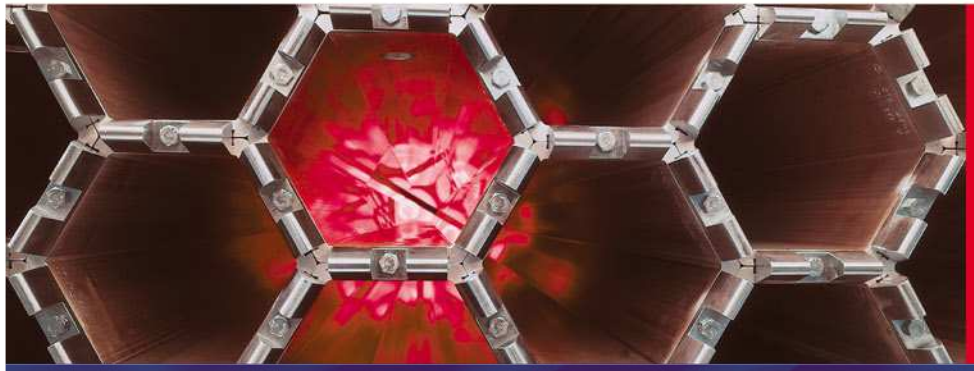
ŠKODA JS a.s.



INTERNATIONAL CONFERENCE VVER2013

EXPERIENCE AND PERSPECTIVES AFTER FUKUSHIMA

Implementation of Configuration Management Information System (CMIS) in ŠKODA JS

Presentation authors: Roman ZDEBOR a Petr JUNG, ŠKODA JS a.s.
Using data from Worley Parsons and Intergraph

ŠKODA JS, IMS, CM AND CMIS

ŠKODA JS a.s.

Introduction – R. Zdebor

Implementation procedure and „Lessons Learned“ – P. Jung

GENERAL INFORMATION ON THE COMPANY

ŠKODA JS a.s.

1859 - Establishment of the company ŠKODA

1956 - Starting a nuclear programme in ŠKODA

1974 - VVER production scheme started

1980 - First VVER 440-type reactor produced

1989 - First VVER 1000-type reactor produced

1993 - Fuel cask production scheme started

1993 - Privatization and establishment of parent company ŠKODA a.s. and daughter company ŠKODA JADERNÉ STROJÍRENSTVÍ s.r.o.

1999 - Transformation into a joint-stock company

2004 - Sale of ŠKODA JS to the Russian engineering group OMZ (100% owner)

2013 – At present the leading Czech supplier to nuclear power plants

GENERAL INFORMATION ON THE COMPANY

ŠKODA JS a.s.

Contact

- Orlík 266, 316 06 Pilsen, the Czech Republic
- www.skoda-js.cz, info@skoda-js.cz

Number of employees in 2012

- nearly **1200**

Revenues in 2012

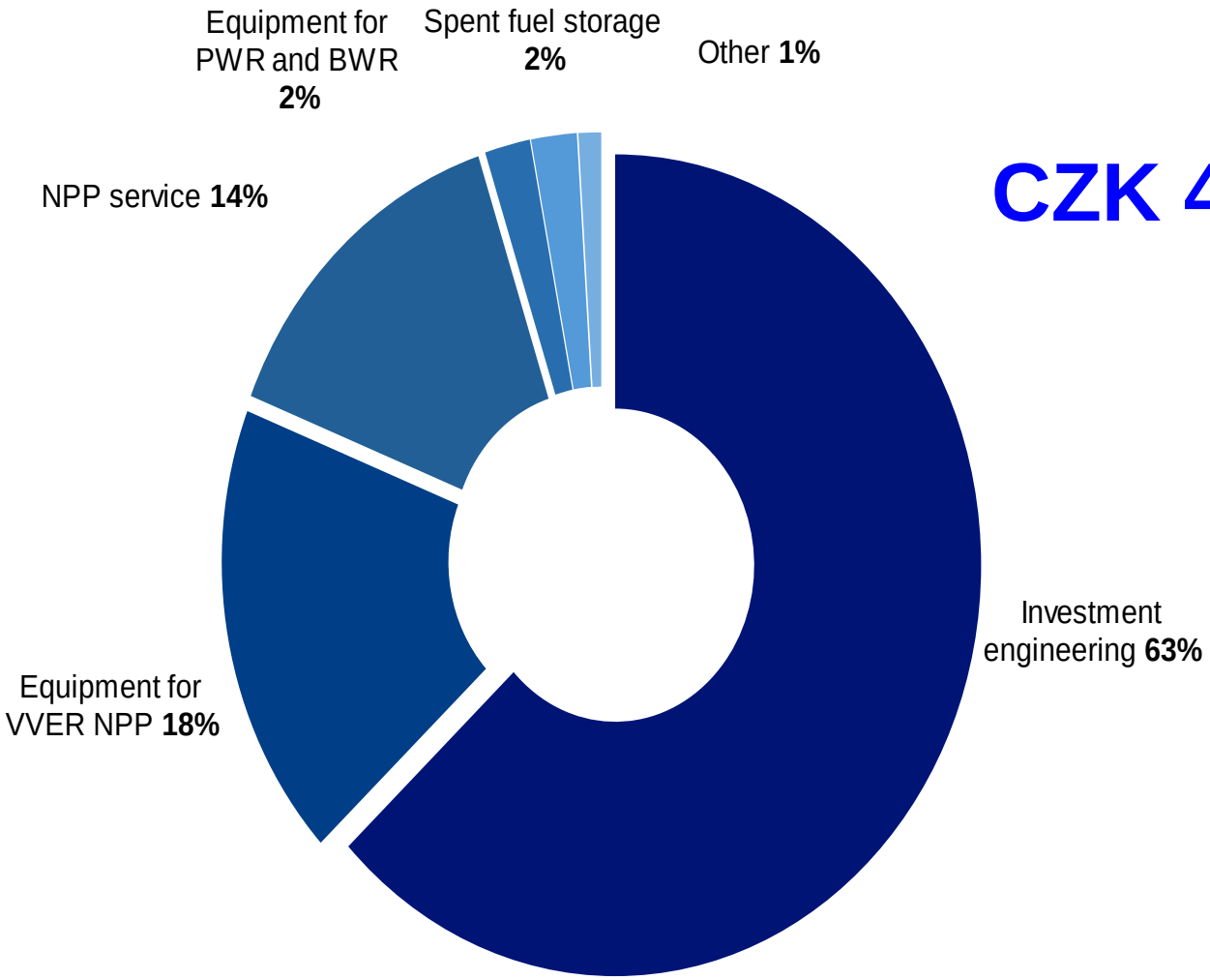
- **CZK 4.98 billion** (approx. € 200 mil.)

Profit in 2012

- **CZK 310 million** (approx. € 12.4 mil.)

YIELDS BY ACTIVITY SUBJECTS IN 2012

ŠKODA JS a.s.



CZK 4,983 mil.

RELEVANT INVESTMENT PROJECTS

ŠKODA JS a.s.

NPP Paks, Hungary
- Units 1, 2, 3, 4 (1980 – 1987), in operation

NPP Dukovany, Czech Republic
- Units 1, 2, 3, 4 (1982 – 1987), in operation

NPP Greifswald, Germany
- Units 5, 7, 8 (1984 – 1985), project cancelled

NPP Zarnowiec, Poland
- Units 1, 2, 3, 4 (1986 – 1988), project cancelled

NPP Mochovce, Slovakia
- Units 1, 2 (1998 – 1999), in operation
- Units 3, 4 (2009 – until now), under construction

NPP Belene, Bulgaria
- Units 1, 2 (1988) project cancelled
- Reactor set installed in Kalininskaya NPP, Unit 4

NPP Temelín, Czech Republic
- Units 1, 2 (1991–2003), in operation
- Units 3, 4 – since 2009 tendering procedure

Delivery scope

- Primary circuit system
- Fuel transport and handling

Main activities

- Detail design
- Production of components and completing activities
- Site installation
- Commissioning

WHY IMS, CM, CMIS?

ŠKODA JS a.s.

- ČEZ requirement in BIS
- Part of Consortium offer
- Requirement of int‘l standards (IAEA /MAAE/) and supervisory bodies
- Standard part of implementation of large investment units
- Company competitiveness increase

REQUIREMENTS FOR IMS IN BIS

ŠKODA JS a.s.

More than 75 basic requirements for IMS (primary requirements)

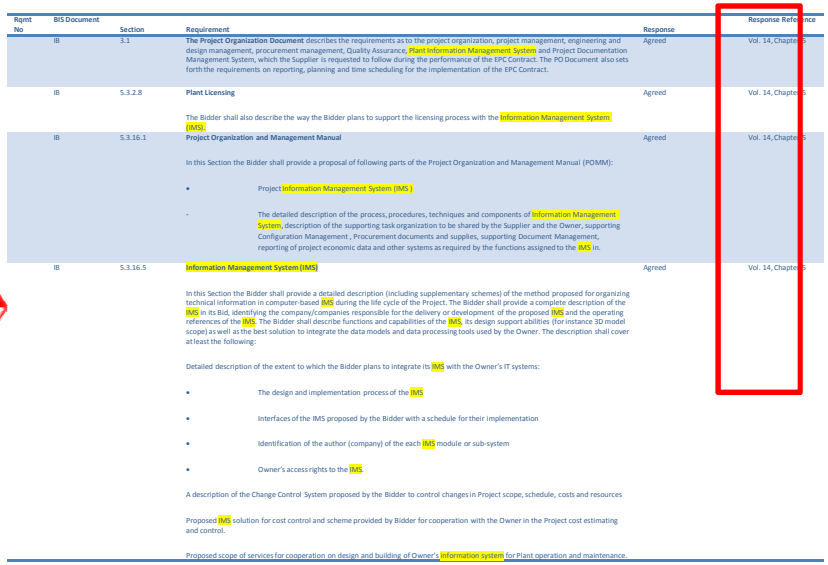
More than 2,000 requirements depending on or relating to IMS (secondary requirements)

