Data management in the metallurgical industry:
The experience of implementing SAP MDG at Metinvest Holding

Mariupol, 2015
METINVEST is an international vertically-integrated group of steel and mining companies that manages every link of the value chain, from mining iron ore and coal to manufacturing semi-finished and finished steel products. The group includes mining and metallurgical companies in Ukraine, Europe, and the USA, and a sales network covering all key world markets.
2014 PRODUCTION RESULTS

COKING COAL
4.10 MILLION TONS

IRON ORE CONCENTRATE
34.89 MILLION TONS

CAST IRON
9.21 MILLION TONS

STEEL
9.20 MILLION TONS

SEMI-FINISHED PRODUCTS
1.69 MILLION TONS

FLAT SECTION STEEL
4.62 MILLION TONS

ROLLED SECTION STEEL
1.85 MILLION TONS

PIPES
296 THOUSAND TONS
Structure of METINVEST Group process chain

**Mining Division:**
- Inguletskiy Iron Ore Enrichment Plant
- Northern Iron Ore Enrichment Plant
- Central Iron Ore Enrichment Plant
- Komsomolskoye Mining Company
- Krasnodon Coal
- United Coal Company

**Metallurgical Division:**
- Azovstal Iron & Steel Works
- Ilyich Iron & Steel Works
- Yenakiieve Iron & Steel Works
- Khartsyzsk Pipe Plant
- Promet Steel
- Ferriera Valsider
- Metinvest Trametal
- Metinvest Steel Service Center
- Metinvest Resource
- Avdiivka Coke Plant
- Inkor & Co.
Goals and objectives:

- create a single analytical nomenclature to integrate and coordinate the actions of the Group companies
- flexible and manageable relations with the business partners based on unified and accurate information about the materials, products and services
- integrating the directory data and business processes will make it possible to automate the processes in SAP and to ensure efficient controls and reliable reporting

Centralized management of master data

Expected results

1. Obtaining a single consolidated base for global analytical profiles (procurement cost analysis, product profitability analysis)
2. Sales and production forecast for the Group companies
3. Unified taxonomy and directory classification to meet the needs of all Group companies for analytics and functionality
4. Managing the directory of goods and services purchased and products manufactured in order to optimize the internal and external logistics
5. Creating a single naming agreement that provides for the appropriate and sufficient attributes for each of the classifier sections.
6. Creating consistent and up-to-date master data at the very first stage
7. Determining the quality of the master data, ensuring it is high quality
8. Single basis for performing accurate analytics and for SAP functionality to operate effectively
9. Verified and integral information in various ERP installations and other information systems
The single directory was developed using the following basic approaches:

- Analyzing the status of Metinvest Group's directories
- Determining the directory key elements that require unification
- Directory classification
- Directory content development
- Procedure for transition to the single directory

Assessing the current status of Metinvest Group's local directories, determining the methods for eliminating the weak points

- ID classification of the directory nomenclature numbers
- Determining the future structure of the single directory (mandatory fields, their parameters, etc.)
- Mandatory and sufficient attributes of the nomenclature items

Creating nomenclature numbers of the single directory based on the state classifier of products and services of Ukraine

- Developing a directory classification with greatest possible regard for the needs of all potential consumer companies

Developing a single naming agreement

- Stage-by-stage adjustment by the companies of their local directories in compliance with the naming agreement and receiving the codes of the single directory

- Creating individual transition plans for the single directory of nomenclatures, depending on the company's involvement in the pilot SAP implementation.

- Identifying the tools used to maintain the single directory for all Group companies (ERP/MDM)
Creating nomenclature numbers for the single directory based on the state classifier of products and services of Ukraine (DKPP-016:2010)

The lower level of the DKPP classifier is used to form an external number for a material or service

Example:

24 Metallurgy products
24.1 Iron, cast iron, steel, and ferroalloys
24.10 Iron, cast iron, steel, and ferroalloys
24.10.1 Primary products of iron and steel
24.10.11 Steel-making and specular cast iron in pigs, blanks and other primary forms
24.10.11-00.00 Steel-making and specular cast iron in pigs, blanks and other primary forms
Unified rules for forming a full name were developed: mandatory and sufficient attributes of nomenclature items – **Naming Agreements.**

The attributes included in the naming agreements are uploaded to SAP as the classification system features, each class is filled in with the attributes of records included in the naming agreement. Each material master record is assigned a class corresponding to the naming agreement and a set of feature values used in forming a full name in the system.

### Rules of forming attributes

A material record must begin with a Noun starting with a capital letter and small letters for the rest of the word. Adjectives following the noun are spelled with small letters. There is one space between the words.

- **The attribute identifies the type of cast iron**
  - steel-making
  - foundry iron
  - desulfurized
  - The words “pig”, “drain”, “without blowing”, “blend”, etc. are NOT ALLOWED.

