



Roundtable discussion: NPP lifecycle from the stage of NPP construction management up to NPP information management throughout the whole lifecycle

ГОСУДАРСТВЕННАЯ КОРПОРАЦИЯ ПО АТОМНОЙ ЭНЕРГИИ «РОСАТОМ»

Multi-D Technology. From the Stage of Construction to the Stage of Operation.

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ASE Group – Rosatom State Corporation EPC Division

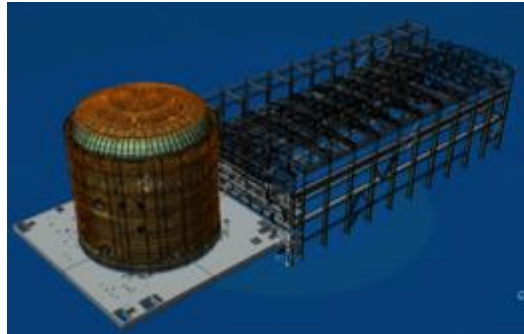


30+ NPP Units are under design and construction = about 30% of nuclear projects worldwide

Presence in 20 countries worldwide

20 000 employees, including 4000 design engineers

\$2 bn.-
Revenue in 2014



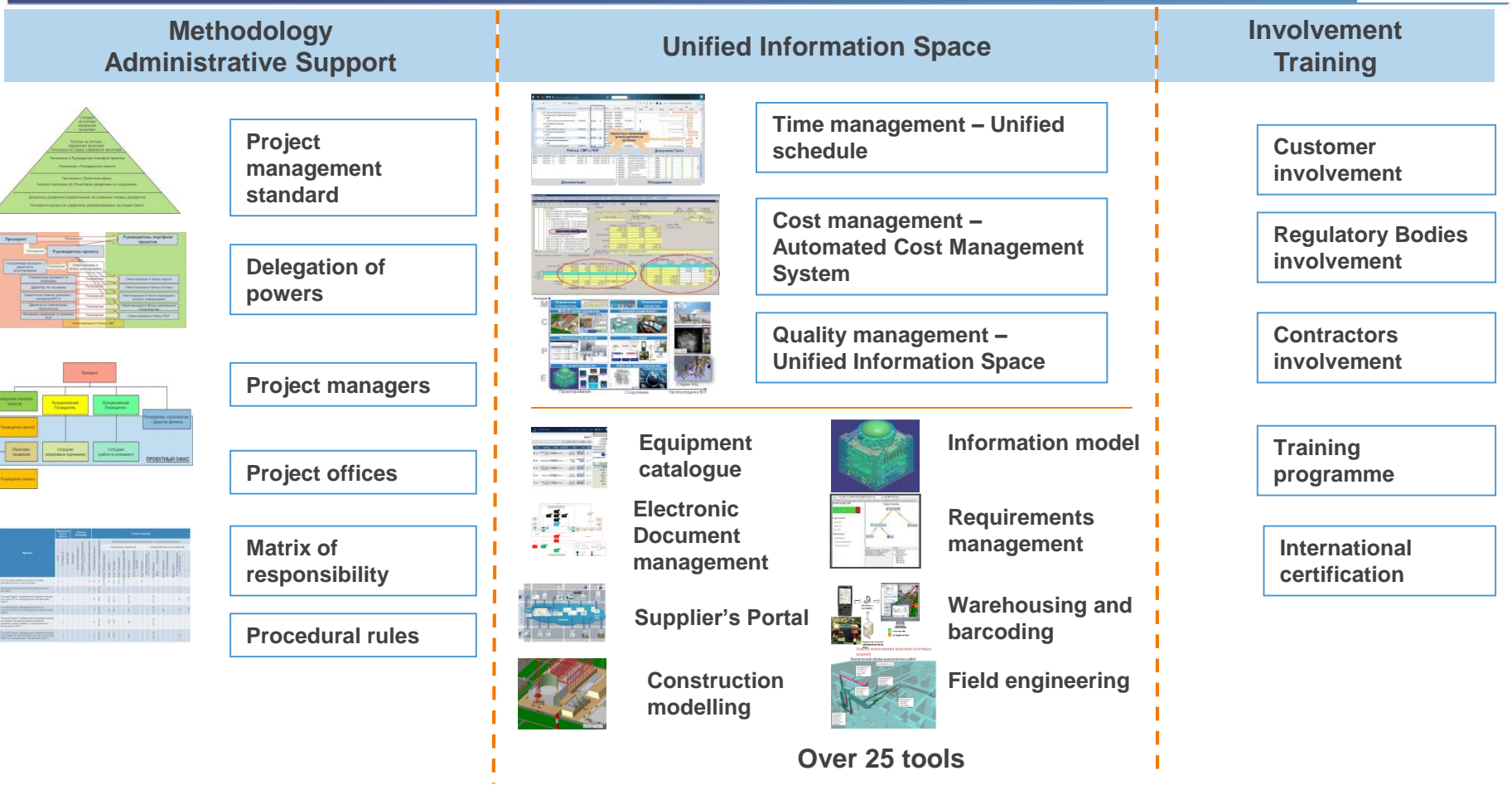
80% of order book are projects abroad

Multi-D – innovative technology of design and construction of complex engineering facilities

8 nuclear GW commissioned over the last 10 years