The Consortium made a strategic decision to „ACCEPT“ ALL requirements fully

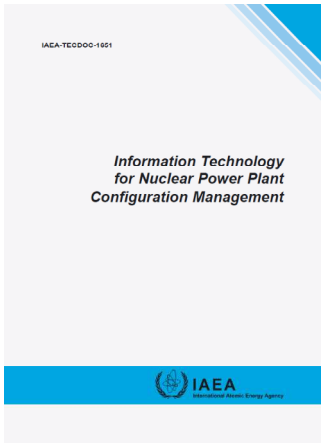

BID INVITATION SPECIFICATION

SCOPE OF SUPPLY DOCUMENT

COMPETITIVE BIDDING STAGE



Rqmt No	BIS Document	Section	Requirement	Response	Response Reference
	IB	3.1	**The Project Organization Document** describes the requirements as to the project organization, project management, engineering and design management, procurement management, Quality Assurance, Plant Information Management System and Project Documentation Management System, which the Supplier is requested to follow during the performance of the EPC Contract. The PO Document also sets forth the requirements on reporting, planning and time scheduling for the implementation of the EPC Contract.	Agreed	Vol. 14, Chapter 5
	IB	5.3.2.8	**Plant Licensing** The Bidder shall also describe the way the Bidder plans to support the licensing process with the Information Management System (IMS).	Agreed	Vol. 14, Chapter 5
	IB	5.3.16.1	**Project Organization and Management Manual** In this Section the Bidder shall provide a proposal of following parts of the Project Organization and Management Manual (POMM): • Project Information Management System (IMS) - The detailed description of the process, procedures, techniques and components of Information Management System, description of the supporting task organization to be shared by the Supplier and the Owner, supporting Configuration Management , Procurement documents and supplies, supporting Document Management, reporting of project economic data and other systems as required by the functions assigned to the IMS in.	Agreed	Vol. 14, Chapter 5
	IB	5.3.16.5	**Information Management System (IMS)** In this Section the Bidder shall provide a detailed description (including supplementary schemes) of the method proposed for organizing technical information in computer-based IMS during the life cycle of the Project. The Bidder shall provide a complete description of the IMS in its Bid, identifying the company/companies responsible for the delivery or development of the proposed IMS and the operating references of the IMS. The Bidder shall describe functions and capabilities of the IMS, its design support abilities (for instance 3D model scope) as well as the best solution to integrate the data models and data processing tools used by the Owner. The description shall cover at least the following: Detailed description of the extent to which the Bidder plans to integrate its IMS with the Owner's IT systems: • The design and implementation process of the IMS • Interfaces of the IMS proposed by the Bidder with a schedule for their implementation • Identification of the author (company) of the each IMS module or sub-system • Owner's access rights to the IMS. A description of the Change Control System proposed by the Bidder to control changes in Project scope, schedule, costs and resources Proposed IMS solution for cost control and scheme provided by Bidder for cooperation with the Owner in the Project cost estimating and control. Proposed scope of services for cooperation on design and building of Owner's information system for Plant operation and maintenance.	Agreed	Vol. 14, Chapter 5


IAEA-TECDOC-1651

Information Technology for Nuclear Power Plant Configuration Management

IAEA

IAEA-TecDoc-1651

WHAT IS IMS?

ŠKODA JS a.s.

Fully integrated solution of all activities in the ETE34 project (creation of diagrams, 3D model, time schedules, cost management, control of requirements, licence process management, …, Configuration Management)

BIS, EPC Terms and Conditions:

IMS = Information Management System (i.e. IMS of the Project)

IMS = Conventional term for set of ICT (Information and Communication Technology) resources. In these documents IMS means all ICT resources used jointly by the Supplier and by the Owner, during all Project Phases

ICT = Information and Communication Technology

WHAT IS IMS?

ŠKODA JS a.s.

- Interrelations in IMS are critical
- IMS parts are not „plug-and-play“
- The IMS strategy includes defining work-flow processes and parties
- IMS must start asap for us to be able to control all parts of the ETE34 project

WHAT IS CONFIGURATION MANAGEMENT?

ŠKODA JS a.s.

A means to prevent chaos

A package of activities to introduce and keep order in information about a power plant = design requirements, current situation and stored information correspond to each other at all times
= the power plant actually meets the requirements placed on it and everything is documented in a due manner

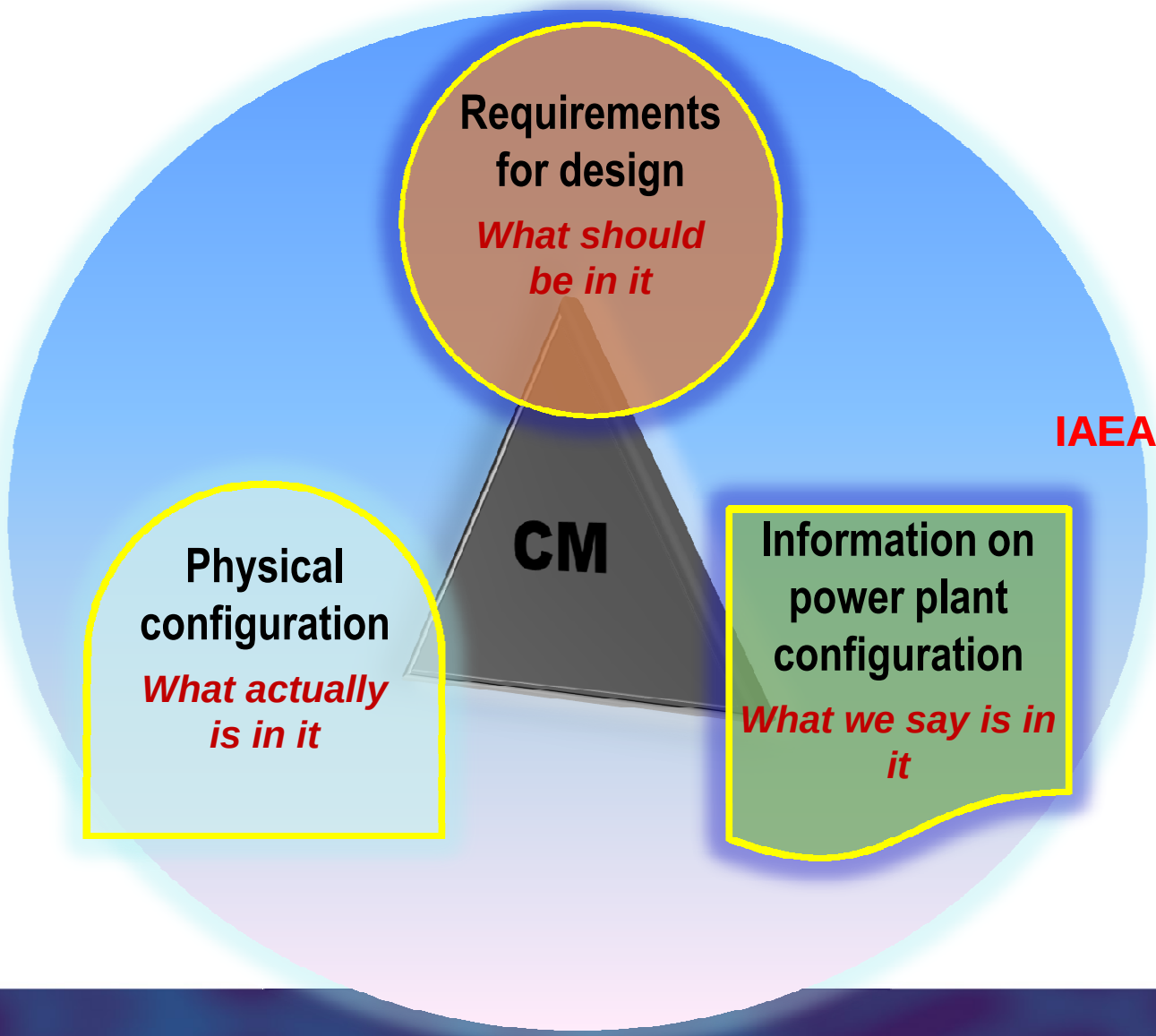
Integral part of IMS to guarantee that, among other things

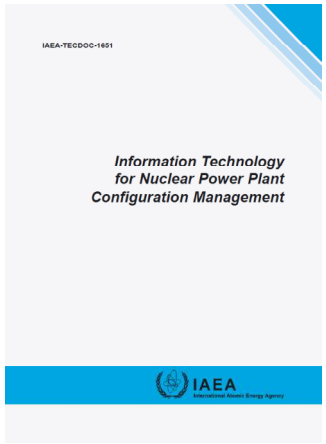
- Changes are controlled and traceable
- Correct information is available to correct people in due time

BIS, EPC Terms and Conditions: Configuration Management
According to ČSN ISO 10007, the Configuration Management is a management discipline that applies technical and administrative direction to the development, production and support life cycle of a configuration item. The general objectives of the Configuration Management are: documentation of the plant design basis, continued maintenance and updating of the plant design basis and verification that plant modifications are consistent with the existing plant. From US NUREG/CR-5147, Configuration Management of NPPs can be considered as a programme which facilitates the design, construction, test, modification and operation of the plant to achieve:
- verification of the plant design basis
- documentation of the baseline design basis of the plant
- continued maintenance and updating of the plant design basis with respect to plant modifications or changes in requirements or criteria
- verification that the plant modifications and changes in requirements or criteria are consistent with the established criteria for the overall plant

CONFIGURATION MANAGEMENT EQUILIBRIUM MODEL

ŠKODA JS a.s.





IAEA-TecDoc-1651

WHAT IS CMIS AND WHO DEMANDS IT?

