CHAIR DAY 2023 RRSC

MODEL-BASED HUMAN-SYSTEM INTEGRATION FOR GRADE OF AUTOMATION 2 (GOA2) WITH TRAIN DRIVING ASSISTANCE

PhD Candidate - Yang SUN

Supervisors - Prof. Anne BARROS, Prof. Guy André BOY

Manager SNCF - Dr. Marc SANGO

+ 01. INDUSTRIAL CONTEXT

- AUTOMATED TRAINS OPERATION (ATO) ON GOA2

+ 02. STATE OF ART

- FOR TO-BE SYSTEM GOA2 : PRELIMINARY RISK ANALYSIS BY SNCF
- FOR AS-IS SYSTEM GOA1 : TRAIN DRIVERS TRAINING PROCESS & INCIDENTS BASES
- HUMAN SYSTEM INTEGRATION METHOD (PRODEC DEVELOPED IN FLEXTECH)

+ 03.METHODOLOGY : SAFETY-ORIENTED PRODEC

- SCENARIOS SELECTION BY INCIDENTS ANALYSES
- SCENARIOS CONSTRUCTION & MODELLING

+ 04.SIMULATORS & NEXT STEPS

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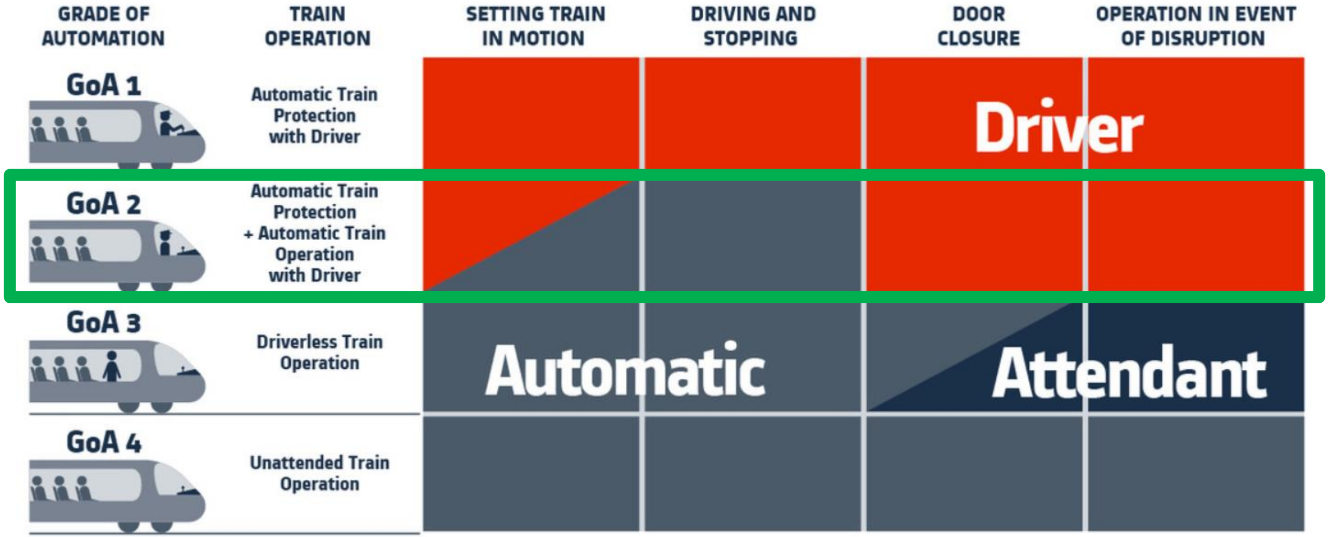
SNCF AMBITION: AUTONOMOUS TRAINS

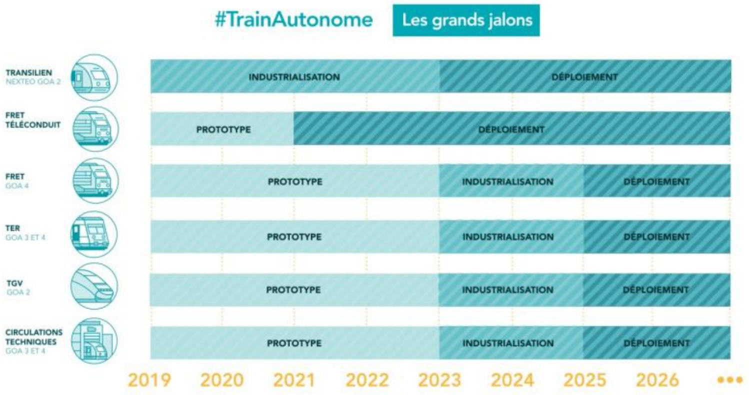


GRADE OF AUTOMATION	TRAIN OPERATION	SETTING TRAIN IN MOTION	DRIVING AND STOPPING	DOOR CLOSURE	OPERATION IN EVENT OF DISRUPTION
GoA 1	Automatic Train Protection with Driver	Driver	Driver	Driver	Driver
GoA 2	Automatic Train Protection + Automatic Train Operation with Driver	Driver / Automatic	Automatic	Driver	Driver
GoA 3	Driverless Train Operation	Automatic	Automatic	Automatic / Attendant	Attendant
GoA 4	Unattended Train Operation	Automatic	Automatic	Automatic	Automatic

Grade of Automation (GoA2) is an intermediate level of automation that integrates the Automatic Train Operation (ATO) which provides the service of acceleration and deceleration. It is surpvised by the Automatic Train Protection system (ATP). The train driver is always in charge of the exchanges with passengers, door control, and other unexpected situations.

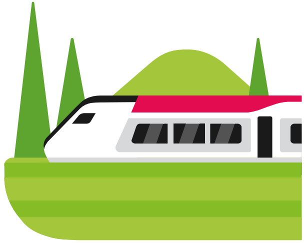
Source: https://www.alstom.com/fr

RESEARCH CONTEXT WITHIN SNCF



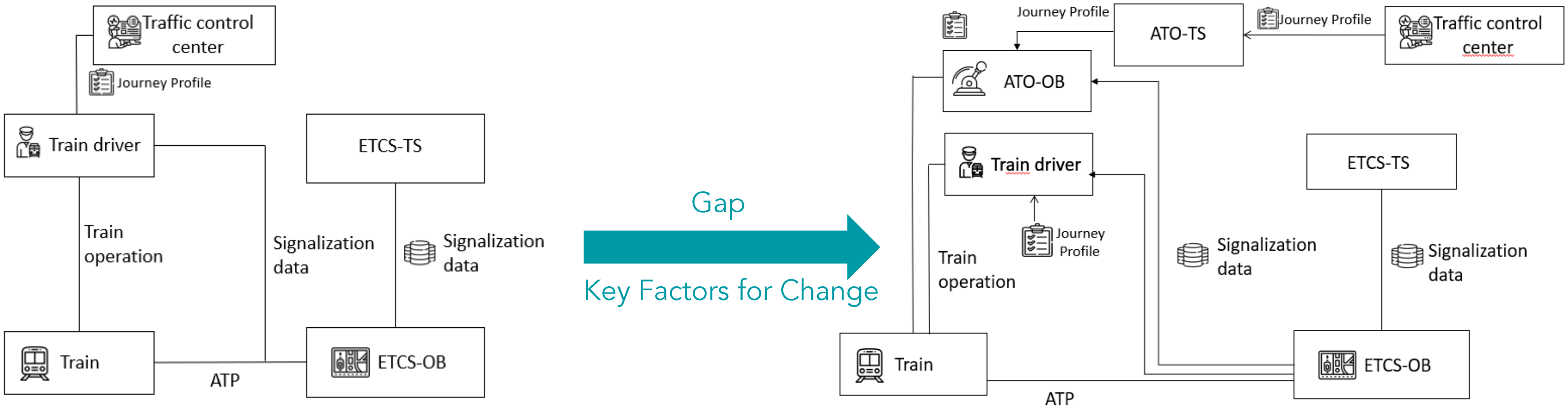
SNCF AIMS TO DEVELOP AUTOMATED TRAINS. HOW DOES THE ROLE OF PEOPLE EVOLVE IN RAILWAY SYSTEMS DURING AUTOMATION CHANGE?

