

# New approaches to teaching Corporate Information Systems & Operations Research and ERP



Ing. Jaromír Skorkovský, CSc.  
Department of Business Management  
Faculty of Economics and Administration  
Masaryk University Brno  
Czech Republic

# Reasons for the presentation

Demonstration of technologies and approaches used in teaching certain parts of the Corporate Information Systems field of study

Snapshots of the technology used in ESF education over almost **three decades**

Challenges and opportunities are being offered thanks to the use of the latest updated technologies not only to the teachers of the Corporate Information Systems, but also to all members of our department, both in the teaching of their subjects and in the field of research as well.

# The Structure of the PowerPoint Presentation



**Historical Evolution of used ERP versions**

**Software is decelerating faster than hardware is accelerating !!!**



**Present and prospective state of teaching  
and related instruments**

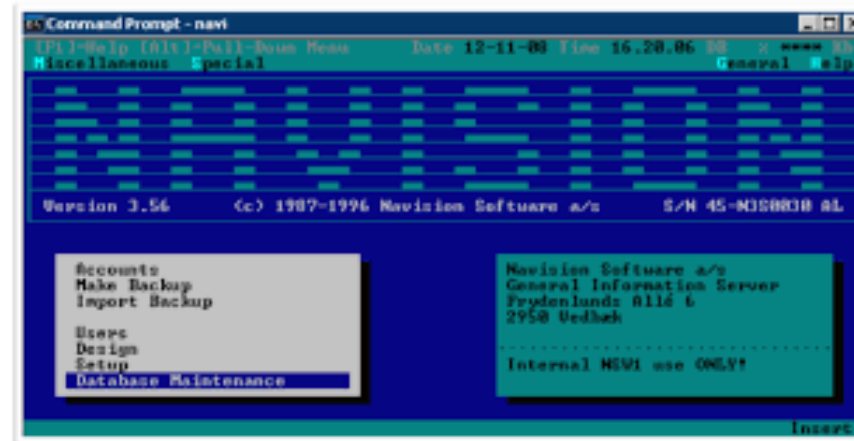


**The benefits of learning ERP systems  
and Operations Management**

# Microsoft Business Solutions Flashbacks in ESF

## 1995

The former residence of the faculty



Although still character-oriented, but full of excellent features that are used in the most recent versions such as calculated fields and Navigation principles if I should mention the most interesting top technologies of this system

# Explanation of the somewhat strange name of the ERP system we used so far

- **1984** - Authors of the system: students of the Technical University of Copenhagen
- The Danes (originally Vikings) are great mariners
- When at sea one needs very good navigation -> hence the ERP name **NAVIGATOR**
- Good navigation in the ocean of data that ERP generates is vital for a **quick response time**
- Established company **PC&C** further refined and sell ERP system NAVIGATOR
- Over time, the ERP name has changed to **NAVISION**
- Over time, the **PC&C** company name has changed to **NAVISION Software**
- **1990** - The Roll-out **NAVISION** into Europe and USA
- **1991-95** -> Window 3.1. and Window 95 >.....
- **2002** - **NAVISION software** sold the company to Microsoft for \$1.6 billion USD
- **And so on...**

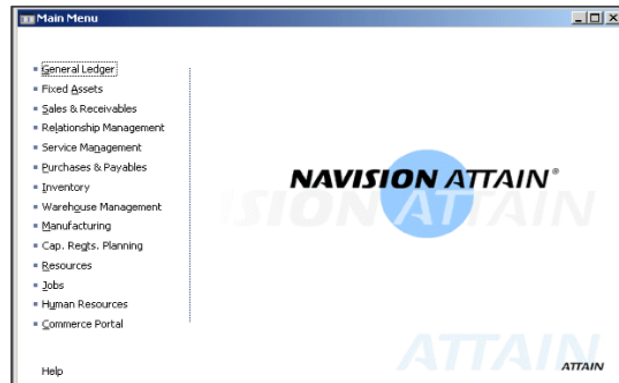


# Microsoft Business Solutions Flashbacks used in ESF

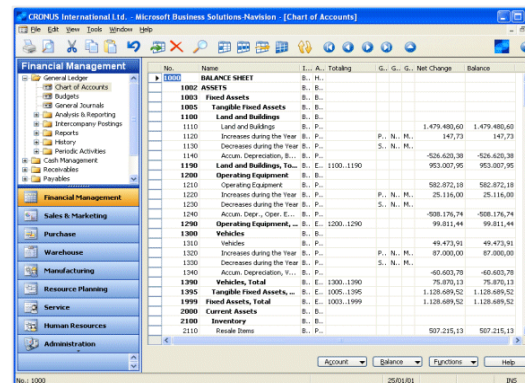


## 2003-2023

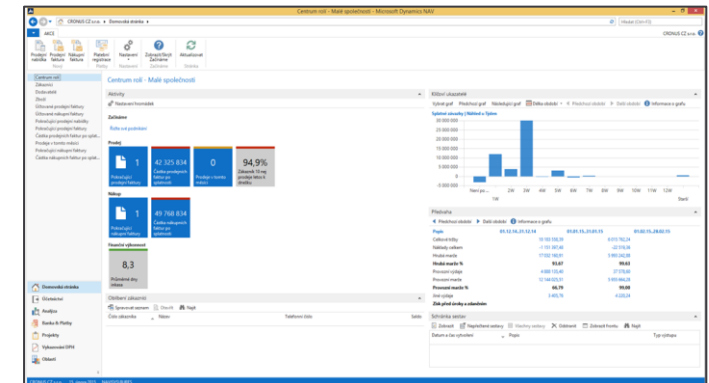
**(BPH\_PIS1 & BPH\_PIS2)**



Basic business processes  
(on the background of financial management)



