



ATOMEXPO-2017, MOSCOW, JUNE 19-20

# Digital future: the next step in the development of nuclear technologies

Nikolay Godunov, VP of NC/CIS, ABB Enterprise Software

# Quantum leap in digital: ABB Ability™

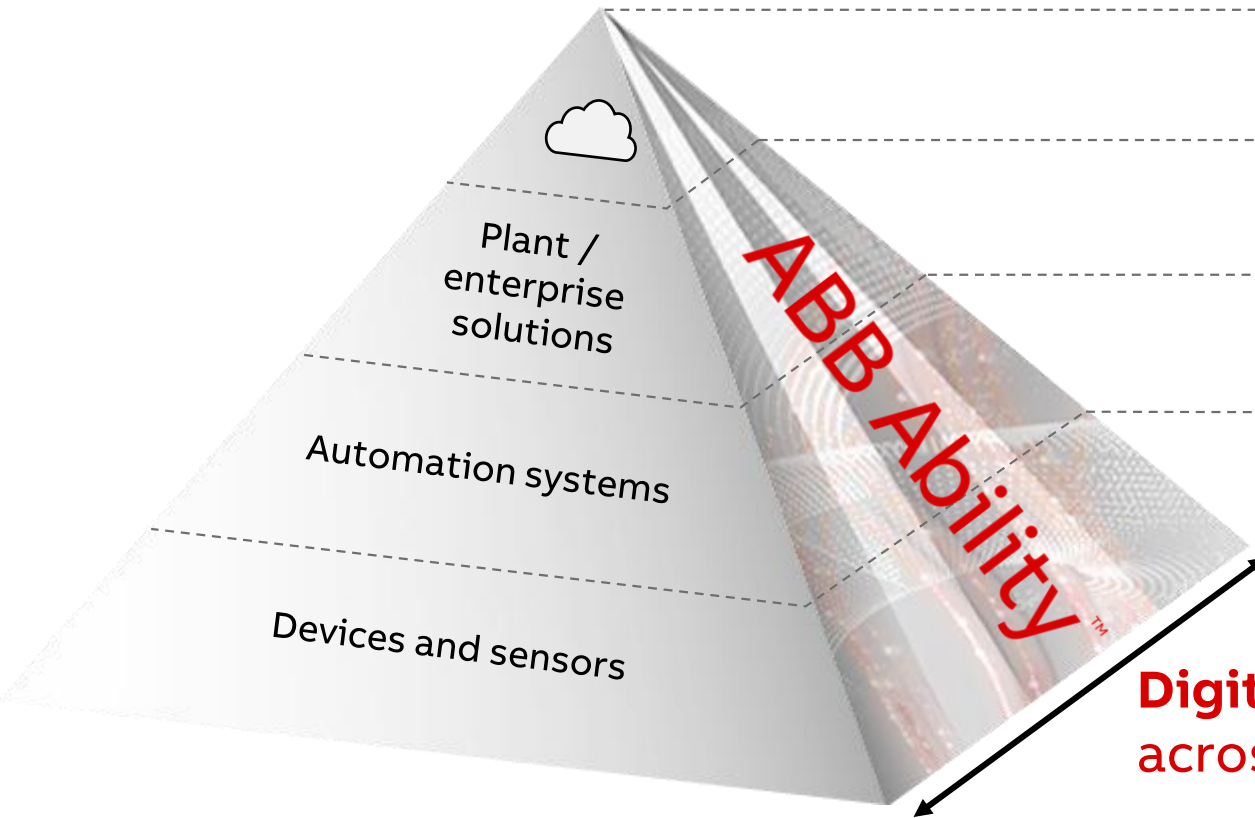
Creating one common offering for digital end-to-end solutions

Build on customer trust, domain expertise,  
deep process knowledge

Open access, intelligent cloud

New end-to-end digital solutions

Closing the loop with connected devices



**Digital ABB offering**  
across businesses: integrate, penetrate, replicate

# ABB Ability™

**Industry/Market' s Challenge**  
 cross-function, customer req., competitor, industry flat/diversified/mature,...

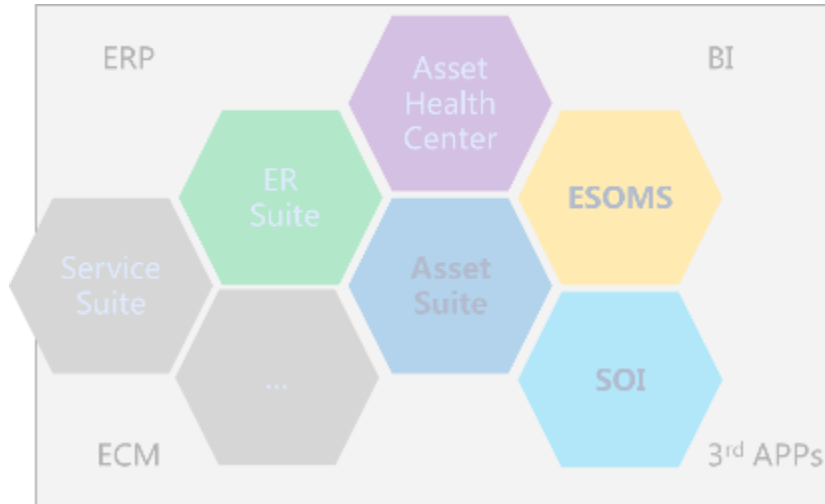
**IT Tech. Challenge**  
 Cloud, Big Data, IoT, Mobility, AI, Machine Learning, Cyber security, ...