WITH THIS INCREASING AUTONOMY, HOW CAN WE ALLOCATE THE FUNCTIONS TO HUMANS AND TECHNICAL SYSTEMS TO BETTER ENSURE SAFETY AND SECURITY?



RESEARCH CONTEXT WITHIN SNCF
AS-IS & TO-BE ANALYSIS

Project the future application on GoA2 by analysing the existing scenarios



Traffic control center

Journey Profile

Train driver

Train operation

Signalization data

ETCS-TS

Signalization data

Train

ATP

ETCS-OB

Gap

Key Factors for Change

Journey Profile

ATO-TS

Journey Profile

Traffic control center

ATO-OB

Train driver

Journey Profile

Train operation

Signalization data

ETCS-TS

Signalization data

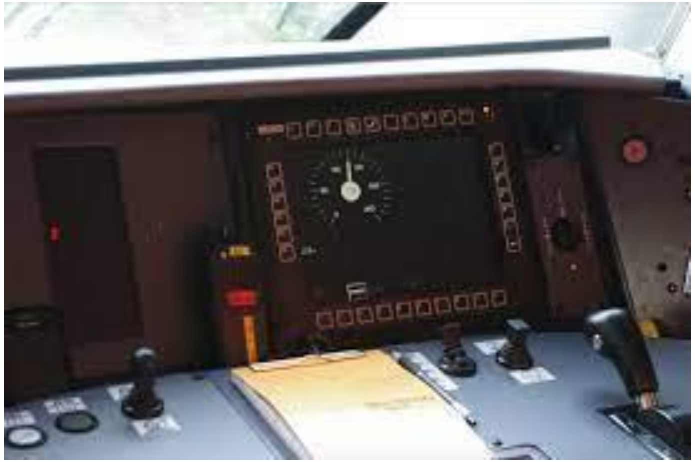
Train

ETCS-OB

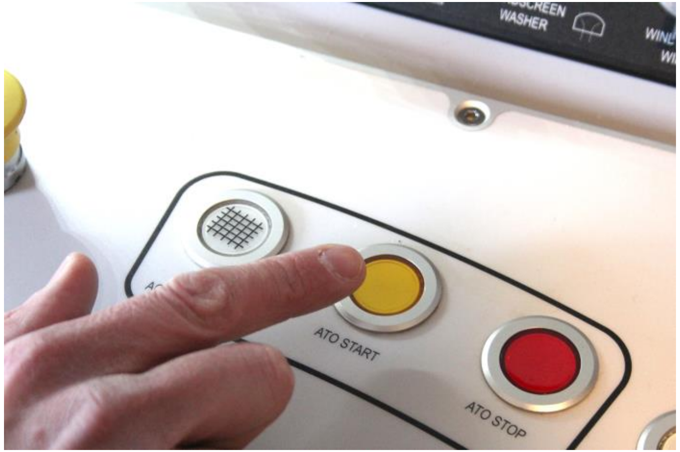
ATP

RESEARCH CONTEXT WITHIN SNCF: A LOOK IN THE CABIN

DRIVER MACHINE INTERFACE (DMI) IN CABIN



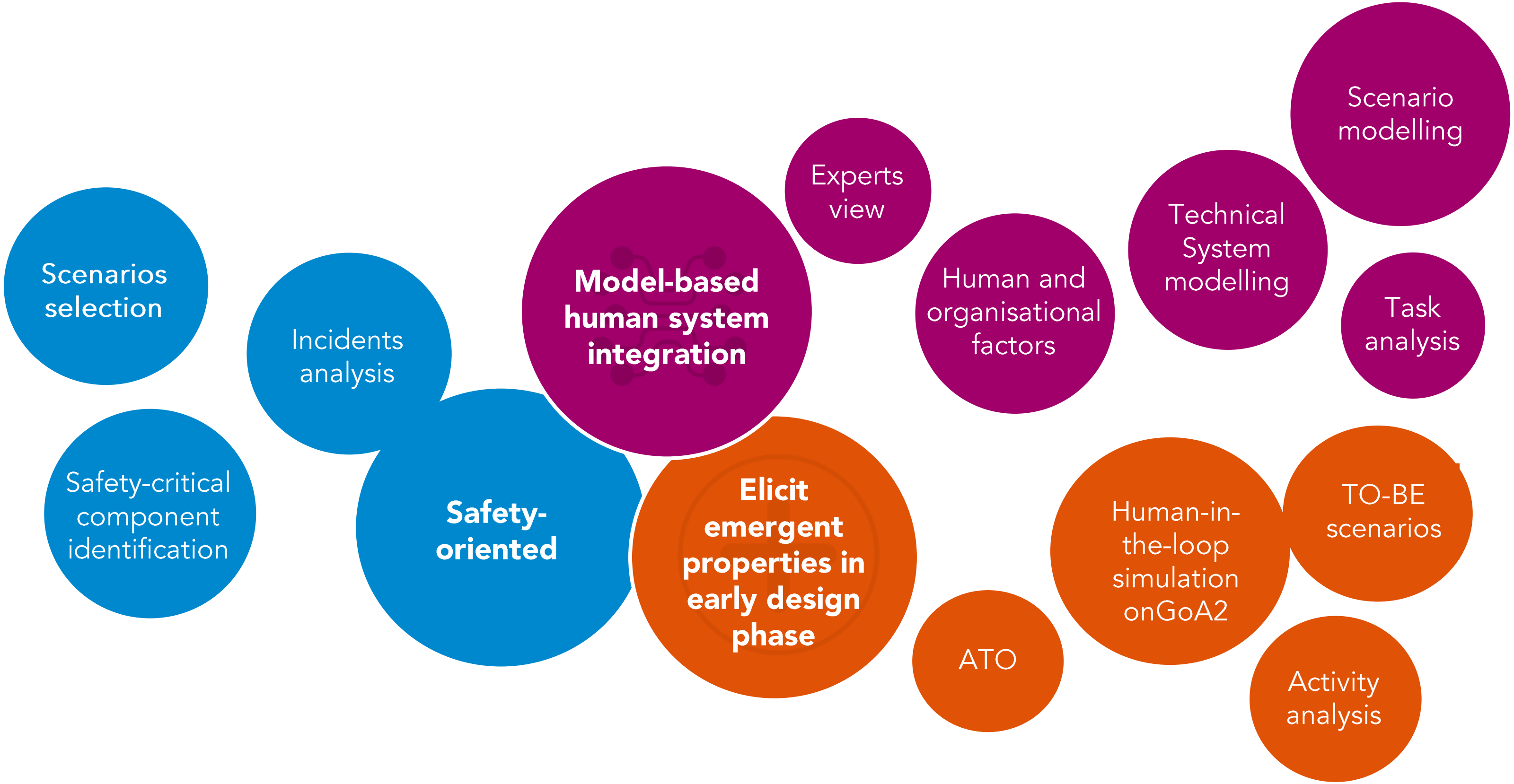
Classical driving cabin



Automated Train Operation (ATO) Panel

Source: https://www.lettreducheminot.fr/ertms-ecran-regio2n/; http://transportrail.canalblog.com/pages/ertms---les-grands-principes-techniques/38926569.html;

COMPOSITION OF THESIS WORK


Scenarios selection
Incidents analysis
Safety-critical component identification
Safety-oriented
Model-based human system integration
Experts view
Human and organisational factors
Technical System modelling
Scenario modelling
Task analysis
Elicit emergent properties in early design phase
ATO
Human-in-the-loop simulation onGoA2
TO-BE scenarios
Activity analysis

