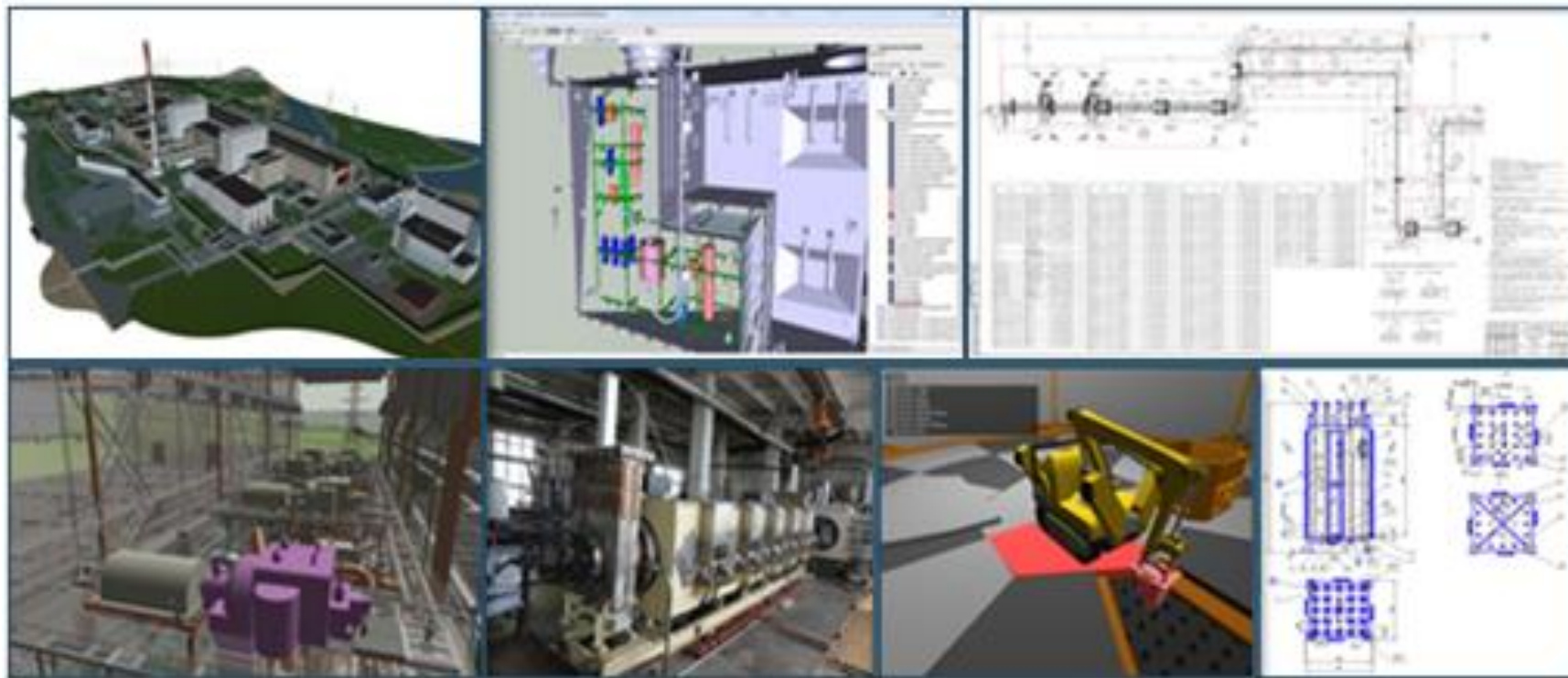




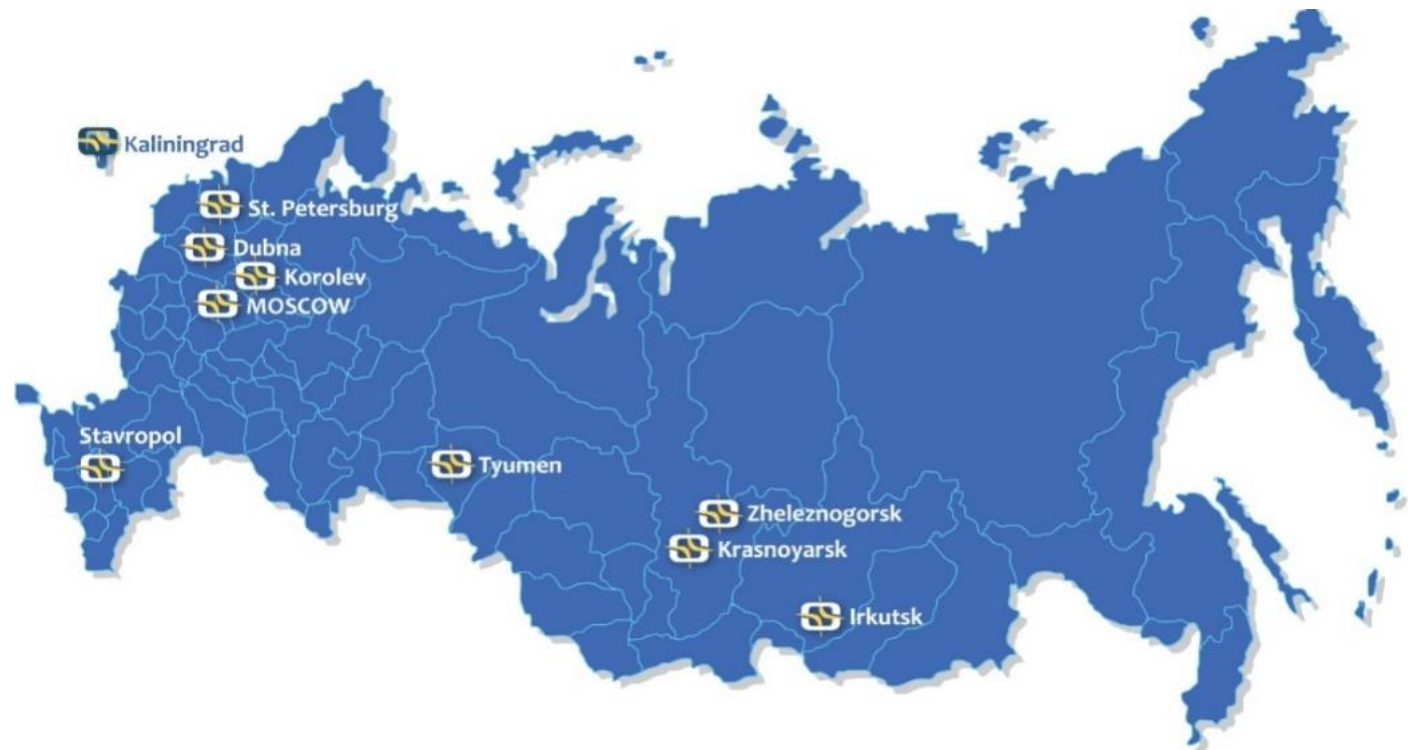
# Life Cycle Management and Information Transfer



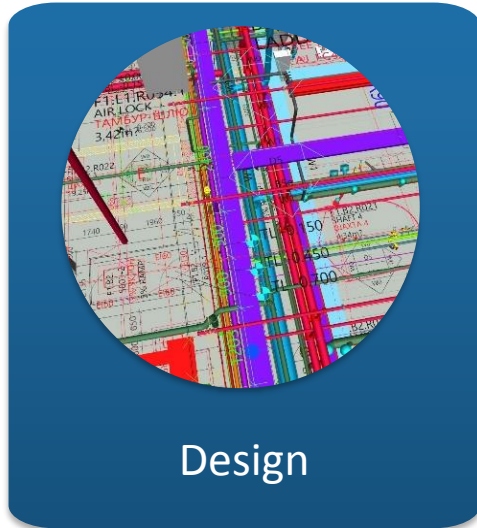
- Established: 2004
- The number of engineers (2017): ~500
- Main office: Moscow,
- Offices: St. Petersburg, Kaliningrad, Stavropol, Krasnoyarsk, Irkutsk, Tyumen, Zheleznogorsk, Dubna