**Traditional Ability**  
 ABB, s

**Business**

NPP Project Mgmt.	Prod.-Prep. Mgmt.	Commission Mgmt.	Training Mgmt.
Maintenance Mgmt.	Operation Mgmt.	Engineering Mgmt.	Supply Chain Mgmt.
QHSE Mgmt.	IT/Doc Mgmt.	HR Mgmt.	Enterprise Mgmt.

- ABB Provide:**
- Business Consulting
  - Benchmarking
  - Peer interviewing
  - ...



- ABB Provide:**
- Software Products
  - Industry IT Solution
  - Professional IT Services
  - ...

**OT**

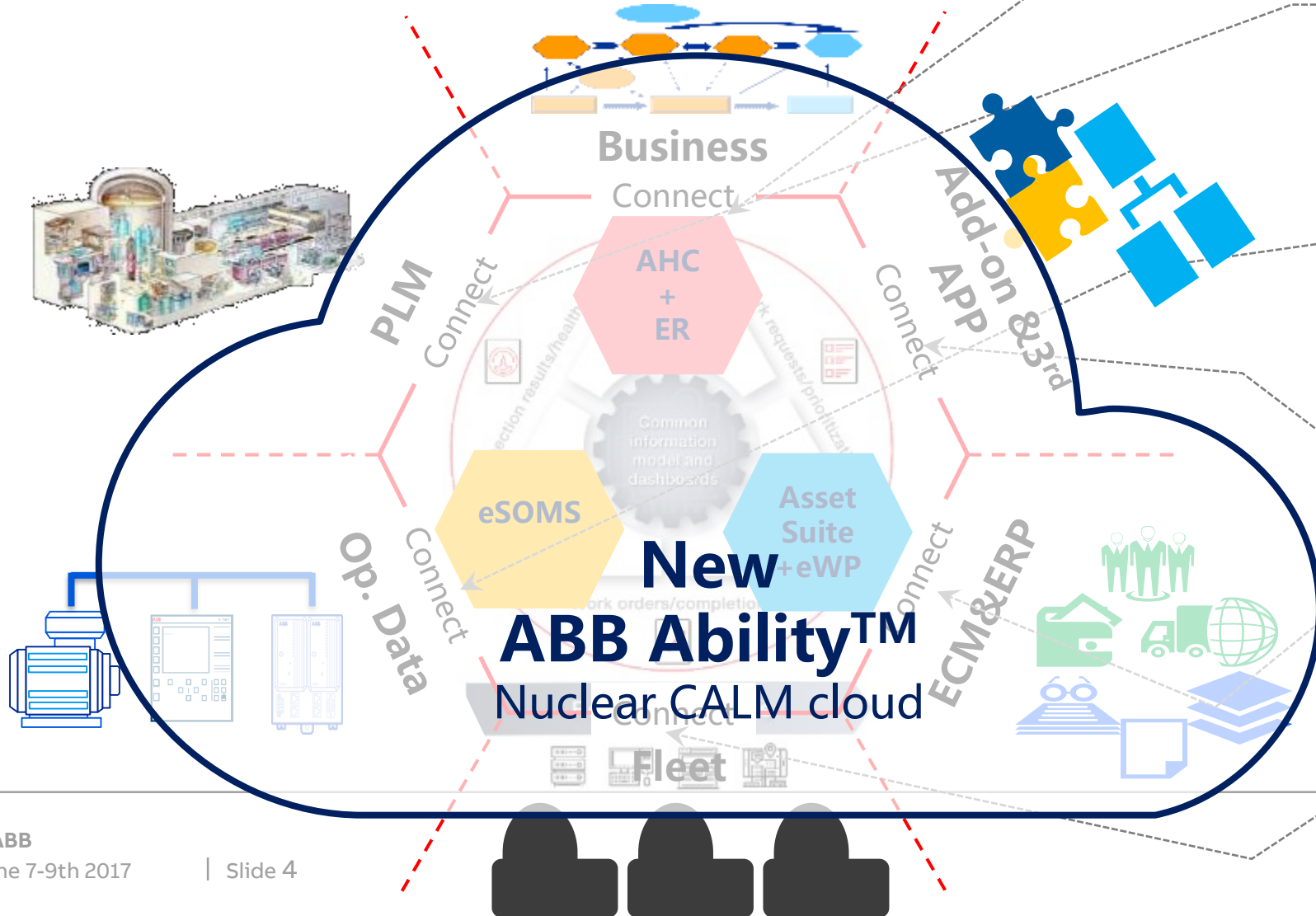


- ABB Provide:**
- Electric Power Equipment
  - Distribute Control System
  - Robot
  - Electric Power Automation
  - ...

