




ERJU SYSTEM PILLAR

PRAMS Log - Main ERJU Hazard Database



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Abstract	This document details the European Railway Harmonized Hazards Database to be used for risk assessment by ERJU SP Domains in accordance with ERJU PRAMS Plan and guidelines.
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1 Preamble

1.1 Purpose

Purpose

The ERJU Hazard Database covers the need of having a common set of accidents and hazards that shall be used by all SP Domains to perform their safety analyses.

This is due to the fact that today there are no common sets of accidents or hazards in Europe, although they are mostly common among the different countries. Today, suppliers/RU/IM shall dig into each NSA documentation, if existing (in case a project involves several countries) to find a potential list of accidents / hazards or have to create their own list in case nothing is publicly available. [SPRM-1787,  Text]

1.2 Intended audience


ERJU Hazard Database Intended audience

This document is intended for the following users:

- PRAMS team,
- PRAMS engineers part of mirror group(s),
- other System Pillar Domains.

In addition, this document can be shared with a wider audience for informal opinion reviews.

Comments will be handled by the PRAMS team but they cannot block the delivery of the document in case of disagreement with the PRAMS team.


Note: the document is a key part of the general safety methodology proposed by the PRAMS team to be applied within the SP domains and then for future projects. [SPRM-35,  Text]

Open Issue

Please consider that at this stage the ERJU Hazard Database contains current state of knowledge and it is focusing only on Safety. The ERJU Hazard Database is intended to be extended to report both safety hazards and RAM equivalents in future revisions.

1.3 Document Context

Document context

The ERJU Hazard Database represents a centralized, standardized and harmonized hazards database combining all railway accidents categories, top-level hazards and refined ones and is a key part of the general safety methodology proposed by the PRAMS team to be applied within the SP domains and for future projects. [SPRM-2308,  Text]



1.4 Glossary

1.4.1 Terms and definitions


No references

accident

'accident' means an unwanted or unintended sudden event or a specific chain of such events which have harmful consequences; accidents are divided into the following categories: collisions; derailments; level crossing accidents; accidents to persons involving rolling stock in motion; fires and others;

[SOURCE:  SPPRAMSS-337 - [Directive (EU) 2016/798] Article 3 Definitions (11)] [SPPRAMSS-346, [Directive (EU) 2016/798] Article 3 Definitions (11),  Definition]


ERJU Hazard Database

ERJU Hazard Database. A collection existing hazard lists of known hazards and accidents which is initiated and maintained by ERJU's PRAMS domain with the aim to provide a harmonized set of hazards/ accidents. [SPPRAMSS-3552,  Definition]


Hazard

Condition that could lead to an accident


Note 1 to entry: The equivalent definition in [IEC 60050-903:2013, 903-01-02] refers to "harm" instead of "accident".

Note 2 to entry: A Hazard sits at the boundary of the system under consideration. [ERA-REC-116-2015-GUI] [SPPRAMSS-4044,  Definition]


Operational Hazard

Hazard whose cause is related to a failure in the application of an operational scenario/procedure (e.g. hazard due to operator or signaller or driver error) and/or to external events. These hazards are managed by means of "Operational Hazard" Work Item. [SPRM-40,  Definition]

System Hazard

Hazard whose cause is related to a failure of one of the technical system functions/components. These hazards are managed by means of the "Hazard" Work Item. [SPRM-41,  Definition]


HOF Hazard


Hazard whose cause is related to human and organisational (HOF) factors. These hazards are managed by means of the "HOF Hazard" Work Item. [SPRM-1349,  Definition]

1.4.2 Abbreviations

1.5 Inputs for ERJU Hazard Database








Main Input: CSM-ASLP


According to the ERA Recommendation of future CSM-ASLP  SPPRAMSS-6866 - [ERA-REC-1219-CSM-ASLP] the category A events are used to categories accidents that may happen when a hazard occurred.