Top-10 Global Players in RadWaste and Decommissioning

Complex Multi-D-based Project Management System



The complex Multi-D-based project management system allows to implement complex capital construction projects within the targeted limits of cost and deadlines with the required quality

The main tools of Unified information space

Functions

M

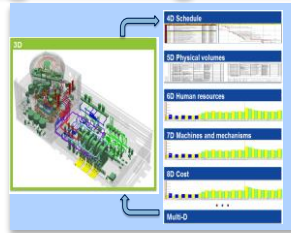
Cost management



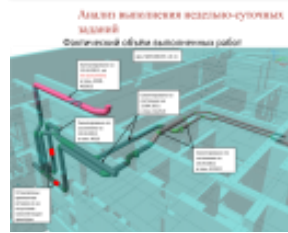
Project management



Multi-D engineering



Field Engineering

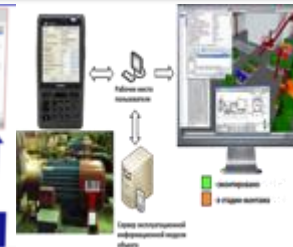
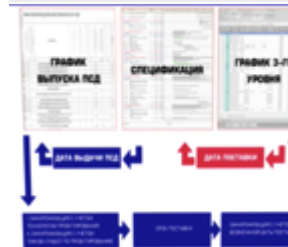


C

Catalogue

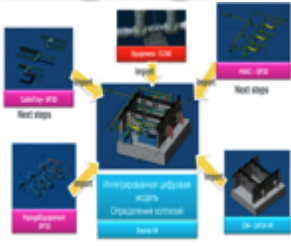
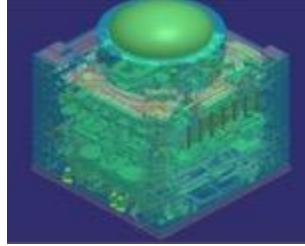


Procurement

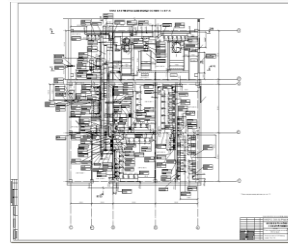


P

3D smart designing



Detailed Engineering



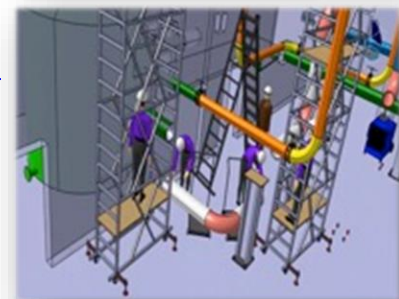
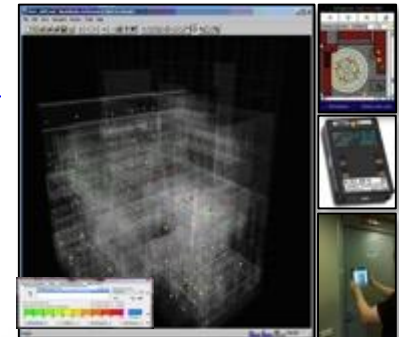
E