**ABB**  
 Moving Ahead  
 ...

# ABB Ability™

## Connected Asset Lifecycle Management - (CALM)



- Cover all 'ASSET' related business.
- Support business standardization and nuclear performance model.
- Exelon, EDF eNPM, Hualong DNPP, etc.

- Support digital 'Data Handover'
- Archive asset Maintenance/Op. data lifecycle management.
- Config. Mgmt. – EC Alignment
- Maint. /Op. 3D visualization

- Sensors, SCADA, PI integration
- New Power Automation integration
- Asset Health status analysis
- PM strategy optimize
- ...

- Migrate Add-on into platform
- Bundle production support apps. (Mobile, Fuqing Tool Management,)

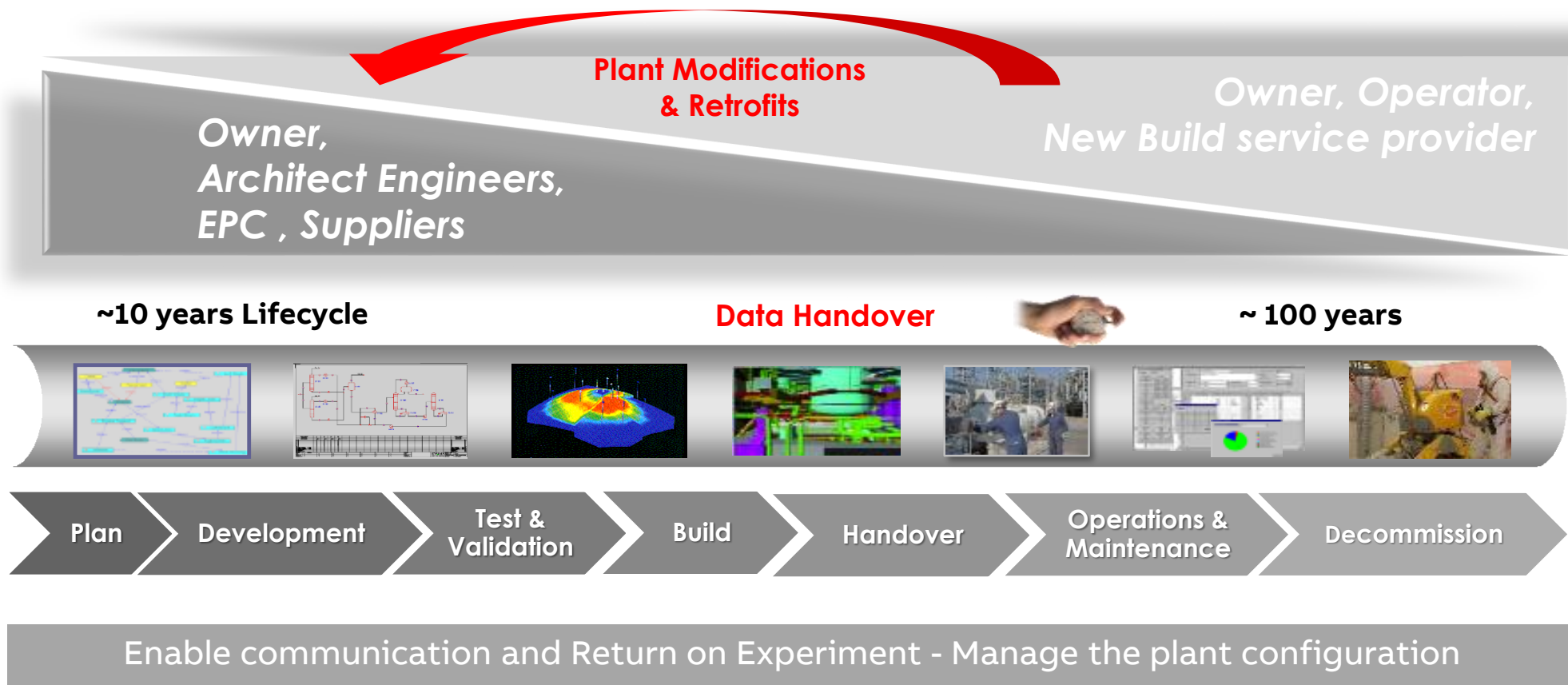
- Enterprise Management Platform
- ERP, ECM, P6,...
- Config. Mgmt. – EC docs\ spare part. Alignment.

