**Transactions of the Korean Nuclear Society Spring Meeting**
**Jeju, Korea, June 17-19, 2017**

**Workshop H: 원전 형상관리 추진현황 및 향후 계획**

# Case Study on Configuration Management System Strategy and Implementation at Krsko NPP, Slovenia

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# Agenda

1. Introduction
2. CM Strategy
3. CM Processes
4. CM Lifecycle
5. CM Systems and IT
6. KPMIS - Krsko Plant Management Information System
7. Conclusion

# 1. Introduction - Background

*"[Krsko] NPP received the highest total rating for nuclear safety and operational readiness. By presenting the review results, the mission members pointed out the above-average high implementation of recommendations of international operational experiences and safety achievements." (WANO, 2014)*

W A N O

[NEK] was a host to numerous international delegations who visited the power plant on the recommendation of the World Association of Nuclear Operators (WANO); the Association is known to give our plant as an example and good opportunity for the transfer of best practices.

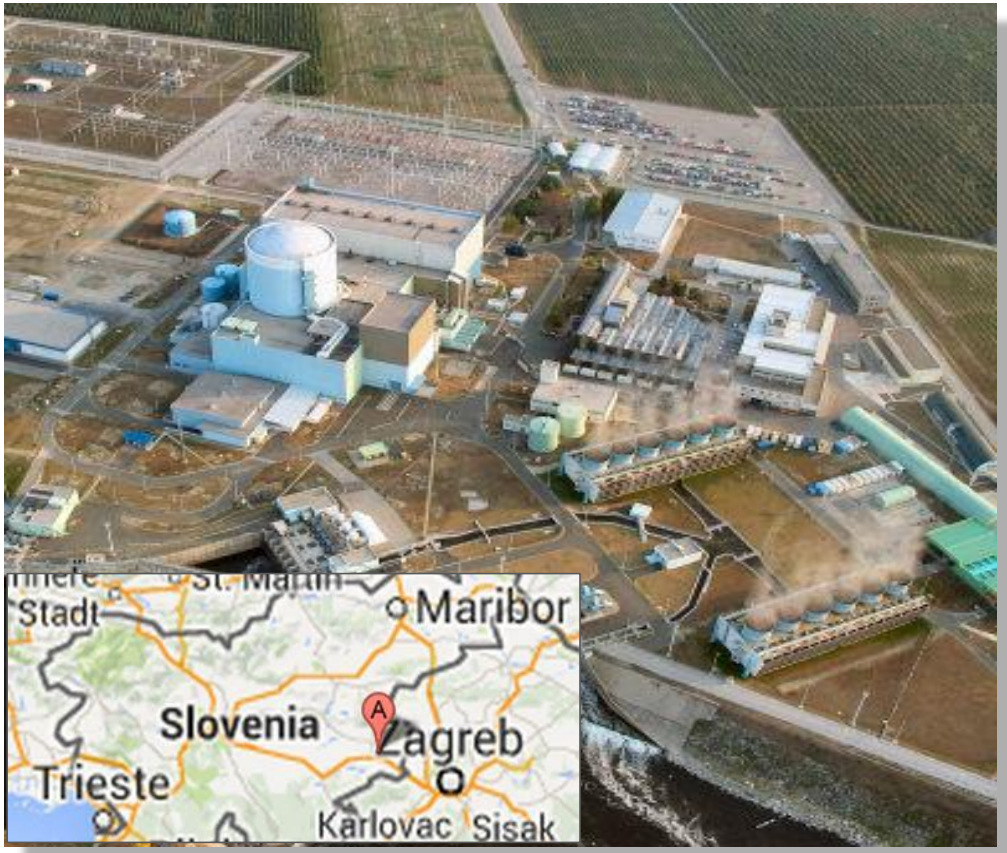
IAEA

Often Referenced as Model Plant by IAEA for Operations and CM. OSART missions consistently in top rankings.

Nuklearna Elektrarna Krsko

Operating history of a total of 1-2 unplanned trips over the last 10 years of operation, averaging 35,000 hours of continuous FPH, generally non-stop operation between refueling outages.

# Krsko Nuclear Power Plant




Slovenia

Model 60
2-loop
PWR

705
MWe

Built by
GAI
(WorleyParsons)

Sister NPP to
Kori-2

Commissioned
1981



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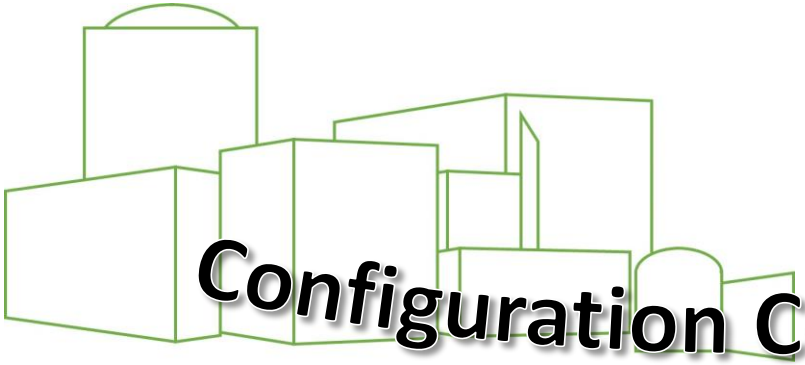
**Task Requirements**
(What is required to be installed)

# Configuration Control Program

The process must ensure that:
• the [CM] elements (requirements, and configuration information) are coordinated [with design information]
- all configuration changes are approved
- consistency may be checked with operating data



Design Information

Installation Information

Related Information
— Maintenance
— Training
— Purchasing

Configuration Control Program

**Physical Configuration**
(What is actually in the Plant)

**Configuration Information**
(What we say is in the Plant, or "As-Built")



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# 2. Configuration Management Strategy

**Safety Case**

- How the capture and maintenance of CM information impacts and determines NPP safety and performance