Design

Construction

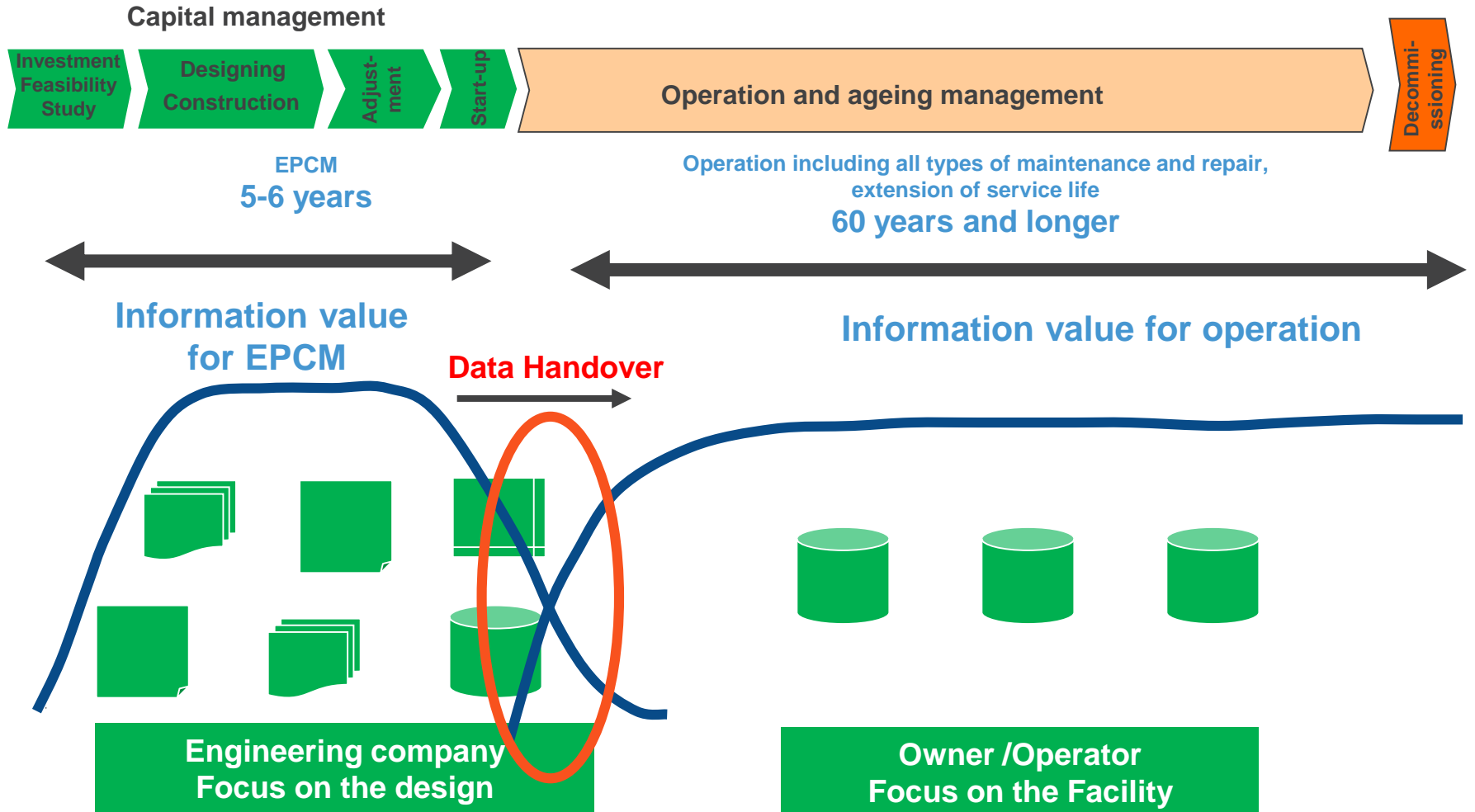
Life Cycle

Operation/
Decommissioning

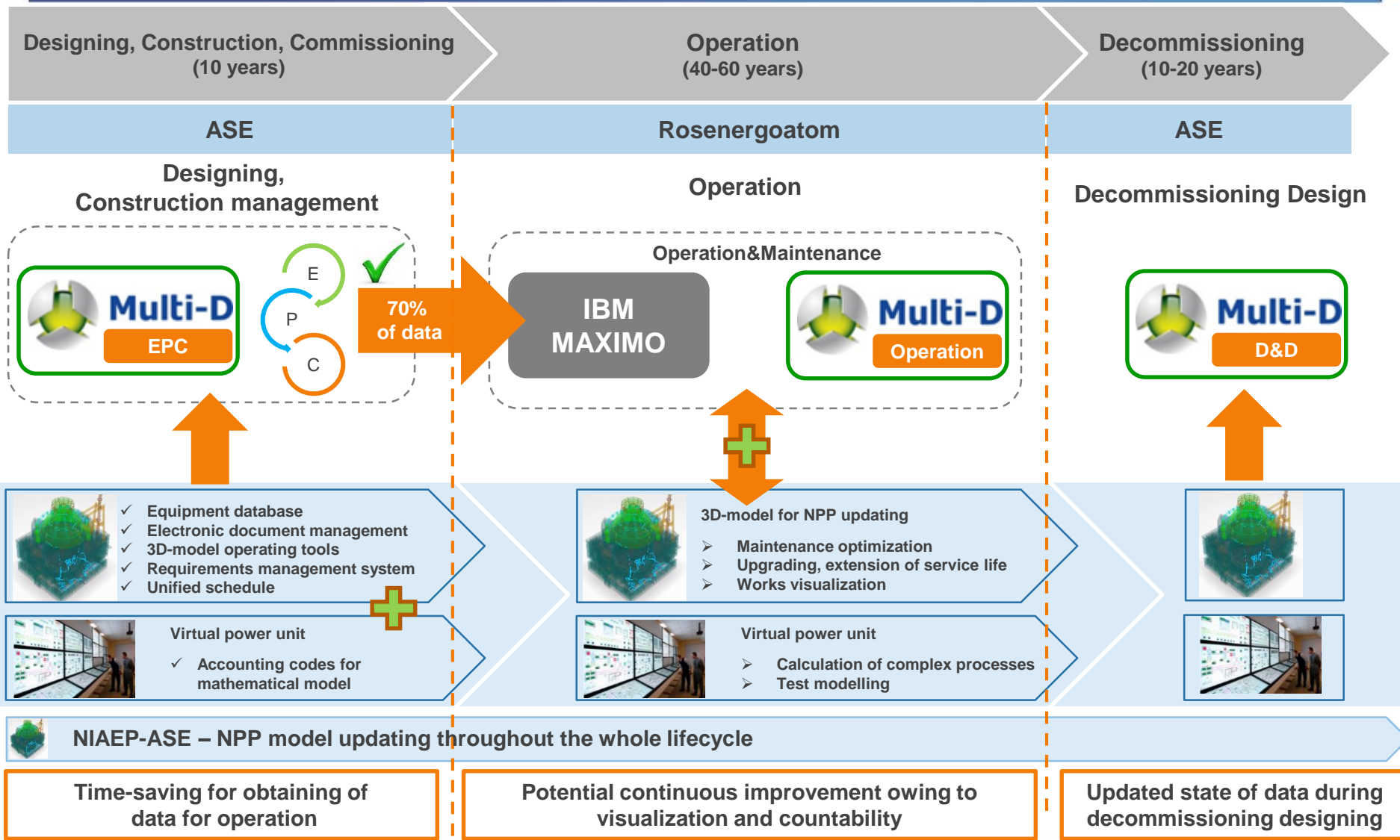


Information Management throughout NPP Life Cycle.

It is necessary to guarantee NPP information handover including the information model from the stages of construction up to operation



Multi-D-based Operation Management System Provides a Basis for Sustainable Efficiency Growth



Future engineering is today!

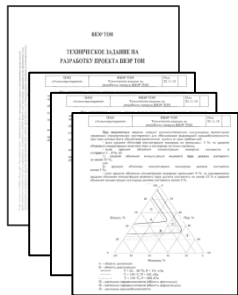
NPP Construction Project Configuration Management (IAEA-TECDOC-1651)

- Regulatory documentation
- Design documentation
- Basic specifications
- Engineering specification of the Contract (optional)

- Regulatory documentation
- Technical specification/Terms of Reference
- As-built documentation
- (3D|2D)

