# Feasibility of Establishing a National Dose Register using RAIS in South Africa

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# Background

- SA has been discussing the establishment of NDR
  - Self-assessment conducted in 2010
  - One recommendation emanating from the self-assessment is to establish a NDR
- IAEA has developed a highly customizable software for regulatory purposes
- An NDR model has been developed using RAIS
- Can RAIS be used for establishing an NDR in SA?

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# Objectives

- To provide assistance to SA in investigating the feasibility of using RAIS to establish NDR. In particular:
  - Analysis of the different data structures used by the different Dosimetry service providers (DSP) in South Africa
  - Providing advice on the scope and elements that the NDR should include
  - Identification of the possible NDR data structure in RAIS
  - Identification of means for data exchange between the DSPs and RAIS NDR
  - Identification of training needs

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# Contents

This presentation will provide:

- IAEA Safety requirements & activities on occupational dose records
- an overview on RAIS
- description of NDR implementation under RAIS

# Records of Occupational Exposure

- International Safety Requirements: GSR Part 1, Requirement 35
  - Para 4.63: *The regulatory body shall make provision for establishing and maintaining the following main registers and inventories:*
    *— Records of occupational doses;*
  - Para 4.64: The regulatory body may or may not be the sole entity responsible for the maintenance of these registers and inventories, but it shall be involved in their proper retention and use.
  - The requirement for the regulatory body to maintain records cannot diminish the responsibility of authorized parties to keep their own records.

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# Records of Occupational Exposure

- There is a tendency to strengthen the application of this safety requirement by establishing a central dose register
- Draft EU BSS: results of individual monitoring should be submitted to a national dose register established by each EU member state
- Many other countries have established a national dose register

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# IAEA activities related to the management of occupational doses

- Dose management system (DMS)
- ISOE (Information System on Occupational Exposure) for ORP in NPPs
- ISEMIR (Information System on occupational exposure in Medicine, Industry and Research)
- Information system on Occupational Exposure in Uranium mining: a system for ALARA purpose (just initiated).
- Provision of technical assistance and training

Recently, a generic NDR model has been developed using the Regulatory Authority Information System (RAIS)

# What's RAIS?

- The Regulatory Authority Information System (RAIS) is a software developed by the IAEA to assist the regulatory bodies in managing their regulatory programme

  TECHNICAL DETAIL: The current version is a web application interacting with a RAIS database on a SQL server

- RAIS promotes a consistent and common approach to the regulatory control, in accordance with IAEA Safety Standards and Code of Conduct, while offering high flexibility to match national needs and circumstances

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# What's RAIS?

- RAIS provides for:

  Keeping registry/records of regulatory data

  Management of regulatory information

  Management of regulatory activities

# What is RAIS?

- RAIS is highly customizable to match national regulatory systems
- RAIS customization features open a wide door for its application beyond regulatory activities. For example:
  - A system for national dose register
  - A system for waste management
- Both examples have been implemented

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# RAIS – Scope

- RAIS is a comprehensive system. Its default scope covers:
  - Infrastructure information (e.g. country's administrative infrastructure, regulatory body, governmental authorities, laws and regulations …)
  - Facilities
  - Radiation sources and associated equipment

  Inventory of sources

  - Authorization
  - Inspection
  - Enforcement
  - Workers
  - Additional items: radiation events, occupational exposure, technical services, security aspects
- RAIS provides, through its <u>customization mechanisms</u>, for expansion to cover other areas, if of interest to the regulatory body

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# RAIS Features

- Compatibility with IAEA safety standards
- Customization features
- Design features:
  - Static & Dynamic data
  - Unique identifiers
  - Rationality
- Examination of data consistency
- Quality management aspects
- Data protection
- Data confidentiality: Functional roles and data roles
- Online submission of data
- Several catalogues included
- Connection to ICSRS

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# Feature: Unique Identification

- A unique identifier is required for each item. This identifier is called the Regulatory Authority Number (RAN).
- The RAN can be related to other national systems, if applicable.
- If the regulatory body has an algorithm for assigning the RANs, RAIS offers utility to implement this algorithm and to automatically generate the RAN