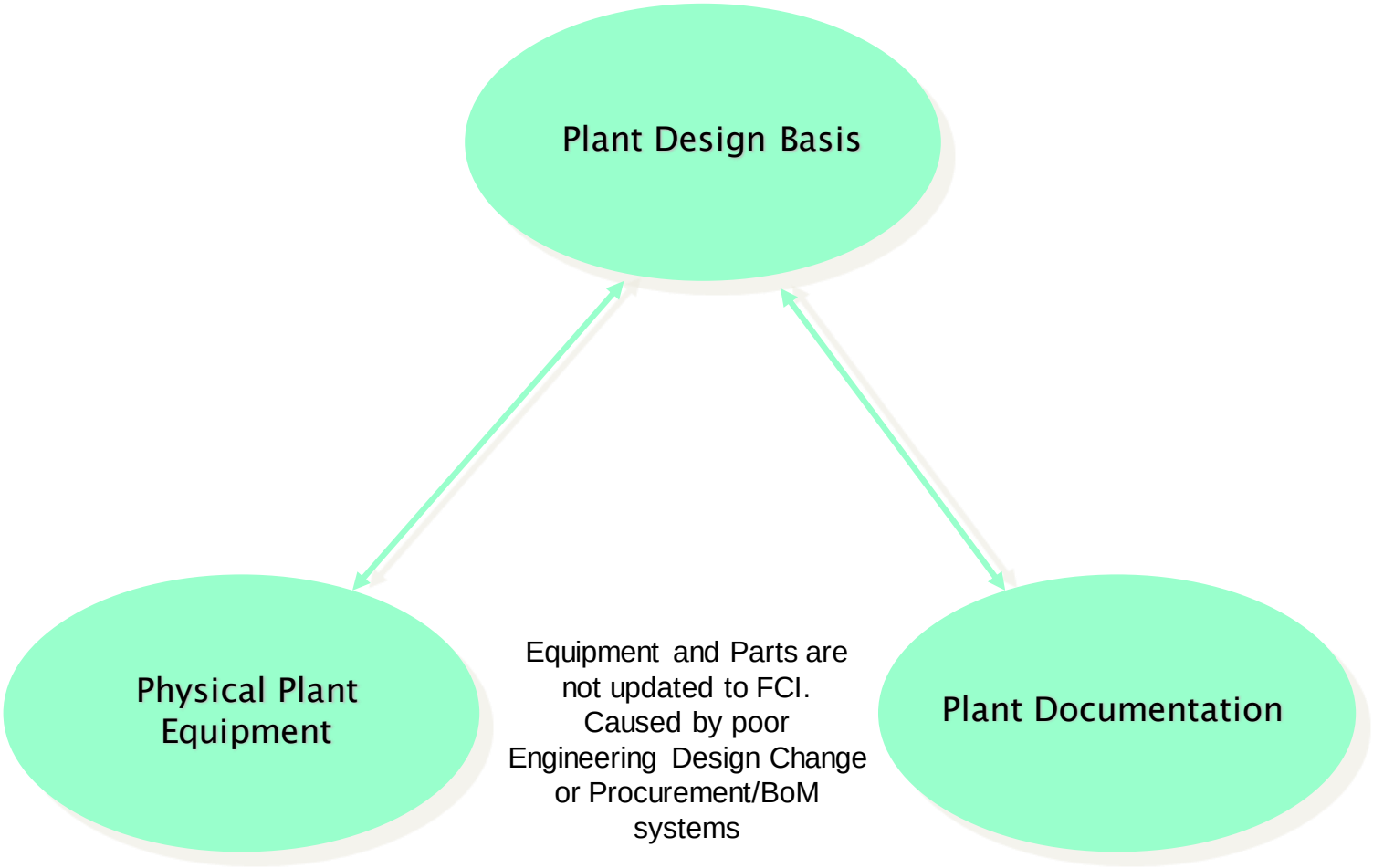
**NPP Design and Operation**

- How virtually every NPP process, organization and process can affect the integrity of CM

**Capture and Use**

- The best sources and methods to capture, validate, utilize and maintain CM data

# 2. CM Strategy - Loss of CM Equilibrium



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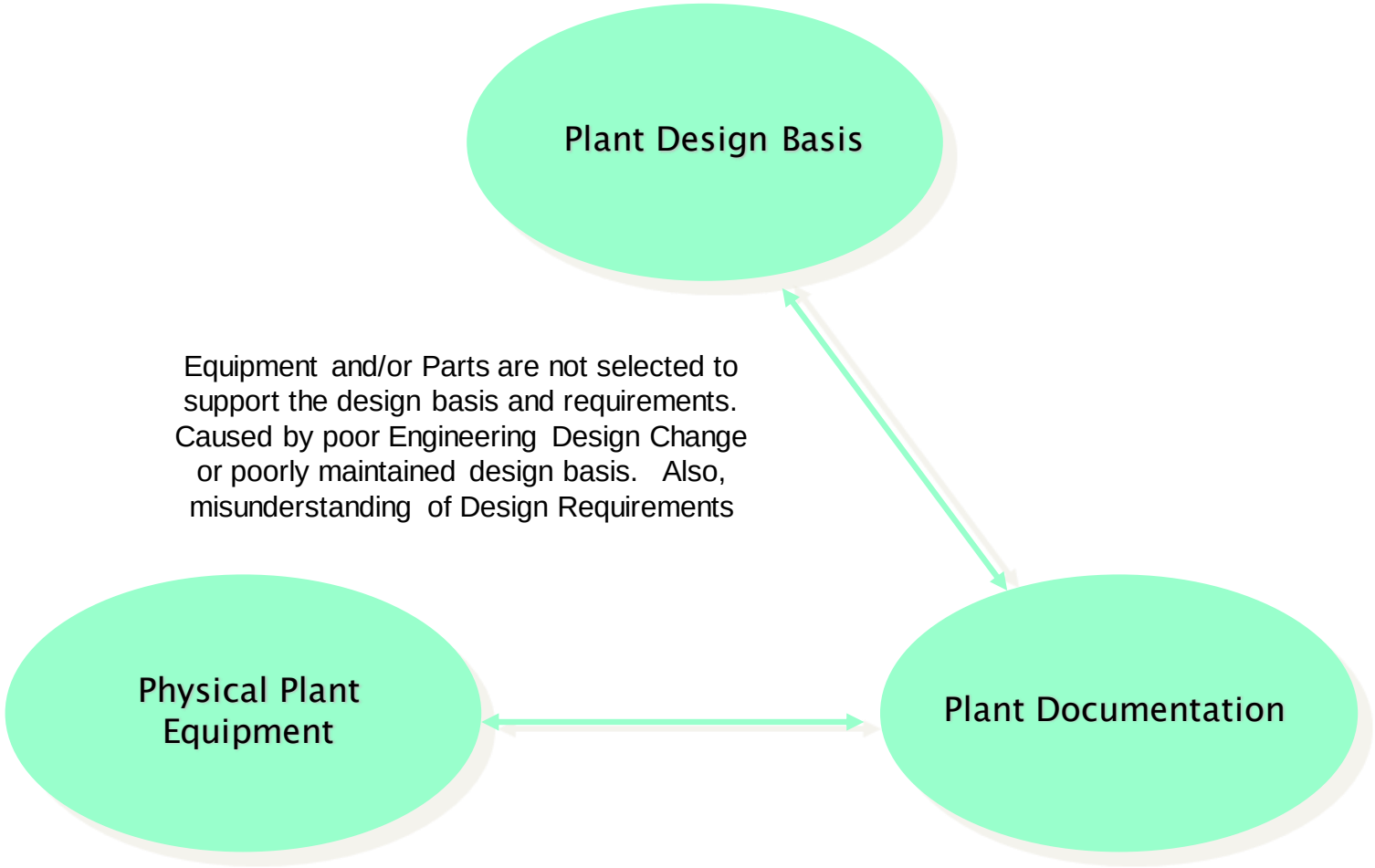