Enhanced with manufacturing control  
and advanced reporting tools

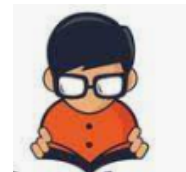
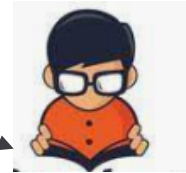
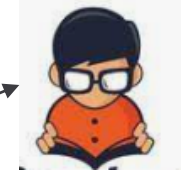
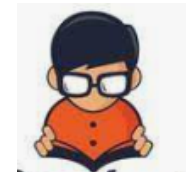
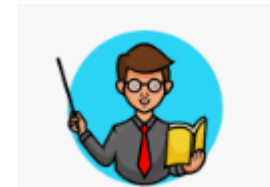


Expanding to cover more advanced warehouse  
management and the financial reporting  
such as cash flow, cost management and budgeting

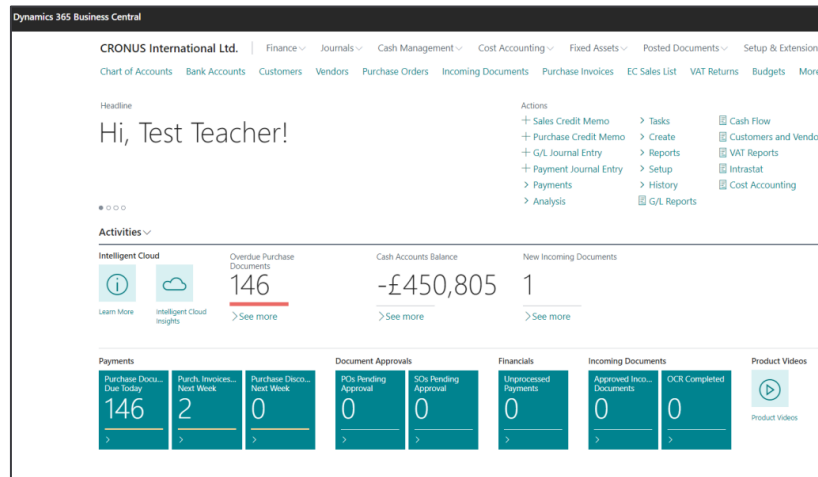
# Microsoft Business Solutions Flashbacks in ESF



## 2020-2022 (MPH\_AOPR)



## Microsoft 365 Business Central



**Comment : MPH\_AOPR = Operations Research and ERP**

# Some disadvantages of existing solutions



**Used in teaching the subject BPH\_PIS1 & PIS2**

Each student needed to install the entire Dynamic NAV solution including the SQL database on his home computer.

ERP NAV had to be installed on all PCs in the classroom, library and galleries after each change of software version

The Microsoft company's support for this product is now over



# Some disadvantages of existing solutions



Microsoft Dynamics 365  
Business Central



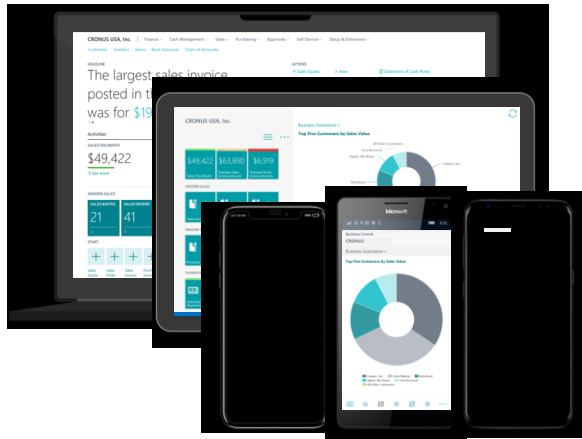
**Used in teaching the subject MPH\_AOPR  
(Classes in English)**

In the same database, each student has to generate his/her own objects such as customers, financial reports, his/her own items, his/her own number of series not to influence the models of his/her colleagues.

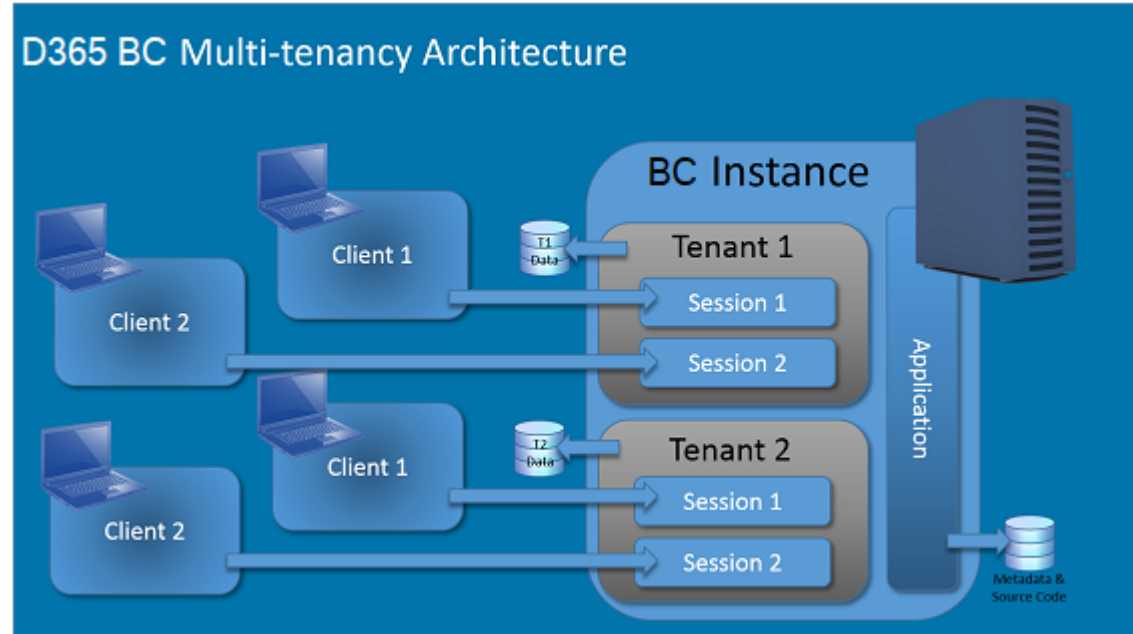
# Current state as of autumn 2023 - new approach