- **The attribute indicates the condition of the cast iron or steel. The attribute is filled in with the values:**
  - liquid

### Indicate whether the attributes are mandatory or optional

<table>
<thead>
<tr>
<th>Inventory/service name</th>
<th>( &quot; &quot; ) (space)</th>
<th>Type of cast iron</th>
<th>( &quot; &quot; ) (space)</th>
<th>Cast iron, steel condition</th>
<th>FULL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>A material record must begin with a Noun starting with a capital letter and small letters for the rest of the word. Adjectives following the noun are spelled with small letters. There is one space between the words.</td>
<td>The attribute identifies the type of cast iron</td>
<td>The attribute indicates the condition of the cast iron or steel. The attribute is filled in with the values:</td>
<td>liquid</td>
<td>Steel-making liquid cast iron</td>
<td></td>
</tr>
<tr>
<td>Indicate whether the attributes are mandatory or optional</td>
<td>( O/O )</td>
<td>( O/M )</td>
<td>liquid</td>
<td>Foundry liquid cast iron</td>
<td></td>
</tr>
<tr>
<td>( 24.10.110000 ) Cast iron</td>
<td>steel-making</td>
<td>liquid</td>
<td>Desulfurized liquid cast iron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 24.10.110000 ) Cast iron</td>
<td>foundry</td>
<td>liquid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 24.10.110000 ) Cast iron</td>
<td>desulfurized</td>
<td>liquid</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXAMPLES:**
When the Details button is pushed, the system shows the rules for forming the attribute from the naming agreement.

Material master record classification: 001 class type

Naming agreement, features, mandatory values, and formation rules of attributes:
Verification upon creating a request in the system

Verifying if mandatory features of the naming agreement are all filled in

<table>
<thead>
<tr>
<th>Материал: нов., &amp;MATNR_DESC&amp;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Сохранить Запросить</td>
</tr>
</tbody>
</table>

- Пожалуйста, заполните характеристику класса! : :
- Обязательный признак NAİMENOVANİE_TMC_USLUGİ класса CS_04_АЛЬБОМЫ / 001 не заполнен
- Обязательный признак KOLİCHESTVO_LISTOV_V_TMC класса CS_04_АЛЬБОМЫ / 001 не заполнен

<table>
<thead>
<tr>
<th>Общие данные</th>
<th>Данные обработки</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ид. запроса на изменение: 3970</td>
<td></td>
</tr>
</tbody>
</table>

Verifying if a MMR duplicate copy was created in the system

<table>
<thead>
<tr>
<th>Экспорт в Excel</th>
</tr>
</thead>
<tbody>
<tr>
<td>% совпад. по наименованию</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>69.29</td>
</tr>
<tr>
<td>86.21</td>
</tr>
<tr>
<td>85.71</td>
</tr>
<tr>
<td>85.71</td>
</tr>
<tr>
<td>85.71</td>
</tr>
</tbody>
</table>
Implementation phases for pilot and non-pilot assets

**Phase 1 (non-pilot assets)**
- MDG 6.0
- Materials directory
- Restricted number of fields
- Simple maintenance of the materials master records / services directory
- Temporary solution

**Phase 2 (non-pilot assets) and circulation (pilot assets)**
- MDG 6.1
- All directories
- Non-standard type of requests
- MMR views
- Complicated maintenance of directories
- Production system
Organization of request processing for pilot assets

Asset initiator
- Creates a request in the system with a full name, classification, UOM

Asset master data editor
- Verifies if the request from the asset initiator is correct, decides to proceed to the next step or send it back for adjustment

Specialist of the managing company's centralized directory maintenance service
- Checks if data is correct, approves or sends back for adjustment
Organization of request processing for pilot assets

**Asset initiator**
- Creates a request in the system: Full name, classification, UOM

**Asset business experts**
- Fills in the Master Data with MMR views (procurement, MRP, financial views, etc.)

**Asset master data editor**
- Verifies if the asset request is correct, decides to proceed to the next step or send it back for adjustment

**Specialist of the managing company's centralized directory maintenance service**
- Verifies if data is correct, approves or sends it back for adjustment

*METINVEST*
**MMR view** is a SAP technical requirement. It is the entity containing the features and attributes that describe certain characteristics and properties of a material or service. A feature may affect the procurement, production, sales and accounting or analytics. A missing or incorrect view may lead to incorrect operation or unavailability (downtime) of a process or analytics.
The methodology for filling in the MMR views is a description of the rules for filling in the MMR views depending on the process in the SAP system.