[SPRM-37,  Text]

Further Inputs

Further inputs were used to check coverage and completeness of the list are reported in the below list:

-  SPPRAMSS-4469 - [RSSB2023]
-  SPPRAMSS-7052 - [ESPF - Arrêté du 4 janvier 2016 relatif à la nomenclature de classification des événements de sécurité ferroviaire]
-  SPPRAMSS-7093 - [VDE V 0831-103]
-  SPPRAMSS-7094 - [AB-EBV]
-  SPRM-47 - [SUBSET-091]
-  SPRM-48 - [SUBSET-113]
-  SPRM-995 - [EN 62267]


Further details about the inputs considered for both accidents and hazards are reported in 3.1 - Inputs for ERJU Hazard Database [SPRM-38,  Text]

1.6 List of References

[ERA-REC-1219-CSM-ASLP]

RECOMMENDATION ERA1219 OF THE EUROPEAN UNION AGENCY FOR RAILWAYS on Common Safety Methods for assessing the safety level and the safety performance of railway operators at national and Union level [SPRM-43, external reference - https://www.era.europa.eu/content/recommendation-era1219_en,  Reference]

[RSSB2023]

Rail Safety and Standards Board Ltd.: Research and Development Common Hazards for the Management Of Industry Safety (CHAMOIIS). T1194, 2023. [SPPRAMSS-4469, external reference - <https://www.rssb.co.uk/>,  Reference]

[ESPF - Arrêté du 4 janvier 2016 relatif à la nomenclature de classification des événements de sécurité ferroviaire]

[SPRM-44, external reference - <https://www.securite-ferroviaire.fr/reglementation/arrete-relatif-la-nomenclature-de-classification-des-evenements-de-securite-ferroviaire>,  Reference]

[VDE V 0831-103]

DIN VDE V 0831-103 VDE V 0831-103:2020-09

Elektrische Bahn-Signalanlagen

Teil 103: Ermittlung von Sicherheitsanforderungen an technische Funktionen in der


Eisenbahnsignaltechnik [SPRM-45, external reference - <https://www.vde-verlag.de/normen/0800686/din-vde-v-0831-103-vde-v-0831-103-2020-09.html>,  Reference]

[AB-EBV]

Ausführungsbestimmungen zur EBV (AB-EBV) [SPRM-46, external reference - <https://www.bav.admin.ch/bav/de/home/rechtliches/rechtsgrundlagen-vorschriften/ab-ebv.html>,  Reference]


[SUBSET-091]

Safety Requirements for the Technical Interoperability of ETCS in Levels 1 & 2

[SPRM-47, [SUBSET-091_v400.pdf](#), external reference - https://www.era.europa.eu/system/files/2023-09/index027_-_SUBSET-091_v400.pdf,  Reference]

[SUBSET-113]

ETCS Hazard Log

[SPRM-48, [subset_113.pdf](#), external reference - https://www.era.europa.eu/system/files/2022-11/subset_113_1.pdf,  Reference]


[Digital Railway PHA]

Digital Railway Preliminary Hazard Analysis Report [SPRM-598,  Reference]

[EN 62267]

Railway applications - Automated urban guided transport (AUGT) - Safety requirements [SPRM-995,  Reference]

UIC List of HOF Automation Hazards

UIC List of HOF Automation Hazards (2025) [SPRM-1350,  Reference]

[DIRECTIVE 2004/49/EC]

DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on safety on the Community's railways

[SPRM-1532, external reference - <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32004L0049&from=IT>,  Reference]

[Directive (EU) 2016/798]


Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety

[SPRM-1537, external reference - <https://eur-lex.europa.eu/eli/dir/2016/798/oj/eng>,  Reference]

[UIC SAFETY DB]


UIC SAFETY DB [SPRM-1829, external reference - <https://safetydb.uic.org/>,  Reference]

[BEU]

Bundesstelle für Eisenbahnunfalluntersuchung - BEU [SPRM-1852, external reference - <https://www.eisenbahn-unfalluntersuchung.de>,  Reference]

[EBA]

Definitionen der Ereignisarten, Ereignisunterarten und Ereignisdetails [SPRM-1853, external reference - https://www.eba.bund.de/DE/Themen/Melden_gefaehrlicher_Ereignisse_im_Eisenbahnbetrieb/Definitionen/definitionen_node.html#:~:text=von%20gef%C3%A4hrlichen%20Ereignissen-,Definitionen%20der%20Ereignisarten%20