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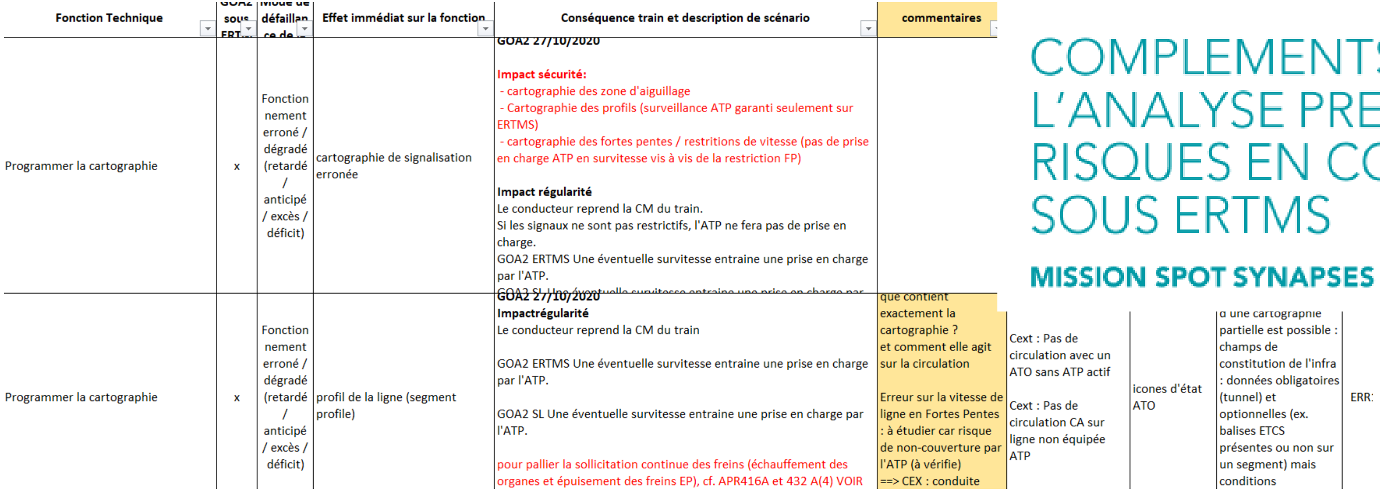
FOR TO-BE SYSTEM GOA2 : PRELIMINARY RISK ANALYSIS BY SNCF

Several risk analysis are performed within SNCF for GoA2

- **Risk analysis by functions**



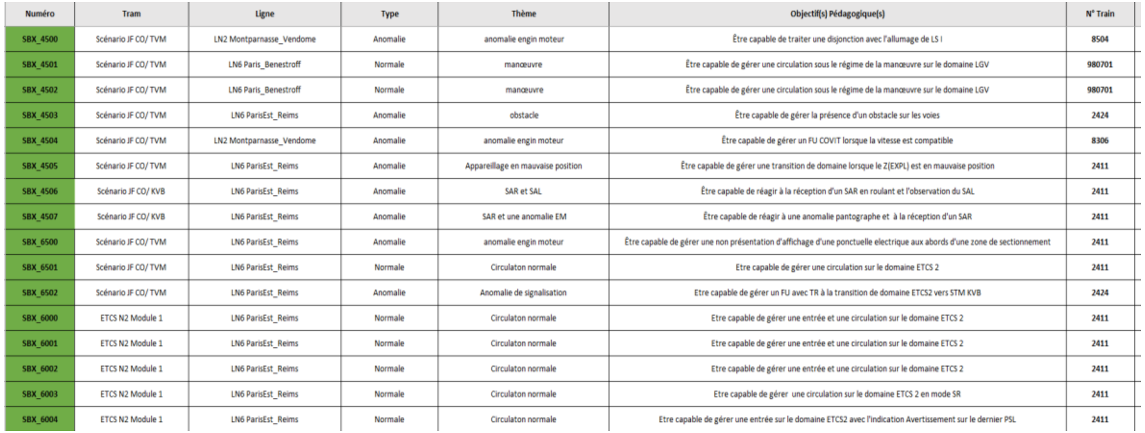
Fonction Technique	GOA2 sous ERT…	Mode de défaillance de …	Effet immédiat sur la fonction	Conséquence train et description de scénario	commentaires				
Programmer la cartographie	x	Fonctionnement erroné / dégradé (retardé / anticipé / excès / déficit)	cartographie de signalisation erronée	GOA2 27/10/2020 **Impact sécurité:** - cartographie des zone d'aiguillage - Cartographie des profils (surveillance ATP garanti seulement sur ERTMS) - cartographie des fortes pentes / restritions de vitesse (pas de prise en charge ATP en survitesse vis à vis de la restriction FP) **Impact régularité** Le conducteur reprend la CM du train. Si les signaux ne sont pas restrictifs, l'ATP ne fera pas de prise en charge. GOA2 ERTMS Une éventuelle survitesse entraine une prise en charge par l'ATP. GOA2 SL Une éventuelle survitesse entraine une prise en charge par					
Programmer la cartographie	x	Fonctionnement erroné / dégradé (retardé / anticipé / excès / déficit)	profil de la ligne (segment profile)	GOA2 27/10/2020 **Impactrégularité** Le conducteur reprend la CM du train GOA2 ERTMS Une éventuelle survitesse entraine une prise en charge par l'ATP. GOA2 SL Une éventuelle survitesse entraine une prise en charge par l'ATP. pour pallier la sollicitation continue des freins (échauffement des organes et épuisement des freins EP), cf. APR416A et 432 A(4) VOIR	que contient exactement la cartographie ? et comment elle agit sur la circulation Erreur sur la vitesse de ligne en Fortes Pentes : à étudier car risque de non-couverture par l'ATP (à vérifie) ==> CEX : conduite	Cext : Pas de circulation avec un ATO sans ATP actif Cext : Pas de circulation CA sur ligne non équipée ATP	icones d'état ATO	d une cartographie partielle est possible : champs de constitution de l'infra : données obligatoires (tunnel) et optionnelles (ex. balises ETCS présentes ou non sur un segment) mais conditions	ERR:

- **FOH analysis**

COMPLEMENTS FOH A L'ANALYSE PRELIMINAIRE DES RISQUES EN CONDUITE GOA2 SOUS ERTMS

MISSION SPOT SYNAPSES

FOR AS-IS SYSTEM GOA1 : TRAIN DRIVERS TRAINING PROCESS & INCIDENTS BASES



Numéro	Tram	Ligne	Type	Thème	Objectif(s) Pédagogique(s)	N° Train
SBX_4500	Scénario JF CO/ TVM	LN2 Montparnasse_Vendome	Anomalie	anomalie engin moteur	Être capable de traiter une disjonction avec l'allumage de LS I	8504
SBX_4501	Scénario JF CO/ TVM	LN6 Paris_Benestroff	Normale	manœuvre	Être capable de gérer une circulation sous le régime de la manœuvre sur le domaine LGV	980701
SBX_4502	Scénario JF CO/ TVM	LN6 Paris_Benestroff	Normale	manœuvre	Être capable de gérer une circulation sous le régime de la manœuvre sur le domaine LGV	980701
SBX_4503	Scénario JF CO/ TVM	LN6 ParisEst_Reims	Anomalie	obstacle	Être capable de gérer la présence d'un obstacle sur les voies	2424
SBX_4504	Scénario JF CO/ TVM	LN2 Montparnasse_Vendome	Anomalie	anomalie engin moteur	Être capable de gérer un FU COVIT lorsque la vitesse est compatible	8306
SBX_4505	Scénario JF CO/ TVM	LN6 ParisEst_Reims	Anomalie	Appareillage en mauvaise position	Être capable de gérer une transition de domaine lorsque le Z(EXPL) est en mauvaise position	2411
SBX_4506	Scénario JF CO/ KVB	LN6 ParisEst_Reims	Anomalie	SAR et SAL	Être capable de réagir à la réception d'un SAR en roulant et l'observation du SAL	2411
SBX_4507	Scénario JF CO/ KVB	LN6 ParisEst_Reims	Anomalie	SAR et une anomalie EM	Être capable de réagir à une anomalie pantographe et à la réception d'un SAR	2411
SBX_6500	Scénario JF CO/ TVM	LN6 ParisEst_Reims	Anomalie	anomalie engin moteur	Être capable de gérer une non présentation d'affichage d'une ponctuelle electrique aux abords d'une zone de sectionnement	2411
SBX_6501	Scénario JF CO/ TVM	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une circulation sur le domaine ETCS 2	2411
SBX_6502	Scénario JF CO/ TVM	LN6 ParisEst_Reims	Anomalie	Anomalie de signalisation	Etre capable de gérer un FU avec TR à la transition de domaine ETCS2 vers STM KVB	2424
SBX_6000	ETCS N2 Module 1	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une entrée et une circulation sur le domaine ETCS 2	2411
SBX_6001	ETCS N2 Module 1	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une entrée et une circulation sur le domaine ETCS 2	2411
SBX_6002	ETCS N2 Module 1	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une entrée et une circulation sur le domaine ETCS 2	2411
SBX_6003	ETCS N2 Module 1	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une circulation sur le domaine ETCS 2 en mode SR	2411
SBX_6004	ETCS N2 Module 1	LN6 ParisEst_Reims	Normale	Circulaton normale	Etre capable de gérer une entrée sur le domaine ETCS2 avec l'indication Avertissement sur le dernier PSL	2411