#### Specialization:

- IT – PLM, PDM, CAD, GIS, DMS, MES, etc.
- Engineering, include:
  - Decommissioning engineering and radioactive waste management
  - Specialized decommissioning equipment manufacturing
  - Prime design contractor for civil objects

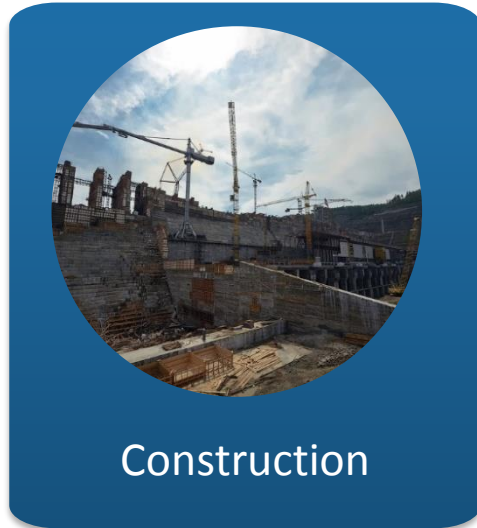


# The Life Cycle of a Process Facility and Accumulation of Information about the Assets



Design

~ 3 years



Construction

~ 5 years



Operation,  
Reconstruction

more than 60 years



Decommissioning,  
Recycling

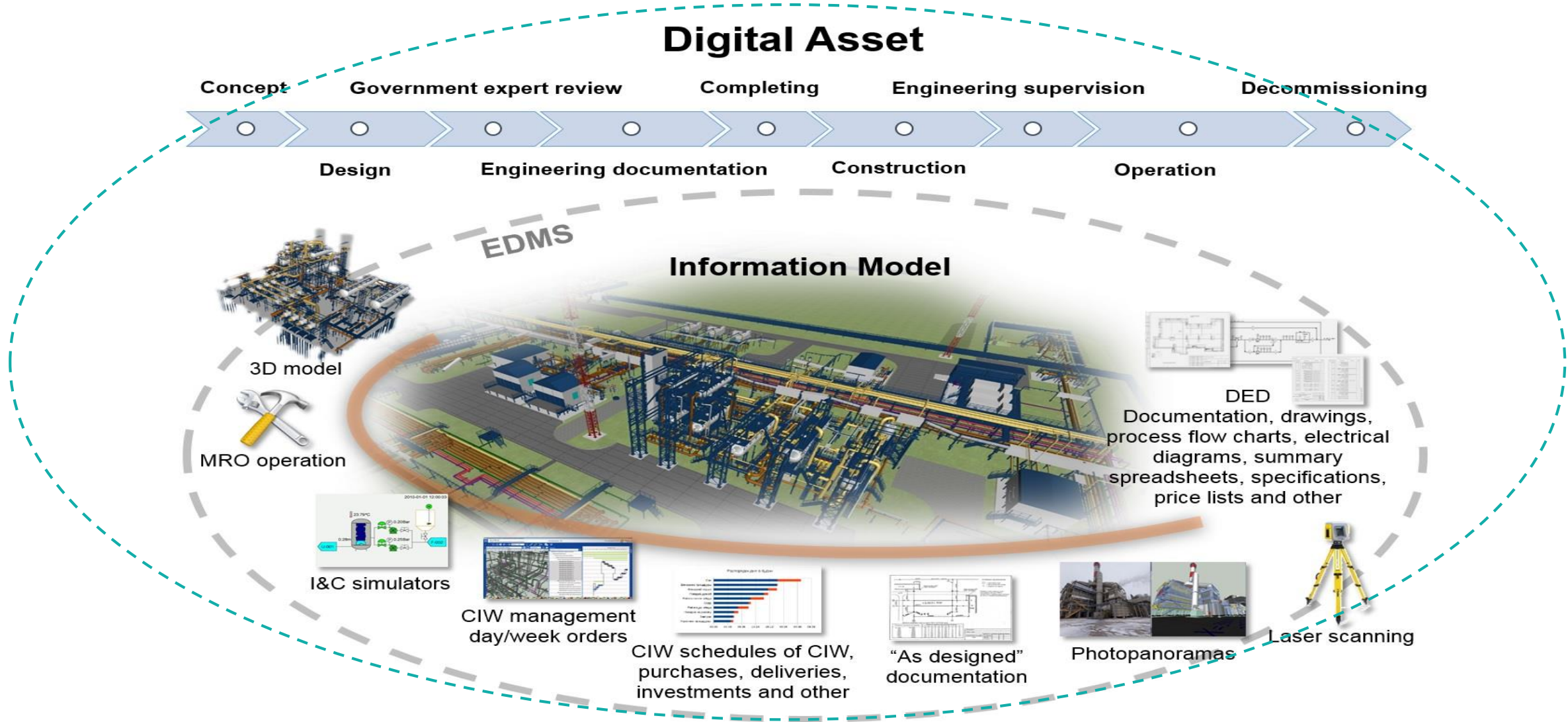
more than 20 years

- *Life-cycle* - consecutive and interlinked stages in the life of a structure consisting of planning, design, construction, operation and decommissioning
- *Life-cycle management* - systematic and coordinated activities and practices through which a structure is appropriately managed over its life cycle
- *Infrastructure asset management* - combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner





# Life Cycle of a Process Facility and Its Data-focused Information Model



# Effects of Information Modeling Technologies Using



Increasing the manageability, transparency and predictability



Improvement of the decision's quality



Data integrity



Optimization of time and resources.

# Russian Technologies Support All Stages of The Life Cycle

Design

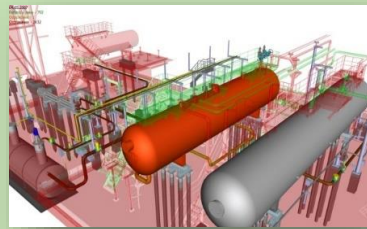
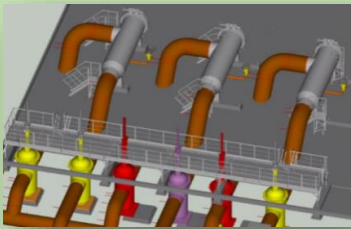
Construction