Design requirements

Objective



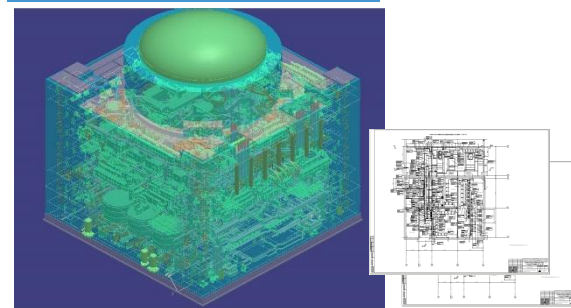
Must comply with

Change

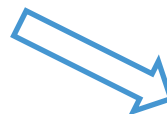


Management

Configuration data



AUDITS



Must comply with

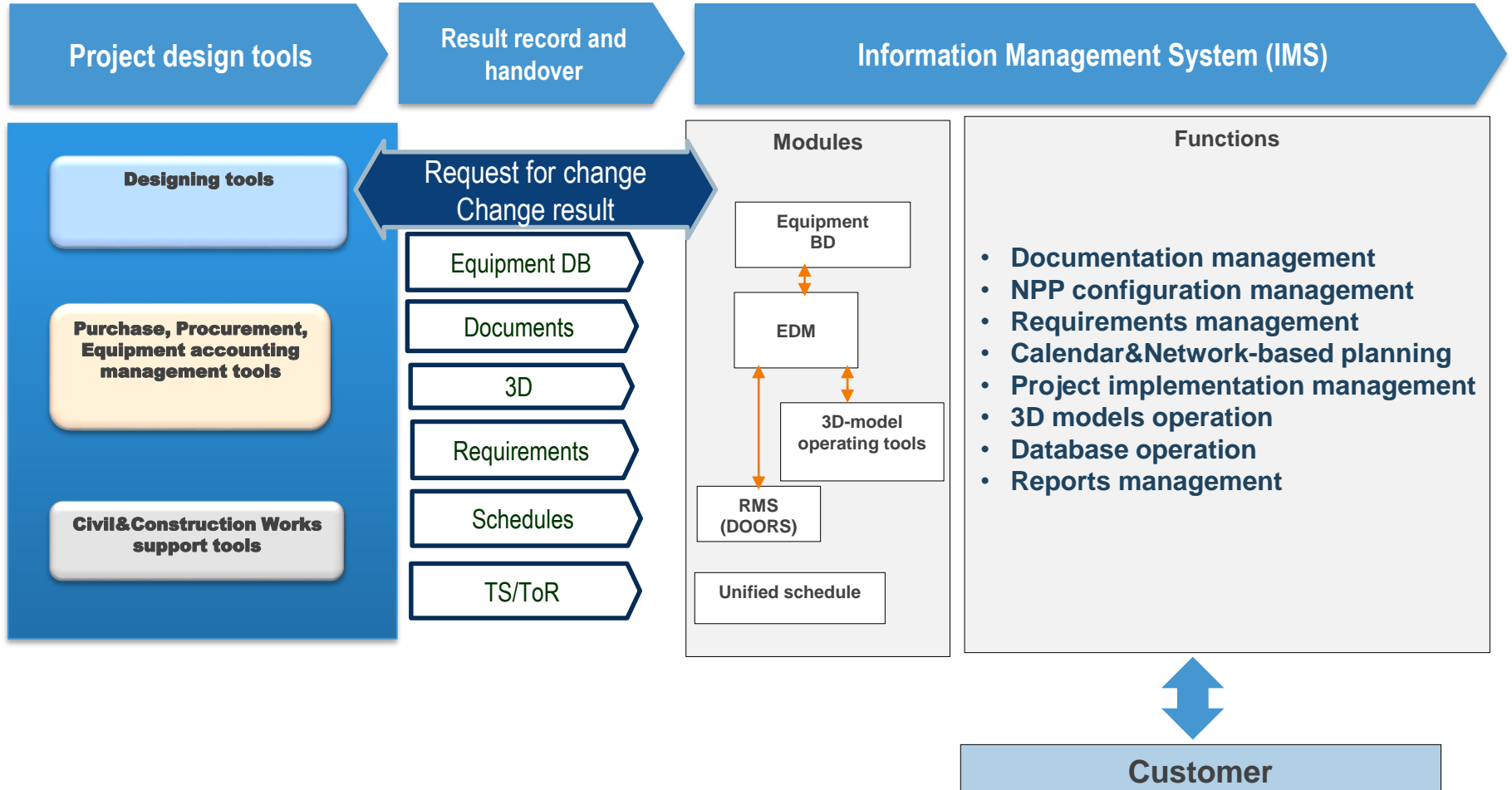
Object physical configuration

Must comply with

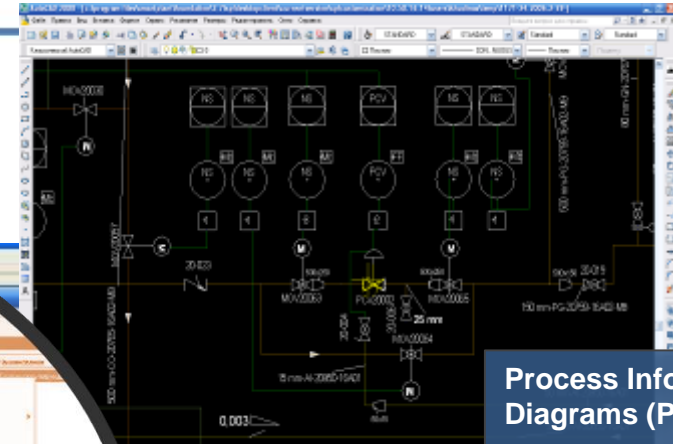


Configuration management objects are made feasible for the commissioned Facility

Information Management System for the Purposes of Project Configuration management and NPP Unit Dossier Generation