Exemple of training scenarios inside SNCF for train drivers' educational purpose

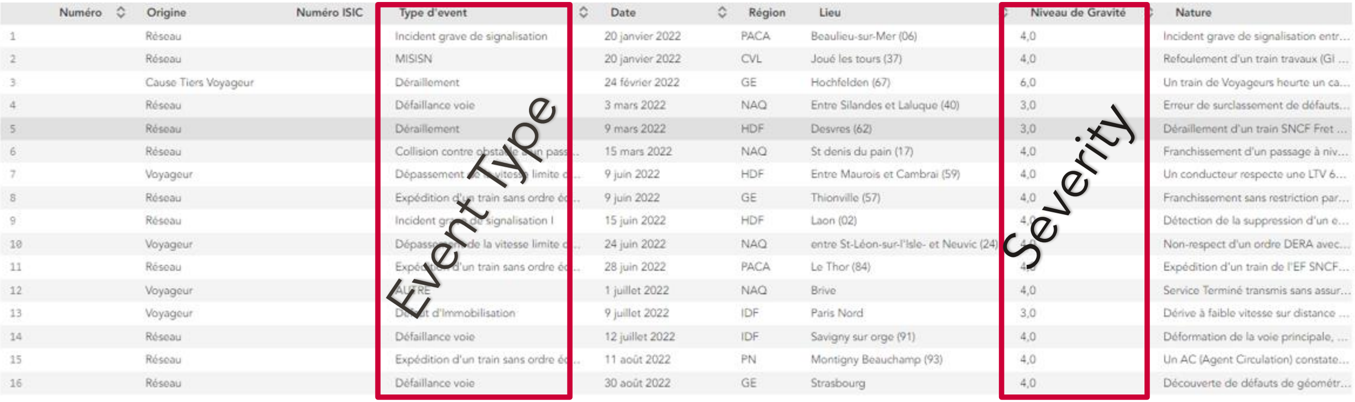
More than 1,000 training scenarios are available inside the SNCF training center for different kind of simulators. From which we can start our simulations and project to future applications on GoA2?

FOR AS-IS SYSTEM GOA1 : TRAIN DRIVERS TRAINING PROCESS & INCIDENTS BASES

Review of the incidents that happened in the past years to anticipate the safety-critical elements and situations to improve the early design phase of GoA2.

- **SNCF OPEN DATA**

https://ressources.data.sncf.com/explore/dataset/incidents-securite/table/?sort=-niveau_gravite



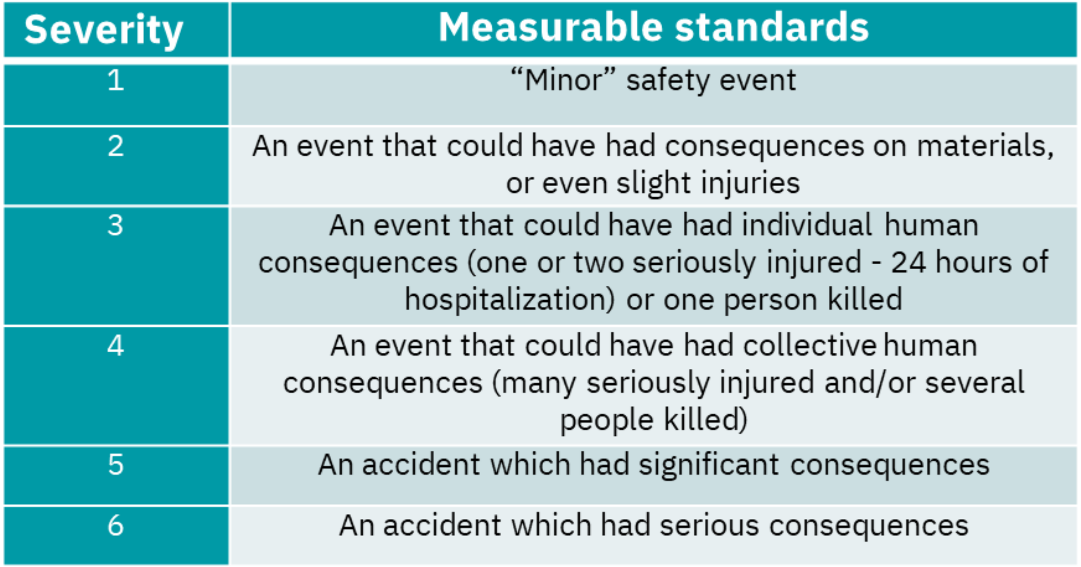
	Numéro	Origine	Numéro ISIC	Type d'event	Date	Région	Lieu	Niveau de Gravité	Nature
1		Réseau		Incident grave de signalisation	20 janvier 2022	PACA	Beaulieu-sur-Mer (06)	4,0	Incident grave de signalisation entr...
2		Réseau		MISISN	20 janvier 2022	CVL	Joué les tours (37)	4,0	Refoulement d'un train travaux (GI ...
3		Cause Tiers Voyageur		Déraillement	24 février 2022	GE	Hochfelden (67)	6,0	Un train de Voyageurs heurte un ca...
4		Réseau		Défaillance voie	3 mars 2022	NAQ	Entre Silandes et Laluque (40)	3,0	Erreur de surclassement de défauts...
5		Réseau		Déraillement	9 mars 2022	HDF	Desvres (62)	3,0	Déraillement d'un train SNCF Fret ...
6		Réseau		Collision contre obstacle à un pass...	15 mars 2022	NAQ	St denis du pain (17)	4,0	Franchissement d'un passage à niv...
7		Voyageur		Dépassement de la vitesse limite d...	9 juin 2022	HDF	Entre Maurois et Cambrai (59)	4,0	Un conducteur respecte une LTV 6...
8		Réseau		Expédition d'un train sans ordre éc...	9 juin 2022	GE	Thionville (57)	4,0	Franchissement sans restriction par...
9		Réseau		Incident grave de signalisation I	15 juin 2022	HDF	Laon (02)	4,0	Détection de la suppression d'un e...
10		Voyageur		Dépassement de la vitesse limite d...	24 juin 2022	NAQ	entre St-Léon-sur-l'Isle- et Neuvic (24)	4,0	Non-respect d'un ordre DERA avec...
11		Réseau		Expédition d'un train sans ordre éc...	28 juin 2022	PACA	Le Thor (84)	4,0	Expédition d'un train de l'EF SNCF...
12		Voyageur		AUTRE	1 juillet 2022	NAQ	Brive	4,0	Service Terminé transmis sans assur...
13		Voyageur		Défaut d'Immobilisation	9 juillet 2022	IDF	Paris Nord	3,0	Dérive à faible vitesse sur distance ...
14		Réseau		Défaillance voie	12 juillet 2022	IDF	Savigny sur orge (91)	4,0	Déformation de la voie principale, ...
15		Réseau		Expédition d'un train sans ordre éc...	11 août 2022	PN	Montigny Beauchamp (93)	4,0	Un AC (Agent Circulation) constate...
16		Réseau		Défaillance voie	30 août 2022	GE	Strasbourg	4,0	Découverte de défauts de géométr...

