleTask = MoleTask(t1 -- t2)

// Delegate the whole workflow execution to an execution environment
moleTask on env
```

In that case, the *MoleTask*'s inputs are the same as *t1*s and its outputs are the same as *t2*'s.

On the left side of the page, there is a "Language" section with a list of buttons: FILE MANAGEMENT, SCALA FUNCTIONS, HOOKS, TRANSITIONS, SOURCE, CAPSULE, and MOLE TASK (which is highlighted). On the right side, there is a "See also in the doc" section with links to Embed, Explore, Scale Up, Language, Genetic Algorithms, Developers, and GUI.

Tensor Flow

- <https://www.tensorflow.org/>

↻  ▶

Iterations: 000,408

Learning rate: 0.03

Activation: Tanh

Regularization: L1

Regularization rate: 0

Problem type: Classification

DATA

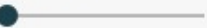
Which dataset do you want to use?



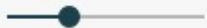
Ratio of training to test data: 50%



Noise: 0



Batch size: 10



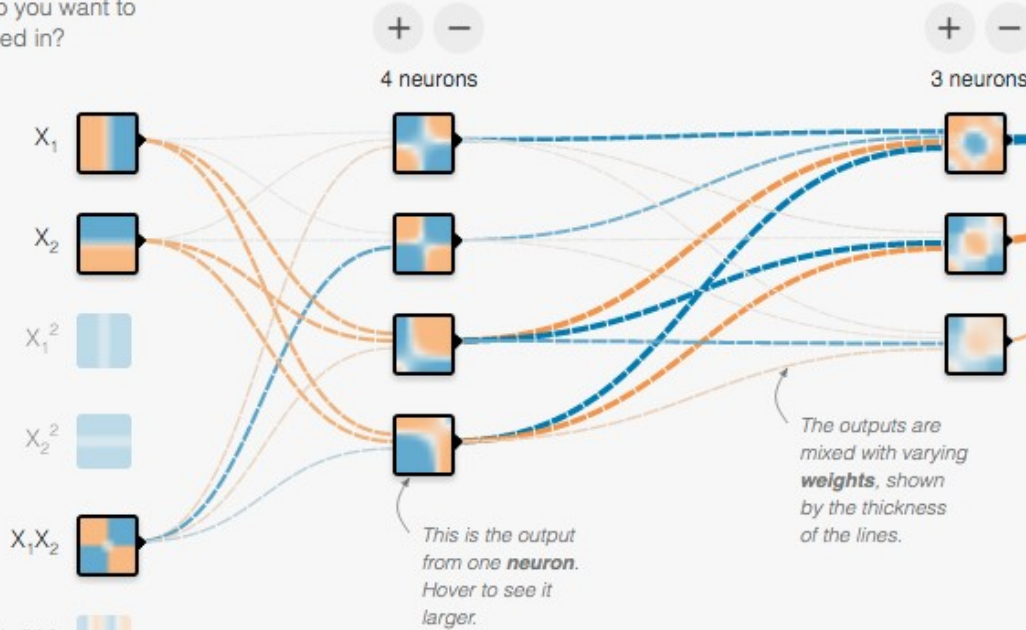
REGENERATE

INPUT

Which properties do you want to feed in?

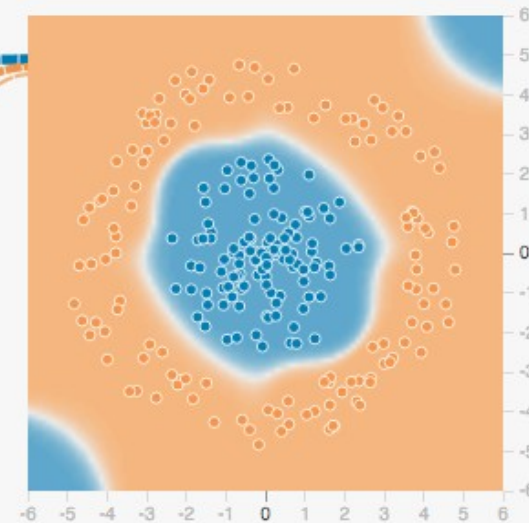


2 HIDDEN LAYERS

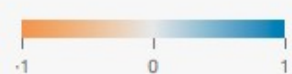


OUTPUT

Test loss 0.001
Training loss 0.000



Colors shows data, neuron and weight values.



Questions ?

Table de ronde sur la formalisation du processus d'analyse :

- Peut-on formaliser les traitements/apprentissages sur les données ?
- Peut-on peupler des bases d'apprentissage massives ?
- En quoi la formalisation des traitements aide à la reproductivité ?
- Quelle mise en œuvre possible ?
- etc