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# Feature: Unique Identification (Cont'd)

Proper selection of RAN is crucial

- Examples of 'bad' RANs
  - auto-generated unique number
  - Source RAN = serial number
  - Worker RAN = name or non-durable ID number
  - Authorization process RAN = date of application receipt
- Examples of 'good' RANs
  - proper combination of meaningful information
  - RANs which are recognized nation-wide, if applicable, e.g.
    - Facility RAN = registration number
    - Worker RAN = national number or durable ID number

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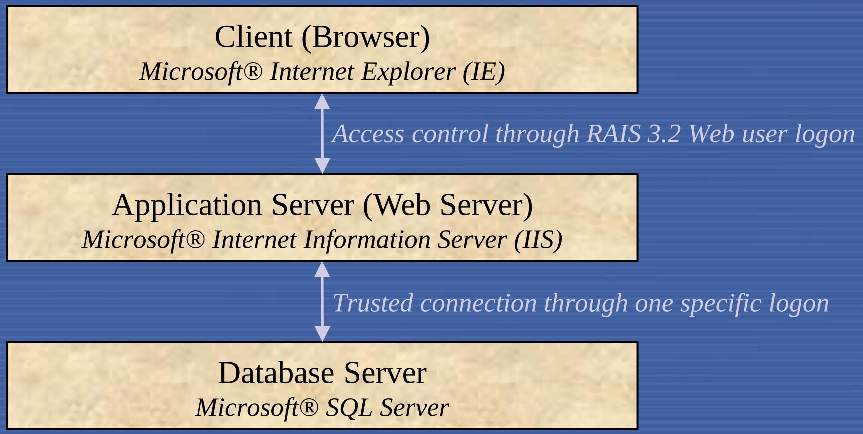
# Customization Features

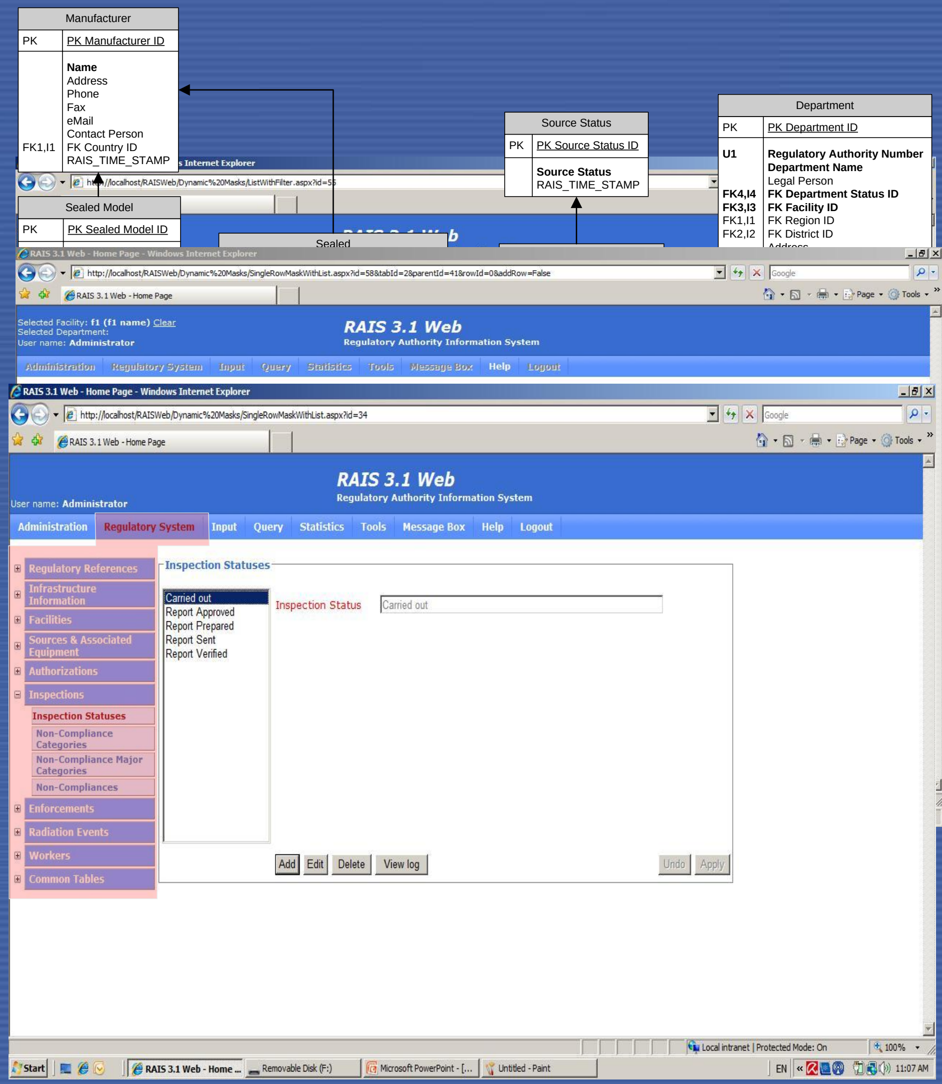
- Most of RAIS interface components are dynamically generated from specific database entries
- Additionally, RAIS interface includes customization tools to modify such database entries