Event Type

Severity

INCIDENTS ANALYSIS

Severity scale for incidents and accidents (adapted from EPSF, (2016))

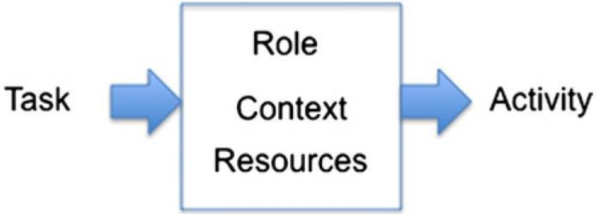


Severity	Measurable standards
1	“Minor” safety event
2	An event that could have had consequences on materials, or even slight injuries
3	An event that could have had individual human consequences (one or two seriously injured - 24 hours of hospitalization) or one person killed
4	An event that could have had collective human consequences (many seriously injured and/or several people killed)
5	An accident which had significant consequences
6	An accident which had serious consequences

In 2016, a working group led by EPSF (French Safety authority) defined the principles of a six-level severity scale. The most serious accidents, of levels 5 and 6, correspond to significant accidents covered by the common safety indicators (CSI), the definition of which is given in European directive (EU) 2016/798.

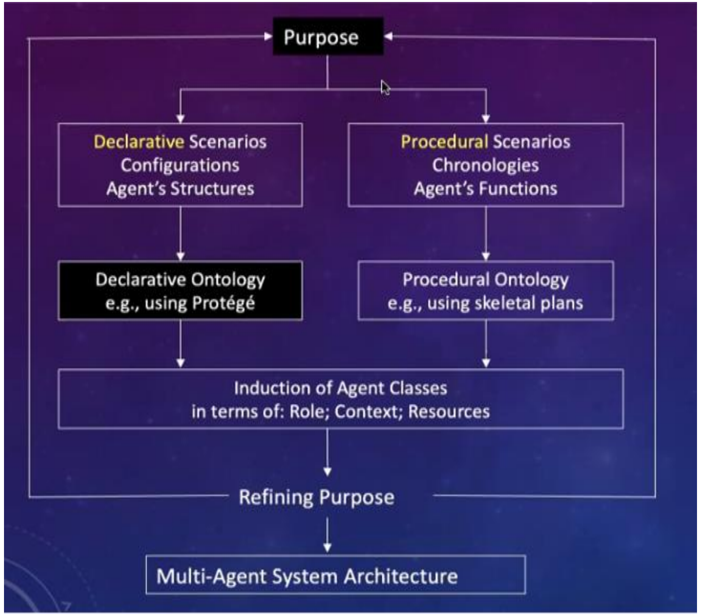
HUMAN SYSTEM INTEGRATION METHOD (PRODEC DEVELOPED IN FLEXTECH)

PRODEC is a scenario-based design method that enables the elicitation of emergent properties of a human-machine system in the design phase



Task: what are assigned to do
Activities: what really did

A **cognitive function** as a transformation of a task into an activity.



PRODEC method

Source: Guy A. BOY - The Role of People in Large Interconnected Systems (2022)

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PRODEC METHOD

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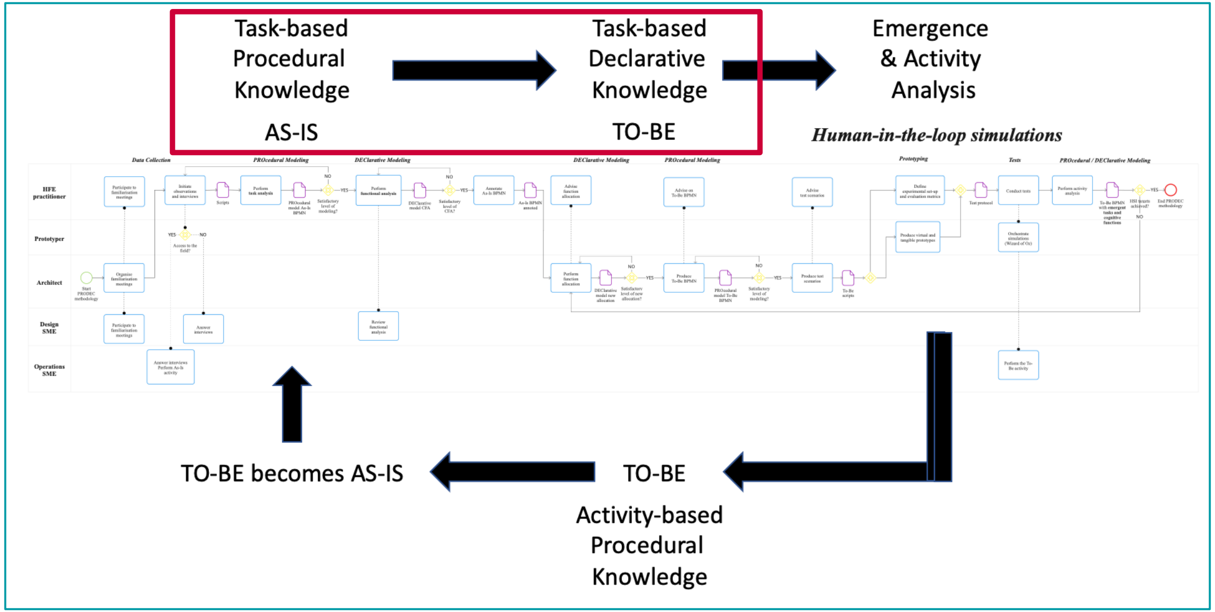


Task-based Procedural Knowledge

AS-IS

Task-based Declarative Knowledge

TO-BE

Emergence & Activity Analysis

Human-in-the-loop simulations

TO-BE becomes AS-IS

TO-BE

Activity-based Procedural Knowledge

Data Collection
PROcedural Modeling
DEClarative Modeling
DEClarative Modeling
PROcedural Modeling
Prototyping
Tests
PROcedural / DEClarative Modeling
HFE practitioner
Prototyper
Architect
Design SME
Operations SME
Start PRODEC methodology
Organise familiarisation meetings
Participate to familiarisation meetings
Participate to familiarisation meetings
Initiate observations and interviews
Access to the field?
YES
NO
Answer interviews
Answer interviews Perform As-Is activity
Scripts
Perform task analysis
PROcedural model As-Is BPMN
Satisfactory level of modeling?
NO
YES
Perform functional analysis
Review functional analysis
DEClarative model CFA
Satisfactory level of CFA?
NO
YES
Annotate As-Is BPMN
As-Is BPMN annoted
Advise function allocation
Perform function allocation
DEClarative model new allocation
Satisfactory level of new allocation?
NO
YES
Advise on To-Be BPMN
Produce To-Be BPMN
PROcedural model To-Be BPMN
Satisfactory level of modeling?
NO
YES
Advise test scenarios
Produce test scenarios
To-Be scripts
Define experimental set-up and evaluation metrics
Produce virtual and tangible prototypes
Test protocol
Conduct tests
Orchestrate simulations (Wizard of Oz)
Perform the To-Be activity
Perform activity analysis
To-Be BPMN with emergent tasks and cognitive functions
HSI targets achieved?
YES
NO
End PRODEC methodology

PRODEC method

Source: Guy A. BOY - The Role of People in Large Interconnected Systems (2022)

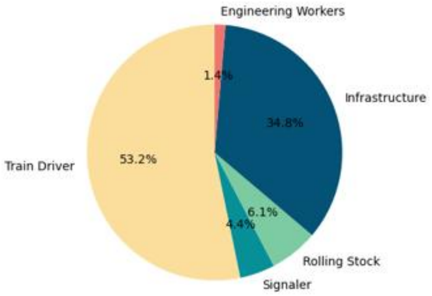
SCENARIOS SELECTION BY INCIDENTS ANALYSES

Incidents categorizations according to the incident cause. We defined two main categories: cause related to the infrastructure and rolling stocks, and violations of procedures and rules.