NPP Integrated Information Model at the Stage of Operation is the main source of information



Process Information Diagrams (PID)

Hierarchical structure of technological objects

Equipment
Pipelines

Pipe accessories

Tools

Technical documentation
(design&estimate documentation, as-built documentation, certificates, regulatory documents)

3D models



Gridded data



Assets Management. Structured Equipment Database

Objectives of Assets Management System

Register keeping and supervision over equipment and its recycle components transfer

Equipment maintenance (scheduled maintenance)

Equipment dismantling and installation

Planning and organization of repair complexes

Spare parts and materials resources planning

Equipment performance monitoring

Maintaining of necessary and sufficient reliability level with cost efficiency

Assets Management Information

Register of equipment, classification

Groups of equipment

Location

Equipment status

Technical systems

Technical certificates

Components codes

Fault error codes

Line assets

Assets track record

Calculation of assets lifecycle

Sensors and groups of sensors

Track record of sensor readings

Licensing and insurance

Recycle assemblies and components

Guarantees tracing

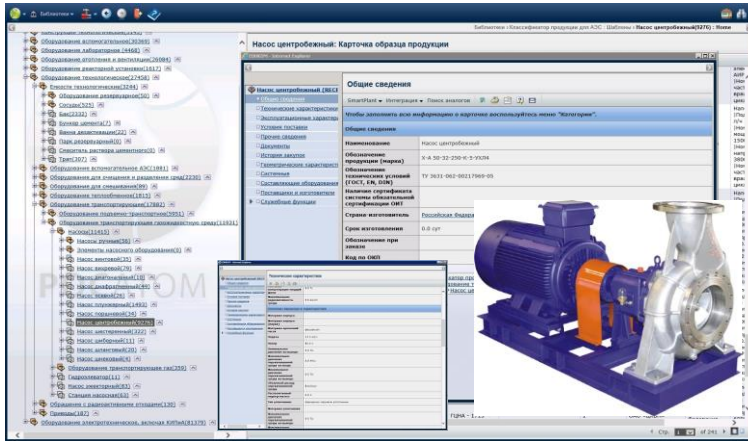


Equipment Catalogue as the Main Source of Data for Operation Database

At the stage of operation, suppliers must enter the data required not only for designing and construction but the data required as well for operation.

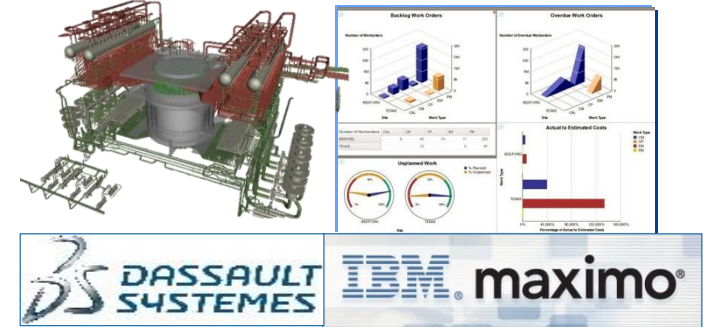
UISICEM

(Unified Industry-Specific Inventory Catalogue of Equipment and Materials)



OMS

(Operation Management System)