Microsoft Dynamics 365  
Business Central

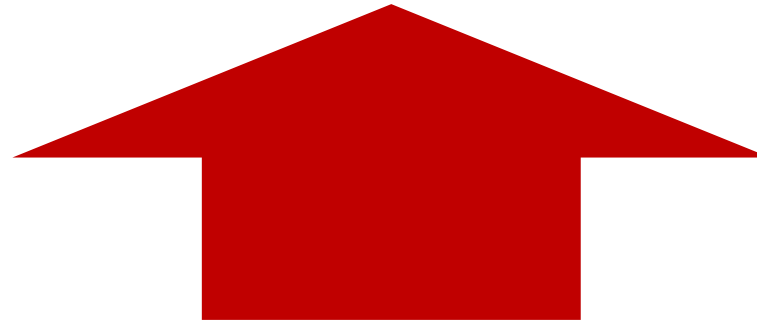
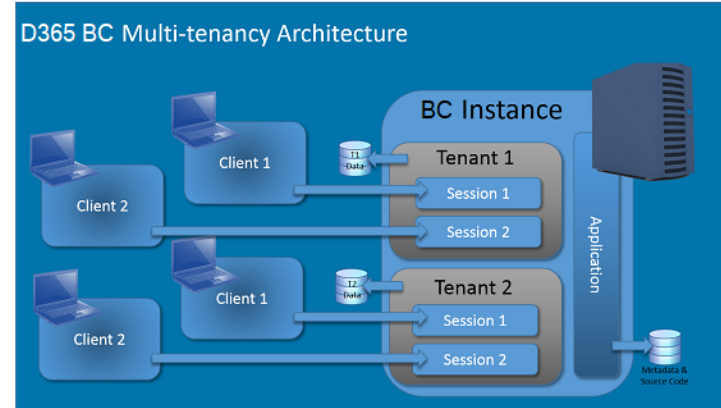
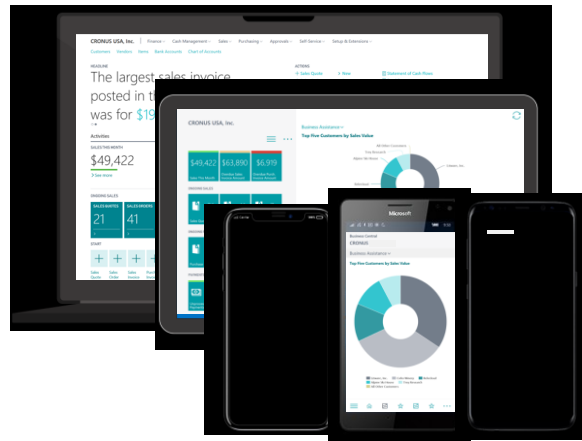


All-in-One business management system for small and medium-sized businesses



The environment has been designed by company Navertica including related scripts.  
**KPEM ESF** and **CIKT** have collaborated on the implementation, testing and final setup.

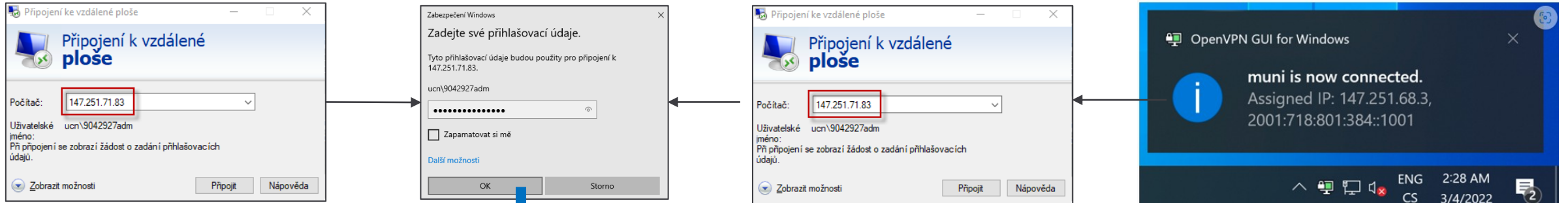
# Current state as of autumn 2023 - new approach



**Corporate Information Systems**  
**BPH\_PIS1 & PIS2**

**Operations Research and ERP**  
**MPH\_AOPR**

# A bit of technology - Server Start



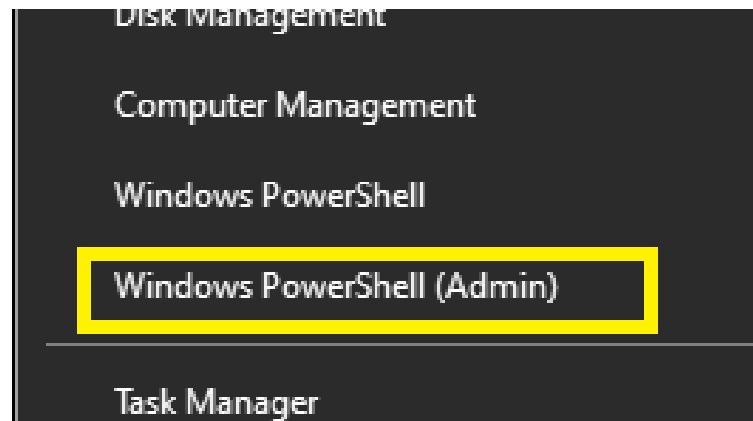
From the computers at the faculty

From home computers - remote access

The screenshot shows the Windows taskbar and system tray. On the left, the taskbar contains icons for 'Software Center' and 'Business Central W...'. A yellow arrow points to the 'Business Central W...' icon. On the right, the system tray displays the following information:

- DYNAMICS-ESF**
- UCN.muni.cz**
- Logged on user: ucn\9042927adm
- OS: Windows Server 2022 Standard
- OS release: 2009
- CPU: 4 at 2800 MHz
- RAM: 16 GB
- IPv4 address: 147.251.71.83
- Machine domain: ucn

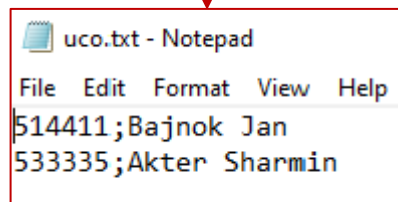
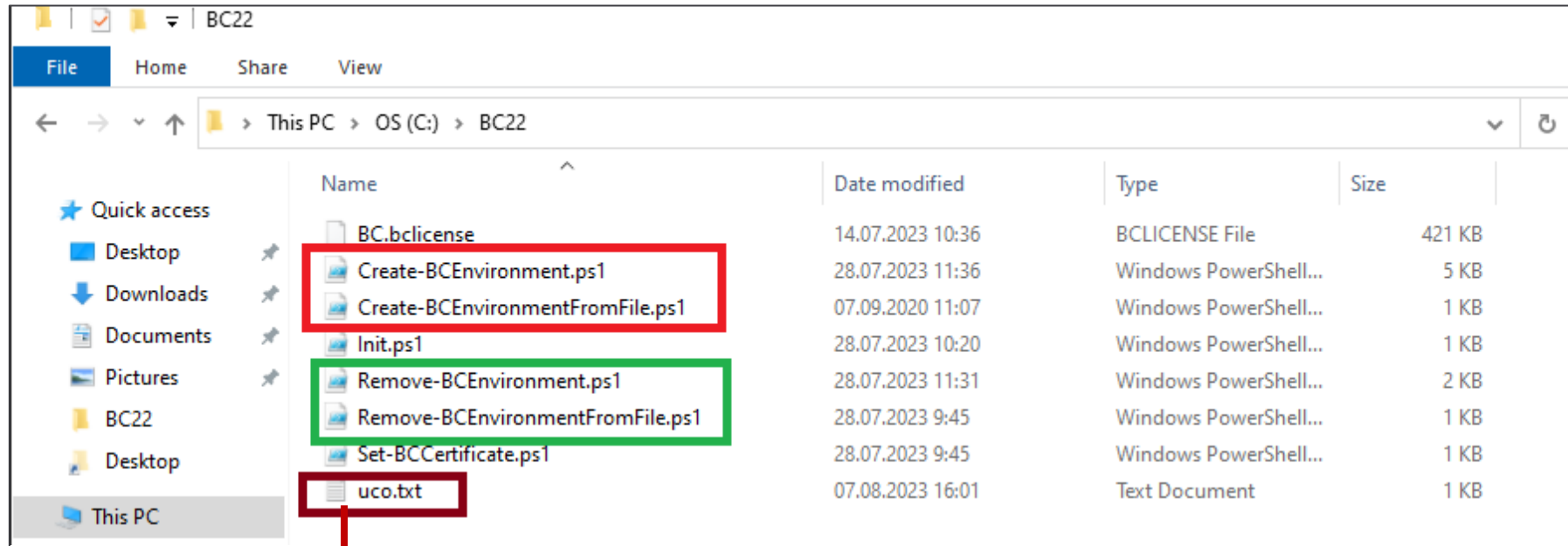
# A bit of technology - Access to scripts and tools



```
PS C:\Users\9042927adm> cd C:\BC22\.
```

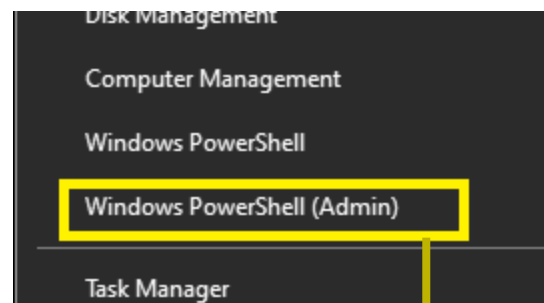
Thanks to the scripts, it is possible to create or delete new instances and to list the created instances in the logic one instance = one student (UČO)

# Script operations when creating new instances



Students for whom the new Business Central environment is being created (batch approach)

# The process of creating one student environment



```
PS C:\Users\9042927adm> cd C:\BC22\
```

```
PS C:\Users\9042927adm> cd C:\BC22\  
PS C:\BC22> .\Create-BCEnvironmentFromFile.ps1 - FileName uco.txt
```

```
PS C:\BC22> .\Create-BCEnvironmentFromFile.ps1 -FileName uco.txt  
Creating environment for 535444 - Borek Daniel...  
Importing PS Modules  
Creating folder for DB  
Creating new Environment 535444  
Creating new database 535444...  
Database Restored  
Creating new server instance 535444...  
Setting configuration...  
  
URL reservation successfully added  
  
URL reservation successfully added  
  
URL reservation successfully added  
  
URL reservation successfully added  
  
Restarting service...
```