Operation,  
Reconstruction

Decommissioning

**Digital Asset**

**NEOSYNTEZ**

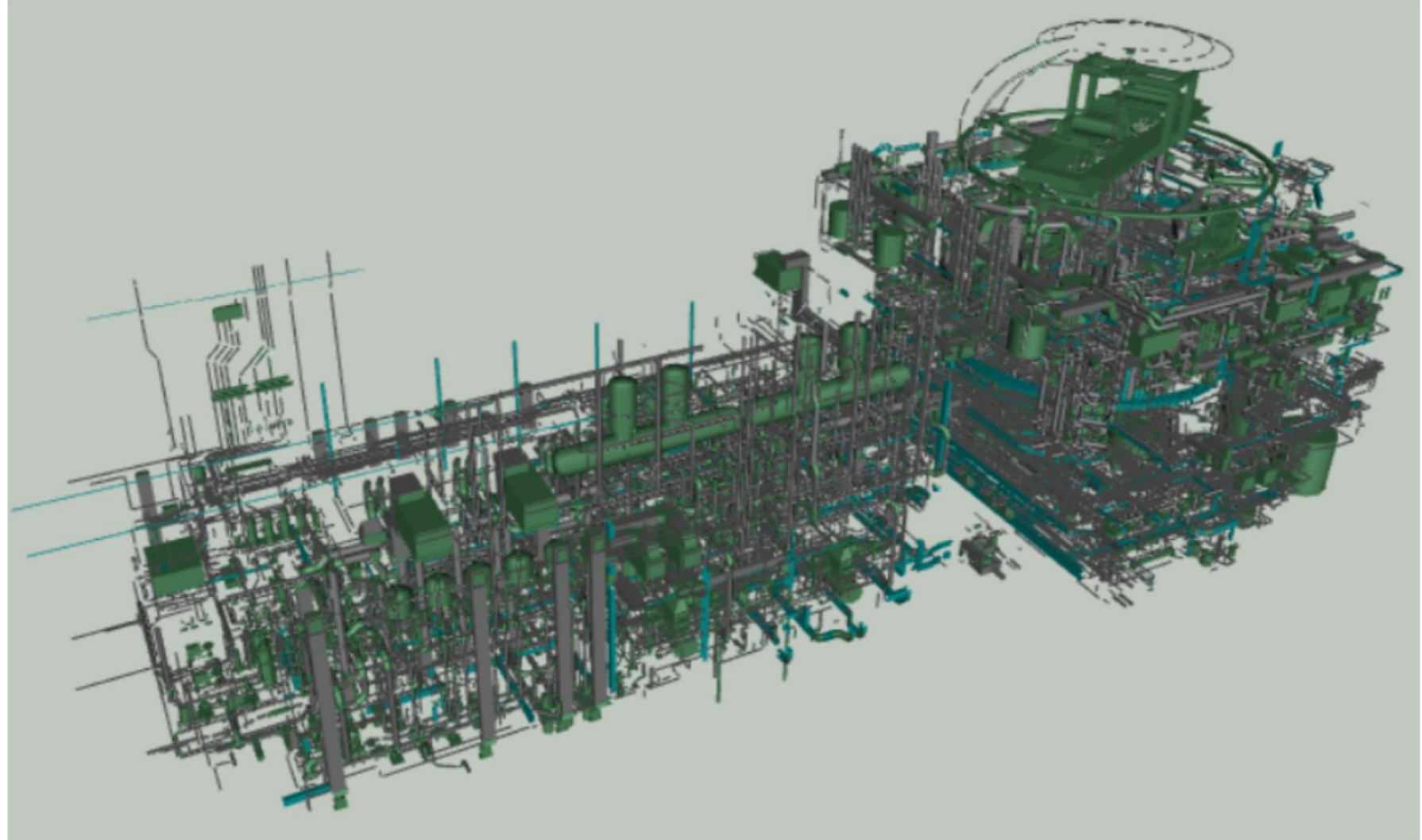


**Горизонт, ЦМОЭМ, InterBridge, InterStorage, Polynom, SOMOX and etc.**

- Creation of a integrated information model «as-design»
- A digital model for the construction and operation of the field
- 4D/5D/6D information modeling
- Construction management
- Creation information model «as-build»
- Accessing the information portal supporting operations
- Considering all types of operating data
- Analyzing accumulated data with flexibility
- Planning and accounting of repairs
- Planning of shutdowns and dismantling
- Supporting the information needs of complex process through engineering surveys
- Visualizing dismantling activities



# Examples of Projects to Create and Maintain IM for Construction and Operation Tasks



**Industry :** Nuclear Industry

**Customer :** Rosatom group (JSC NIAEP-JSC Atomstroyexport»

**Project :** Creating software solutions for use in the construction of NPP

# Examples of Projects to Create and Maintain IM for Construction and Operation Tasks



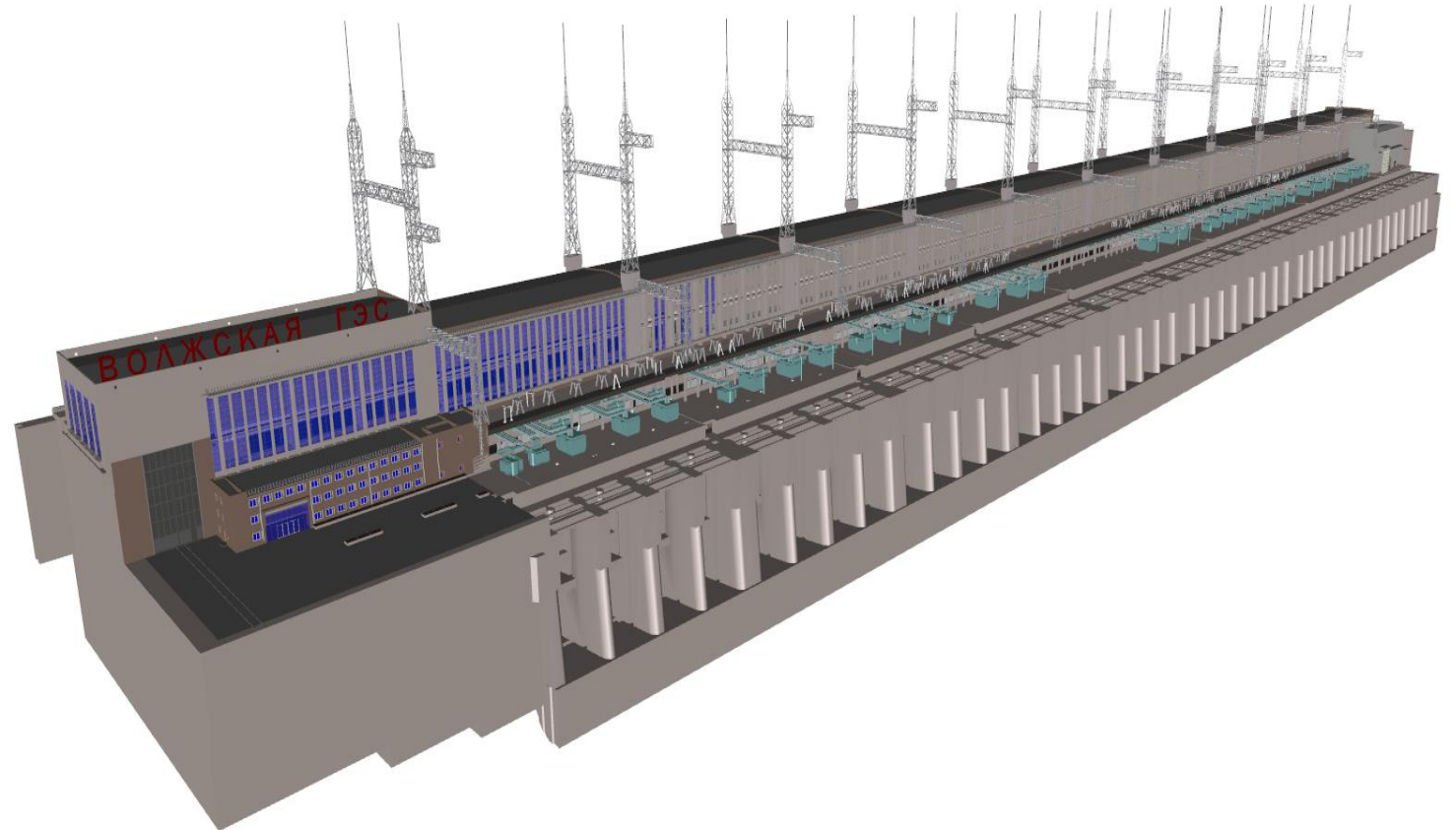
**Industry :** Oil and Gas Extraction

**Customer :** : Gazprom Neft PJSC

**Project :** Creation of an IM and implementation of engineering data management system for the facilities of the Novoportovskoye field



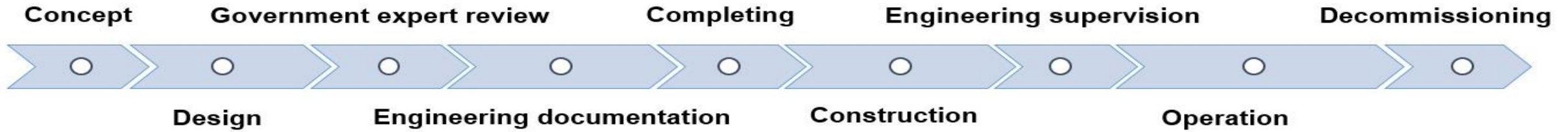
# Examples of Projects to Create and Maintain IM for Construction and Operation Tasks



**Industry** : Hydropower Complex

**Customer** : : RusHydro PJSC

**Project** : Creation of the information model of the Volga HPP and implementation of engineering data management system



Life cycle management of concrete structures

ISO/PWI 22040: #### (E)

## 8. Information transfer among management stages

Information accumulated at each stage of planning, design, execution, use, and end of life in the life cycle of a structure shall be transferred within and across the stages. Necessary information on decision-making shall also be transferred.