- Reference Fleet management.
- Model Object Library.
- Plant Class or Vintage

Example

# Digital ABB offering across businesses

New Build Challenges: need to manage the data from day 1 till the end of plant life



Example

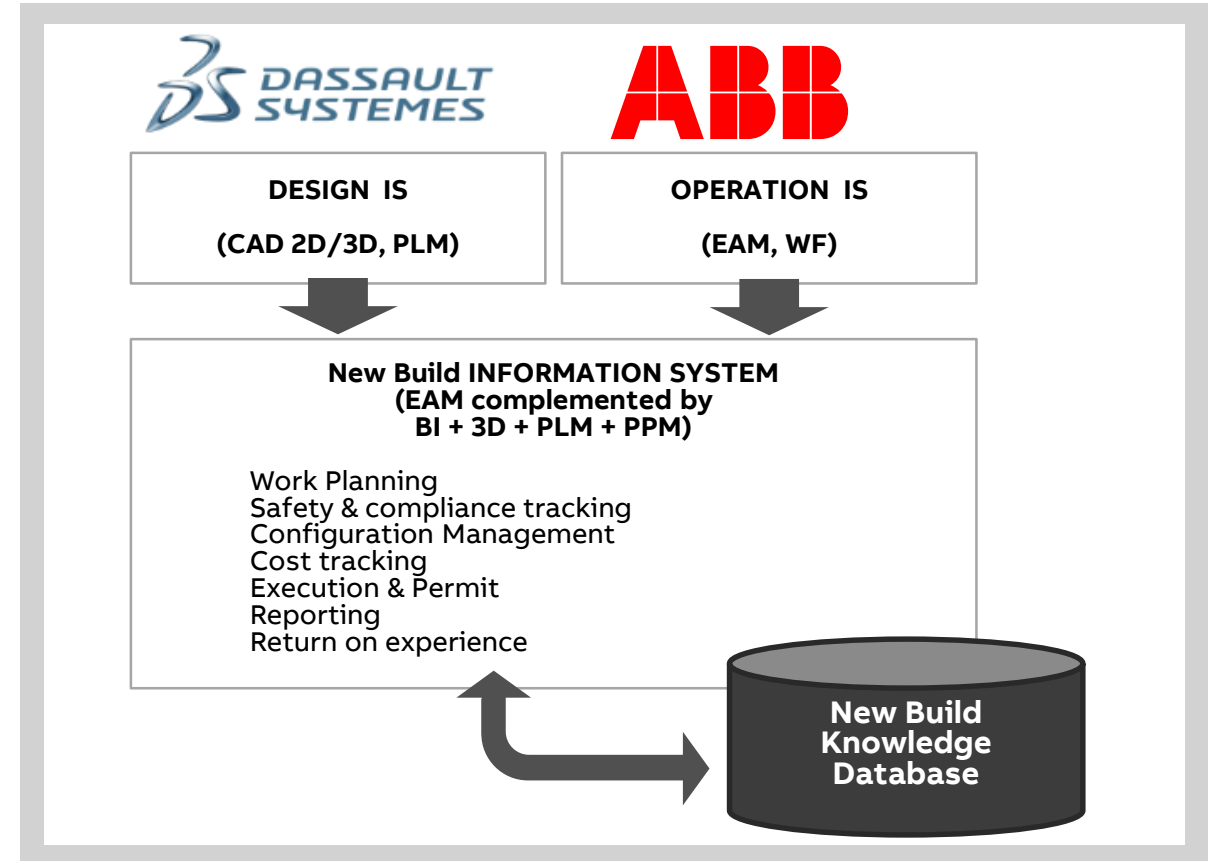
# Digital ABB offering across businesses: integrate

Enterprise solutions. Plant Life Management / Enterprise Asset Management

## New Build Information System

New Build IS Foundation is Nuclear EAM & PLM

- Provide efficiency during Maintenance Planning
  - 4D Maintenance Simulation
  - 3D Work Assessment
- New Build IS supports the New Build Strategic business approach and rely on a central data repository
- DATA shared across all actors to maintain control of operation and optimize future New Build strategies
- New Build IS enables other innovative practices
  - 3D Virtual Training & Certification,
  - 3D Work understanding / familiarization
  - 4D Deconstruction Simulation, 3D Work Assessment,



# Digital ABB offering across businesses: integrate, penetrate

Plant solutions. EOM (ABB eSOMS) usage in NEK

Example

## About NEK

- PWR, Westinghouse
- Thermal power ~ 2000 MW
- Net electrical output ~ 700 MW
- Shared between Slovenia and Croatia
- 40% electrical power in Slovenia
- 1983 commercial operation start
- Licenced to 2043



## Why ABB eSOMS?

Broader scope of seamlessly connected applications with much desired functionalities.

Required interfaces were:

- MECL,
- WOS,
- Primavera.