It takes about 7 minutes  
to create one instance

```
Restarting service...  
Server instance 535444 restarted  
Importing license...  
WARNING: Importing a license file requires a restart of other services using the same database.  
Creating webservice instance 535444  
Creating NAV user 535444  
Client available at: https://dynamics-esf.ucn.muni.cz/535444  
PS C:\BC22>
```

# List of created instances (some of them)

MicrosoftDynamicsNavServer\$1730

MicrosoftDynamicsNavServer\$485052

MicrosoftDynamicsNavServer\$514051

MicrosoftDynamicsNavServer\$514411

MicrosoftDynamicsNavServer\$519214

MicrosoftDynamicsNavServer\$524822

MicrosoftDynamicsNavServer\$524989

MicrosoftDynamicsNavServer\$530562

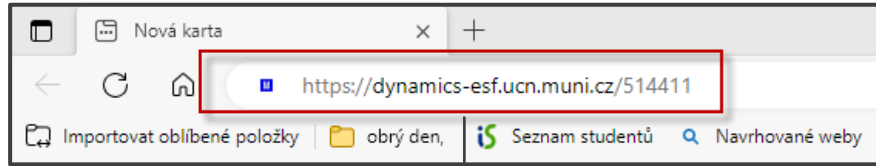
MicrosoftDynamicsNavServer\$533213

MicrosoftDynamicsNavServer\$533322

MicrosoftDynamicsNavServer\$533335



# Access to the new environment through a browser (cloud approach)



Either straight from the classroom (VT206) or remotely from home (using a VPN)

A screenshot of the Dynamics 365 Business Central login page. The header shows the Microsoft logo and the text "Dynamics 365 Business Central". Below the header, there are two input fields: "User name:" and "Password:". A "Sign In" button is located at the bottom right of the form.A screenshot of the Dynamics 365 Business Central login page, identical to the previous one, but with the "User name:" field filled with the text "514411". The "Password:" field contains a series of dots. The "Sign In" button is still visible at the bottom right.A screenshot of a dialog box titled "Enter Password". It has three input fields: "Old Password", "Password", and "Confirm Password". Each field is followed by a dotted line. At the bottom right, there are two buttons: "OK" (highlighted in green) and "Cancel".

# Business Central

The screenshot shows the Dynamics 365 Business Central interface. At the top, the user is identified as 'Cronus MTB'. The navigation bar includes 'Sales', 'Purchasing', 'Inventory', 'Posted Documents', and 'Shopify'. Below this, a list of menu items includes 'Sales Orders', 'Items', 'Customers', 'Item Journals', 'Sales Journals', 'Cash Receipt Journals', and 'Transfer Orders'. A headline greets the user: 'Good morning, User One!'. To the right, there are 'Actions' for '+ Sales Quote', '+ Sales Invoice', '+ Sales Order', '+ Sales Return Order', '+ Sales Credit Memo', '+ Sales Order', '+ Sales Return Order', '+ Sales Credit Memo', '+ Sales Order', '+ Tasks', '+ Sales', '+ Reports', and '+ History'. Below the headline, there are three dots and a section titled 'Activities'. The 'Activities' section is divided into several categories: 'For Release', 'Sales Orders Released Not Shipped', and 'Returns'. 'For Release' includes 'Sales Quotes - Open' (10) and 'Sales Orders - Open' (163). 'Sales Orders Released Not Shipped' includes 'Ready To Ship' (1), 'Partially Shipped' (0), 'Delayed' (44), and 'Average Days Delayed' (252,6). 'Returns' includes 'Sales Return O... - Open' (0) and 'Sales Credit M... - Open' (1). Below 'Activities', there are three more sections: 'Intercompany', 'User Tasks', and 'Email Status'. 'Intercompany' includes 'Incoming Transactions' (New Intercom... Transactions: 0, Rejected...ner Companies: 0) and 'Outgoing Transactions' (Intercompany ... to Send: 1). 'User Tasks' includes 'My User Tasks' (Pending User Tasks: 0). 'Email Status' includes 'Email Activities' (Failed Emails in Outbox: 0, Draft Emails in Outbox: 0, Sent Emails Last 30 Days: 0).

**Dynamics 365 Business Central**

Cronus MTB | Sales ▾ Purchasing ▾ Inventory ▾ Posted Documents ▾ Shopify ▾ | ☰

Sales Orders Items Customers Item Journals Sales Journals Cash Receipt Journals Transfer Orders

Headline

## Good morning, User One!

Actions

- + Sales Quote
- + Sales Invoice
- + Sales Order
- + Sales Return Order
- + Sales Credit Memo
- + Sales Order
- + Sales Return Order
- + Sales Credit Memo
- + Sales Order
- + Tasks
- > Sales
- > Reports
- > History

● ○ ○

**Activities** ▾

**For Release**

Sales Quotes - Open <b>10</b>	Sales Orders - Open <b>163</b>
----------------------------------	-----------------------------------

**Sales Orders Released Not Shipped**

Ready To Ship <b>1</b>	Partially Shipped <b>0</b>	Delayed <b>44</b>	Average Days Delayed <b>252,6</b>
---------------------------	-------------------------------	----------------------	--------------------------------------

**Returns**

Sales Return O... - Open <b>0</b>	Sales Credit M... - Open <b>1</b>
--------------------------------------	--------------------------------------

**Intercompany**

**Incoming Transactions**

New Intercom... Transactions <b>0</b>	Rejected...ner Companies <b>0</b>
--	--------------------------------------