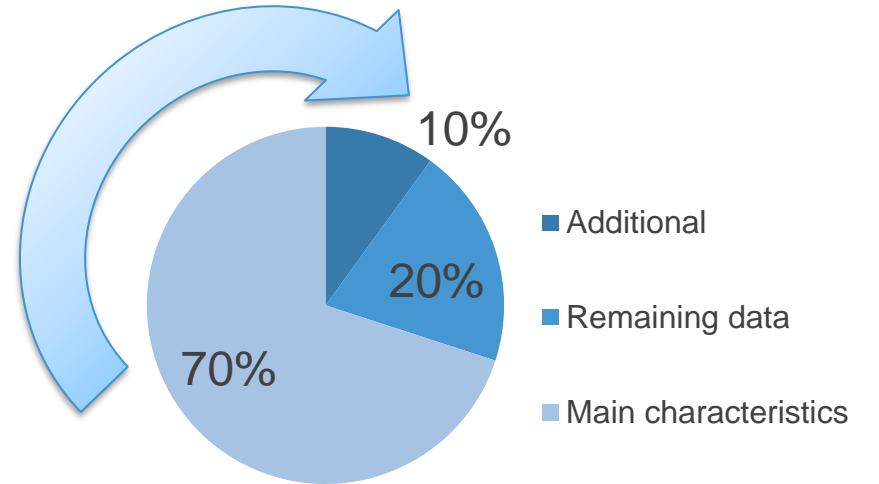
70%
Basic data

10%
Additional data

Entering of data
Entering of documents



Suppliers commitments related to entering additional digitized data required for operation



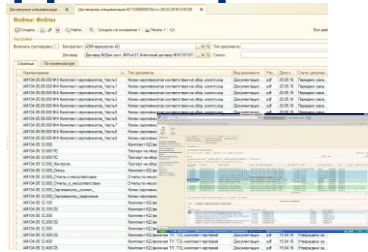
Equipment suppliers

Barcoding at the Stage of Construction to Enhance Efficiency of Visiting Rounds and Maintenance during Operation



IBM MAXIMO Mobile module includes tools to provide remote and reliable access to data of the system based on Maximo Asset Management in off-line and on-line mode.

Supplier's portal



Equipment suppliers

Suppliers commitments related to entering all data and documents required for the incoming inspection



Set of supporting and operational documentation that has passed the incoming inspection

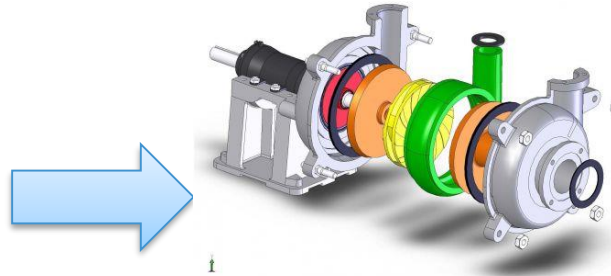
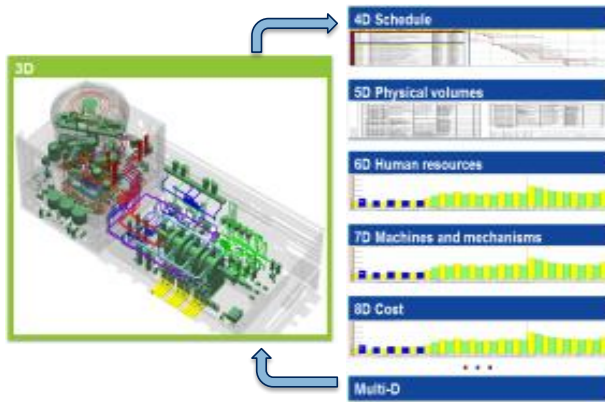


Mobile applications support the remote assets, personnel and material resources management:

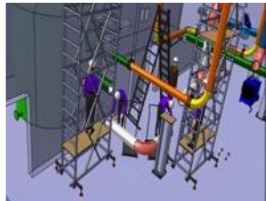
- Connection to the system at any point
- Mobile works management
- Mobile inventory management
- Mobile equipment accounting
- Mobile calibration



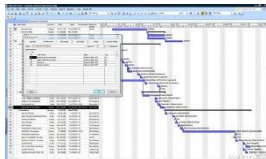
Use of Multi-D Modelling for Scheduled Preventive Maintenance



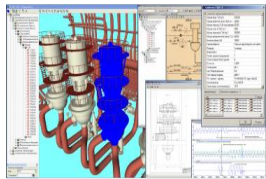
Reduction of scheduled time for preventive maintenance



- Performing a large scope of preliminary works for equipment repair and upgrading within a short time period