 Reference]


[ATO-SA]

Rail to Digital automated up to autonomous train operation - D8.3: Safety analysis for ATO function

[SPRM-1868,  Reference]

2 ERJU Hazard Database Management

General approach used for ERJU Hazard Database

The general procedure for the definition and subsequent use of the ERJU Hazard Database is shown in the following diagram. [SPRM-50,  Text]

ERJU Hazard Database creation process and linking with other SP domains safety activities

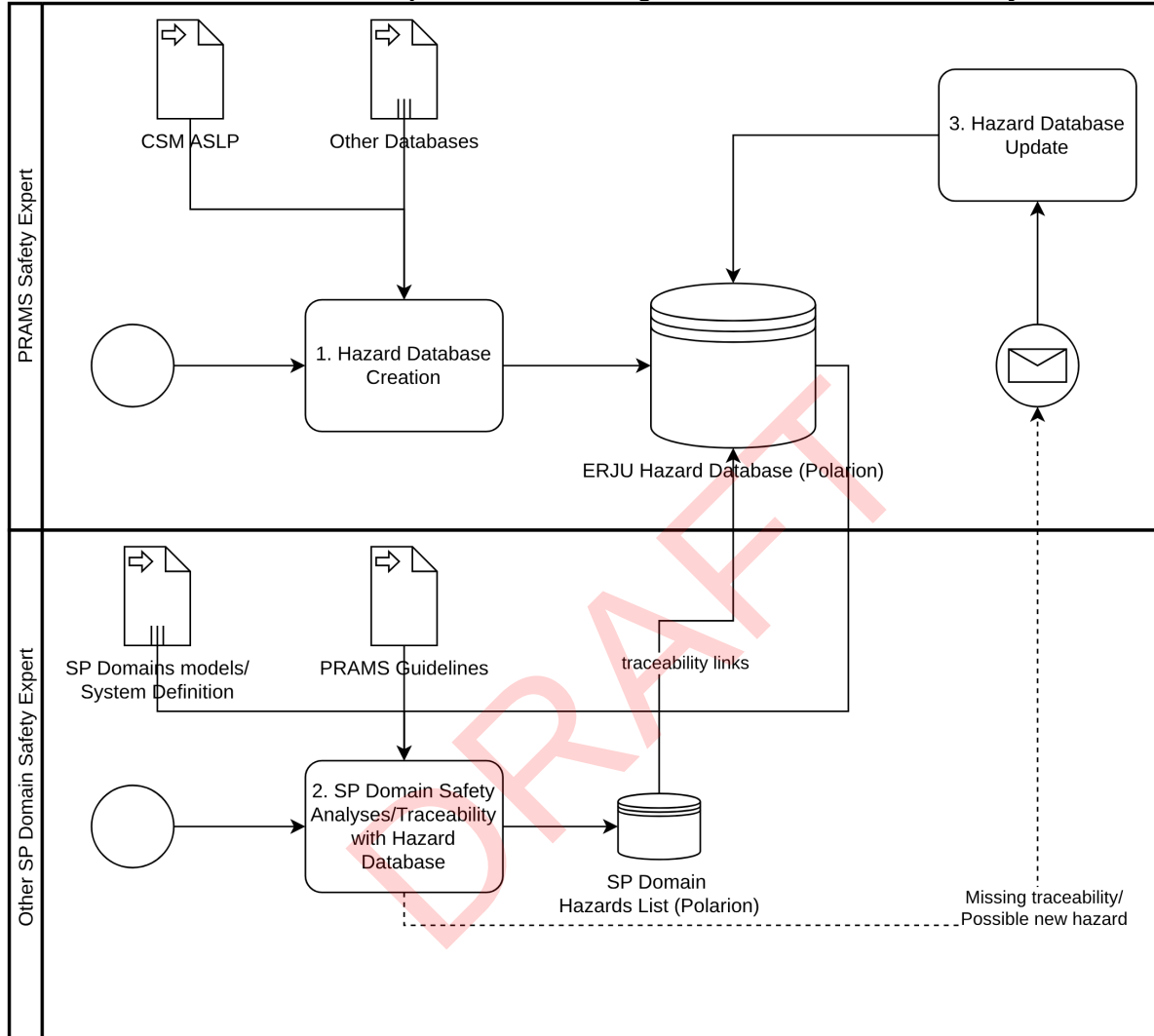




Figure 1 - ERJU Hazard Database creation process and linking with other SP domains safety activities