# Customization Features

RAIS Customization includes:

- Scope
- Interface
- Background functionalities
- Reports and data analysis
- Regulatory system settings



# Access Control

- Access control is provided through two roles:
  - Functional roles: control which interface elements, e.g. menus, are accessible by a user, and the corresponding access rights.
  - Data roles: control the specific data sectors which are accessible by a user.
- For convenience, 5 default combinations of data roles and functional role are predefined as "user types"

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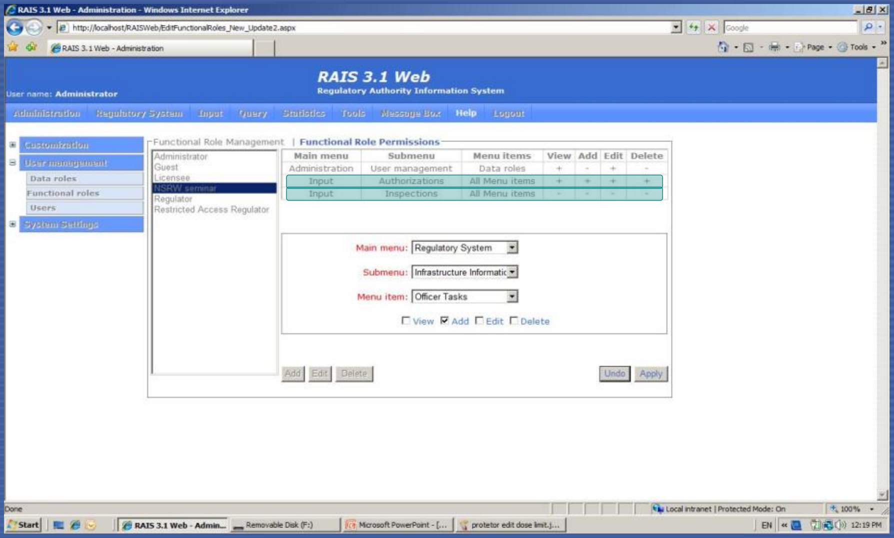
# Functional Roles

- Control which interface elements, e.g. menus, are accessible by a user, and the corresponding access rights.