ŠKODA JS a.s.

„Configuration Management and Information System“ is an advanced system of information and configuration control designed for nuclear power plants.

Many supervisory bodies demand CMIS for granting operation permit.

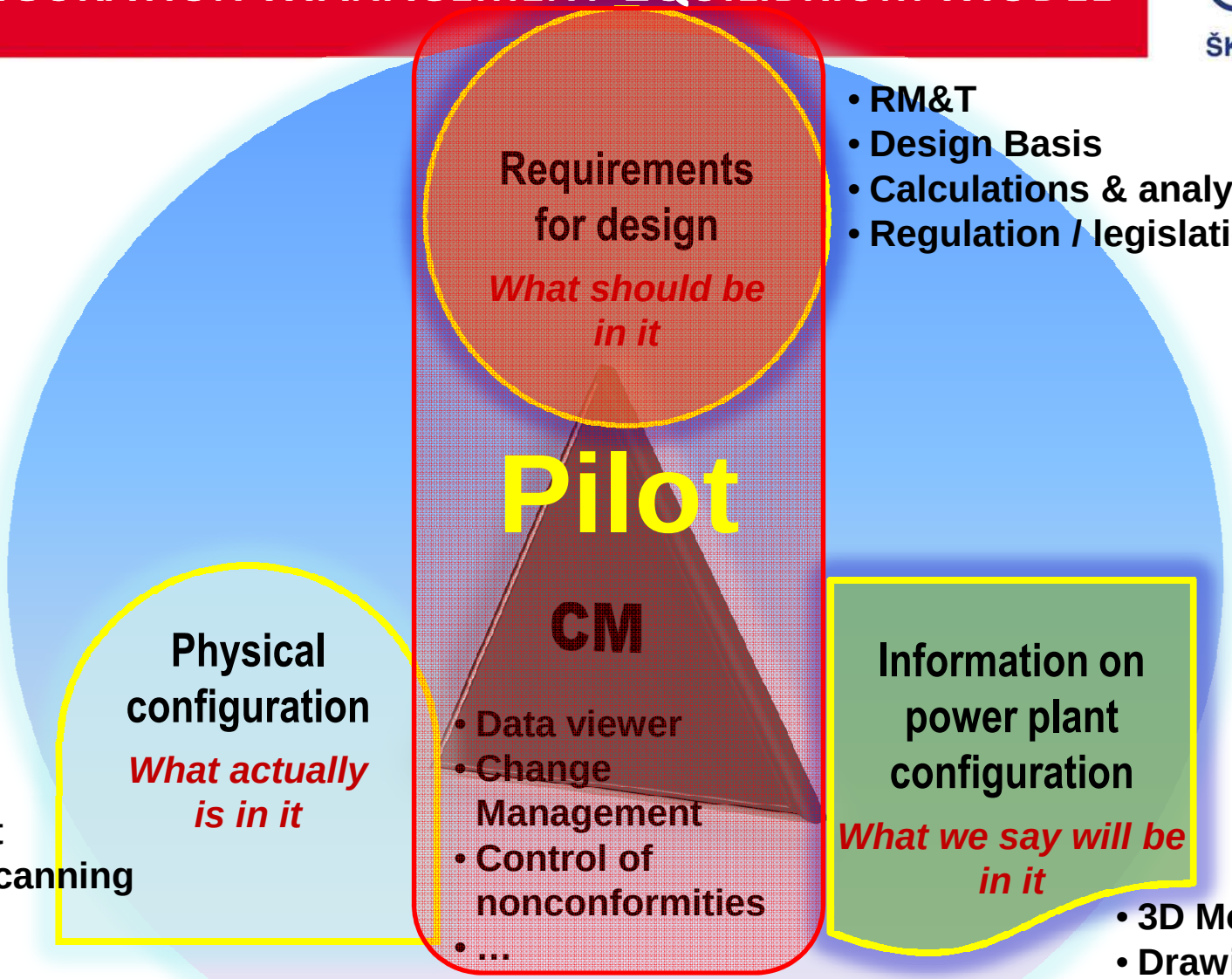
CMIS may also cover document control but the document control system does not equal to CMIS.

The CMIS principles are provided in the following publications:

- IAEA Tec Do c 1335 „Configuration Management in Nuclear Power Plant“
- IAEA Tec Do c 1651 „Information Technologies for NPP Configuration Management“
- Required observance through the document of ČEZ BIS TR 2.5.3.4 „Level 2 Laws and Standards“
- ANSI/NIRMA CM 1.-0-2000 „Configuration Management in Nuclear Facilities“
- Institute for Nuclear Power Plant Operation (INPO) AP929 „Configuration Management“ and INPO-09-00 „New Procedure of Development and Implementation of Power Plant Configuration Management“

CONFIGURATION MANAGEMENT EQUILIBRIUM MODEL

ŠKODA JS a.s.



CMIS APPLICATION (EXCEPT ETE34)

ŠKODA JS a.s.

Development of know-how for various global projects

- NPP Dukovany, Czech Republic
- NPP Temelín, Czech Republic
- NPP Mochovce 3, 4, Slovakia
- New units in the UK
- NPP Paks, Hungary
- NPP Bohunice, Slovakia
- NPP Ziarnowec, Poland
- Ukrainian NPP‘s

Integration with future „IMS“

PROCEDURE OF IMPLEMENTATION AND „LESSONS LEARNED“

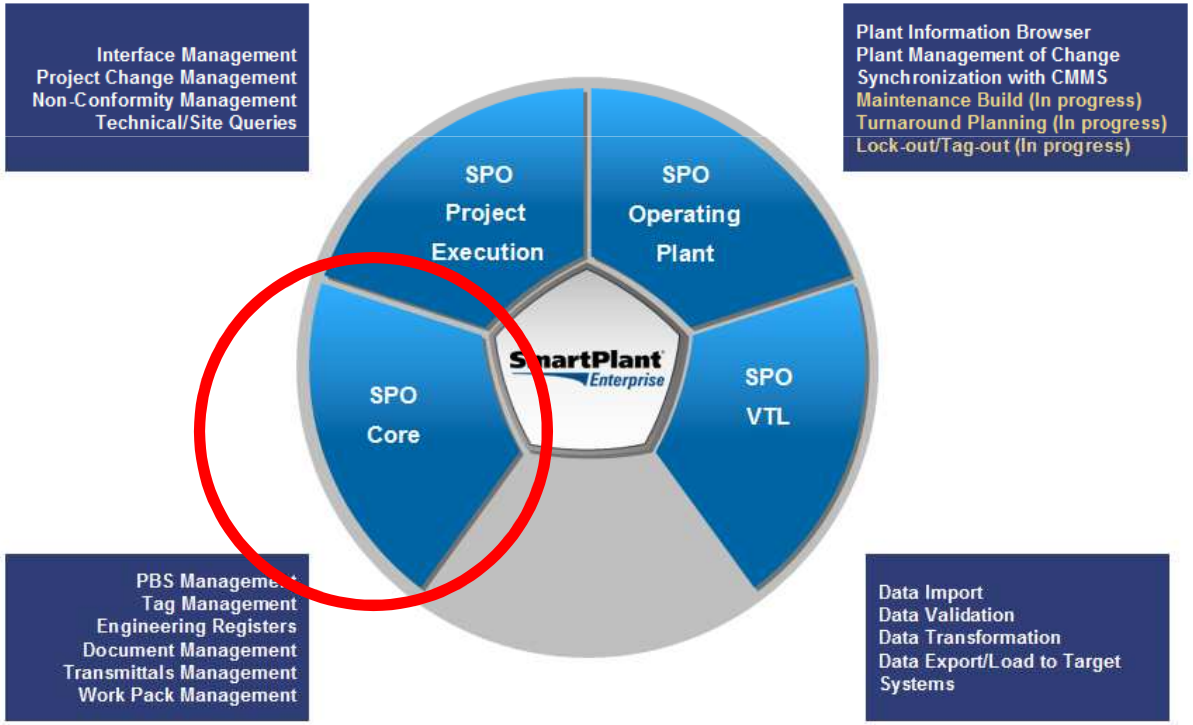
ŠKODA JS a.s.

- SPO Core
- Fast Track
- PBS – Plant Breakdown Structure
- WBS – Work Breakdown Structure
- DMS - Document Management System and Document WorkFlow
- RM&T
- Configuration Management
- General conclusions

SPO CORE

ŠKODA JS a.s.

Intergraph® SmartPlant® Enterprise for Owner Operators (SPO) Core Solution is a set of tools to control the core work processes that are relevant throughout the whole power plant life cycle and a precondition for the implementation of other SPO tool packages.



FASTTRACK

ŠKODA JS a.s.