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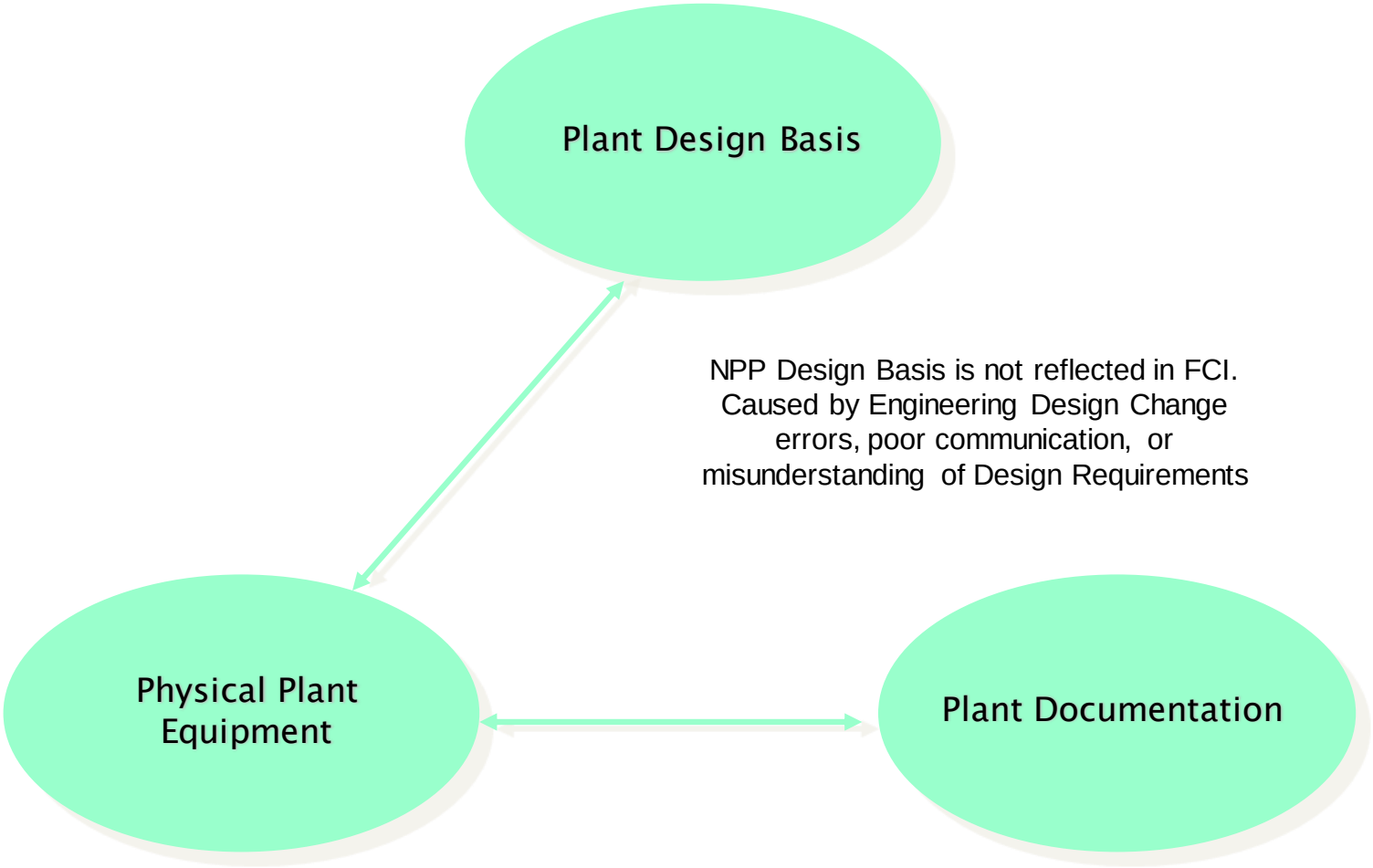