[SPRM-51,  Diagram]

ERJU Hazard Database process description

The Business Process Modeling Notation diagram above shows the process for the management of ERJU Hazard database within System Pillar. More specifically:

1. *PRAMS Safety Experts* defines the ERJU Hazard Database starting from the analysis of different inputs (i.e. CSM ASLP and other available national databases). ERJU Hazard Database is structured as depicted in  [SPRM-56](#) and it is maintained in Polarion.
2. *Other SP Domains Safety Experts* carry out safety analyses within their domain based on the SP Domain models/system definition in accordance with the defined PRAMS guidelines. The more refined hazards identified within each SP domain are stored in the SP Domain Hazard List and traced to the top-level ones identified in the PRAMS domain stored within the ERJU Hazard Database.
3. In case no traceability can be established for some hazards, information listed in  [SPRM-53](#) are reported in form of an issue via this ERJU Hazard Database hazard reporting page

(SPCoregroupPublic/Safety/ERHD Hazard Report : 725208) or via the PRAMS Functional Team meeting with PRAMS Safety Experts that analyze them and update the ERJU Hazard Database introducing new top-level hazards if required.


[SPRM-52,  Text]

Information to be shared with PRAMS Safety Expert in case no traceability can be established

The following information need to be shared with PRAMS Safety Expert for the hazards that are identified that cannot be linked to any hazard in the ERJU Hazard Database:

Table 1 - Information to be shared for missing hazards

Headline	Description
Polarion ID + Title	Unique identifier of the Work Item + Title
Hazard Synopsis	Short synopsis (useful to promptly recall or sort out the hazard and its content)
Hazard Description	Detailed description of the hazard (You can also use drawings, if useful) As much as necessary, as little as possible.
Hazard Source	Source of the hazard: How the hazard was identified? E.g. standard, observed case on the field, related hazard analyses, risk sheet, Hazard Log of <...>
Related (sub)system	(Sub)system under consideration
Related Accident(s)	Possible accidents from ERJU Hazard Database linked to the hazard
Proposed mitigation(s)	Proposal for mitigation of this hazard e.g. apply code-of-practice, NFR, etc.
Comments	Other useful information to report

[SPRM-53,  Text]


3 ERJU Hazard Database Structure

ERJU Hazard Database Work items and linking

ERJU Hazard Database structure in terms of Work Item types and possible links among them is depicted in the diagram below. More in detail, the ERJU Hazard Database is composed by:

1. **Operational Hazards** reporting the hazardous scenarios caused by operational failures
2. **Hazards** reporting the hazardous scenarios caused by technical failures of systems
3. **Accidents** reporting events having harmful consequences

System hazards or operational hazards, when occurring, may lead to accidents. The diagram also reports how both Operational Hazard and System Hazard may be linked to an Accident by means of the "relates to" relation. Moreover, it also shows how the more refined hazards identified in the context of the safety analysis from the other SP domains may be linked with the ones of the ERJU Hazard Database.

[SPRM-55,  Text]