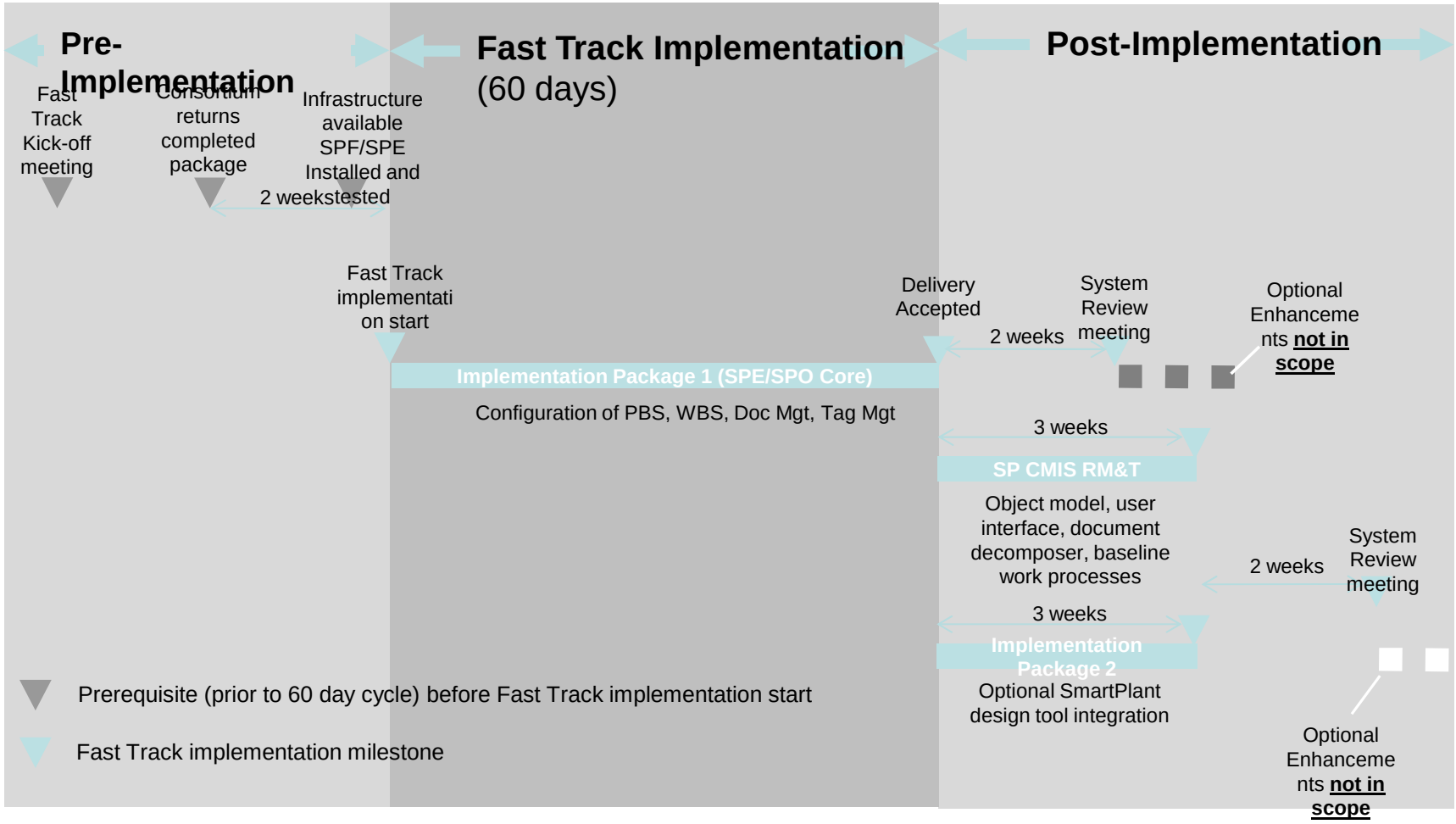
In order to meet the requirements for drawing on the European subsidy scheme, Fast Track implementation was chosen for SPO Core in agreement with Intergraph®.

Fast Track implementation is based on completed SPO Core implementation in the defined extent within 60 days of the beginning of the relevant activities.

Fast Track implementation should avoid lengthy initial analyses and detailed preparatory specifications. Thus, it has a potential to satisfy customer ideas with the basic requirements or can be used to achieve the first implementation milestone for a customer with more extensive needs.

FASTTRACK

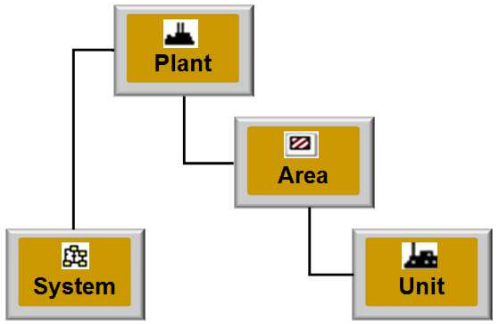
ŠKODA JS a.s.



PBS – PLANT BREAKDOWN STRUCTURE

ŠKODA JS a.s.

Power plant structure based on the grouping of civil structures by their function and location. The „Plant“ type object usually occurs at the highest level of hierarchy. Other levels are occupied by „Area“ and „Unit“ objects.



Intention

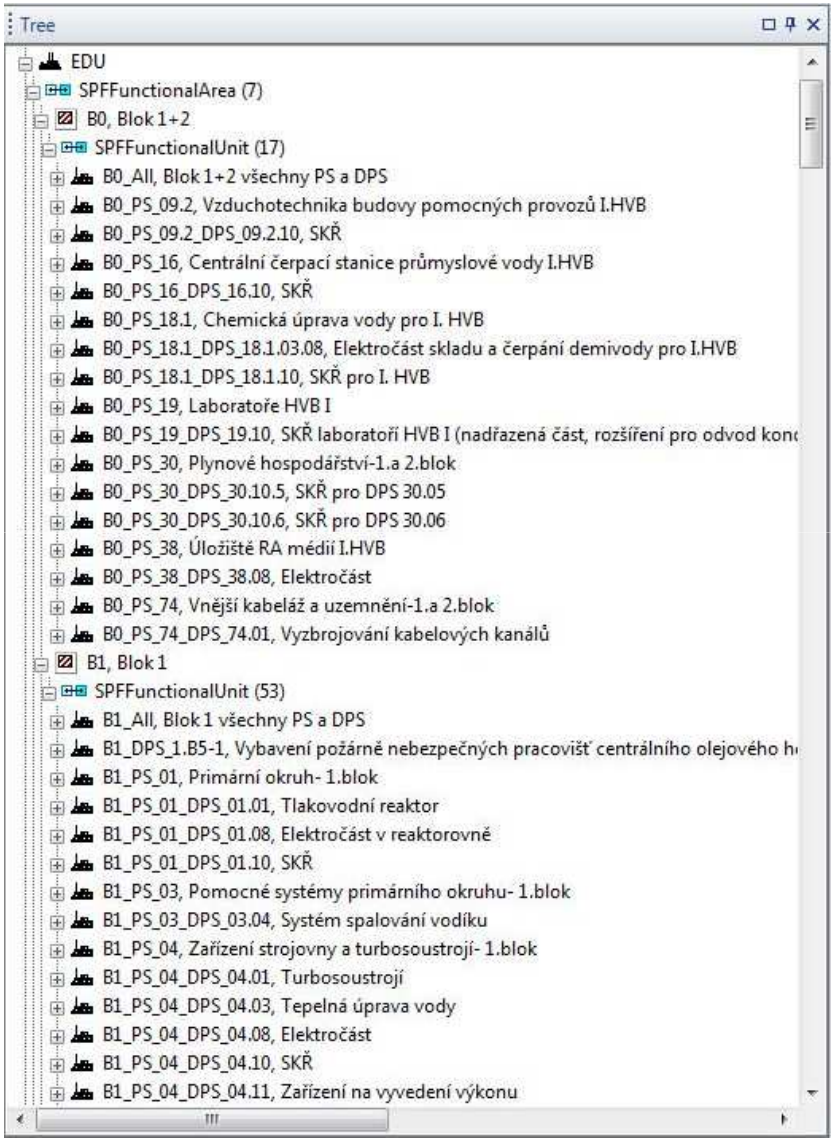
- To create a real and viable PBS so as to enable utilizing fully the complete CMIS functionality.

Experience from implementation

- PBS is one of the foundation stones of the CMIS. Links to it are created with almost all built-up structures. Any later rework of the PBS, therefore, would require critical allocation of the human resources in particular.
- It was not easy to find an optimal and maximally universal structure. Other companies using the same CMIS each use a different PBS in dependence on the characters of their projects.
- In ŠKODA JS a.s., the best way for establishing a proper PBS proved to be the obtaining of a list of power plant civil structures and incorporating them in a structure that would be identical or as similar as possible for other power plants.
- To have an identical PBS with the customer is also important for as smooth as possible handover of as-built data.

PBS – PLANT BREAKDOWN STRUCTURE

ŠKODA JS a.s.



WBS – WORK BREAKDOWN STRUKTURE

ŠKODA JS a.s.

The structure of planned working activities in the plant, typically divided into projects, work packages and documents, and/or other items.

