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**Group REPORT**

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# Foreword

This Group Report (GR) has been produced by ETSI Industry Specification Group <long ISGname> (<short ISGname>).

# Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](https://portal.etsi.org/Services/editHelp!/Howtostart/ETSIDraftingRules.aspx) (Verbal forms for the expression of provisions).

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# Executive summary

# Introduction

# 1 Scope

The present document aims at studying how operations data (KPIs, metrics, alarm notifications, event logs, debug information) can be exploited to ensure the availability and reliability of NFV-MANO and of the network services it manages using data analysis/data driven techniques. This includes, among others, the use of machine learning to find patterns for cases where detailed semantics information is unavailable (e.g., due to confidentiality) or the amount of data is overwhelming. Use cases are created describing how the information can be used offline (for example for root cause analysis and predictive maintenance resulting in, e.g., creation and/or changes of deployment flavours) and online (to identify appropriate LCM operations and policy changes in order to achieve the intended service availability objectives). The result of this report also concretises some DGR/NFV-IFA041 use cases in the context of reliability and availability. The report also considers outputs from DGR/NFV-IFA042, in particular the recommendations on MANO policy management.

# 2 References

## 2.1 Normative references

Normative references are not applicable in the present document.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] <Standard Organization acronym> <document number><version number/date of publication>: "<Title>".

[i.2] etc.

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the [following] terms [given in ... and the following] apply:

## 3.2 Symbols

For the purposes of the present document, the [following] symbols [given in ... and the following] apply:

## 3.3 Abbreviations

For the purposes of the present document, the [following] abbreviations [given in ... and the following] apply:

# 4 Overview

Editor’s note: This introductory clause provides a high level description of the cognitive data analysis for operations data, both offline and online. It will then present the Telco context, and in particular the virtualisation of network functions which is the environment targeted for this study. A brief ‘abstract’ of each of the following clauses form the rest of clause 4.

# 5 Operations data

Editor’s note: This clause details the main input needed for the present study, i.e., operations data of the NFV ecosystem, be it from a local data centre or from the Cloud. Clause 5.1 explores and classifies such operations data (alarms, notifications, …), while clause 5.2 identifies all the pairs Provider-Consumer of these data. These pairs will be categorized according to their role and the functional block they belong to in the NFV architectural framework, e.g., within the set of VNFs (information exchanged between VNFs), within NFV-MANO, between VNFs and NFV-MANO, …

## 5.1 Nature of the data

## 5.2 Data source and destination

# 6 Cognitive analysis of operations data

Editor’s note: This clause describes the way operations data can be treated. Clause 6.1 focuses on the processing using cognitive techniques, while clause 6.2 maps such approaches to the NFV context, e.g., multi-layer requiring a parallel analysis of data produced by different layers.

## 6.1 Data driven techniques

## 6.2 Application to the NFV environment

# 7 Use cases

Editor’s note: Following the description of input (i.e., operations data) and the AI-like techniques to handle them in NFV, this clause presents the use cases spanning from offline to online which benefit from the use of cognitive approaches applied to operations data. It is expected that the development of this clause will lead to several use cases in each category currently presented, e.g., tendency extrapolation includes errors prediction, failures prevention, and may lead to other categories as well.

## 7.1 Service availability assurance

## 7.2 Root cause analysis

## 7.3 Tendency extrapolation

# 8 Recommendations

Editor’s note: The recommendations found through this study are presented in this clause. It is probable that the recommendations will be classified according to each use case they are related to.

# 9 Conclusion

# Annex A: Title of annex

## A.1 First clause of the annex

### A.1.1 First subdivided clause of the annex

# History

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| **Document history** | | |
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