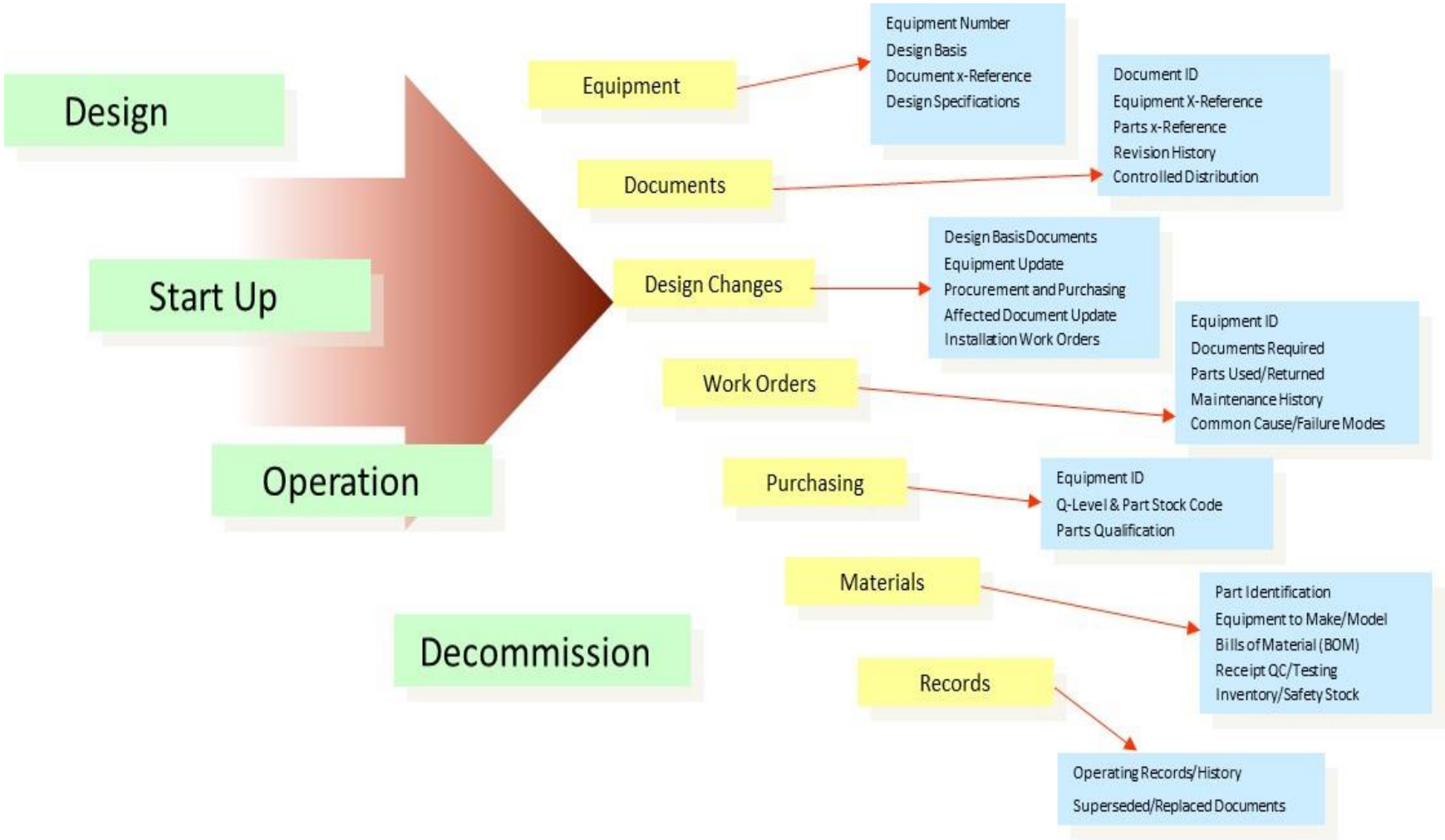
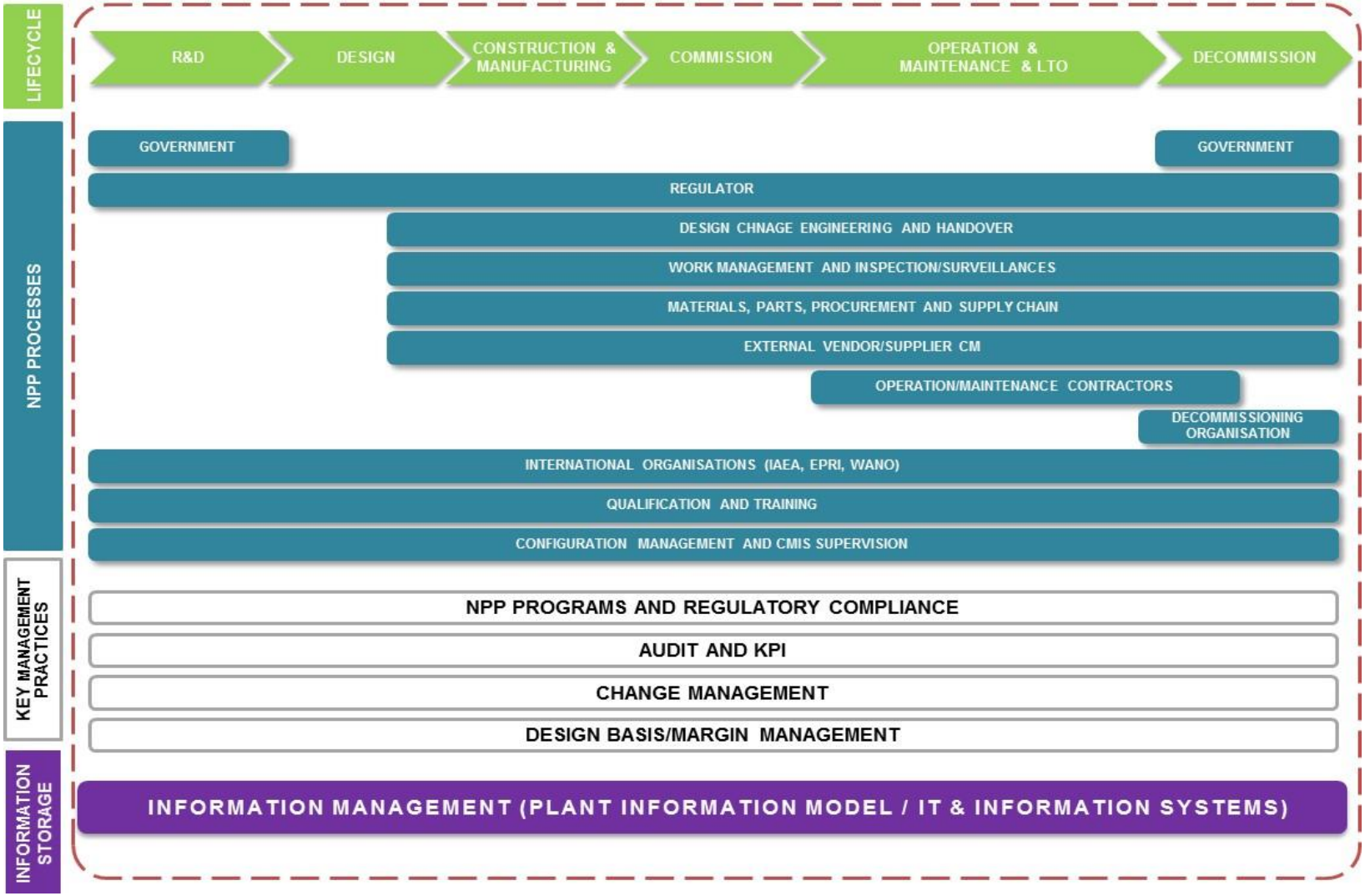