Intention

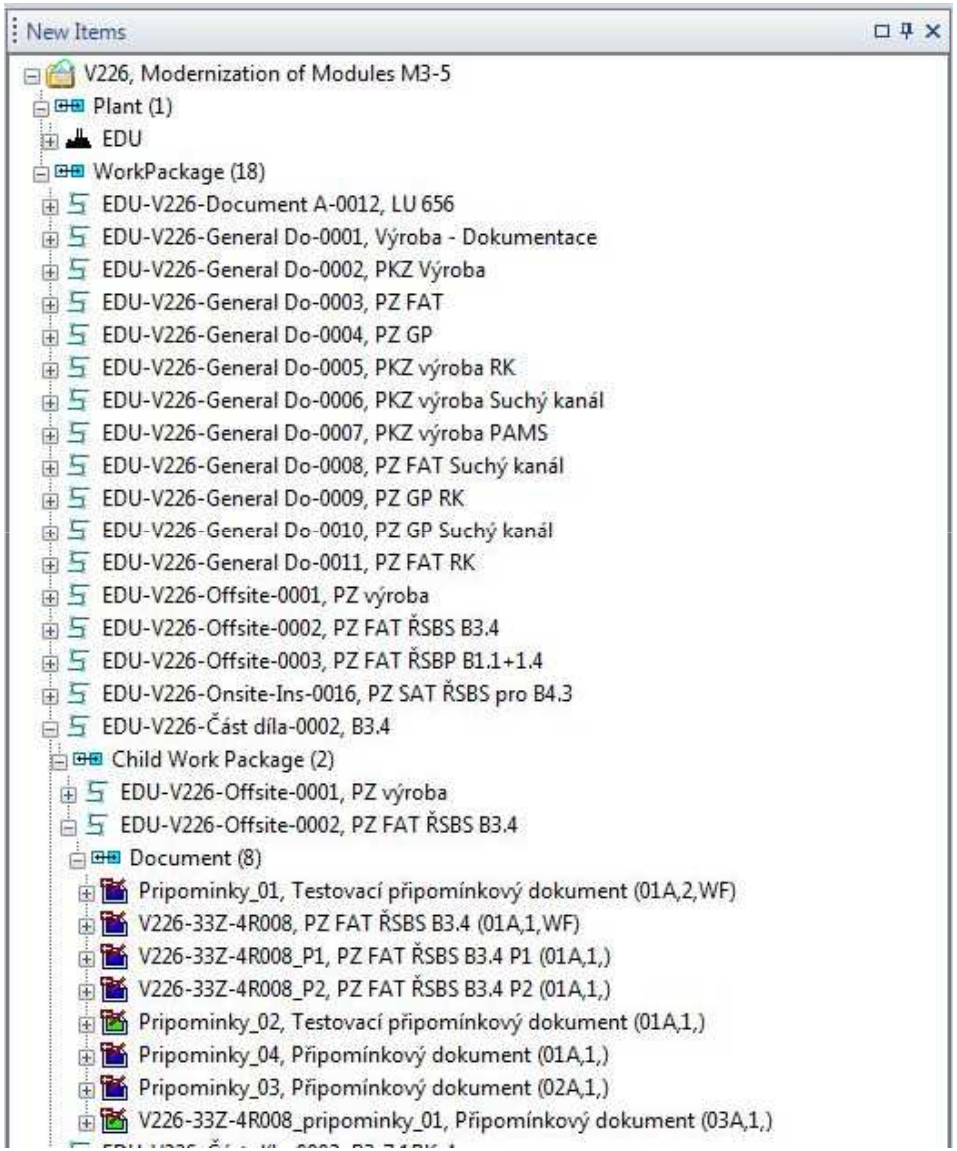
- To create a viable WBS according to the HMG of specific projects so as to correspond with the „best practice“ when using similar tools.

Experience from implementation

- WBS, or the individual Work Packages, should be based on a suitably chosen HMG level.
- It is advisable to synchronize the Work Package with the applied planning software (e.g. Primavera)
- The contents of the individual Work Packages should correspond to what is actually supplied to the Customer.

WBS – WORK BREAKDOWN STRUKTURE

ŠKODA JS a.s.



DMS - DOCUMENT MANAGEMENT SYSTEM AND DOCUMENT WORKFLOW

ŠKODA JS a.s.

SmartPlant Foundation makes it possible to control the following activities in particular:

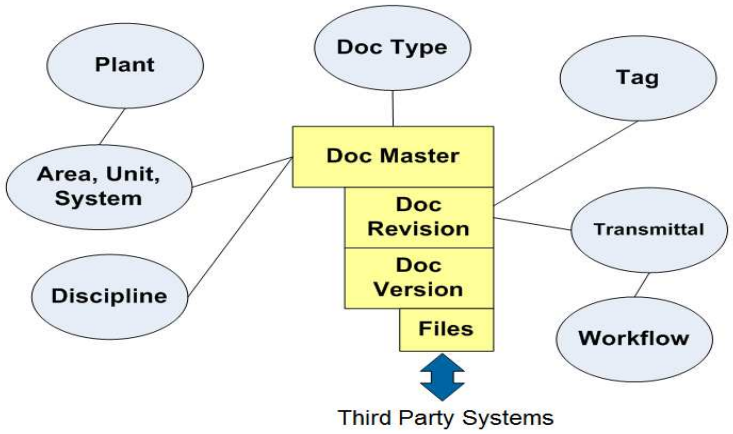
- Control of document revisions and versions
- Access control including check-in and check-out functions
- User notifications of document changes, such as revisions and sign-off functions

Intention

- To control the life cycle of project documents and their transfer between the customer and the suppliers.

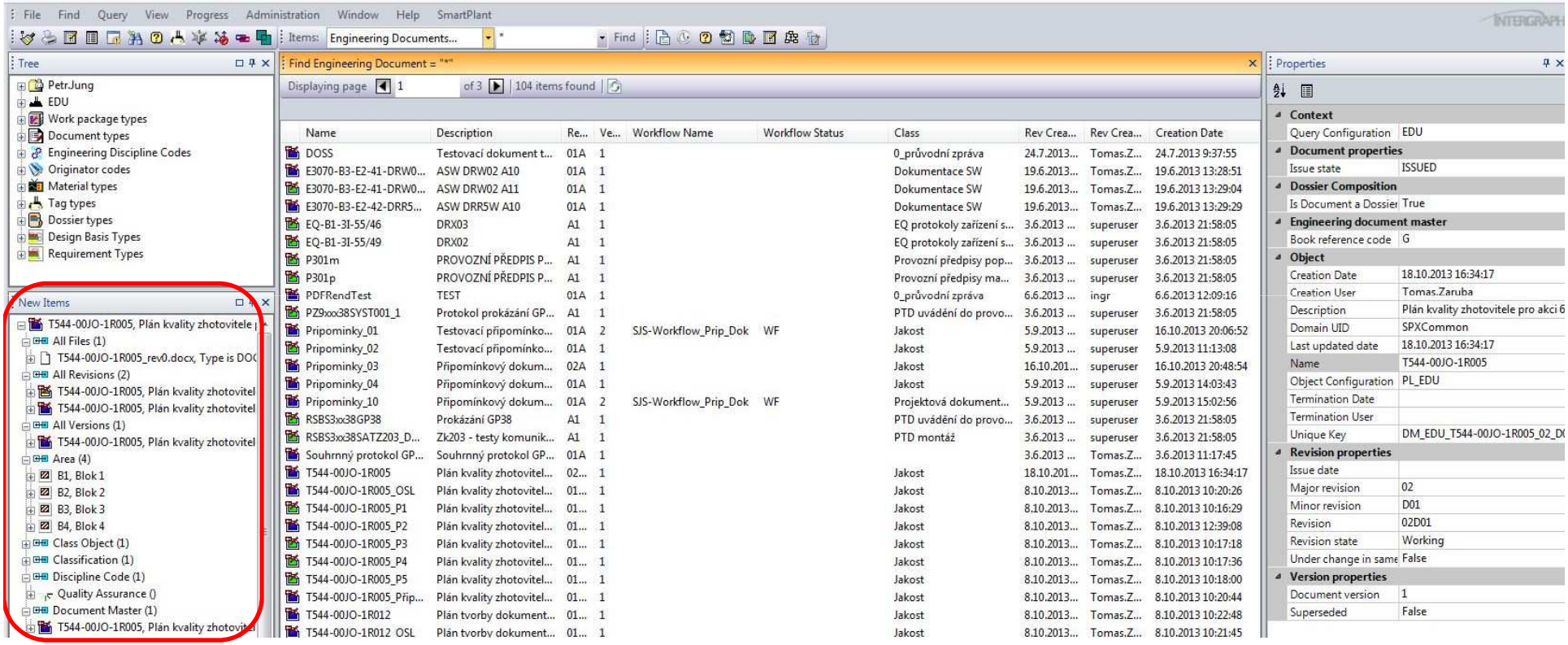
Experience from implementation

- CMIS does not treat files (doc,xls), but controls the metadata above them.
- It is important to classify documents suitably to utilize the complete CMIS functionality.
- It is advisable to create the Workflow above documents only after mastering the basic functions by the users.



DMS - DOCUMENT MANAGEMENT SYSTEM AND DOCUMENT WORKFLOW

ŠKODA JS a.s.



RM&T

ŠKODA JS a.s.

The Intergraph® SmartPlant® Enterprise for Owner Operators (SPO) Requirements Management and Traceability (RMT) Solution stores and tracks the requirements of the legislation and regulator, standards and specifications and their interrelations with the project or operative documentation and/or other items.