ERJU Hazard Database Structure and linking relationships

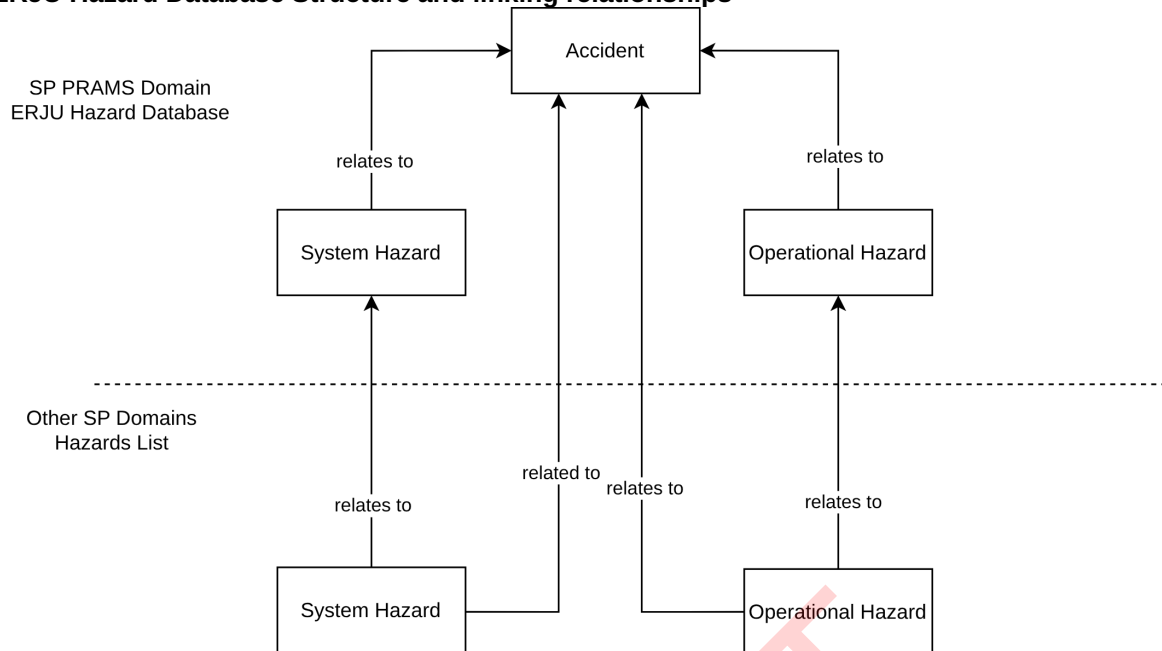



Figure 2 - ERJU Hazard Database Structure and linking relationships

[SPRM-56,  Diagram]

Hazard and accident attributes


The work items for Operational hazards, Hazards and Accidents are characterized by the following main attributes:

- **ID:** unique identifier
- **Title:** reports the title of the hazard
- **Description:** reports a description of the hazard
- **old ID:** reporting the mapping with the considered input source (i.e. Name of the source and ID in the source document, with multiple values separated with ";")
- **Risk Acceptance Principle:** reports the Risk Acceptance Principle applicable for the hazards (i.e. Explicit Risk Estimation or Code of Practice/Reference System). Note: a suggested Risk Acceptance Principle has been defined in order to specify for which hazard it is expected to have an Explicit Risk Estimation and for which one a Code of practice or reference system may be used (in future revision of the document it will be detailed the suggested code of practice or reference system).
- **Rationale:** reports details about the defined risk acceptance principle, as an example the information about the Code of Practice or Reference system for the hazard having Code of Practice/Reference System as Risk Acceptance Principle or proposed mitigation/s, if already identified.

[SPRM-57,  Text]

3.1 Inputs for ERJU Hazard Database

Input for Accidents and Hazards

Below table reports all the inputs considered for producing the Accident List. [SPRM-1533,  Text]