# 3. CM Processes

# 4. CM Lifecycle



# 4. CM Lifecycle



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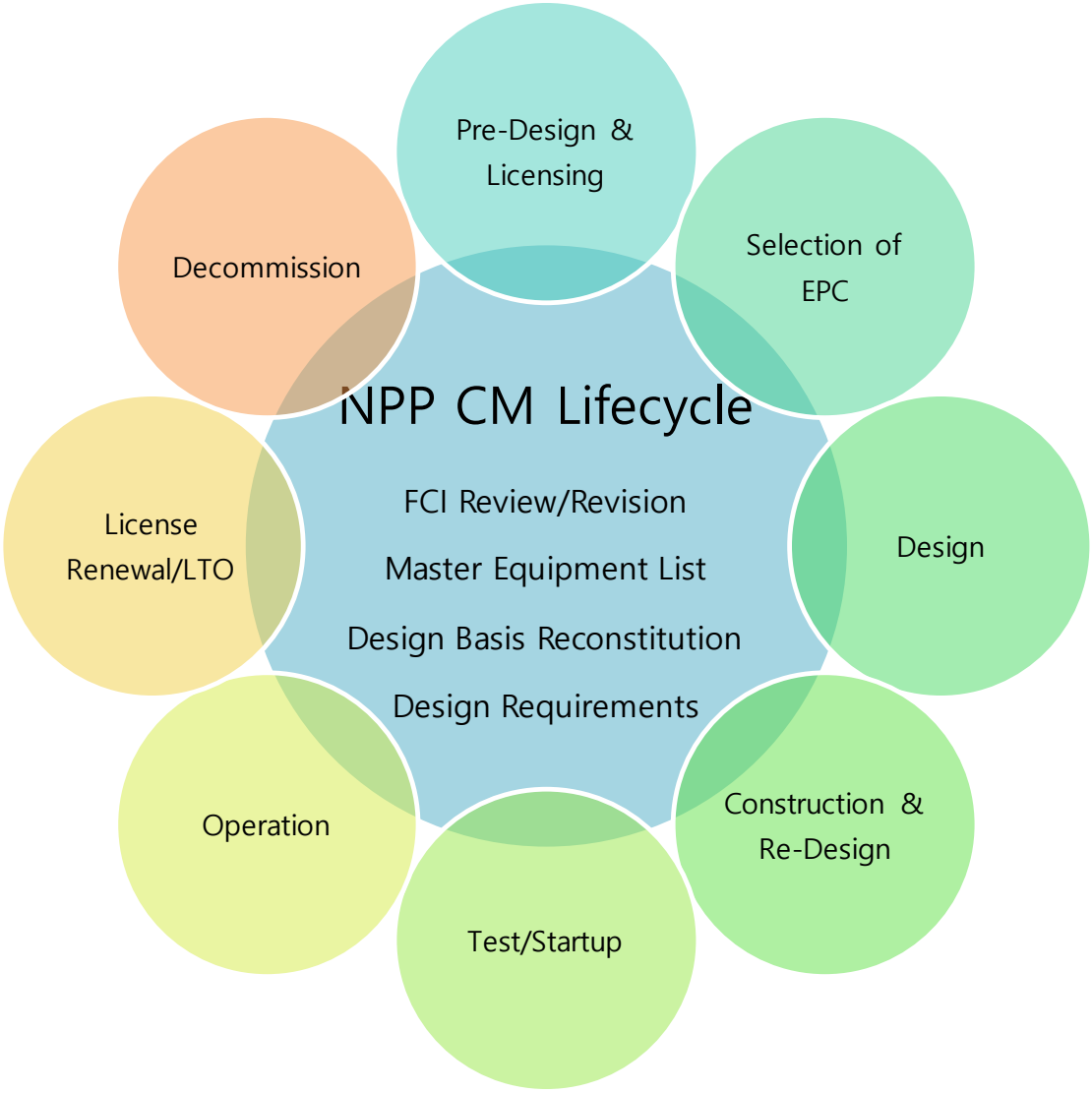