The information accumulated should be recorded in a proper way for the improvement of LCM. The accurate information collected at each stage shall be retained in a form readily understandable at subsequent stages.

NP stage

Warning for WDs and CDs

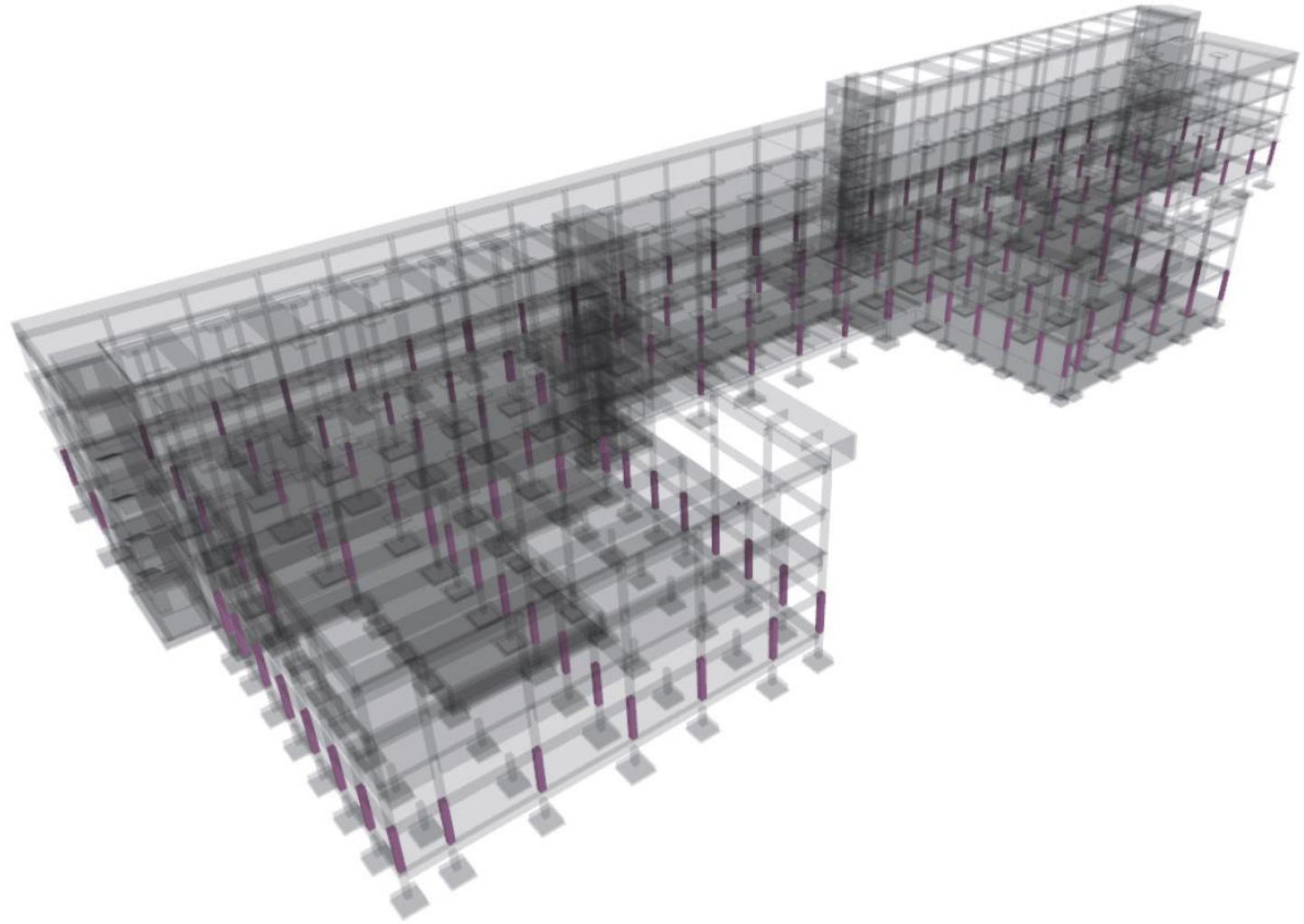
This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