**Outgoing Transactions**

Intercompany ... to Send <b>1</b>
--------------------------------------

**User Tasks**

**My User Tasks**

Pending User Tasks <b>0</b>
--------------------------------

**Email Status**

**Email Activities**

Failed Emails in Outbox <b>0</b>	Draft Emails in Outbox <b>0</b>	Sent Emails Last 30 Days <b>0</b>
-------------------------------------	------------------------------------	--------------------------------------

# Current status as of autumn 2023

## 2023-? (BPH\_PIS1 & PIS2 & MPH\_AOPR)



Dynamics 365 Business Central

CRONUS International Ltd. | Finance | Journals | Cash Management | Cost Accounting | Fixed Assets | Posted Documents | Setup & Extensions

Chart of Accounts | Bank Accounts | Customers | Vendors | Purchase Orders | Incoming Documents | Purchase Invoices | EC Sales List | VAT Returns | Budgets | More

Headline  
Hi, Test Teacher!

Actions

- + Sales Credit Memo > Tasks
- + Purchase Credit Memo > Create
- + G/L Journal Entry > Reports
- + Payment Journal Entry > Setup
- > Payments > History
- > Analysis

- Cash Flow
- Customers and Vendors
- VAT Reports
- Intrastat
- Cost Accounting
- G/L Reports

Activities

Intelligent Cloud

Overdue Purchase Documents	Cash Accounts Balance	New Incoming Documents
146	-£450,805	1
<a href="#">See more</a>	<a href="#">See more</a>	<a href="#">See more</a>

Payments

Purchase Docu... Due Today	Purch. Invoices... Next Week	Purchase Disco... Next Week
146	2	0

Document Approvals

POs Pending Approval	SOs Pending Approval
0	0

Financials

Unprocessed Payments
0

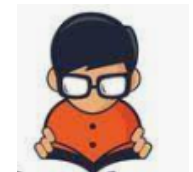
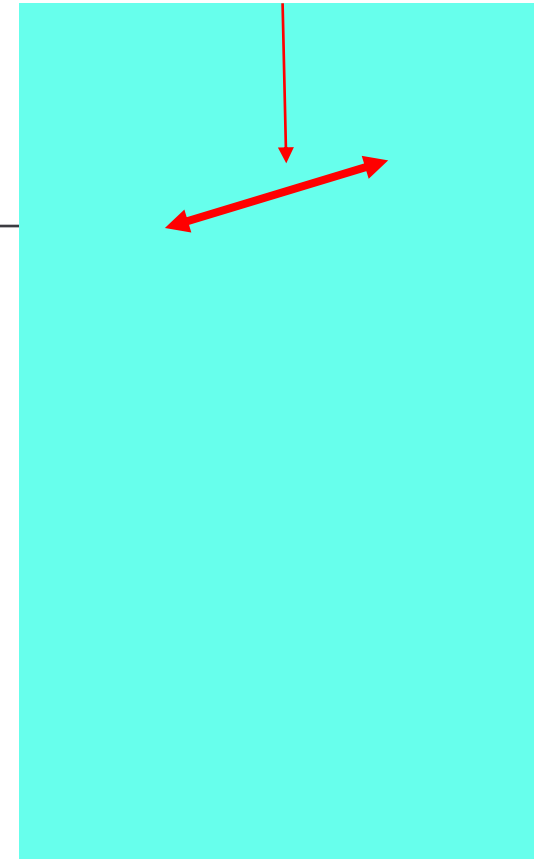
Incoming Documents

Approved Inco... Documents	OCR Completed
0	0

Product Videos



Here is an Inspection of a selected student's work by a supervisor



# Supporting materials



Microsoft Dynamics 365  
Business Central

The teaching is supported by more than **1000 slides** in the PWP application, which were created during the last year. These slides are still being updated, because the latest version of the database has a slightly changed design for the system control.

The Business Central environment and the teaching materials are in English only.

# Some examples of PWP slides

## Use of account schedules (Financial reporting)

The **Cash Cycle** and **Account** calculate the  
You can use  
for example,  
on the **Acco**

Cash flow – account schedule in this presentation

Accounting schedule income and expenses in reality

Name	Description
CASHFLOW	Calculation

Attention A  
is now call

I\_CACYLE

I\_CASHFLOW

I\_INCEXP

I\_MINTRIAL

Attention A

### General

Account Schedule Name

Column Layout Name

### Dimension Filters

Department Filter

Project Filter

Row No.