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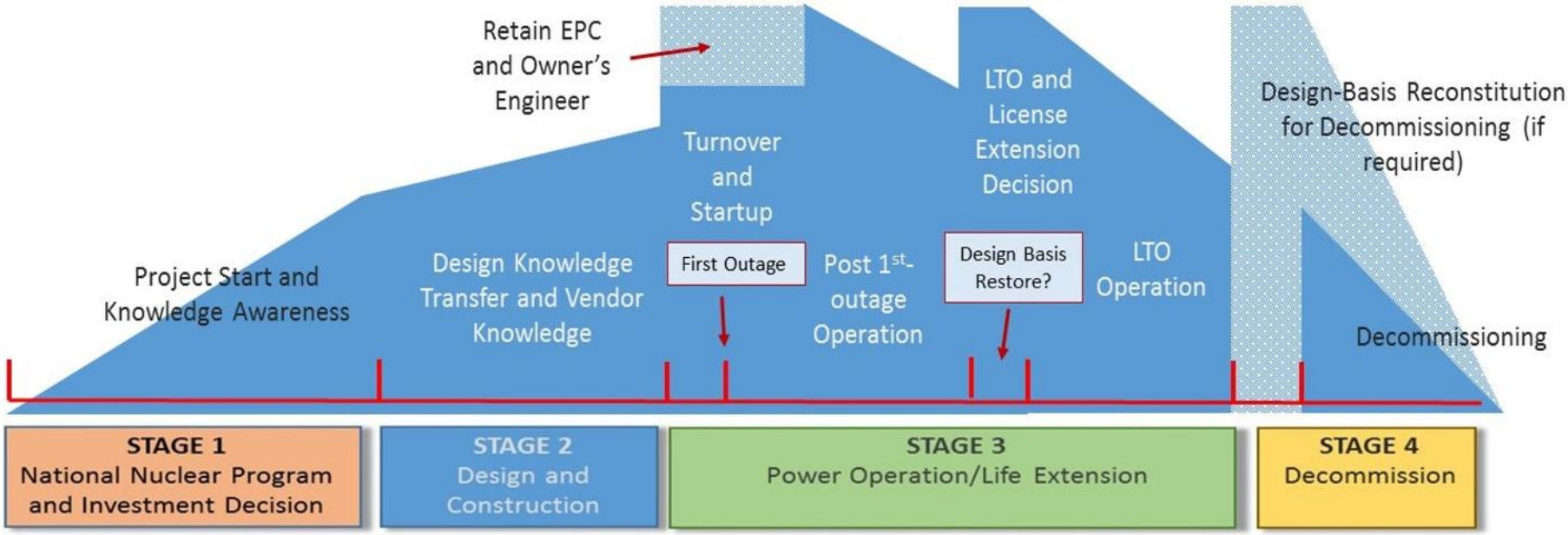
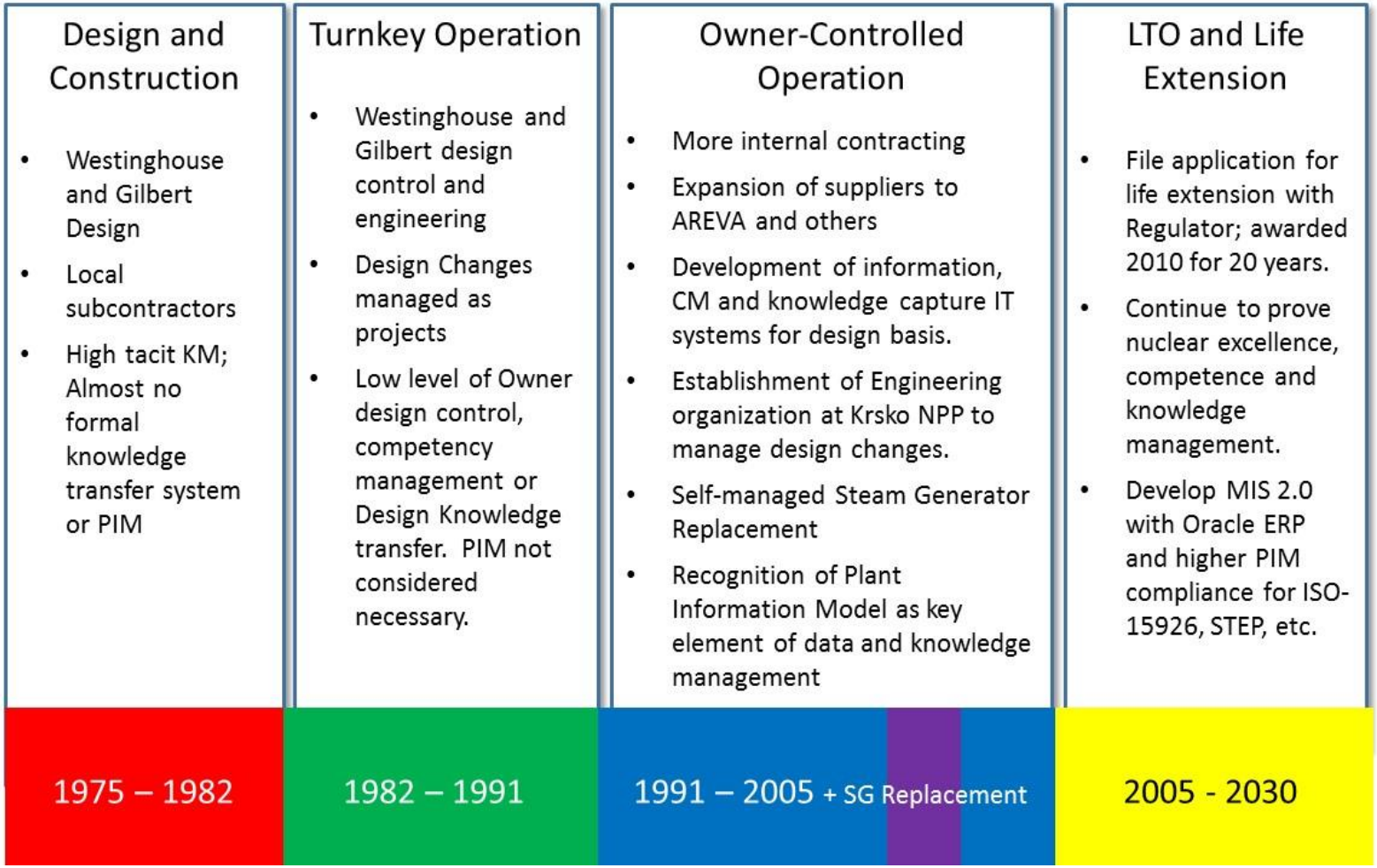
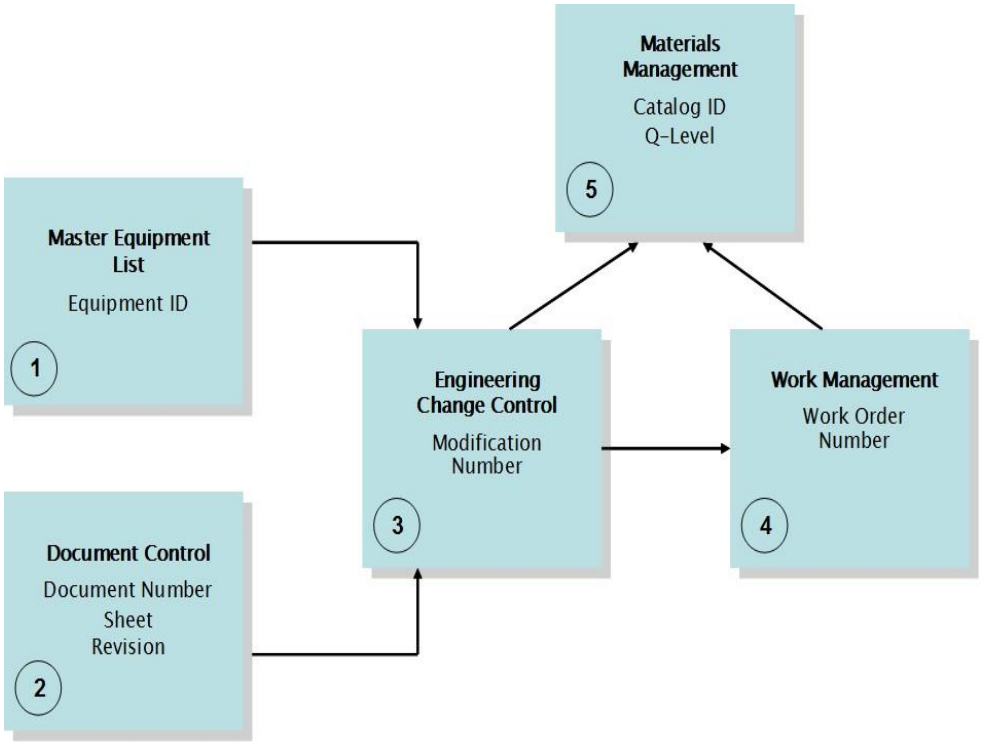