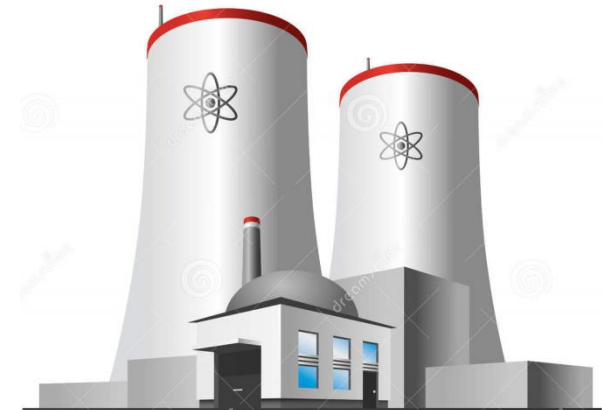
- Improvement of organization of works and requirements for personnel



- Simulation of works



Increase of plant performance

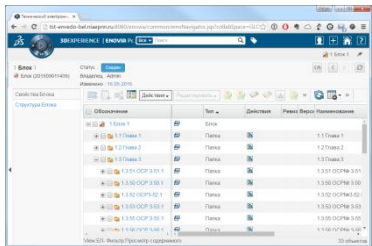


Chain of Assistance is a Tool to Support the Owner at the Stage of Operation

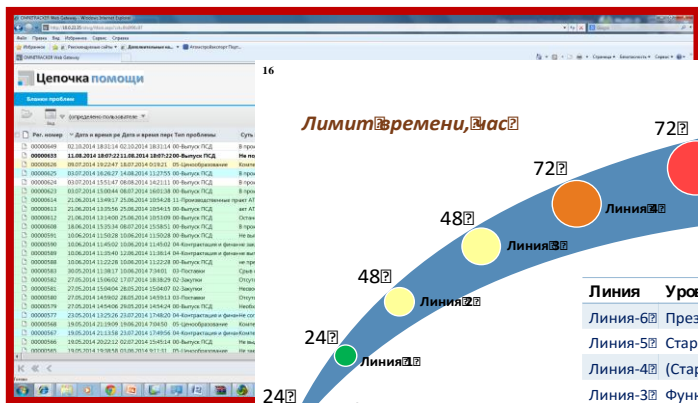


TEDM

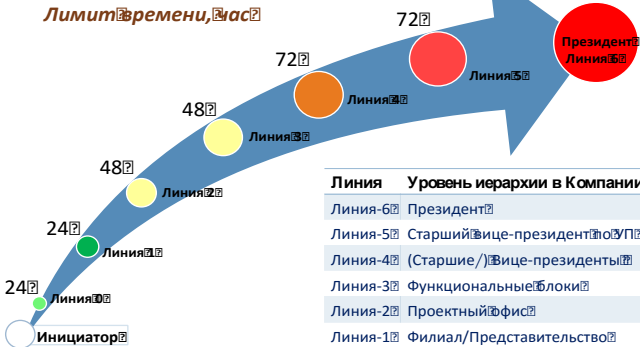
(Technical Electronic Documentation Management)



Chain of assistance



Лимит времени, час



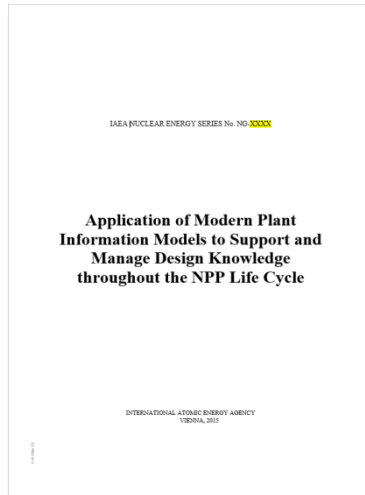
Линия Уровень иерархии в Компании

- Линия-6: Президент
- Линия-5: Старший вице-президент
- Линия-4: (Старшие) вице-президенты
- Линия-3: Функциональные блоки
- Линия-2: Проектный офис
- Линия-1: Филиал/Представительство
- Линия-0: Группа управления

Global Market to Prescribe Requirements to Establish a Complex Designing and Operation System

IAEA trend to use information and engineering 3D models at the stage of operation

Foreign Customers' requirements prescribing availability of the information model at the stage of operation (Czechia, Iran, Finland, Egypt, India etc.)



Available information model is important for both newcomer countries and mature NPP operators



"...IM is based on the 3D modelling technology that is used throughout the whole lifecycle."

"...3D models initially developed as part of the design are consequently used during construction and operation (and prospectively for decommissioning)..."

"The Supplier shall identify the best solution as to the information model handover to the Customer and its integration into or compatibility with the Customer's IT-systems."

Operation management integrated into the NPP information model shall establish a quality standard of the operation management system

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Thank you!