# Management in Planning and Design Stages

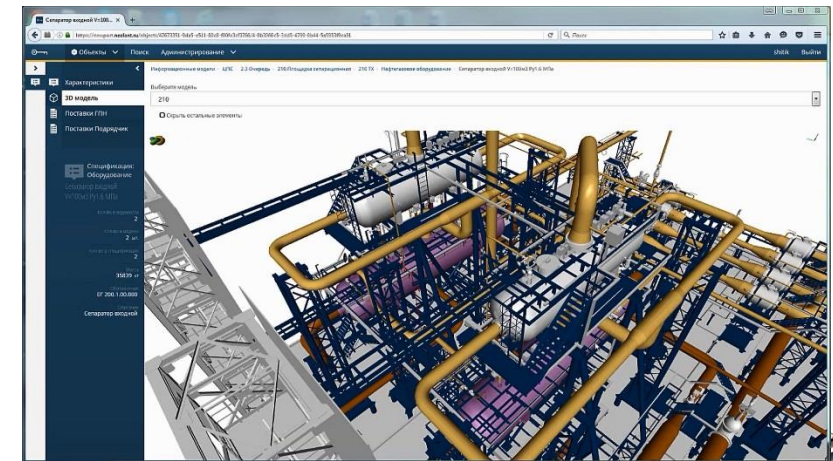
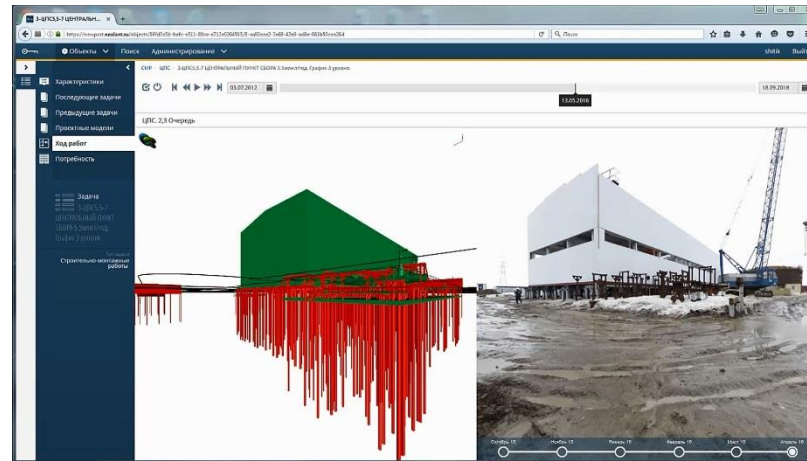
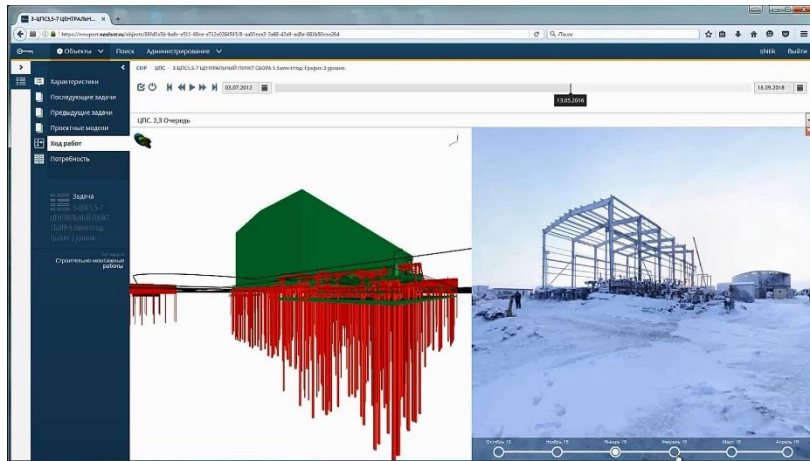
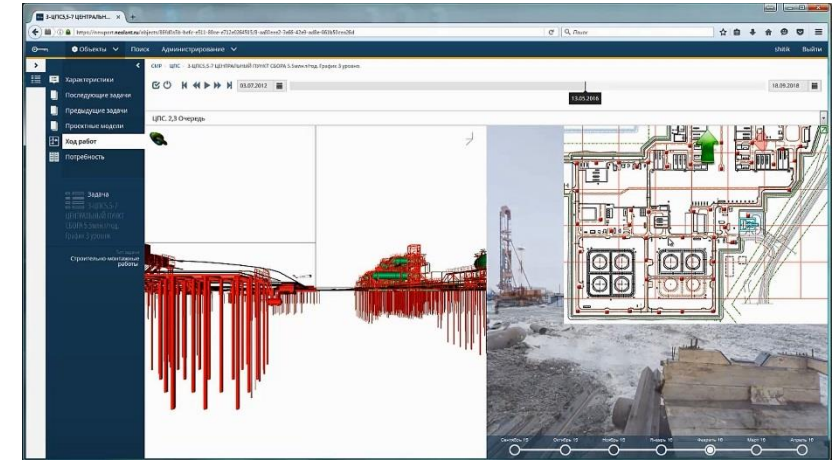
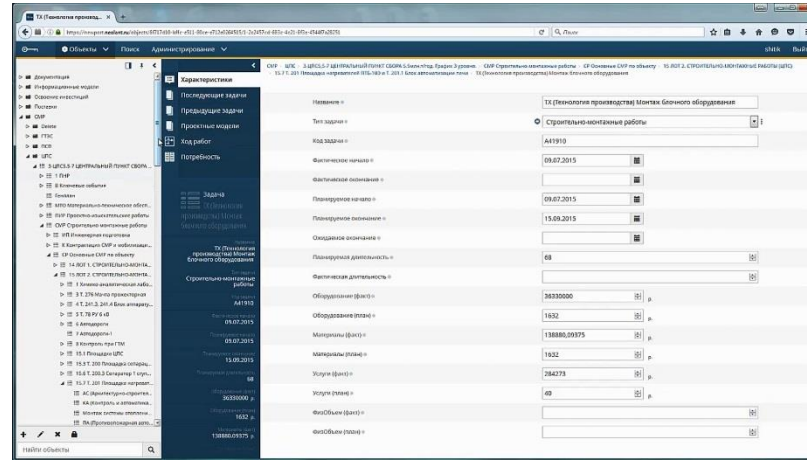
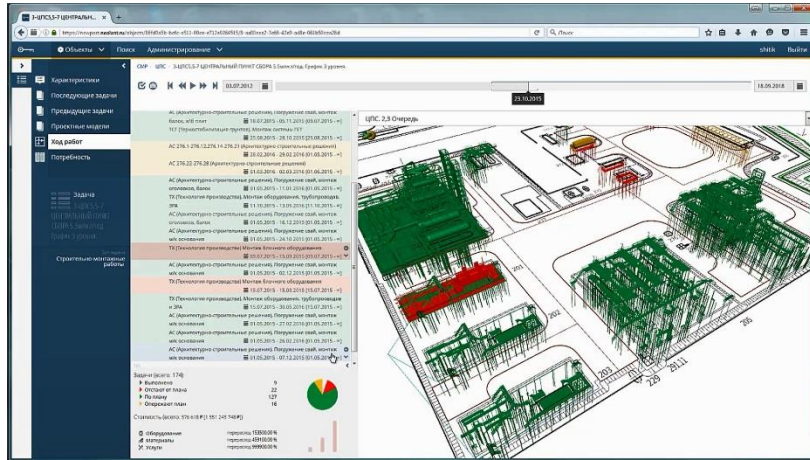
## □ DATA:

- Concrete Type
- Concrete Class
- Technology information
- Dimensions
- Tolerances
- Surface type
- Cover
- Environmental action
- Fire resistance





# Management in Construction Stage Support of Installation and Construction Work



# Management Construction Stages

## Creation and Implementation of Electronic Supervisor's Log

The screenshot displays a web application interface for project management. On the left, a sidebar contains a search bar and a table of project entries. The central window shows a technical drawing of a rectangular structure with handwritten annotations in Russian. The drawing includes dimensions such as 20,000 mm in height and 3,250 mm in width, and a circular hole with a diameter of 2800 mm. The right sidebar lists files related to the project, including 'Эскиз 853.pdf' and 'Эскиз 840.pdf'.

№	Название	Дата начала	Выявление отсту- пления от требо- ваний по пр
1	01	01.12.2015	Система SMD. Согл. №36). Необходи- мости в трубопро
2	02	01.12.2015	Система SOD. Согл. №27). Необходи- мости в трубопро
3	14	06.10.2015	Отм. -6.300. Оси В- коммуникациями
4	19	08.12.2015	отм. -6.300. систем части раскрепл
5	20	08.12.2015	Отм.-6300. Систем прогиб трубы.
6	21	08.12.2015	Отм. -6300, +0.000. материала необх- дренажа. Хомуты,
7	22	18.11.2015	В связи с актуализ технологическому дозакупки матери

**Handwritten Annotations on Drawing:**

- Решение по монолитному полу
- 1. Очистить поверхность от полимерного покрытия.
- 2. Выполнить монолитный пол по технологии Минпром согласно инструкции.
- ен. ЧЗЕЛ "А"
- Ф. ДТ. 2014г.
- 500 (500) мм
- 1400 (500) мм
- 20,000
- 3,250
- Мин. дощ.
- MAX
- Профиль 20x40x3/4
- Магнезитовый пол мин. тол.
- h = 4000 мм
- m = 23т.
- Ø 2800 мм