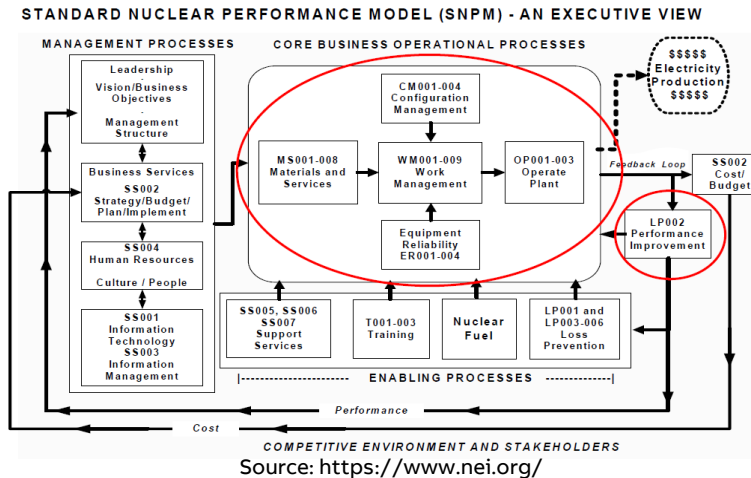
## Current state eSOMS 3.9

Modules used:

- Equipment
- Clearances
- Narrative Logs
- Operator Rounds
- Mobile Operator Rounds
- Configuration & Control
- Notice of Change
- AutoPrint
- Utilities

Reports & printouts:

- All Crystal Reports within eSOMS are customized
- Web interface for CR and MS
- SharePoint is used for some CR reports on NEK intranet portal
- Web reports for tagouts for work orders that are saved as pdfs
- Oracle BI is used for gathering requirements for clearances



# Digital ABB offering across businesses: integrate, penetrate

Plant solutions. eSOMS usage in NEK

Example

## eSOMS some statistical data

On line (18 months):

– Work shift:

- 3 shifts x 8h / day

– Number of clearances:

- ~1150

Outage (1 month):

– Work shift

- 3 shifts x 8h / day + additional support

– Number of clearances

- ~1200

120 System Operation Procedures implemented in Configuration Control module with their startup and operation lineups

- ~ 15000 different equipment

The screenshot displays the eSOMS software interface. At the top, there are navigation buttons: 'Urejanje OP', 'Complete Work Order', 'Update Work Order', 'Check Material Shortage', 'Estimate', 'View Costs', 'Clearances', 'Update Work Hierarchy', and 'Enter Event/Message'. The main window title is 'Clearance Module - Urbič Dušan - [1-OL29 - Nevamost-OLM - CW-0021 - -23022 REMONT REDUKTORJA]'. Below the title bar is a menu bar with 'File', 'Edit', 'Setup', 'Window', and 'Help'. A toolbar contains various icons for file operations and navigation. The main area shows a table with columns: 'Work Order Operation Number', 'Description', '1st Verified By Date/Time', '2nd Verified By Date/Time', 'Work Complete', 'Work Verified Complete', 'Status', 'Opened', 'Closed', and 'Percent Complete'. The table contains several rows of data for work orders 89219-10, 89219-100, 89219-20, and 89219-40. A detailed view of work order 89219-20 is shown in a pop-up window, providing information such as 'Status: OP FINISHED', 'Percent Complete: 0', 'Description: Opis DN: CW-23022] REMONT REDUKTORJA IN AKTUATORJA | 2017/160-2: NEZMOŽNOST ROČNE MANIPULACIJE Z VENTILOM 23022', 'Operacija: ZA DELO', 'Tip DN: CM - Corrective Maintenance', 'Status DN: Working', 'Prioriteta DN: O - Ostalo', 'Opis operacije: DEMONTAŽA POGONA IN REDUKTORJA, DVIG REDUKTORJA Z AVTO-DVIGALOM', 'Status operacije: FINISHED', 'Opened: 2.2.2017 08:00:00', 'Closed: 9.2.2017 10:24:35', 'Odgovorne osebe: Tehnolog: [redacted]', 'Kordinator: [redacted]', 'Vodja del: [redacted]', 'Dovolilnica za osamitev: Dovolilnica št: 84418', 'Opis dovolilnice: CW-23022 REMONT POGONA IN REDUKTORJA TAGG', 'Posebne zahteve: Zacasni odmik: N', 'Delni odmik: N', 'Komentar: Ventil bomo blokirali v odprtoj poziciji, tako da sistem bode operabilan. Postavili rdečo kartico na breaker', 'Časovni okvir DN: Planiran zacetek delovnega naloga: 30.01.2017 12:00:00', 'Planiran konec delovnega naloga: 19.05.2017 10:00:00', 'Planiran zacetek operacije: 02.02.2017 08:00:00', 'Planiran konec operacije: 09.02.2017 10:00:00', 'Dejanski zacetek operacije: 02.02.2017 08:00:30', 'Dejanski konec operacije: 09.02.2017 10:24:35', 'Časovni okvir systemskega okna: Systemsko okno: OL29-COTX', 'Zacetek: 31.10.2016 07:00:00', 'Zaključek: 30.03.2018 15:00:00', and 'Ostale informacije: Zadnja sprememba: 18.05.2017 06:36:35'. At the bottom right, there are fields for 'Signed Off By' and 'Notes', with '(eBS)' entered in the notes field.