<table>
<thead>
<tr>
<th>Field name</th>
<th>Material number</th>
<th>Plant</th>
<th>Rating class</th>
<th>Rating class for the project stock</th>
<th>Rating type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory (Yes/No)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Completion instruction for the products purchased for the sales plant based on commission.</td>
<td>Sales plants as per the attached directory</td>
<td>Determined depending on the directory: type of materials, plant, availability account, and cost account.</td>
<td>Determined depending on the directory: type of materials, plant, availability account, and cost account.</td>
<td>Determined depending on the directory type of material, plant, availability account and cost account.</td>
<td></td>
</tr>
<tr>
<td>completion instruction for the off-balance recognition of the goods taken on commission.</td>
<td>Off-balance plants as per the attached directory</td>
<td>Determined depending on the directory: type of material, plant, availability account, and cost account.</td>
<td>Determined depending on the directory: type of material, plant, availability account, and cost account.</td>
<td>Always takes the X value.</td>
<td></td>
</tr>
<tr>
<td>Reference to the directory</td>
<td>Plants directory A1</td>
<td>Information to the methodology</td>
<td>Information to the methodology</td>
<td>Information to the methodology</td>
<td></td>
</tr>
</tbody>
</table>

Example of reference to the directory:

<table>
<thead>
<tr>
<th>Workpiece type</th>
<th>Type of material</th>
<th>Material type name</th>
<th>Plant</th>
<th>Rating type</th>
<th>Rating type name</th>
<th>Price determination</th>
<th>Price management</th>
<th>Operating stock</th>
<th>Investment stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>2MEJO</td>
<td>Coal concentrate and carbons</td>
<td>1300</td>
<td>D</td>
<td>ПФ/ПОК/НЗП/ТОБАР_ZMD0</td>
<td>3</td>
<td>V</td>
<td>1503</td>
<td>Coal concentrate</td>
</tr>
</tbody>
</table>

PS: Coal concentrate
General derivation rules in the system

Derivation rules depending on the plant
Master data maintenance system
Key tasks for the master data maintenance system:

- Centralized MD maintenance
- Web interface
- Standard ERP structure
- Standard ERP verifications
- Verifications for duplicate copies
- Standard keymapping
- Stable management of a large bulk of data
- Flexible workflow setting system
- Standard role model
- Simple implementation
- Simple support
Alternatives to master data maintenance systems:

- SAP MDG
- SAP MDM
- ABAP program
• **ABAP Program:**
  – Difficult to set up a task correctly
  – ABAP developers require a lot of time
  – Testing is too labor intensive
  – May be damaged when updates and notes are installed

• **MDM:**
  – Non-ABAP system
  – Additional setting of all verifications is required
  – Not a standard role model (cannot be connected to GRC)
  – Not a standard request transfer model (cannot be connected to CHARM)
  – No version control of directories
Why MDG?
MDG is an ERP-based system
MDG is an ERP-based system

It can be changed by standard transport requests
MDG is an ERP-based system

It can be changed by standard transport requests

No need for additional verifications or derivations for the ERP part
MDG is an ERP-based system

It can be changed by standard transport requests

No need for additional verifications or derivations for the ERP part

ABAP & ABAP for Web Dynpro
MDG is an ERP-based system

It can be changed by standard transport requests

No need for additional verifications or derivations for the ERP part

ABAP & ABAP for Web Dynpro

Preset interfaces and processes for directories
System architecture
Two ways to install MDG

1. As standalone system (master data hub)
   - SAP MDG
   - SAP ERP
   - SAP SRM...
   - SAP SCM

2. On top of operational ERP
   - SAP MDG&ERP
   - SAP ERP, SRM, SCM...
   - 3rd party system
The architecture solution implemented
## System Architecture

### Advantages

<table>
<thead>
<tr>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be updated without updating ERP</td>
</tr>
<tr>
<td>All processes run on a separate server and do not affect ERP performance</td>
</tr>
<tr>
<td>Not all mandatory ERP pre-requisites are supported by MDG</td>
</tr>
<tr>
<td>There may be additional data that must be in ERP</td>
</tr>
</tbody>
</table>
Disadvantages

- Settings must be synchronized
- Data must be synchronized
- Standard ERP verifications cannot be used when a record is used by other ERP processes
Request processing organization
Organization of master data maintenance for Phase 2 of the MDG project

**Process requirements:**

1. The process must include several data enrichment steps
   - The request initiator fills in the master data for the material. Additionally, there is a certain number of business experts responsible for filling in individual views. The system provides for the roles of procurement, production, sales, and finance business experts.

2. There must be an option to choose business experts.
   - For example, if a material is not being sold, there must be an option to exclude that business expert from the chain.
1. The process must have several data enrichment steps.
1. The process must have several data enrichment steps.
2. There must be an option to choose business experts.
2. There must be an option to choose business experts.

**Request processing**

**EXAMPLE:**

1. In all, there are four business experts
2. The initiator and the editor may choose possible experts.
3. The initiator may choose experts 1, 2 and 4
4. The editor may choose experts 1 and 4
2. There must be an option to choose business experts.
2. There must be an option to choose business experts.
Thank you for your attention!

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