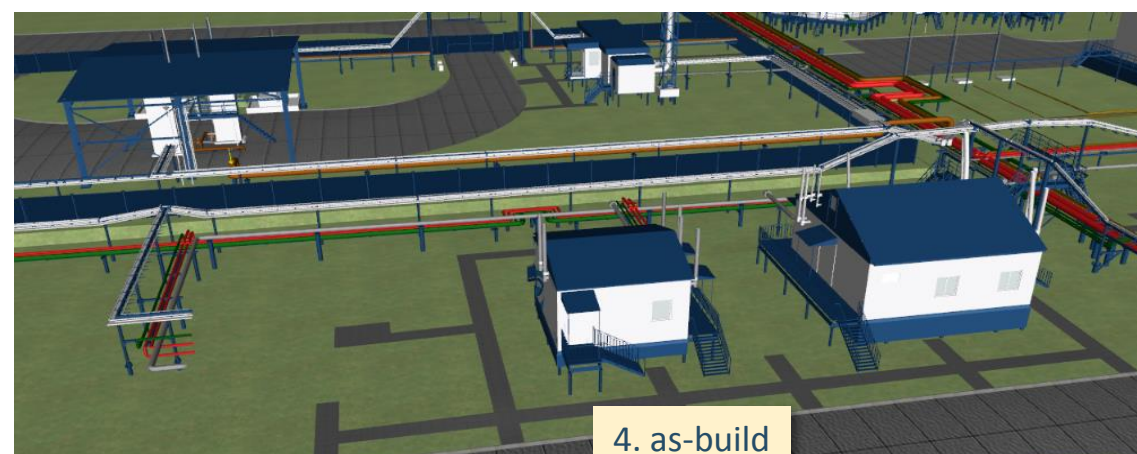
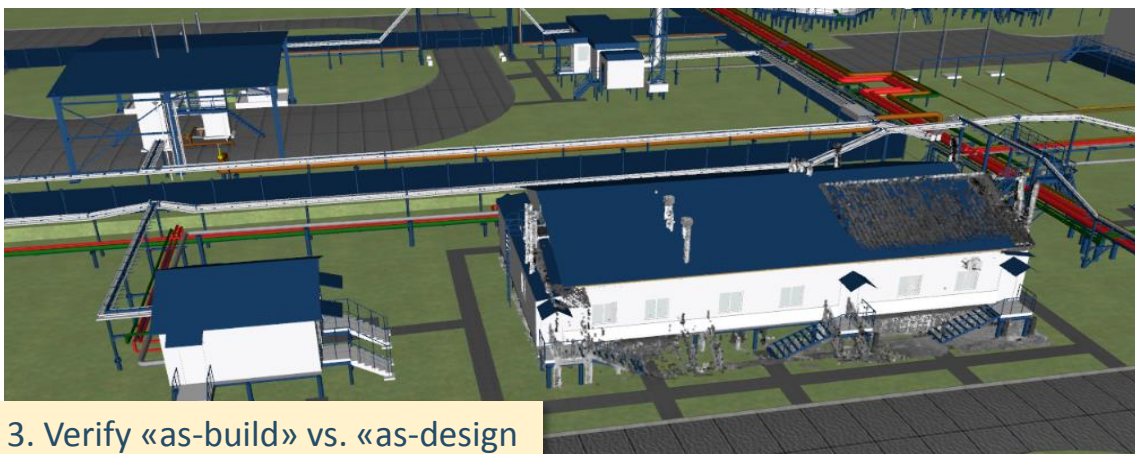
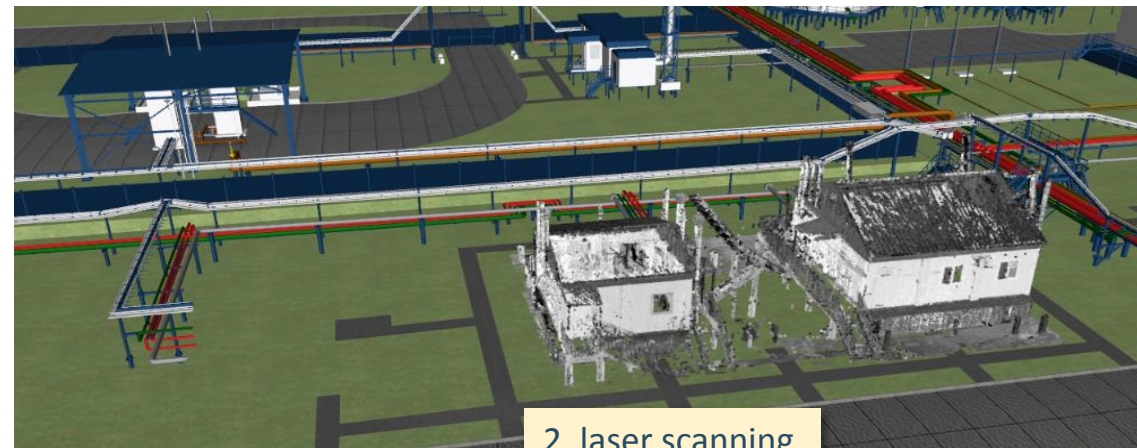
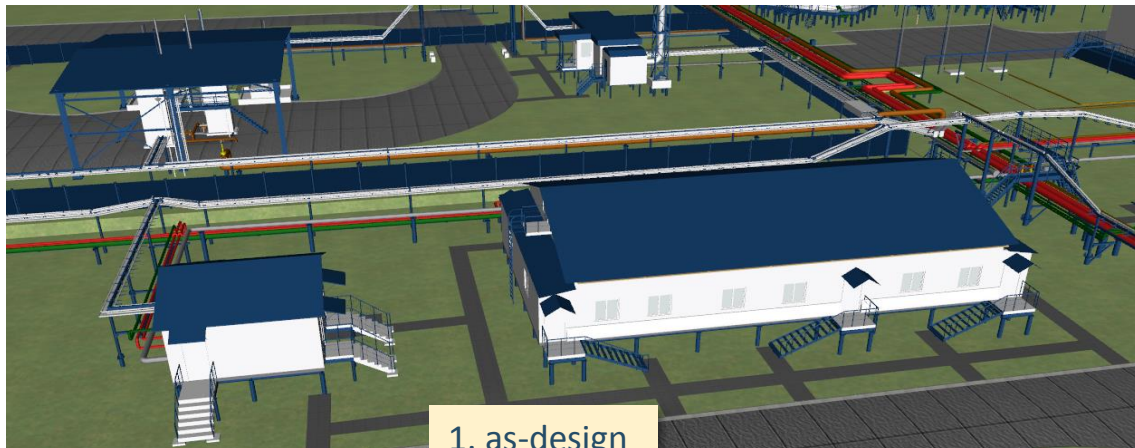
**File List on the Right:**

- Корректируемый рабочий пакет
- WP-65 (Отвод промышленных стоков)
- Эскиз 853.pdf
- WP-65 (Отвод промышленных стоков)
- WP-65 (Отвод промышленных стоков)
- WP-65 (Отвод промышленных стоков)
- WP-65 (Отвод промышленных стоков)
- WP-65 (Отвод промышленных стоков)
- WP-65 (Отвод промышленных стоков)
- Эскиз 840.pdf
- WP-65 (Отвод промышленных стоков)



# Management in construction stage

## Formation of As-Built Information Model





# Management in construction stage Formation of As-Built Information Model

## DATA:

- In-situ Concrete Strength
- Fresh concrete properties
- As-Built Dimensions
- Temperature monitoring
- Suppliers
- Date of execution
- Date of formwork removing
- Defects and its repair

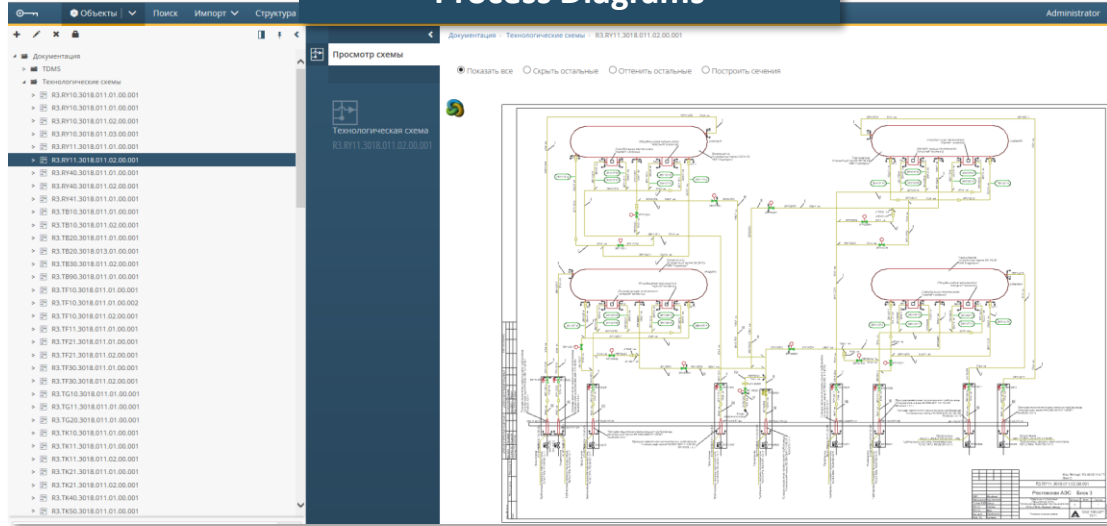
The screenshot displays the NEOLANT software interface. On the left, a tree view shows project documents and a 3D model of a building structure. A blue arrow points from the 'As-Built Dimensions' data point to the 3D model. The main window shows a 3D model of a building structure. On the right, a 'Характеристики' (Characteristics) form is open, detailing concrete properties. The form includes fields for date, model, concrete class, and various test results.