RMT implementation advantages

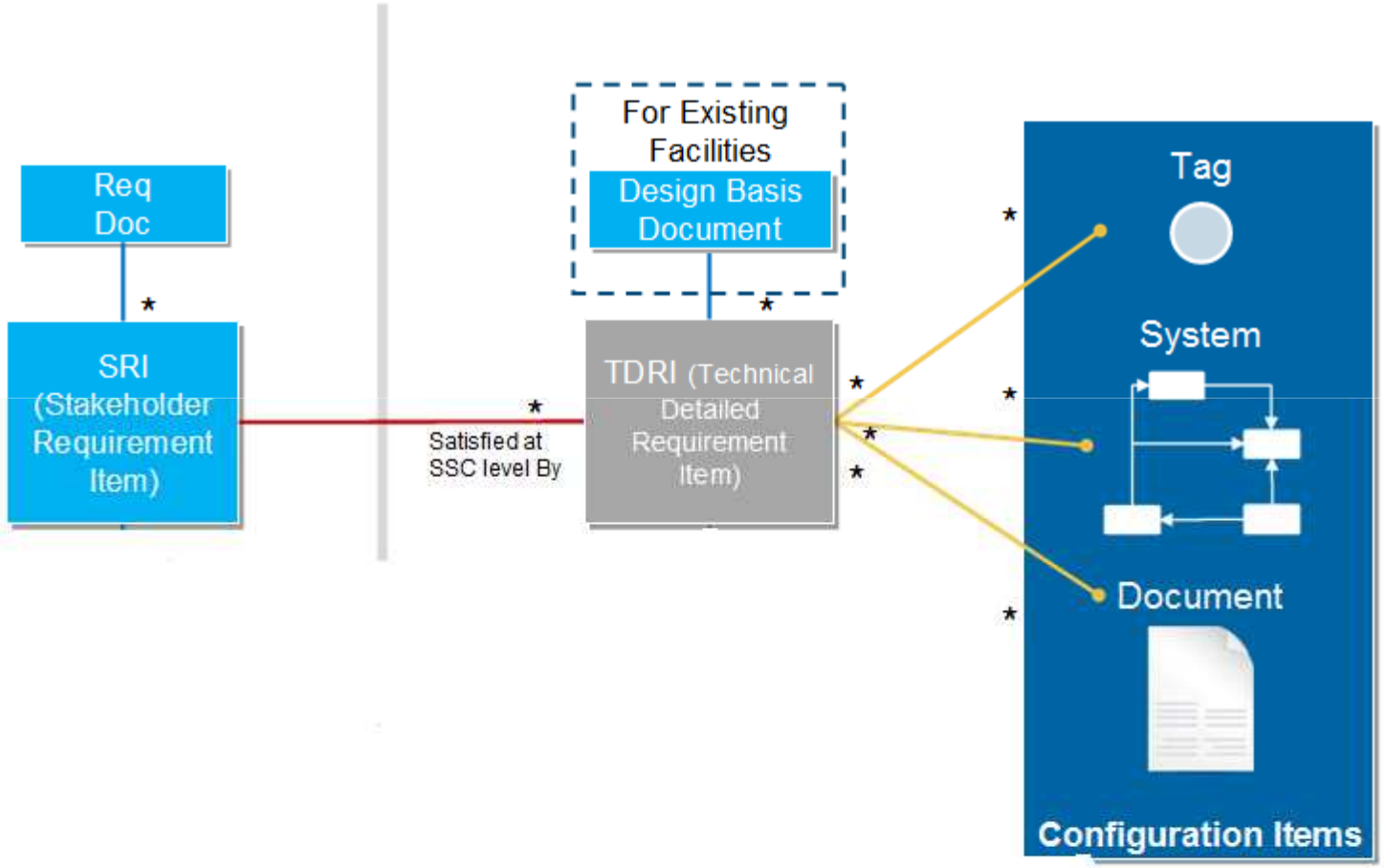
- Compliance with all applied requirements is demonstrated.
- Quick application of new requirements and resulting cost savings.
- Lower risk of nonconformities in audits and of potential penalties from the regulator.

RM&T

ŠKODA JS a.s.

Requirements

Application



RM&T

ŠKODA JS a.s.

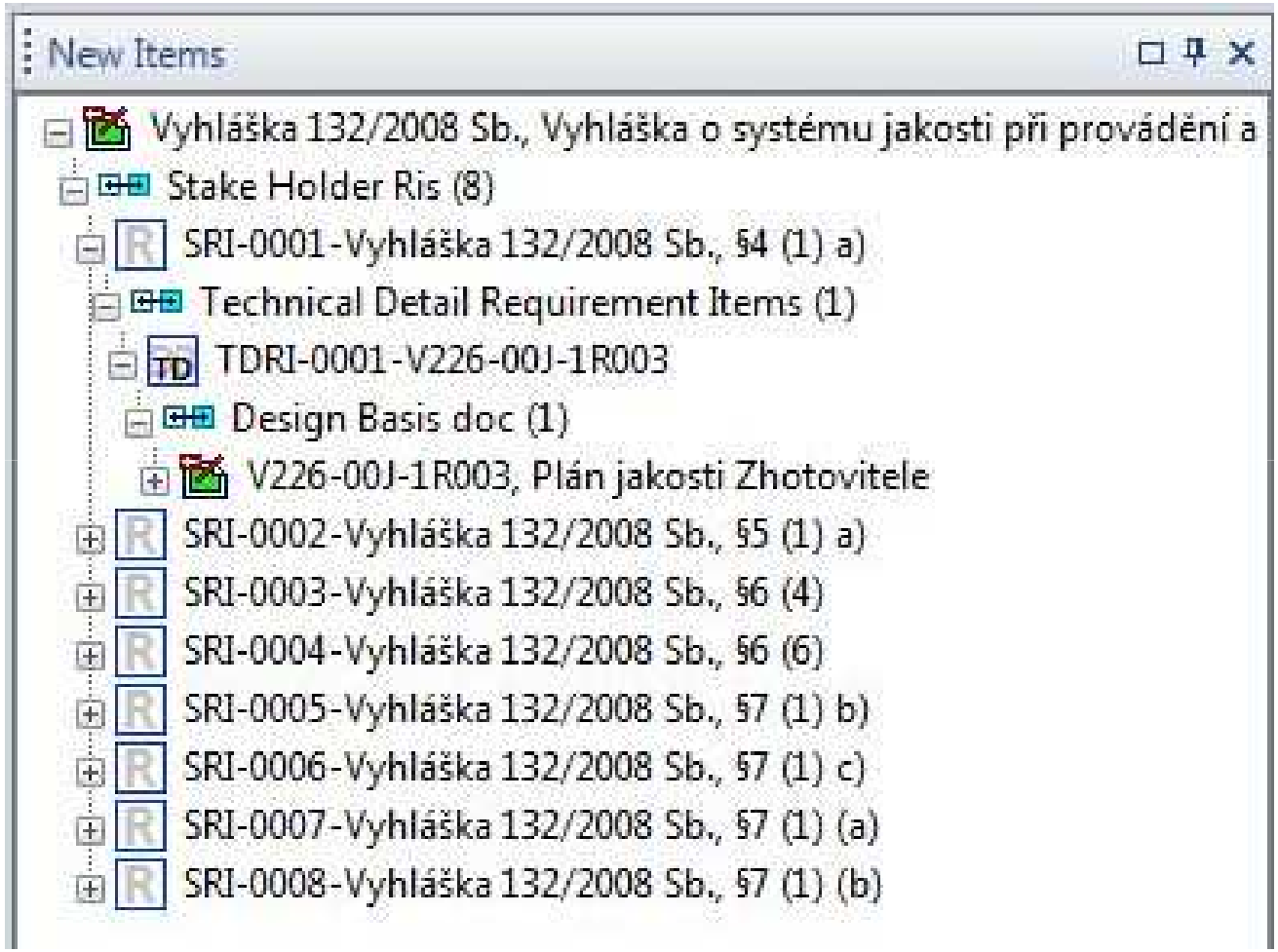
Intention

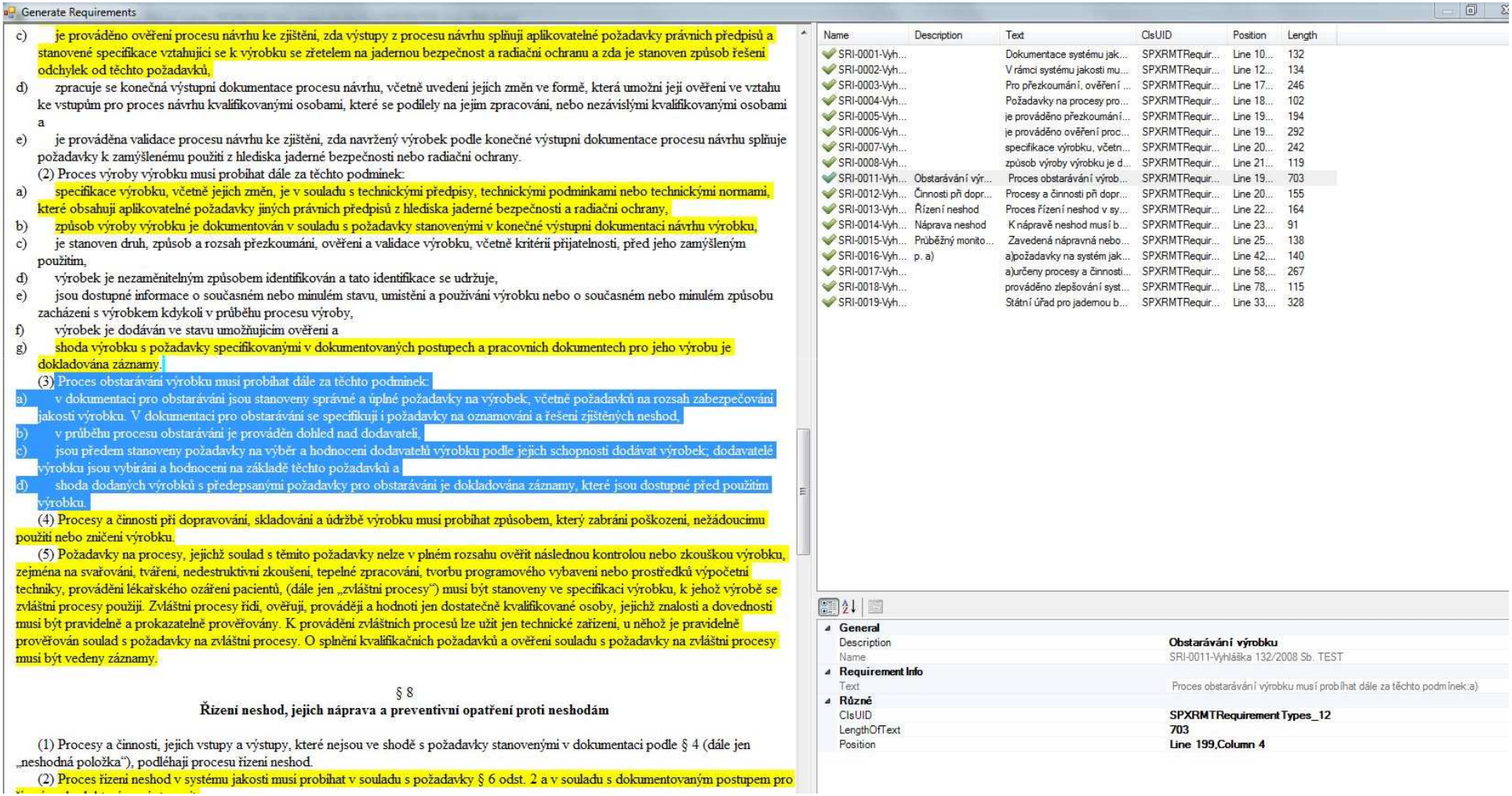
- To control the regulator‘s and customer‘s requirements so as to demonstrate compliance with all the applied requirements in an efficient manner.