Inputs for Accidents List

Table 2 - Inputs for Accidents List

ID	Description	Reference	Notes	Included in the Database
1	Common Safety Methods for assessing the safety level and the safety performance of railway operators at national and Union level	SPRM-43 - Common Safety Methods on Assessment of Safety Level & Safety Performance (CSM ASLP)	Type A events	Yes
2	DIRECTIVE (EU) 2016/798 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (of 11 May 2016 on railway safety)	SPRM-1532 - [DIRECTIVE 2004/49/EC]	List of accidents are reported in Annex 1 (1)	Yes
3	DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (of 29 April 2004 on railway safety)	SPRM-1537 - [Directive (EU) 2016/798]	List of accidents are reported in Annex 1	Yes
4	UIC (Union internationale des chemins de fer) SAFETY DB	SPRM-1829 - [UIC SAFETY DB]	Accident Types	Yes
5	Bundesstelle für Eisenbahnunfalluntersuchung - BEU	SPRM-1852 - [BEU]	JAHRESBERICHT §1.3	Yes
6	EBA (Eisenbahn-Bundesamt) - Definitionen der Ereignisarten, Ereignisunterarten und Ereignisdetails	SPRM-1853 - [EBA]	Table 1	Yes
7	RSSB (Rail Safety and Standards Board) - Common Hazards for the Management of Industry Safety	RSSB - Common Hazards for the Management of Industry Safety - CHAMOIS	Level 1	Yes
8	ESPF (Établissement public de sécurité ferroviaire) - Arrêté du 4 janvier 2016 relatif à la nomenclature de classification des événements de sécurité ferroviaire	SPRM-44 - [ESPF - Arrêté du 4 janvier 2016 relatif à la nomenclature de classification des événements de sécurité ferroviaire]		Yes
9	VDE V 0831-103 VDE V 0831: Electric signalling systems for railways	SPRM-45 - [VDE V 0831-103]		Yes
10	Ausführungsbestimmungen zur EBV	SPRM-46 - [AB-EBV]		Yes



[SPRM-1860,  Text]**Inputs for Hazards List**

Table 3 - Inputs for Hazards List

ID	Description	Reference	Notes	Included in the Database
1			Type B	Yes

ID	Description	Reference	Notes	Included in the Database
	Common Safety Methods for assessing the safety level and the safety performance of railway operators at national and Union level	SPRM-43 - Common Safety Methods on Assessment of Safety Level & Safety Performance (CSM ASLP)		
2	RSSB (Rail Safety and Standards Board) - Common Hazards for the Management of Industry Safety	RSSB - Common Hazards for the Management of Industry Safety - CHAMOIS	From Level 2	Yes
3	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 &	SPRM-47 - [SUBSET-091]		Yes
4	ETCS Hazard Log	SPRM-48 - [SUBSET-113]		Yes
5	EN 62267 - Railway applications - Automated urban guided transport (AUGT) - Safety requirements	SPRM-995 - [EN 62267]		Yes
6	UIC List of HOF Automation Hazards	SPRM-1350 - UIC List of HOF Automation Hazards		Yes
7	Digital Railway PHA	SPRM-598 - [Digital Railway PHA]		Yes
8	Rail to Digital automated up to autonomous train operation - D8.3: Safety analysis for ATO function	SPRM-1868 - [ATO-SA]		Yes
9	VDE V 0831-103 VDE V 0831: Electric signalling systems for railways	SPRM-45 - [VDE V 0831-103]		Yes
10	Ausführungsbestimmungen zur EBV	SPRM-46 - [AB-EBV]		Yes

[SPRM-2176,  Text]


4 Human and Organizational Factors

List of HOF Automation Hazards

This work has been produced by UIC HOF working group (HOFWG). Based on expertise and information from more than 20 participants from various European companies. This list is primary meant for HOF experts and safety assurance managers to identify and mitigate the HOF risks/hazards of introducing automation. The secondary audience comprises automation project managers, systems engineers, senior managers and innovation departments. An abstract of this list has been introduced in the PRAMSS-domain for the purpose of integrating HOF hazards into the Operational Hazard database. The first version of this list has been completed in 2025 and will be updated in the UIC HOF working group when applicable.


Information that has been taken over in the Operational Hazard database includes:

- **ID:** unique identifier
- **Title:** risk parameter as used in the original list
- **Description:** reports a description of the hazards
- **Rationale:** reports additional information to the hazards, such as examples or further clarification

[SPRM-1351,  Text]

5 Appendices

In the following subsections are reported the links to the documents containing...

In the following subsections are reported the links to the documents containing the different lists composing the ERJU Hazard Database. [SPRM-59,  Text]

5.1 Part 1 - Accidents

For the Accidents List refer to *SPRM/ERJU Hazard Database/ERJU - Accident List : 725208*

5.2 Part 2 - Operational Hazards

For the Operational Hazards List refer to *SPRM/ERJU Hazard Database/ERJU - Operational Hazards : 725208*

5.3 Part 3 - System Hazards

For the System Hazard List refer to *SPRM/ERJU Hazard Database/ERJU - System Hazards : 725208*

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