Work Order Operation Number	Description	1st Verified By Date/Time	2nd Verified By Date/Time	Work Complete	Work Verified Complete	Status	Opened	Closed	Percent Complete
89219-10	Opis DN: CW-23022] REMONT REDUKTORJA IN AKTUATORJA   2017/160-2: NEZMOŽNOST ROČNE	25.1.2017 11:25	25.1.2017 12:14	<input type="checkbox"/>		OP STARTED	1.2.2017 12:00:00		0
89219-100	Opis DN: CW-23022] REMONT REDUKTORJA IN AKTUATORJA   2017/160-2: NEZMOŽNOST ROČNE	25.1.2017 11:25	25.1.2017 12:14	<input type="checkbox"/>		OP	18.5.2017 07:00:00		0
89219-20	Opis DN: CW-23022] REMONT REDUKTORJA IN AKTUATORJA   2017/160-2: NEZMOŽNOST ROČNE	25.1.2017 11:25	25.1.2017 12:14	<input type="checkbox"/>		OP FINISHED	2.2.2017 08:00:00	9.2.2017 10:24:35	0
89219-40	Opis DN: CW-23022] REMONT REDUKTORJA IN AKTUATORJA   2017/160-2: NEZMOŽNOST ROČNE	25.1.2017 11:25	25.1.2017 12:14	<input type="checkbox"/>		OP PAUSED	9.2.2017 10:00:00		0
89	89219-20					OP	18.5.2017 14:00:00		0
89	89					OP NOT_STARTED	19.5.2017 08:00:00		0





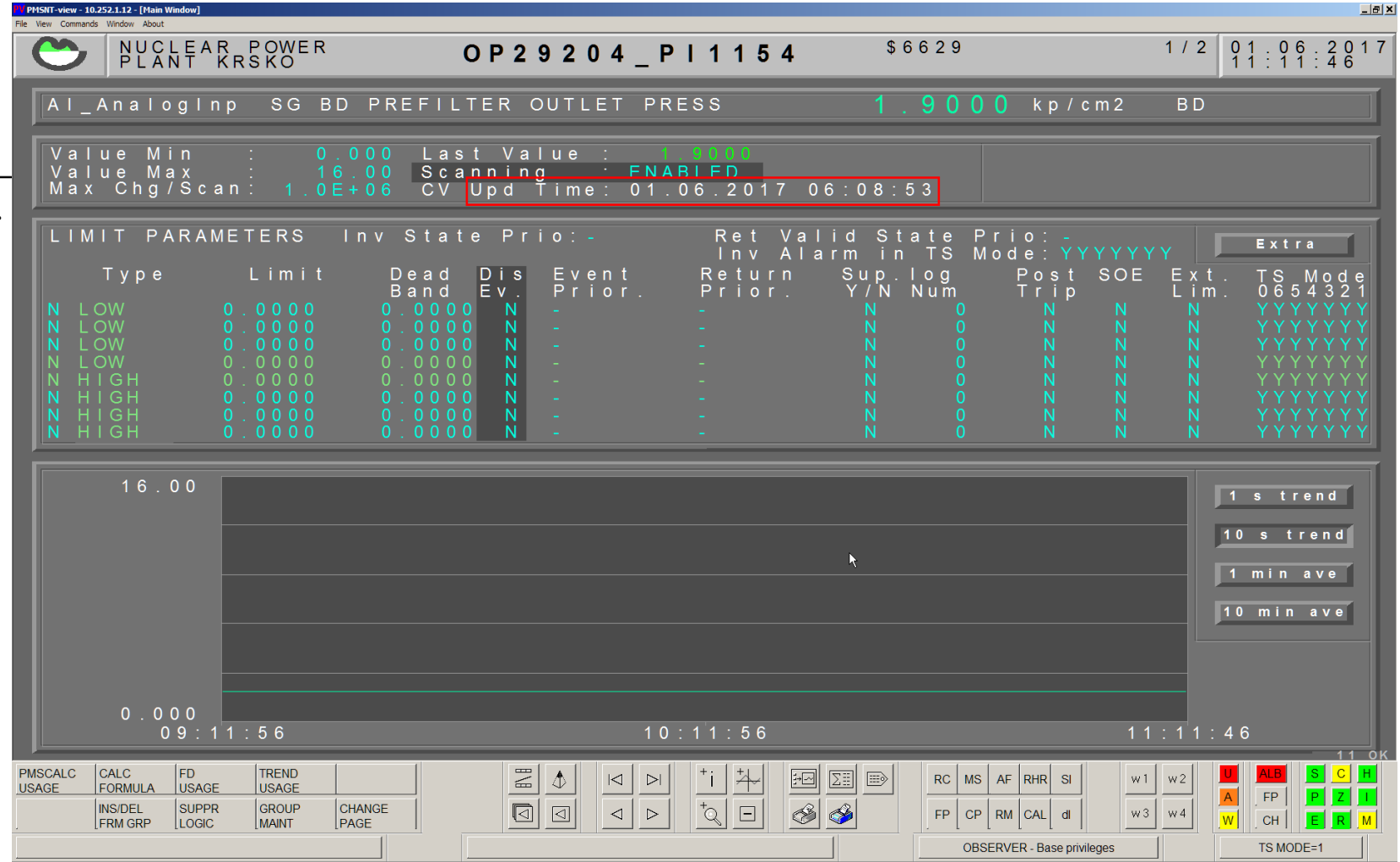
# Digital ABB offering across businesses: integrate, penetrate