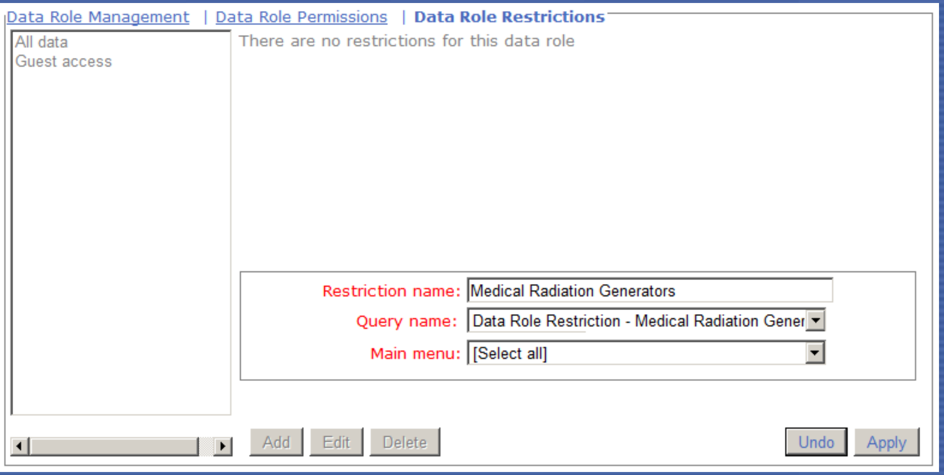



- For example
  - A user may be given access to the inventory menus but not to the licencing or inspection menus
  - A member of the public may have read-only access to the public data.

    *<u>Note:</u> By default, statistical data are considered public in RAIS. This 'public area' can be customized.*

# Data roles

- control the specific data sectors which are accessible by a user.
- For example
  - Health authorities may be given access only to medical facilities
  - Environmental protection authorities may be given access only to data relevant to discharges
  - Customs may be given access only to sources involved in import/export and relevant authorizations
  - Representatives of the facilities can only access their own facility's data



# Online data submission

- Authorized representatives of facilities may submit data online, for example:
  - inventory data, periodic audit
  - application of authorization
  - Notification of changes in their facilities
  - ….
- Data submissions are subject to validation by authorized RAIS users

# RAIS is widely used…

- World wide: 71 countries are using RAIS (July'12 data)
- Africa: 29 countries are using RAIS

# RAIS use in Africa

| Country | RAIS Version | Country | RAIS Version |
|---|---|---|---|
| Algeria | RAIS 3.0 | Mali | RAIS 3.1 Web |
| Angola | RAIS 3.1 Web | Mauritania | RAIS 3.2 Web |
| Botswana | RAIS 3.1 Web | Mauritius | RAIS 3.2 Web |
| Burkina Faso | RAIS 3.1 Web | Mozambique | RAIS 3.0 |
| Cameroon | RAIS 3.0 | Namibia | RAIS 3.2 Web |
| Central African republic | RAIS 3.2 Web | Niger | RAIS 3.0 |
| Cote d'Ivoire | RAIS 3.1 Web | Nigeria | RAIS 3.1 Web |
| D.R. Congo | RAIS 3.1 Web | Sudan | RAIS 3.0 |
| Egypt | RAIS 3.0 | Seychelles | RAIS 3.1 Web |
| Ethiopia | RAIS 3.0 | Sierra Leone | RAIS 3.0 |
| Gabon | RAIS 3.0 | Tanzania | RAIS 3.0 |
| Ghana | RAIS 3.1 Web | Tunisia | RAIS 3.0 |
| Kenya | RAIS 3.0 | Uganda | RAIS 3.0 |
| Madagascar | RAIS 3.0 | Zambia | RAIS 3.1 Web |
| Malawi | RAIS 3.2 Web | | |

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# IAEA Supports its Member States…

- Training provided to more than 450 persons
- More than 18 regional and 19 national workshops organized
- Technical assistance
  - Expert missions (installation, customization, data import)
  - Provision of equipment, e.g. 26 Servers for RAIS 3.1 Web have been provided between Sep 2009 and July 2012
  - Off site support

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# Implementation of NDR in RAIS

- A generic model for NDR in RAIS has been developed
  (Radiation Protection Dosimetry (2011), pp. 1–7, doi:10.1093/rpd/ncr368)

- Considerations:
  - Design considerations:
  - Reporting considerations
  - Administration considerations

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Radiation Protection Dosimetry (2011), pp. 1–7 doi:10.1093/rpd/ncr368

## ESTABLISHING A NATIONAL REGISTER OF OCCUPATIONAL DOSES BASED ON THE IAEA REGULATORY AUTHORITY INFORMATION SYSTEM (RAIS)