Configuration Management integrity (equilibrium) over the NPP Lifecycle. Note plant lifecycle stages and inflection points where potential for configuration and design basis loss, and subsequent design basis reconstitution, is greatest

# 4. CM Lifecycle



# 5. CM Systems & IT - The “Big 5” Functionality




**Master Equipment List**
- Identify NPP SSC's
- Equipment Design
- Determinants
- Cross-References

**Document Control**
- Identify FCI
- Control Revision & Distribution
- ECC and Equipment Cross-Reference
- Document Design Basis

**Engineering Change Control**
- Control Changes to SSC's
- FCI Revision equilibrium with MEL
- Control of Design Basis and Requirements
- Control BoM (with Procurement)

**Work Management**
- Identify correct SSC for Work
- Qualified parts according to BoM
- Correct Process and Procedures
- Safe Equipment Air/Power Supply Isolation

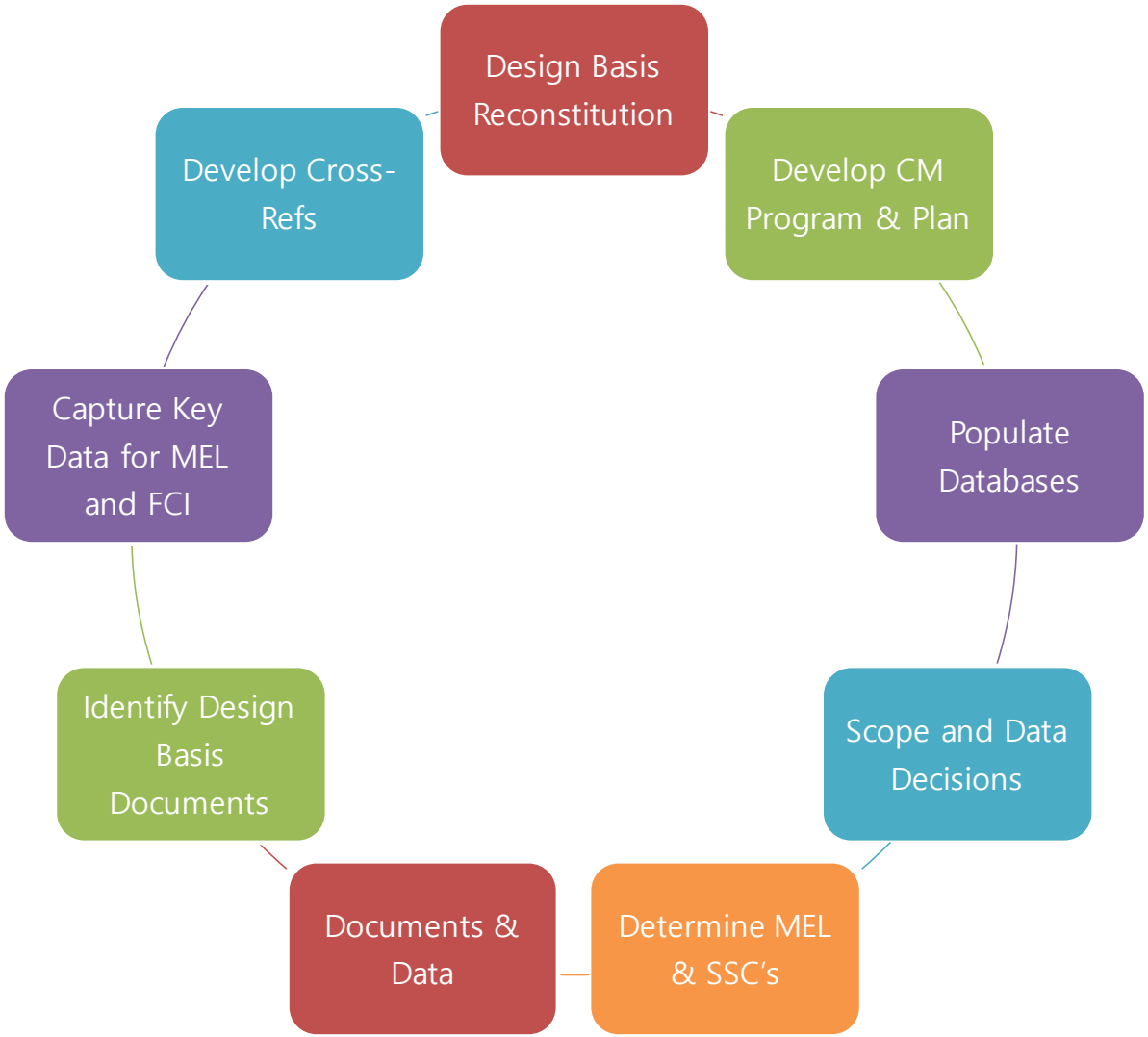
**Materials Management**
- Match Make/Model to SSC
- Reconcile Stocks to BoM and Equipment
- Qualification of Parts to Equipment Location

# 6. KPMIS – Krsko NPP

Krsko NPP realized, after 10 years, that:

- Krsko NPP did not know what equipment was in the plant, or where the equipment was located.
- They did not have a Master Equipment List (MEL).
- They did not have an effective or complete document management solution for FCI.
- Design documents were not cross-referenced to equipment items, work orders or design projects.
- Most plant modifications provided very little documentation as work was performed by third parties with little turnover, resulting in gaps in the design basis.
- Other configuration information, such as design basis and even bills of material and parts, did not exist.
- A central source of general equipment data, or even what was actually contained inside the plant, was not kept in a facility where it could be referenced by NPP staff.