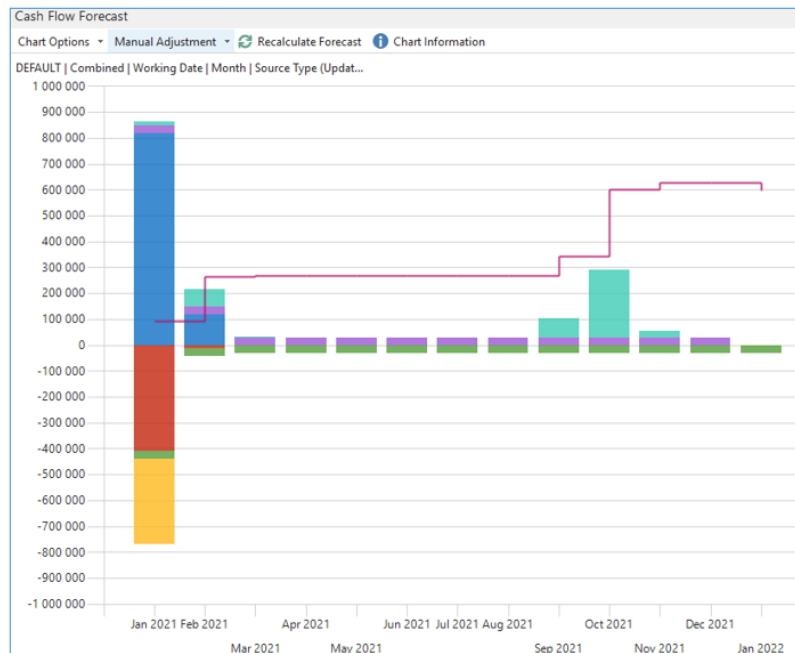
→ 10

20

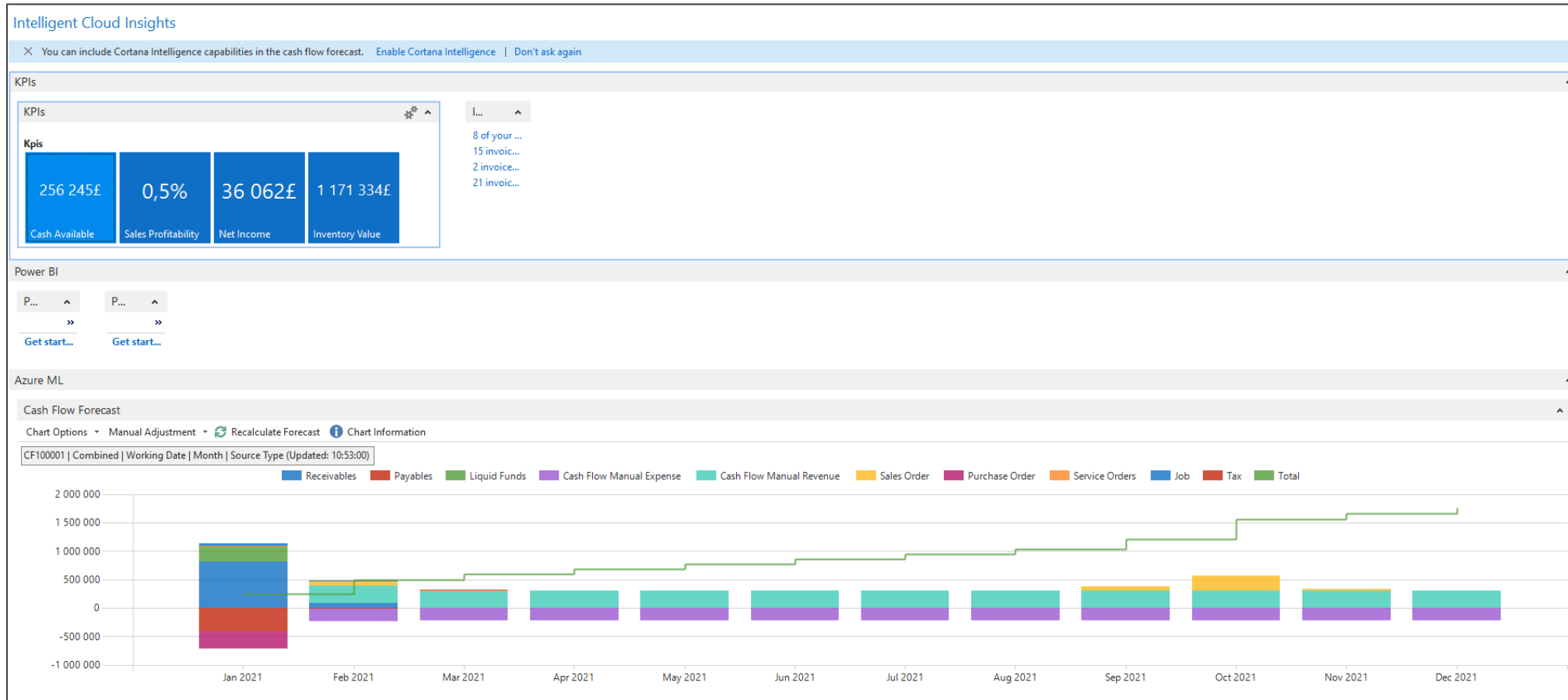
30

40

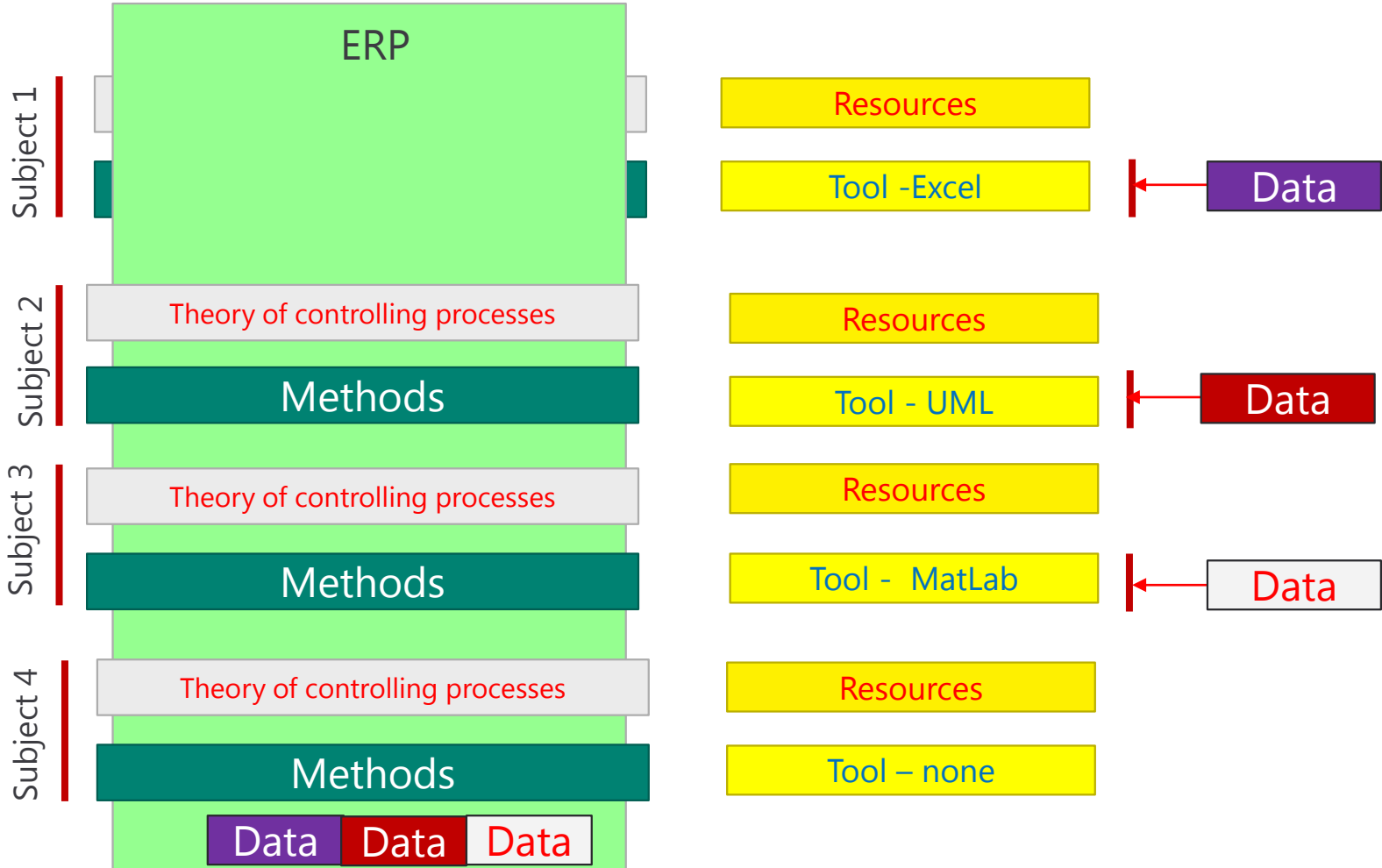
## Graphical representation and manual adjustment



# Intelligent Cloud Insight (Cash Flow) in BC









# Benefits arising from the use of ERP in teaching at the faculty



View across all companies

# Microsoft Dynamics 365 Business Central – **very high level tour of the capabilities of Business**

## Central Core Capabilities

 Financial Management	Account Receivables Payables	Bank reconciliation	Fixed asset management	Month/year end closing
 Sales & Service Management	Quote generation	Contact management	Sales invoicing	Payment processing
 Project Management	Capacity planning	Budgets and estimates	Job and process costing	Resource management
 Supply Chain Management	Inventory and Purchasing control	Shipment and distribution	Returns and cancellations	Procurement and vendor management
 Operations Management	Forecasting	Production planning	Manufacturing capacity	Warehouse management
 Reporting & Analytics	Customer insights	Self-serve reports	Interactive dashboards	Built-in intelligence





# Executive Summary I

So far, so good, but.....

Utilizing Business Central as a primary data source and modeling engine in other classes would be attractive.