Field	Value
Дата бетонирования	01.01.2017
Наименование конструкции	Бетонная подготовка под фундаменты
Класс бетона по прочности на сжатие	B7,5
Состав бетонной смеси и технологические отклонения, Микродозировка составов	ССТ Б7,5 П2 F30W2
Вид и активность цемента	П400
Плотность бетонной смеси	12
Температура смеси при укладке, °C	18
Объем бетона уплотненного в смеси, л	12
Температура наружного воздуха, °C при бетонировании, °C	20
Наличие атмосферных осадков	Нет
Способ уплотнения	Глубинный
Маркировка контрольных образцов бетона	
Количество контрольных образцов шт.	
Наличие иб изготовленных контрольных образцов	
Результаты испытания контрольных образцов, при раставывании, кг/см²	48,5
Результаты испытания контрольных образцов, через 28 дней, кг/см²	44,8
Дата размещения	03.01.2017
Примечание	

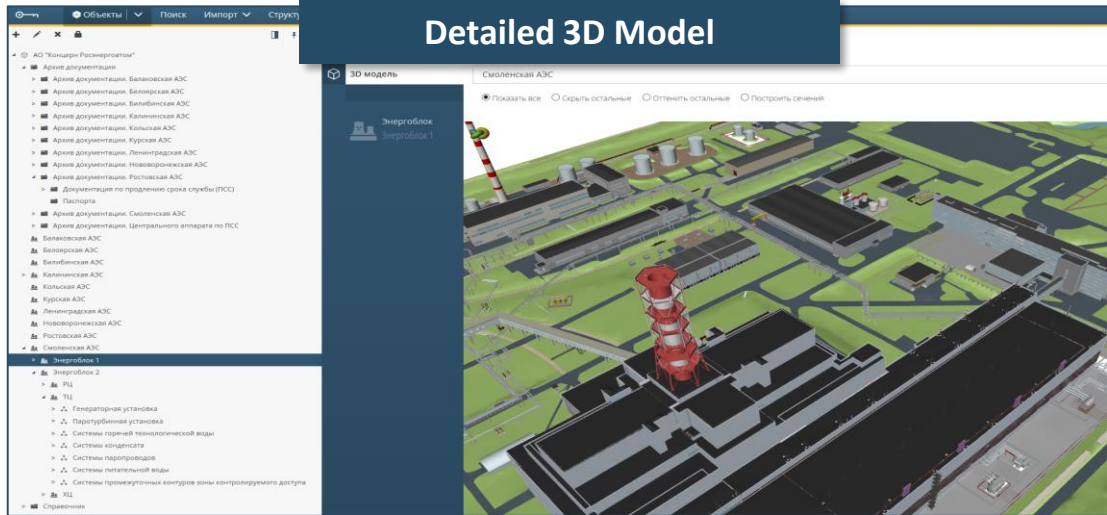
# Management in Operation Stage

## Single Access Point to Information

### Process Diagrams



### Detailed 3D Model



### Documentation Archive

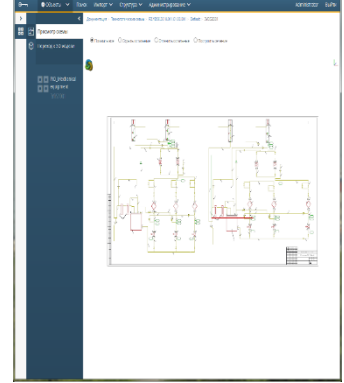
#### Archive documentation (TDMS)



#### Operating instructions



#### P&ID diagrams

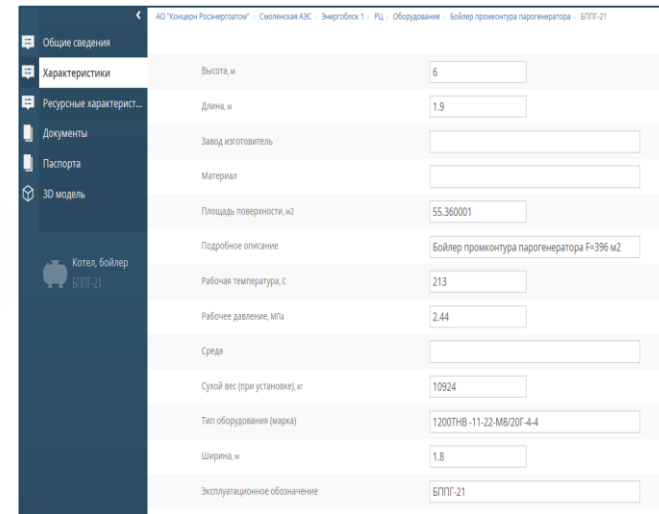


### Object Characteristics

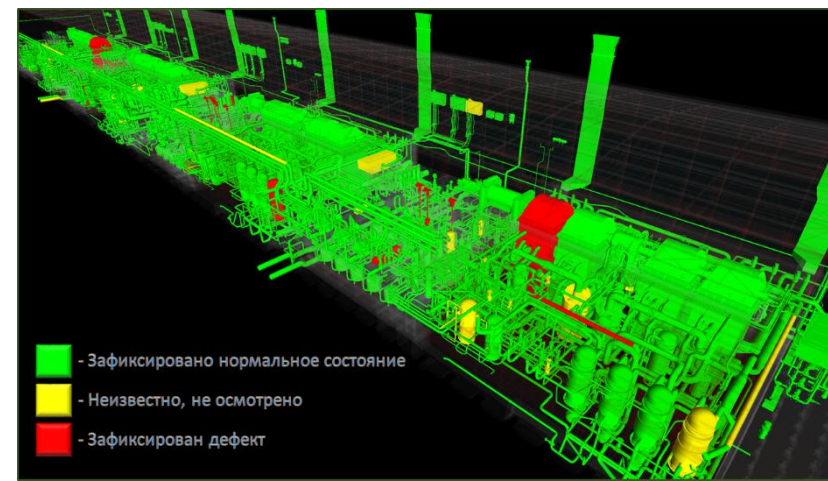
Общие сведения	Высота, м	3,908
Характеристики	Длина, м	30,74
Ресурсные характ...	Завод изготовитель	Энергoinvest - P.O. Тернополь, г. Сараево (СФРЮ)
Документы по УРХ	Материал	сталь Крезелло 330E+ICL473Nb
Паспорт	Площадь поверхности, м2	673,61
3D модель	Подробное описание	Барaban-сепаратор
Сепараторы жидкость - газ	Рабочая температура, с	285
15C-21	Рабочее давление, мПа	10,9
	Среда	Вода КМПЦ насыщенный пар
	Сухой вес (при установке), кг	278000
	Тип оборудования (марка)	18.001.000000
	Ширина, м	3,228
	Эксплуатационное обозначение	15C-21

# Management in Operation Stage

## Scheduled Works: inspections, walkdowns and etc.

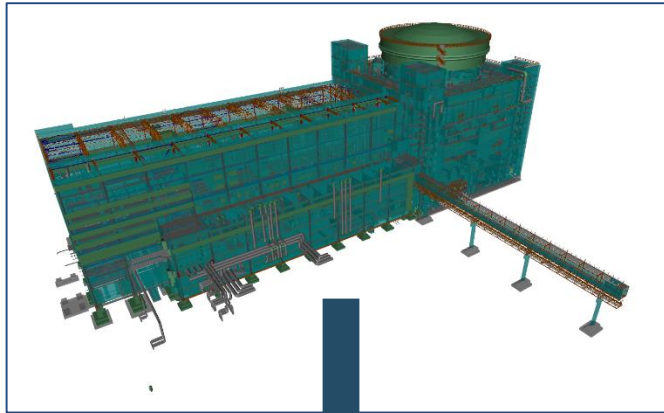


АО "Концан Росэнергоатом" - Системная АЭС - Энергоблок 1 - РЦ - Оборудование - Бойлер промконтра парогенератора - БПГ-21	
Общие сведения	
Характеристики	Высота, м: 6
Ресурсные характерист...	Длина, м: 1,9
Документы	Завод изготовитель: [input]
Паспорта	Материал: [input]
3D модель	Площадь поверхности, м2: 55,360001
Котел, Бойлер	Подробное описание: Бойлер промконтра парогенератора F=396 м2
БПГ-21	Рабочая температура, С: 213
	Рабочее давление, МПа: 2,44
	Среда: [input]
	Сухой вес (при установке), кг: 10924
	Тип оборудования (марка): 1200ТНВ-11-22-МВ/20Г-4-4
	Ширина, м: 1,8
	Эксплуатационное обозначение: БПГ-21





# Management in Operation Stage Support of Modernization and Reconstruction



**Decision about modernization**

## All information for making decisions

- ✓ Design and Engineering documentation
- ✓ Data from forecasting mathematical models
- ✓ Data from scheduled works
- ✓ 3D-Model
- ✓ Recording data about required equipment and materials
- ✓ And Etc.