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**IAEA Safety Standards require countries to establish and maintain registers of occupational doses. This paper demonstrates a possibility of the use of the regulatory authority information system (RAIS) for this purpose. A two-level classification scheme for work activities, based on UNSCEAR categorisation, is adopted. The implementation approach presented in this paper covers all types of occupational exposure to artificial as well as to natural sources of ionising radiation. Although the presented model is general, it can be adjusted to specific national needs by simply changing certain settings or making use of the extensive RAIS customisation capabilities.**

### INTRODUCTION

The International Basic Safety Standards[1] require that records of individual occupational doses of workers predominantly working in controlled areas are kept and made available to the competent authorities and to individuals. This requirement has been adapted in the national legislations and regulations in many countries seeking compliance with the International Basic Safety Standards. There is a clear tendency to strengthen the application of this requirement by establishing a central dose register. In fact, the IAEA Safety Standards require regulatory bodies to make provisions for establishing, maintaining and retrieving records of occupational exposure. The regulatory body may or may not be the sole entity responsible for the maintenance of this register, but it shall be involved in its proper retention and use to support its regulatory functions[2]. The Draft Euratom Basic Safety Standards Directive[3] includes also provisions stating that the results of individual monitoring should be submitted to a national dose register established by each EU member state.

Several countries, such as Australia, Canada and many of the EU member states, have established a central register for occupational doses[4] (see, for example, http://www.hc-sc.gc.ca/ewh-semt/occuptravail/radiation/regist/index-eng.php. http://minister.ret.gov.au/MediaCentre/MediaReleases/Pages/NationalRadiationDoseRegister Announced.aspx.). The responsibility for maintaining a national dose register in some countries, such as Finland[5], lies with the regulatory body, while in some other countries, it is assigned to separate organisations.

In some countries, as, for example, Norway and Syria, individual monitoring is made primarily by a single dosimetry service provider (DSP), covering the majority of the workers in the country and serving partly as a national dose register[6]. In contrast, many countries do not yet have a national dose register and have no mechanism for centralised access to occupational dose records.

Proper operation and maintenance of a national register of occupational doses (NROD) requires that an adequate information system be in place, which provides for data collecting, recording, analysis and reporting. Countries having the NROD have developed their own information systems, and the methods of data recording and reporting in those systems vary considerably[4]. This fact was also observed by UNSCEAR in its 2008 report to the UN General Assembly, in which it was reported that national authorities have used different methods to measure, record and report occupational data[7].

This paper suggests the use of the regulatory authority information system (RAIS) for establishing a national dose register in countries, in which such a register is not yet in place. The potential role of the regulatory body in establishing the NROD will also be discussed in the case where no dedicated organisation is in charge of establishing and maintaining the NROD in the country. The term 'regulatory body' is to be understood in accordance with the IAEA Safety Glossary[8], i.e. an authority or a system of authorities designated by the government of a state as having legal authority for conducting the regulatory process, including issuing authorisations and thereby regulating nuclear, radiation,

# Design Considerations

- Employment considerations:
  - employer, multiple simultaneous employers
  - work activity
  - short term employment
  - outside workers
  - foreign workers