Experience from implementation

- It is advisable to start with the basic requirement documents and continue towards more detailed ones.
- Correct document classification is necessary for RM&T operation.
- The SRI and TDRI administration is quite difficult, especially when checking dependencies in new revisions of requirement documents.

ŠKODA JS a.s.


New Items
Vyhláška 132/2008 Sb., Vyhláška o systému jakosti při provádění a
Stake Holder Ris (8)
SRI-0001-Vyhláška 132/2008 Sb., §4 (1) a)
Technical Detail Requirement Items (1)
TDRI-0001-V226-00J-1R003
Design Basis doc (1)
V226-00J-1R003, Plán jakosti Zhotovitele
SRI-0002-Vyhláška 132/2008 Sb., §5 (1) a)
SRI-0003-Vyhláška 132/2008 Sb., §6 (4)
SRI-0004-Vyhláška 132/2008 Sb., §6 (6)
SRI-0005-Vyhláška 132/2008 Sb., §7 (1) b)
SRI-0006-Vyhláška 132/2008 Sb., §7 (1) c)
SRI-0007-Vyhláška 132/2008 Sb., §7 (1) (a)
SRI-0008-Vyhláška 132/2008 Sb., §7 (1) (b)

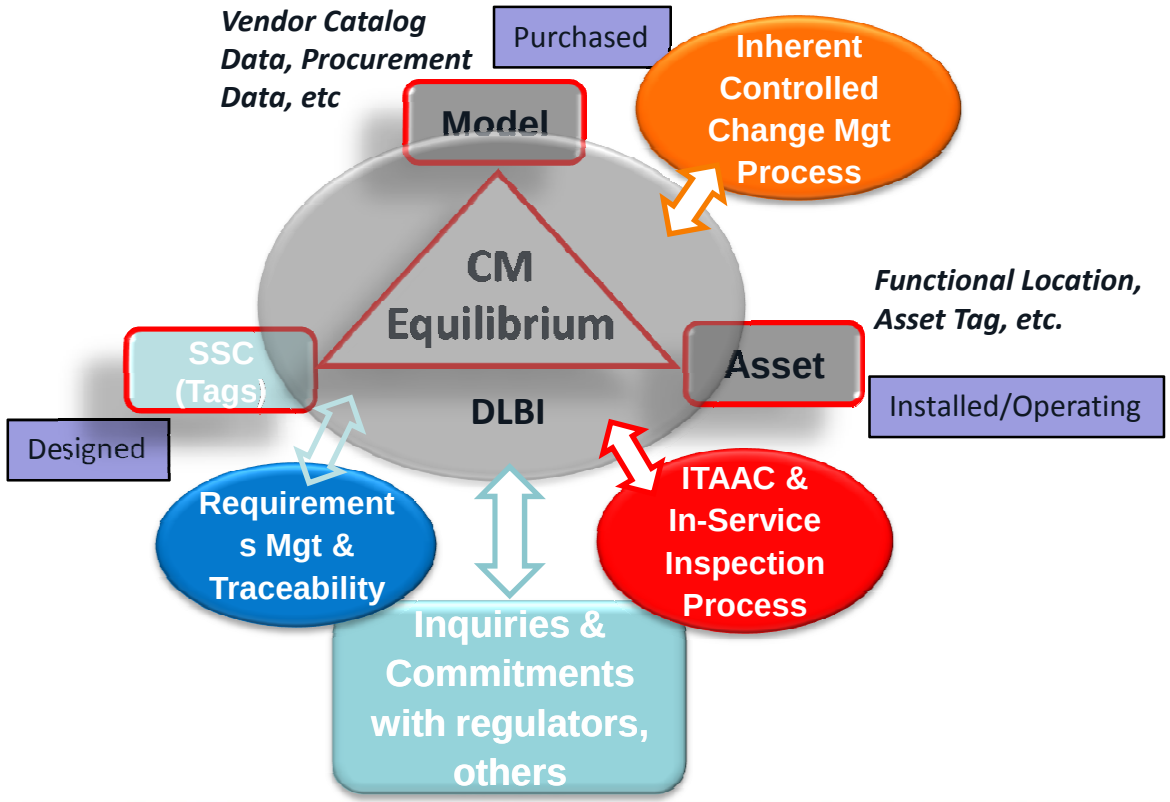

Generate Requirements
c) je prováděno ověření procesu návrhu ke zjištění, zda výstupy z procesu návrhu splňují aplikovatelné požadavky právních předpisů a stanovené specifikace vztahující se k výrobku se zřetelem na jadernou bezpečnost a radiační ochranu a zda je stanoven způsob řešení odchylek od těchto požadavků,
d) zpracuje se konečná výstupní dokumentace procesu návrhu, včetně uvedení jejích změn ve formě, která umožní její ověření ve vztahu ke vstupům pro proces návrhu kvalifikovanými osobami, které se podílely na jejím zpracování, nebo nezávislými kvalifikovanými osobami a
e) je prováděna validace procesu návrhu ke zjištění, zda navržený výrobek podle konečné výstupní dokumentace procesu návrhu splňuje požadavky k zamýšlenému použití z hlediska jaderné bezpečnosti nebo radiační ochrany.
(2) Proces výroby výrobku musí probíhat dále za těchto podmínek:
a) specifikace výrobku, včetně jejích změn, je v souladu s technickými předpisy, technickými podmínkami nebo technickými normami, které obsahují aplikovatelné požadavky jiných právních předpisů z hlediska jaderné bezpečnosti a radiační ochrany,
b) způsob výroby výrobku je dokumentován v souladu s požadavky stanovenými v konečné výstupní dokumentaci návrhu výrobku,
c) je stanoven druh, způsob a rozsah přezkoumání, ověření a validace výrobku, včetně kritérií přijatelnosti, před jeho zamýšleným použitím,
d) výrobek je nezaměnitelným způsobem identifikován a tato identifikace se udržuje,
e) jsou dostupné informace o současném nebo minulém stavu, umístění a používání výrobku nebo o současném nebo minulém způsobu zacházení s výrobkem kdykoli v průběhu procesu výroby,
f) výrobek je dodáván ve stavu umožňujícím ověření a
g) shoda výrobku s požadavky specifikovanými v dokumentovaných postupech a pracovních dokumentech pro jeho výrobu je dokladována záznamy.
(3) Proces obstarávání výrobku musí probíhat dále za těchto podmínek:
a) v dokumentaci pro obstarávání jsou stanoveny správné a úplné požadavky na výrobek, včetně požadavků na rozsah zabezpečování jakosti výrobku. V dokumentaci pro obstarávání se specifikují i požadavky na oznamování a řešení zjištěných neshod,
b) v průběhu procesu obstarávání je prováděn dohled nad dodavateli,
c) jsou předem stanoveny požadavky na výběr a hodnocení dodavatelů výrobku podle jejich schopnosti dodávat výrobek; dodavatelé výrobku jsou vybíráni a hodnoceni na základě těchto požadavků a
d) shoda dodaných výrobků s předepsanými požadavky pro obstarávání je dokladována záznamy, které jsou dostupné před použitím výrobku.
(4) Procesy a činnosti při dopravování, skladování a údržbě výrobku musí probíhat způsobem, který zabrání poškození, nežádoucímu použití nebo zničení výrobku.
(5) Požadavky na procesy, jejichž soulad s těmito požadavky nelze v plném rozsahu ověřit následnou kontrolou nebo zkouškou výrobku, zejména na svařování, tváření, nedestruktivní zkoušení, tepelné zpracování, tvorbu programového vybavení nebo prostředků výpočetní techniky, provádění lékařského ozáření pacientů, (dále jen „zvláštní procesy“) musí být stanoveny ve specifikaci výrobku, k jehož výrobě se zvláštní procesy použijí. Zvláštní procesy řídí, ověřují, provádějí a hodnotí jen dostatečně kvalifikované osoby, jejichž znalosti a dovednosti musí být pravidelně a prokazatelně prověřovány. K provádění zvláštních procesů lze užít jen technické zařízení, u něhož je pravidelně prověřován soulad s požadavky na zvláštní procesy. O splnění kvalifikačních požadavků a ověření souladu s požadavky na zvláštní procesy musí být vedeny záznamy.
§ 8
Řízení neshod, jejich náprava a preventivní opatření proti neshodám
(1) Procesy a činnosti, jejich vstupy a výstupy, které nejsou ve shodě s požadavky stanovenými v dokumentaci podle § 4 (dále jen „neshodná položka“), podléhají procesu řízení neshod.
(2) Proces řízení neshod v systému jakosti musí probíhat v souladu s požadavky § 6 odst. 2 a v souladu s dokumentovaným postupem pro
Name Description Text ClsUID Position Length
SRI-0001-Vyh... Dokumentace systému jak... SPXRMTRequir... Line 10... 132
SRI-0002-Vyh... V rámci systému jakosti mu... SPXRMTRequir... Line 12... 134
SRI-0003-Vyh... Pro přezkoumání, ověření ... SPXRMTRequir... Line 17... 246
SRI-0004-Vyh... Požadavky na procesy pro... SPXRMTRequir... Line 18... 102
SRI-0005-Vyh... je prováděno přezkoumání... SPXRMTRequir... Line 19... 194
SRI-0006-Vyh... je prováděno ověření proc... SPXRMTRequir... Line 19... 292
SRI-0007-Vyh... specifikace výrobku, včetn... SPXRMTRequir... Line 20... 242
SRI-0008-Vyh... způsob výroby výrobku je d... SPXRMTRequir... Line 21... 119
SRI-0011-Vyh... Obstarávání výr... Proces obstarávání výrob... SPXRMTRequir... Line 19... 703
SRI-0012-Vyh... Činnosti při dopr... Procesy a činnosti při dopr... SPXRMTRequir... Line 20... 155
SRI-0013-Vyh... Řízení neshod Proces řízení neshod v sy... SPXRMTRequir... Line 22... 164
SRI-0014-Vyh... Náprava neshod K nápravě neshod musí b... SPXRMTRequir... Line 23... 91
SRI-0015-Vyh... Průběžný monito... Zavedená nápravná nebo... SPXRMTRequir... Line 25... 138
SRI-0016-Vyh... p. a) a)požadavky na systém jak... SPXRMTRequir... Line 42,... 140
SRI-0017-Vyh... a)určeny procesy a činnosti... SPXRMTRequir... Line 58,... 267
SRI-0018-Vyh... prováděno zlepšování syst... SPXRMTRequir... Line 78,... 115
SRI-0019-Vyh... Státní úřad pro jadernou b... SPXRMTRequir... Line 33,... 328
General
Description Obstarávání výrobku
Name SRI-0011-Vyhláška 132/2008 Sb. TEST
Requirement Info
Text Proces obstarávání výrobku musí probíhat dále za těchto podmínek:a)
Různé
ClsUID SPXRMTRequirementTypes_12
LengthOfText 703
Position Line 199,Column 4

CONFIGURATION MANAGEMENT

ŠKODA JS a.s.