eSOMS usage in NEK

Example

## Other uses of kiosk computers

- No Wi-Fi in technological part of the plant.
- Work orders.
- Fire protection.
- ABB Process management system view functionality.
- Live video stream.



# Digital ABB offering across businesses

Plant solutions. EOM (ABB eSOMS) usage in Smolensk NPP

Example

## About Smolensk NPP

Reactor type

- 3 × RBMK-1000

Gross installed capacity – 3000 MW.

Capacity factor - 84,67 %

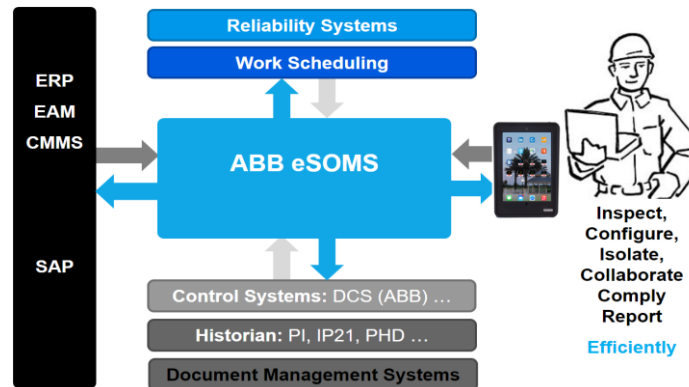
Smolensk NPP is the biggest power generating company of the north-western region of the united energy system of the Russian Federation. In the past years Smolensk NPP has generated as much as 283bln KWh.



## Why ABB eSOMS?

ABB's eSOMS solution was chosen because it provides:

- a digital record all the way down to user level accountability, while improving reactive maintenance and planned operator rounds,
- immediate organizational visibility of electronic logs and critical operational data.



## Current state eSOMS 3.9

Modules used:

- Equipment
- Narrative Logs
- Operator Rounds
- Mobile Operator Rounds
- Notice of Change
- AutoPrint
- Administration (User Rights, Qualifications)

Key goals achieved, including:

- Ability for bidirectional data feeds (push/pull data between the field and Control Room)
- Mobile capabilities for immediate data input and transference
- Scalability and integration capabilities, allowing for multiple departments to make use of the data

# Digital ABB offering across businesses

## Plant solutions. EOM (ABB eSOMS) usage in Smolensk NPP

### Before eSOMS implementation

График сдачи экзаменов

Табельный номер: 567, Ф. И. О.: Ильичев Юрий Владимирович, категория персонала: Рабочие

цех: Турбинный цех, участок: Производная

должности: Нет производной, Должность: Машинист-обходчик по турбинному оборудованию

Экзамен	Вид проверки	риодично проверки	Дата сдачи экзаменов	Оценка	Дата следующей сдачи экзаменов
ОТ	Очередно	1	27.02.2014	проверку знаний пошел	27.02.2015
ППЭ	Очередно	2	16.05.2013	проверку знаний пошел	16.05.2014
ОПЭ АС	Очередно	2	16.05.2013	проверку знаний пошел	16.05.2014
ПРБ	Очередно	1	27.12.2013	проверку знаний пошел	27.12.2014

СОГЛАСОВАНО  
Председатель ППО САЭС Ю.В. Кузнецов 2013

График работы сменного персонала контролируемого доступа с учетом в прохождения предсменных медических на 2014 год

Мес	Смена	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Апрель (3)	1	1	2	3	4	5	6	7	8	9	10	11	12	13										
Можяев А.Е.	2	3	4	5	6	7	8	9	10	11	12	13	14	15										
Аниканов А.А.	3	4	5	6	7	8	9	10	11	12	13	14	15	16										
Немиров С.В.	4	5	6	7	8	9	10	11	12	13	14	15	16	17										
Зубов А.В.	5	6	7	8	9	10	11	12	13	14	15	16	17	18										
Мерников Д.А.	6	7	8	9	10	11	12	13	14	15	16	17	18	19										
Мальцев А.П.	7	8	9	10	11	12	13	14	15	16	17	18	19	20										
Бурачков Е.В.	8	9	10	11	12	13	14	15	16	17	18	19	20	21										
Харченко А.А.																								
Май (5)	1	2	3	4	5	6	7	8	9	10	11	12	13											
Можяев А.Е.	2	3	4	5	6	7	8	9	10	11	12	13	14	15										
Аниканов А.А.	3	4	5	6	7	8	9	10	11	12	13	14	15	16										
Немиров С.В.	4	5	6	7	8	9	10	11	12	13	14	15	16	17										
Зубов А.В.	5	6	7	8	9	10	11	12	13	14	15	16	17	18										
Мерников Д.А.	6	7	8	9	10	11	12	13	14	15	16	17	18	19										
Мальцев А.П.																								
Февраль	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Январь	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Март	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	