**Design**

**Procurement**

**Mounting or Construction**

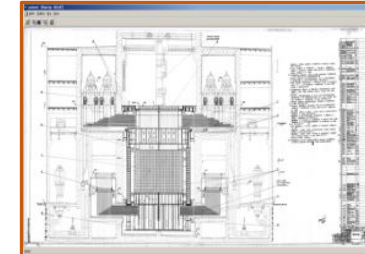
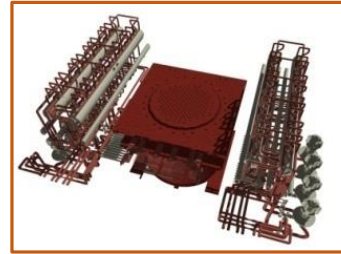
**Attributes and documentation**

**Geometry updates**  
**POLYNOM**  
Designing Complex Plants in 3D

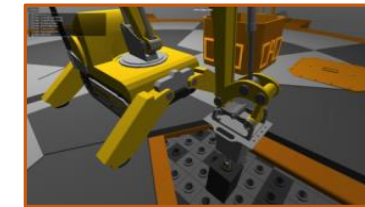
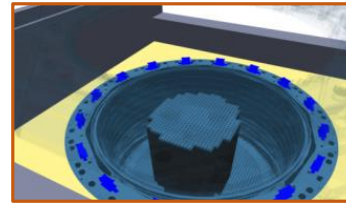
**Update Information Model**

# Management in Decommissioning Stage

1. Accumulation and Arrangement of Nuclear Facility Design and Engineering Data (drawings, specifications, diagrams, CAD models etc.) Keep the Data Available for Hundreds of Years

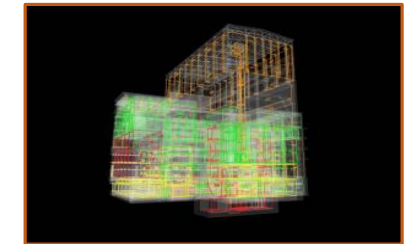


2. Simulation of On-Site Activities That May Affect Facility Nuclear and Radiation Safety

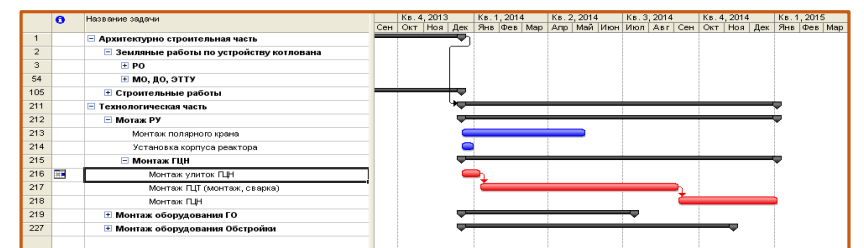
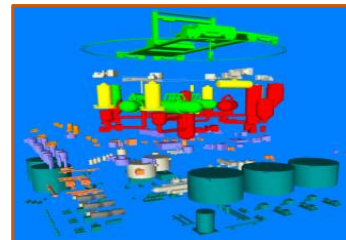


3. Radiation Exposure Data Gathering and Integration into Facility 3D Model:

- forecast amounts of radioactive waste arising from decommissioning;
- information support of radioactive waste management.



4. Decommissioning Projects Planning and Management Including Optimization of Decommissioning Activities Depending Regulatory Restrictions.



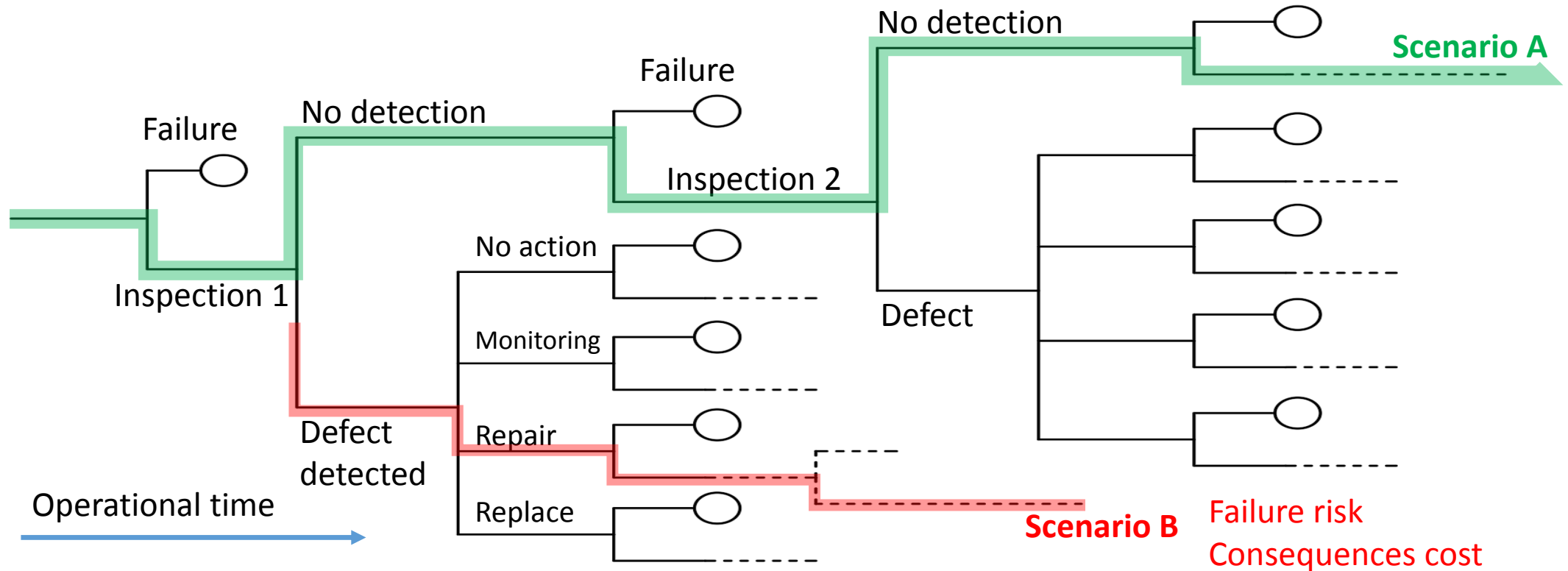


# Further Development

Optimal Life-Cycle Management → RISK BASED DECISION MAKING ←

Pre-posterior decision analysis  
 Big data analysis  
 Bayesian and neural nets

JCSS



life Cycle Management Scenario - plans for ensuring performance of a structure throughout its life cycle [ISO 22040]

# Conclusion

- Nowadays, the Digital form of information is seen as mandatory for the concept of a long life cycle and the development of systems to support solutions for the managing of life cycle, including on the basis of risk assessment and optimal strategies
- IT solutions allow you to organize suitable accounting and reliable storage of information and the company NEOLANT and Russia are actively on this path today
- In ISO 22040 would like to see more specific parameters and indicators that can be taken into account for the development of advanced engineering data management systems



# Thank You!

The group of companies NEOLANT (Russia)

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[ask@neolant.com](mailto:ask@neolant.com)

[www.neolant.com](http://www.neolant.com)



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