**Controlling and BI   Managerial Accounting   Logistic and SCM   Project Management**

More recently, AI applications such as the use of the machine learning type GPT-4 (Generative Pre-trained Transformer) have become increasingly important ..... **and here we can further use tools of this type, for example, to predict a number of processes modelled in Business Central**



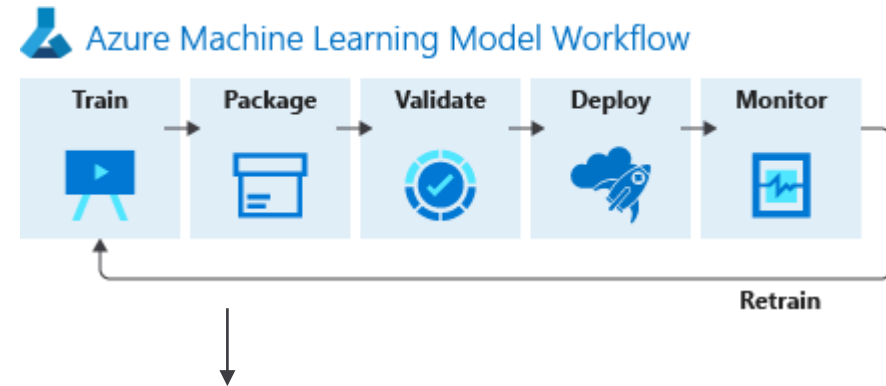
Prediction is extremely difficult,  
especially in the future.

# Use Artificial Intelligence in Microsoft Dynamics 365 Business Central

Prediction of Late Payments

Cash Flow Forecasting

Sales and Inventory Forecasting



The use Azure Machine Learning from Cortana Intelligence to extend the horizon for your cash flow forecasts

# Executive Summary II

**To accomplish this, you need to overcome the heel-to-toe constraint. It is about adding new resources that complement their understanding of using a given ERP (in our case Business Central). Such knowledge is essential for use in the classroom and possible research...**

**On the other hand...You Can't Always Get What You Want....**





**Thank you for your attention**

## Supplement that is not part of the official presentation

Business Central can use models that deal with time series data to calculate forecasts:

- **ARIMA** (Autoregressive Integrated Moving Average)
- **ETS** (Exponential Smoothing State Space)
- **STL** (Seasonal Decomposition of Time Series by Loss)
- **TBATS** (Exponential Smoothing State Space with Box-Cox transformation, ARMA errors, Trend and Seasonal components)