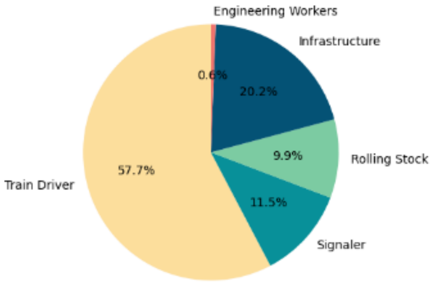
Main Cause	Sub-category	Total
Technical failure	Infrastructure	374
Technical failure	Rolling Stock	150
Human Error	Train Driver	841
Human Error	Signaler	201
Human Error	Engineering workers	43

These data show that more than 67% of incidents that have occurred in recent years on the SNCF network are related to *human errors*. But behind these human errors, we need to think how to improve the technical system design to better meet human needs.

Distribution of incidents in 5 categories of severity [4.0,5.0]



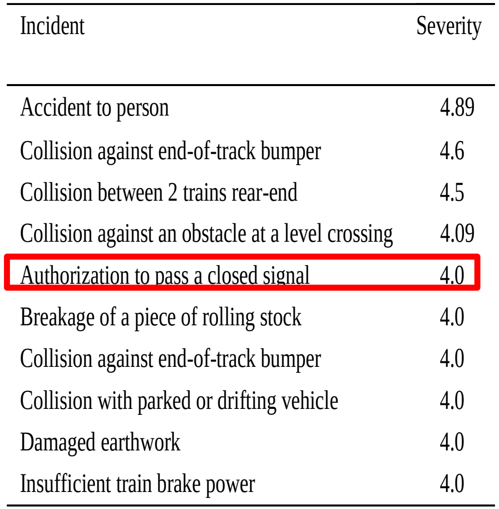
Distribution of incidents in 5 categories of severity [3.0,4.0)



SCENARIOS SELECTION BY INCIDENTS ANALYSES

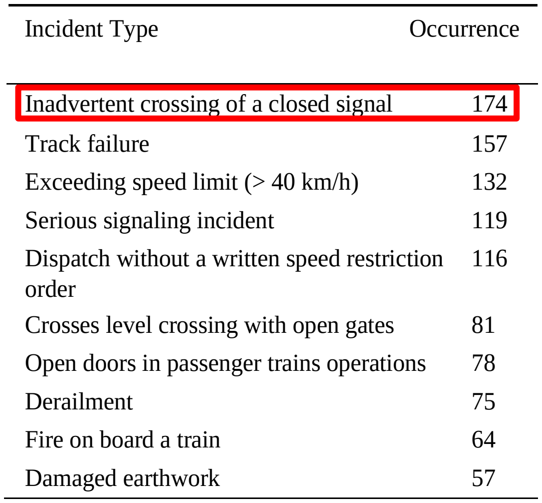
Incidents categorizations according to the incident cause. We defined two main categories: cause related to the infrastructure and rolling stocks, and violations of procedures and rules.

The 10 **highest severity** incidents types in the French railway network 2015-2022.



Incident	Severity
Accident to person	4.89
Collision against end-of-track bumper	4.6
Collision between 2 trains rear-end	4.5
Collision against an obstacle at a level crossing	4.09
Authorization to pass a closed signal	4.0
Breakage of a piece of rolling stock	4.0
Collision against end-of-track bumper	4.0
Collision with parked or drifting vehicle	4.0
Damaged earthwork	4.0
Insufficient train brake power	4.0

The 10 **most frequent** incident types in the French railway network 2015-2022.

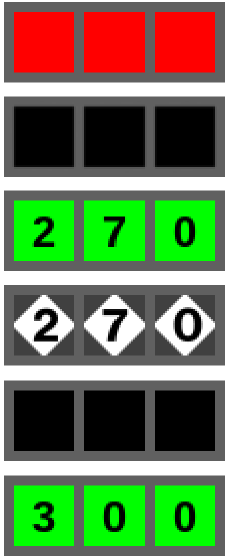


Incident Type	Occurrence
Inadvertent crossing of a closed signal	174
Track failure	157
Exceeding speed limit (> 40 km/h)	132
Serious signaling incident	119
Dispatch without a written speed restriction order	116
Crosses level crossing with open gates	81
Open doors in passenger trains operations	78
Derailment	75
Fire on board a train	64
Damaged earthwork	57

FROM INCIDENT ANALYSES TO SCENARIO CONSTRUCTION AND MODELING

From the incident analysis results, the signalization system dysfunction is a safety-critical component to add to our simulation scenarios.

Trackside signals



TVM display in cabin

After discussion with train drivers, we identified two safety-critical components from experience: **obstacles on the rail** and **weather**

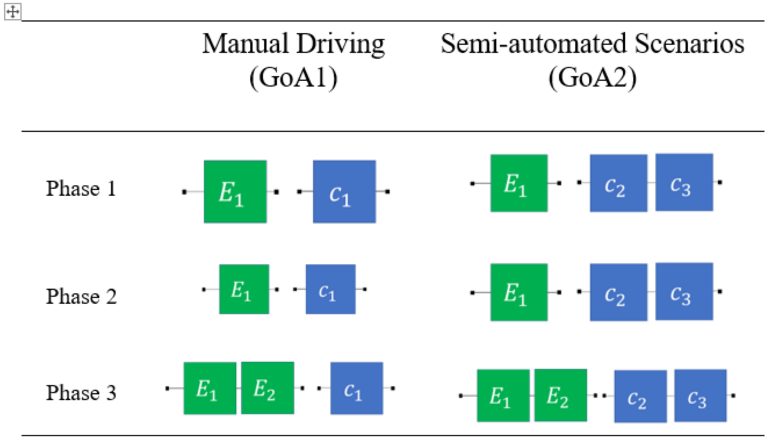
Obstacles on the rail

Bad weather

Source: https://www.sncf.com/fr/groupe/coulisses/signalisation-ferroviaire; https://fr.wikipedia.org/wiki/Transmission_voie-machine

SCENARIO CONSTRUCTION AND MODELING

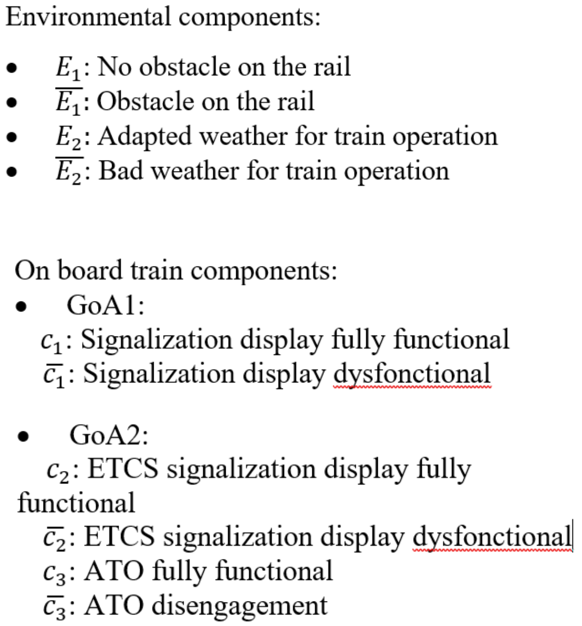
Construct the scenario for PRODEC method application based on the safety-critical elements identified by safety analyses : Safety-critical elements in each critical driving phase



	Manual Driving (GoA1)	Semi-automated Scenarios (GoA2)
Phase 1	E_1 c_1	E_1 c_2 c_3
Phase 2	E_1 c_1	E_1 c_2 c_3
Phase 3	E_1 E_2 c_1	E_1 E_2 c_2 c_3

Three critical driving phases:

- Phase 1: enter high-speed area
- Phase 2: drive in high-speed area
- Phase 3: enter in destination station



Environmental components:

- E_1: No obstacle on the rail
- $\overline{E_1}$: Obstacle on the rail
- E_2: Adapted weather for train operation
- $\overline{E_2}$: Bad weather for train operation

On board train components:

- GoA1:

c_1: Signalization display fully functional
$\overline{c_1}$: Signalization display dysfonctional

- GoA2:

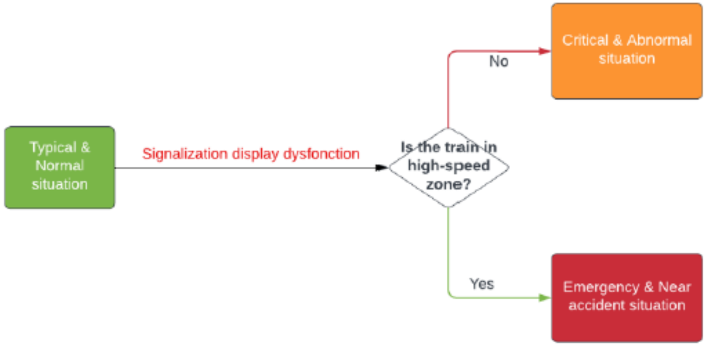
c_2: ETCS signalization display fully functional
$\overline{c_2}$: ETCS signalization display dysfonctional
c_3: ATO fully functional
$\overline{c_3}$: ATO disengagement

SCENARIO CONSTRUCTION AND MODELING

Construct the scenario for PRODEC method application based on the safety-critical elements identified by safety analyses : **The scenarios in each driving phase are composed by these safety-critical components in functional/dysfunctional states.**

Three types of situations:

- T: typical & N: Normal
- C: Critical & A: Abnormal
- E: Emergency & NA: Near Accident



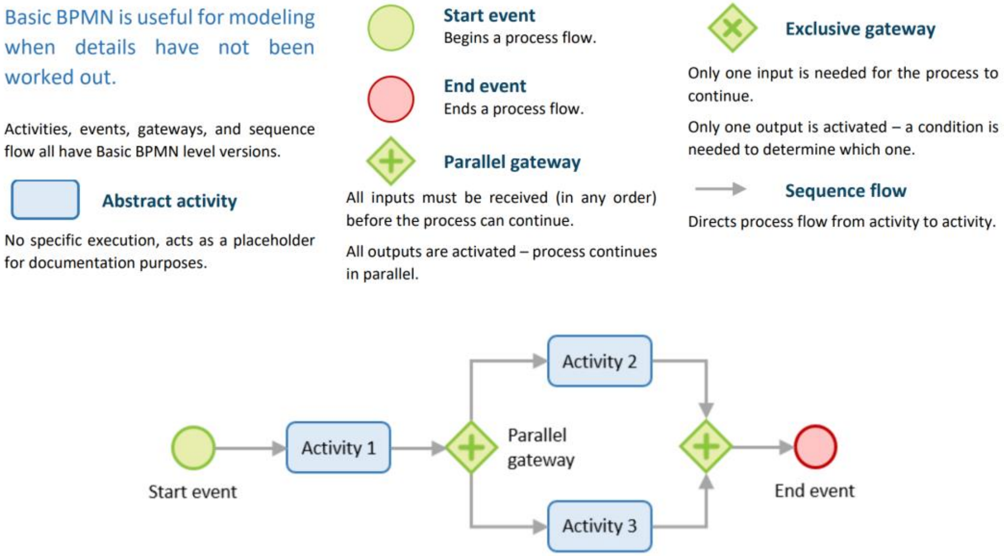
Typical & Normal situation
Signalization display dysfonction
Is the train in high-speed zone?
No
Critical & Abnormal situation
Yes
Emergency & Near accident situation

	GoA1	GoA2
T & N	$E_1 c_1$	$E_1 c_2 c_3$
C & A	$E_1 \overline{c_1}$ (Phase 1)	$E_1 \overline{c_2} c_3$
C & A	$E_1 \overline{E_2} c_1$ (Phase 3)	$E_1 \overline{E_2} c_2 c_3$(Phase 3)
E & NA	$E_1 \overline{c_1}$ (Phase 2)	$E_1 c_2 \overline{c_3}$
E & NA	$\overline{E_1} c_1$	$\overline{E_1} c_2 c_3$

Take the example of signalization system dysfunction, on GoA1, before entering the high-speed zone, train driver can restart the signalization display in case of dysfunction. But during the high-speed driving, this becomes an emergency

FROM INCIDENT ANALYSES TO SCENARIO CONSTRUCTION AND MODELING

Before the human in the loop simulation, we need to model the simulation scenarios to analyze the tasks assigned to train drivers. By modelling these scenarios using BPMN, which is easier to understand for all stakeholders, we can visualize and discuss the simulation scenarios more easily. This also helps us to identify the critical tasks during train driving.



Basic BPMN is useful for modeling when details have not been worked out.

Activities, events, gateways, and sequence flow all have Basic BPMN level versions.

Abstract activity

No specific execution, acts as a placeholder for documentation purposes.

Start event

Begins a process flow.

End event

Ends a process flow.

Parallel gateway

All inputs must be received (in any order) before the process can continue.

All outputs are activated – process continues in parallel.

Exclusive gateway

Only one input is needed for the process to continue.

Only one output is activated – a condition is needed to determine which one.

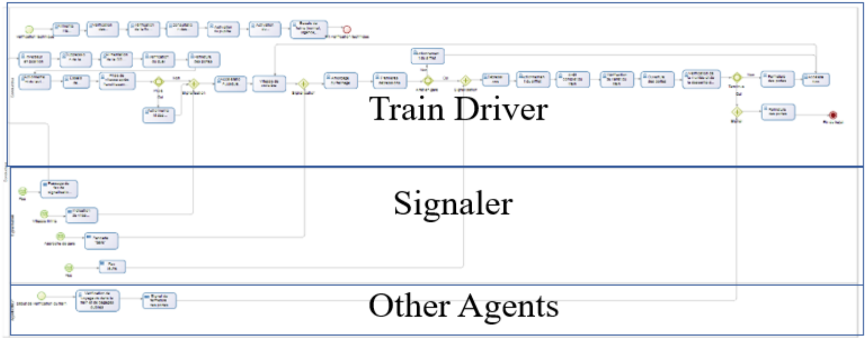
Sequence flow

Directs process flow from activity to activity.

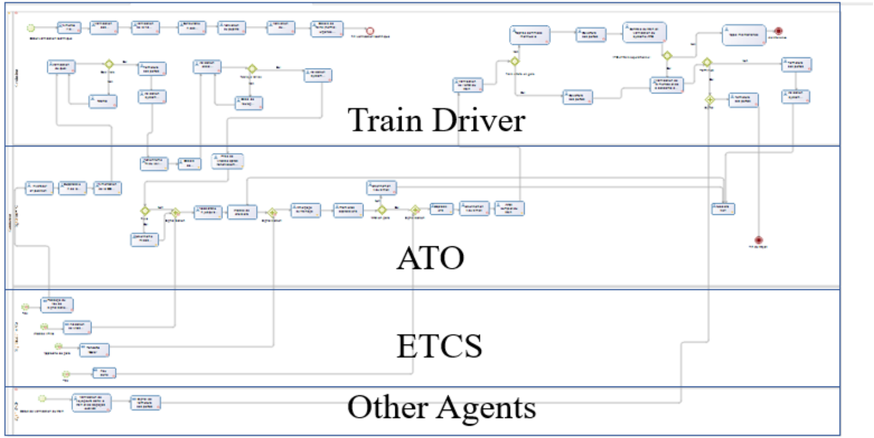
SCENARIO CONSTRUCTION AND MODELING

Modeling the constructed GoA1 and GoA2 scenarios under BPMN:

Exemple of GoA1 scenario under BPMN



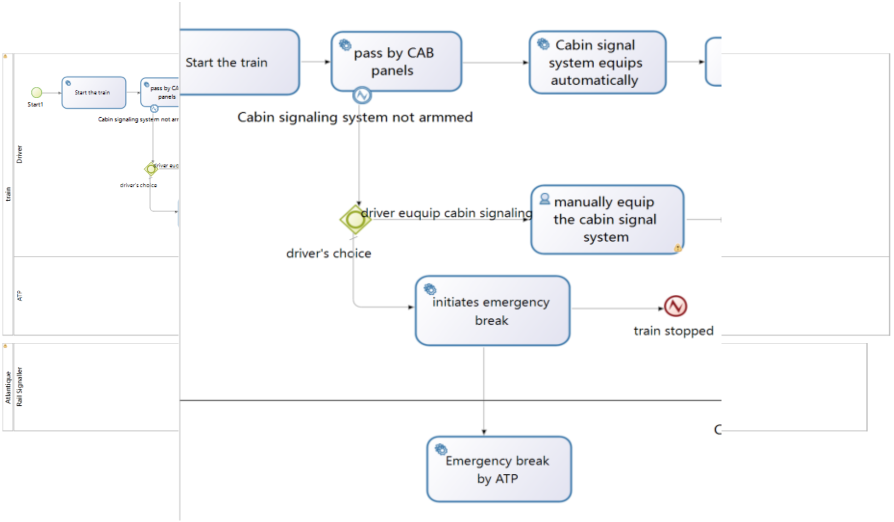
Exemple of GoA2 scenario under BPMN



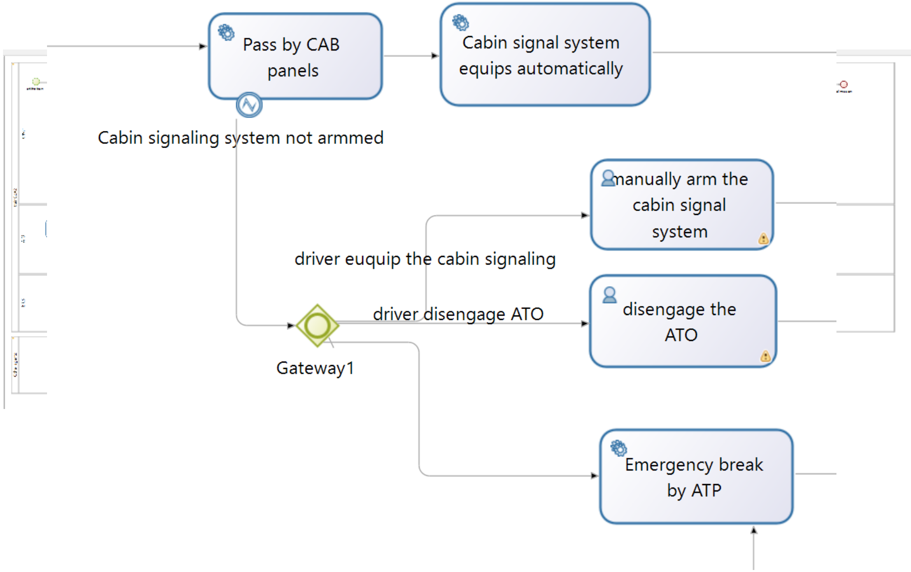
SCENARIO CONSTRUCTION AND MODELING

Modeling the constructed GoA1 and GoA2 scenarios under BPMN: AS-IS and TO-BE analysis

Exemple of GoA1 scenario using BPMN


Start1
Start the train
pass by CAB panels
Cabin signaling system not arr
driver euq
driver's choice
Driver
train
ATP
Atlantique
Rail Signaller
Start the train
pass by CAB panels
Cabin signal system equips automatically
Cabin signaling system not armmed
driver euquip cabin signaling
manually equip the cabin signal system
driver's choice
initiates emergency break
train stopped
Emergency break by ATP

Exemple of GoA2 scenario using BPMN


Pass by CAB panels
Cabin signal system equips automatically
Cabin signaling system not armmed
manually arm the cabin signal system
driver euquip the cabin signaling
driver disengage ATO
disengage the ATO
Gateway1
Emergency break by ATP

+ 01. INDUSTRIAL CONTEXT

- AUTOMATED TRAINS OPERATION (ATO) ON GOA2

+ 02. STATE OF ART

- FOR TO-BE SYSTEM GOA2 : PRELIMINARY RISK ANALYSIS BY SNCF
- FOR AS-IS SYSTEM GOA1 : TRAIN DRIVERS TRAINING PROCESS & INCIDENTS BASES
- HUMAN SYSTEM INTEGRATION METHOD (PRODEC DEVELOPED IN FLEXTECH)

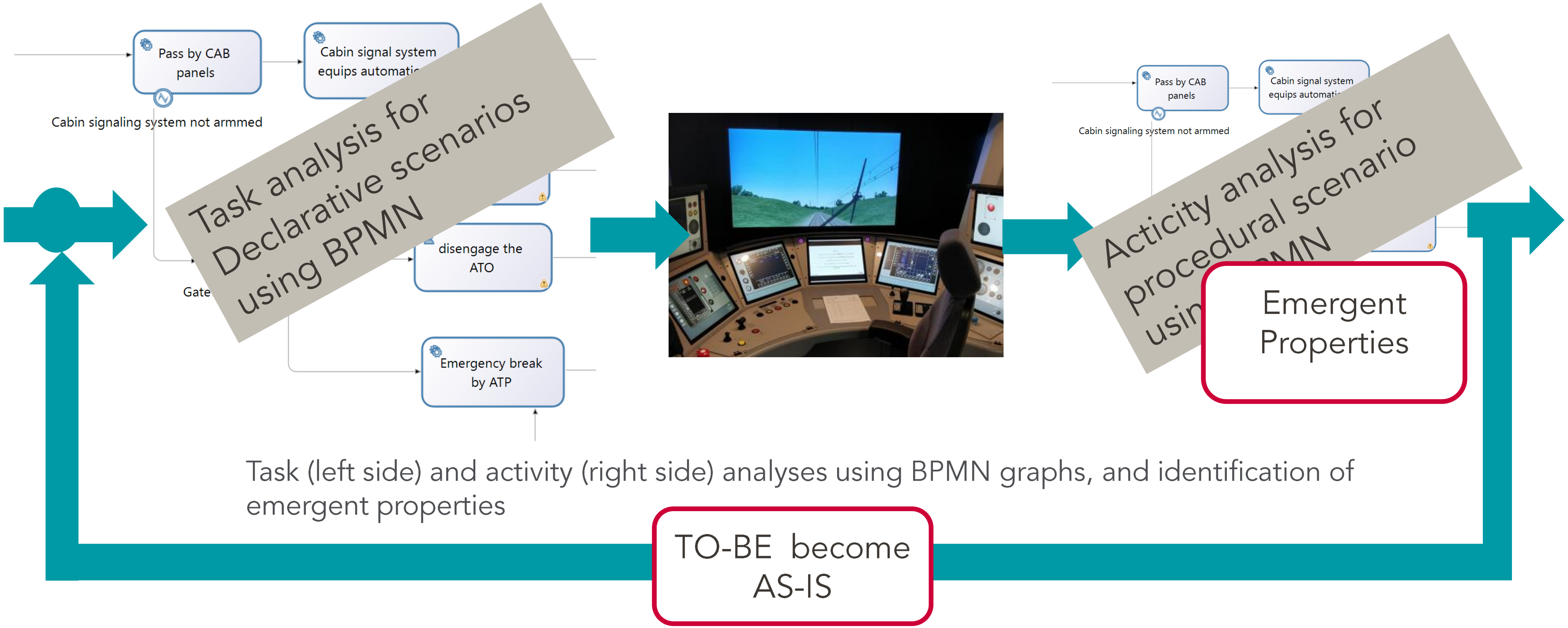
+ 03.METHODOLOGY : SAFETY-ORIENTED PRODEC

- SCENARIOS SELECTION BY INCIDENTS ANALYSES
- SCENARIOS CONSTRUCTION & MODELLING

+ 04.SIMULATORS & NEXT STEPS

SIMULATORS VISITS & NEXT STEPS

Coming soon : Project with “Centre d’Ingénierie Formation Traction “ (CIFT) :



Pass by CAB panels
Cabin signal system equips automatic
Cabin signaling system not armmed
disengage the ATO
Gate
Emergency break by ATP
Pass by CAB panels
Cabin signal system equips automati
Cabin signaling system not armmed

Task analysis for Declarative scenarios using BPMN

Acticity analysis for procedural scenario
usin MN

Emergent Properties

Task (left side) and activity (right side) analyses using BPMN graphs, and identification of emergent properties

TO-BE become AS-IS

Thank you !