### After eSOMS implementation

Квалификация персонала и планирование - Овчинников С.В. - [Настройка квалификации]

Код квалиф. Описание квалификации Выражение для квалификации

Код квалиф.	Описание квалификации	Выражение для квалификации	Имя	Разрешено назначение
13ГИ	станционная комиссия	REQ("OT (1X1)") AND REQ("PB") AND REQ("PB") AND REQ("OPЭ АС")	Administrator	<input type="checkbox"/>
13ГИ+ГАН	станционная комиссия и лицензирование	REQ("OT (1X2)") AND REQ("PB") AND REQ("PB") AND REQ("OPЭ АС") AND REQ("ГАН")	Demo User	<input type="checkbox"/>
ГИ+ГАН	станционная комиссия	REQ("OT (1X2)") AND REQ("PB") AND REQ("PB") AND REQ("OPЭ АС") AND REQ("ГАН")	Арефьев Е.В.	<input type="checkbox"/>
ЦЕХОВАЯ	комиссия	REQ("OT (1X1)") AND REQ("PB") AND REQ("PB") AND REQ("OPЭ АС")	Базарев Д.Н.	<input type="checkbox"/>

Расстановка персонала

Смена	Сб 1.3	Вс 2.3	Пн 3.3	Вт 4.3	Ср 5.3	Чт 6.3	Пт 7.3	Примечания
Смена ИСТЦ.2	1	2	3	4	5	6	7	
Смена ВВУТ.3	1	2	3	4	5	6	7	
Смена СМТО.3	1	2	3	4	5	6	7	

Имя: Калачинский И.П., Разрешено:

Имя: Калачинский И.П., Разрешено:

Имя: Коженко А.Н., Разрешено:

Имя: Коженко В.Н., Разрешено:

временно исполняющие должностные обязанности лиц, указанных в настоящем распоряжении иного порядка, противоположного режима на период исполнения обязанностей согласно

Не действует после: 05.12.2013 00:00:00

Время: 21.11.2013 12:13:56

# Digital ABB offering across businesses

Plant solutions. EOM (ABB eSOMS) usage in Novovoronezh NPP

Example

## About Novovoronezh NPP

Reactor type

- 1 × VVER-440
- 1 × VVER-1200
- 1 × VVER-1000

Gross installed capacity – 3029 MW.

Capacity factor - 84,40%

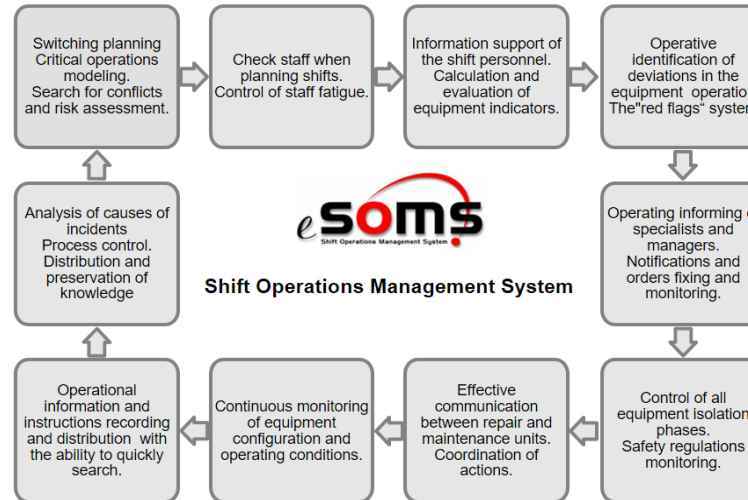
Novovoronezh NPP is a stable source of electricity for Voronezh region. Since its launch the plant has generated over 411bln KWh.



## Why ABB eSOMS?

ABB's eSOMS solution provides:

- a “single source” database that serves as the foundation for efficient plant operations,
- workforce safety - automate permits to work, ensure safety checks are actually performed.



## Current state eSOMS 3.9

Modules used:

- Equipment
- Narrative Logs
- Operator Rounds
- Mobile Operator Rounds
- Notice of Change
- Job orders
- AutoPrint
- Administration (User Rights, Qualifications)

Key goals achieved, including:

- Standardization of technological processes
- Control of deviations and violations of normal operation regulations
- Managing procedures for the configuration of technological systems and equipment



**ABB**