# Design Considerations

- Classification of work activities
  - UNSEAR 2008, or national classification

**Table 1. Classification of work activities derived from the UNSCEAR 2008 report.**

| Activity sectors | Occupational categories | Occupational groups |
|---|---|---|
| Natural sources of radiation | Civilian aviation | |
| | Coal mining | |
| | Other mineral mining | |
| | Oil and natural gas industry | |
| | Handling of mineral and ores | |
| Nuclear fuel cycle | Uranium mining | |
| | Uranium milling | |
| | Uranium enrichment and conversion | |
| | Fuel fabrication | |
| | Reactor operation | |
| | Fuel reprocessing | |
| | Research in nuclear fuel cycle | |
| Medical uses of radiation | Diagnostic radiology | |
| | Interventional procedures | Medical doctors |
| | | Nurses |
| | | Technicians |
| | | Others |
| | Dental practice | |
| | Nuclear Medicine | Medical doctors |
| | | Nurses |
| | | Technicians |
| | | Others |
| | Radiotherapy | |
| | All other medical uses | |
| Industrial uses of radiation | Industrial irradiation | |
| | Industrial radiography | |
| | Luminising | |
| | Radioisotope production | |
| | Well logging | |
| | Accelerator operation | |
| | All other industrial uses | |
| Miscellaneous | Educational establishments | |
| | Veterinary medicine | |
| | Other specific occupational groups | |
| Military activities | Nuclear ships and support facilities | |
| | All other military activities | |

The 'occupational groups' column can be combined with the 'occupational categories' column without losing any classification advantage.

# Design Considerations

- Exposure:
  - Classification of exposure types
  - regulatory requirements
  - Exposure values
  - DSPs

| Exposure Type |
| --- |
| External exposure |
| Intake |
| Dose to the lens of the eyes |
| Extremities/skin dose |

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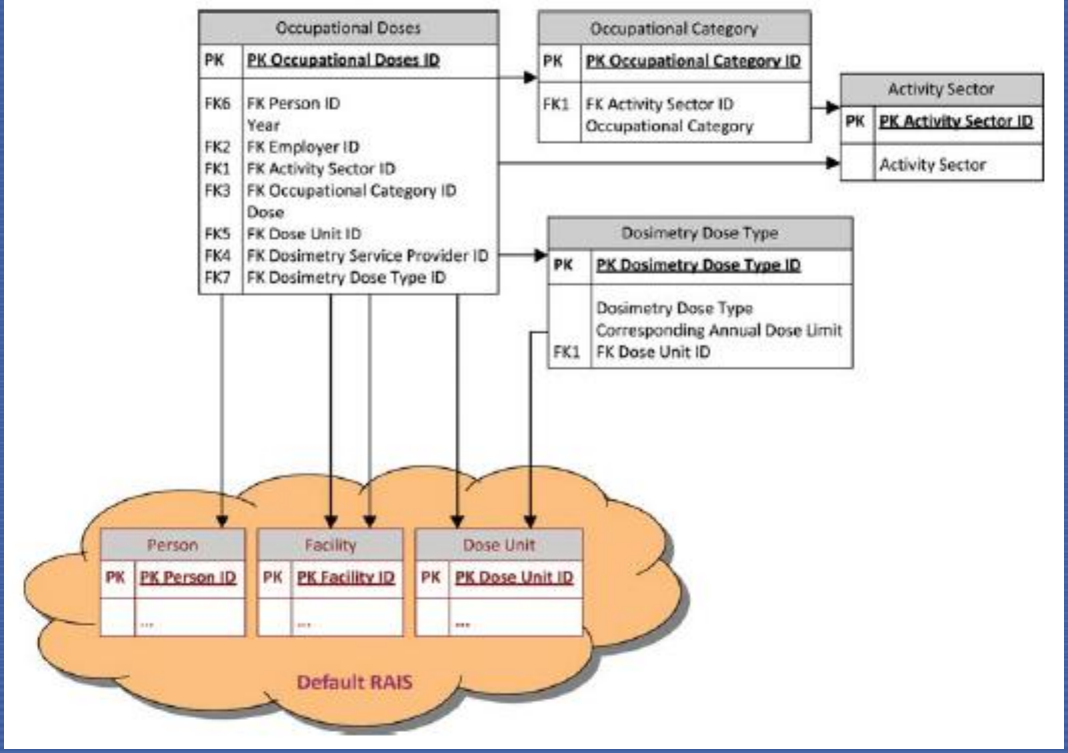
# Design Considerations

- Integration within RAIS data tables
  - Use existing RAIS data tables? Or introduce new ones?



# Administration Considerations

- Who operates NDR? RB or other organization
  - Multiple instances of RAIS in the country?

- Means for data submissions by the DSPs
  - Unique identification of workers and facilities
  - Data format

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# *Thank you for your attention!*