# 6. KPMIS - *Data Acquisition & re-establishment of the Design Basis*



# 6. KPMIS - *Steam Generator Replacement*

## Steam Generator Replacement

- Replacement of 18 year-old Units
- $120M Program

## Preparation and Manufacture

- 18-24 months engineering and planning
- New Steam Generator fabrication and design transfer
- Virtually every system reviewed for power recovery/uprate (10%-15%)

## Installation of Steam Generators

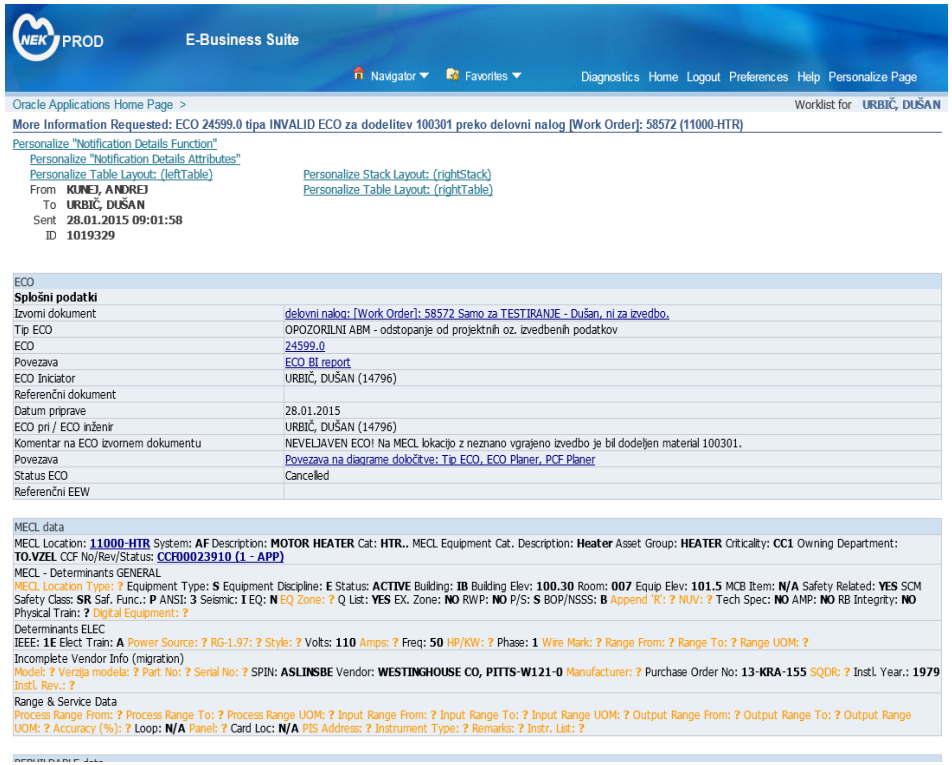
- Removal and Replacement of Steam Generators over 60-Day Extended Outage
- Configuration, MEL, Design Basis and KPMIS Updated from Field Change and Test Data

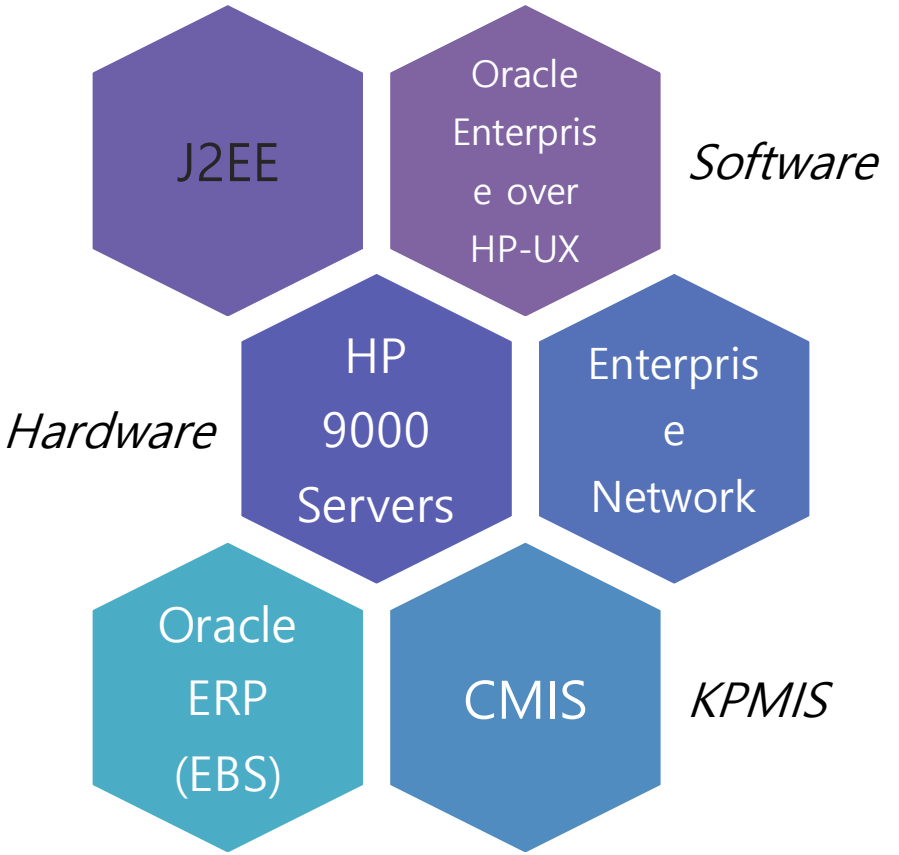
## CM and IT Systems

- KPMIS provided complete MEL, FCI and Design Basis
- Engineering Design Packages and progress tracked in KPMIS
- CM and IT support for Vendors and Subcontractors praised for CM speeding up work, quality
- Licensing work expedited by KPMIS

# 6. KPMIS - *IT Architecture and Technology*

## Krsko Plant Management Information System




*Sample KPMIS system user interface. Major equipment list (MEL) and detailed determinent information*

# 7. Conclusions

One of the ways nuclear power plants ensure safety and viability is to maintain a Configuration Management (CM) program.
Such a program impacts virtually all business activities in operating a nuclear plant.

The Krsko NPP has effective internal methods for controlling plant maintenance and its configuration management activity.

NPP Krsko has reviewed KPMIS replacement technology, such as Ventyx Asset suite and other commercial off the shelf (COTS) products compatible with Oracle database products, but has not, to date, announced any significant changes to the KPMIS program.

# Thank You.

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