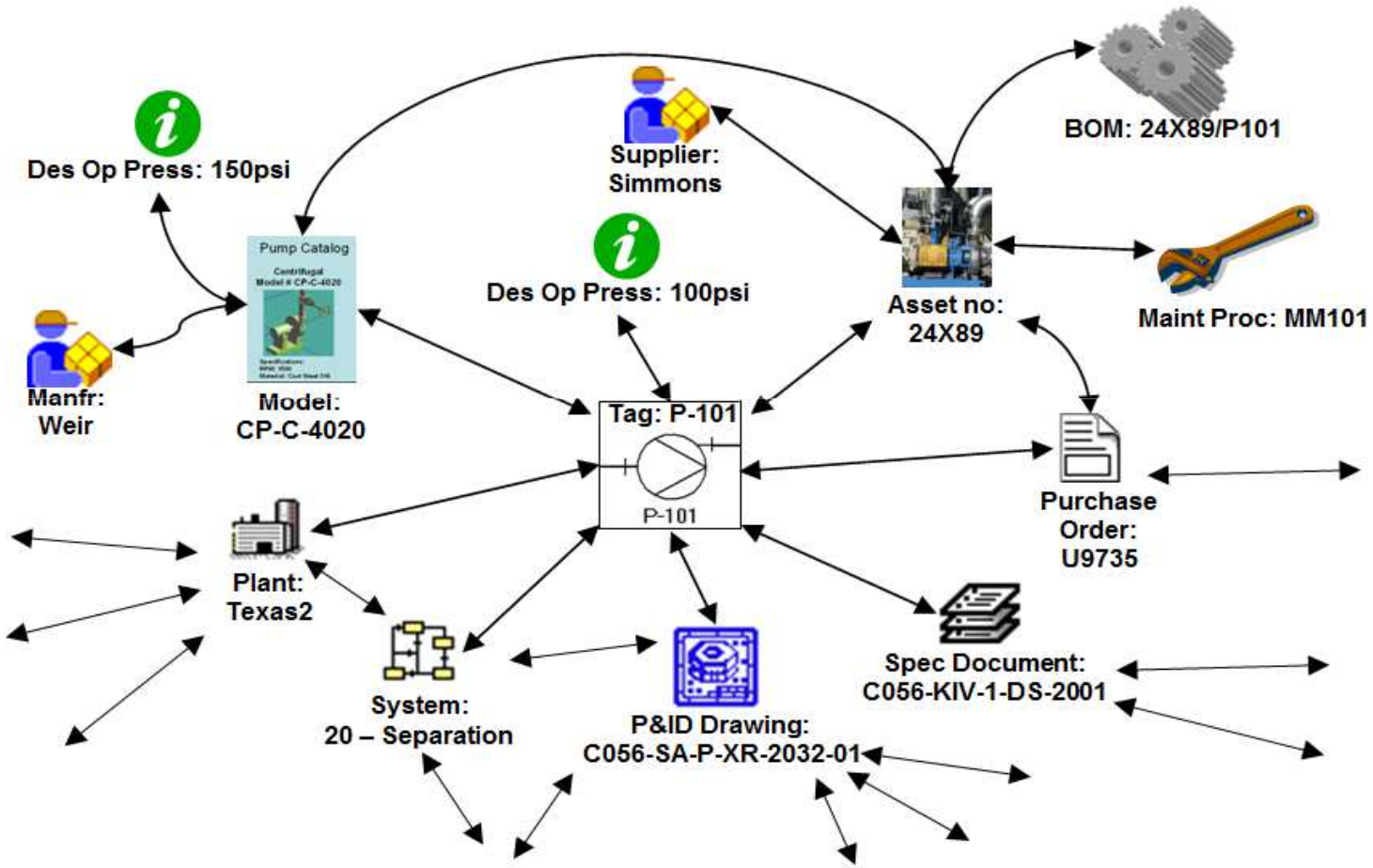
Configuration Management Information System is an advanced information system for the administration of nuclear power plants.

Configuration Management helps ensure the power plant's safe operation by providing fast and reliable solutions of fundamental issues.



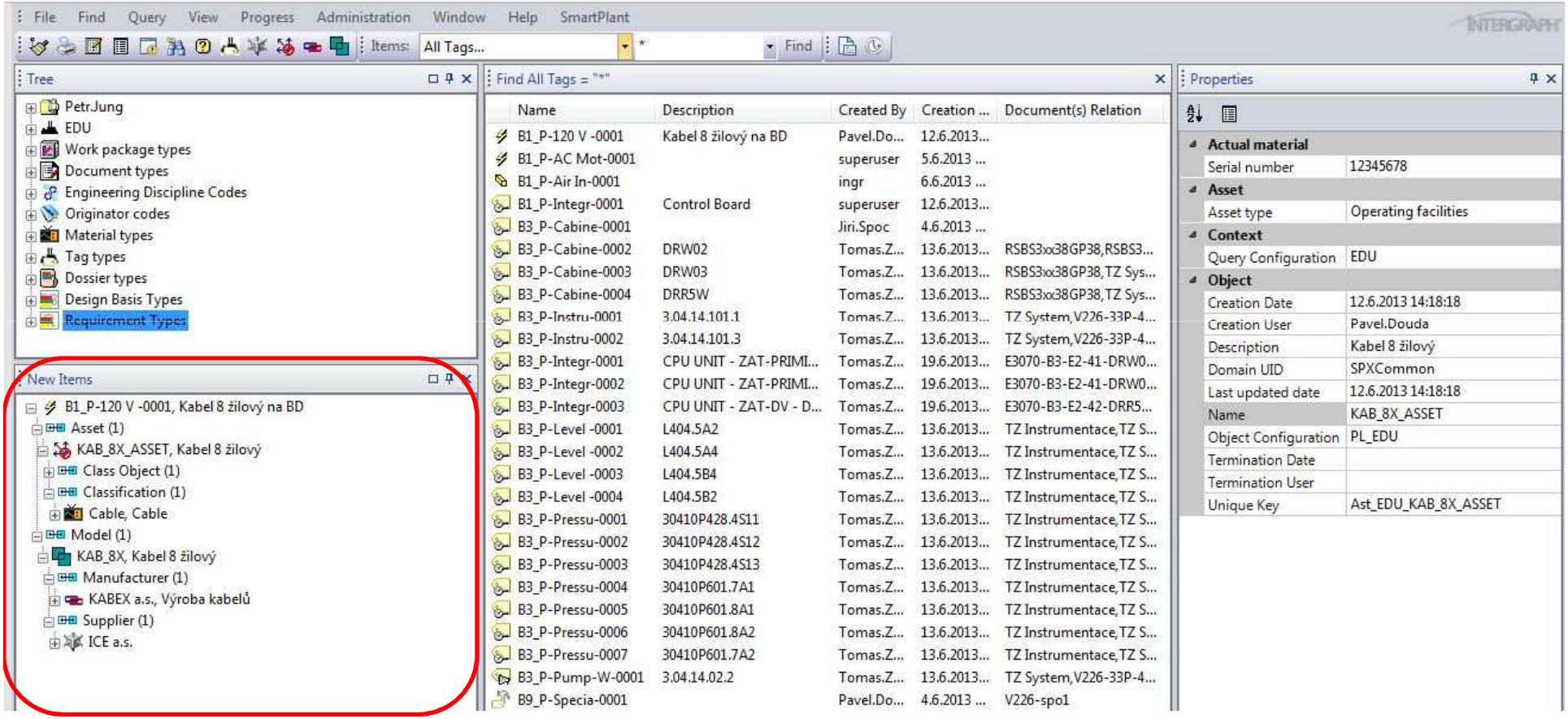
CONFIGURATION MANAGEMENT

ŠKODA JS a.s.



CONFIGURATION MANAGEMENT

ŠKODA JS a.s.



GENERAL CONCLUSIONS

ŠKODA JS a.s.

- When implementing the CMIS, one has to use the project management methods (definitions of responsibilities, risks, work procedures, tasks, etc.) correctly.
- Where possible, enough time should be devoted to the implementation. The period of preparation for the application of the basic functions lasts not less than one year.
- System setting is up to the CMIS orderer; the supplier cannot substitute him in this role.
- Maximum data should be imported from the existing sources and minimum data should be created, the aim being to work with the same data as that possessed by both the customer and the supplier.
- Start with the simpler CMIS functions and work your way gradually to the more complicated and more complex ones.
- User and administrator training is very important, as work with the system is not easy.

QUESTIONS …

ŠKODA JS a.s.