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

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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 !!!

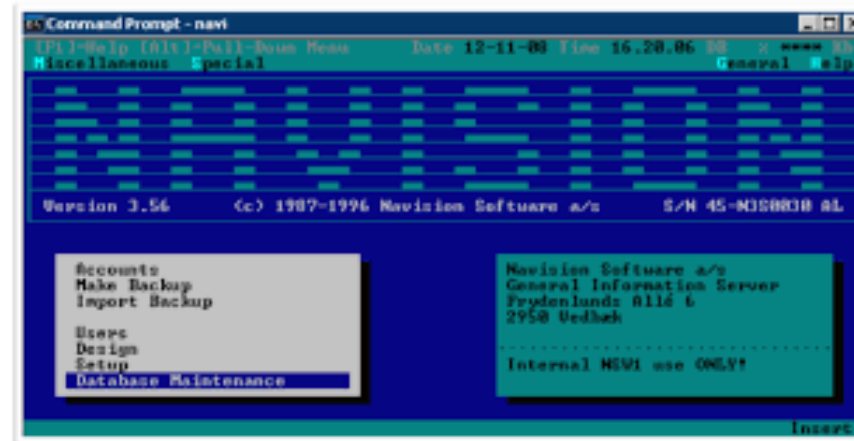**Present and prospective state of teaching and related instruments**

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)

ON-PREMISE
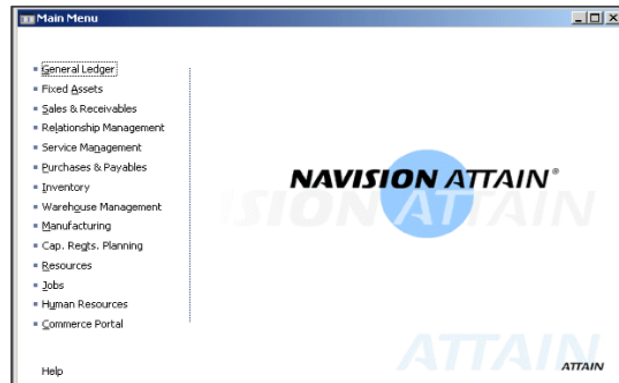
Basic business processes
(on the background of financial management)
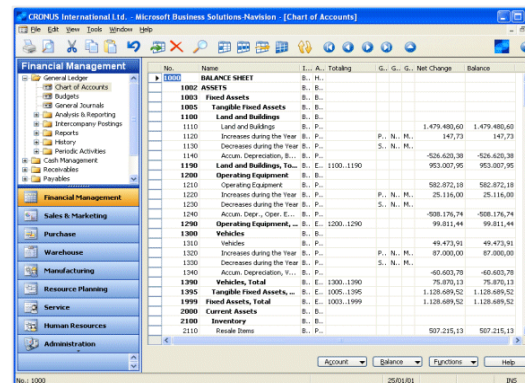
Enhanced with manufacturing control
and advanced reporting tools
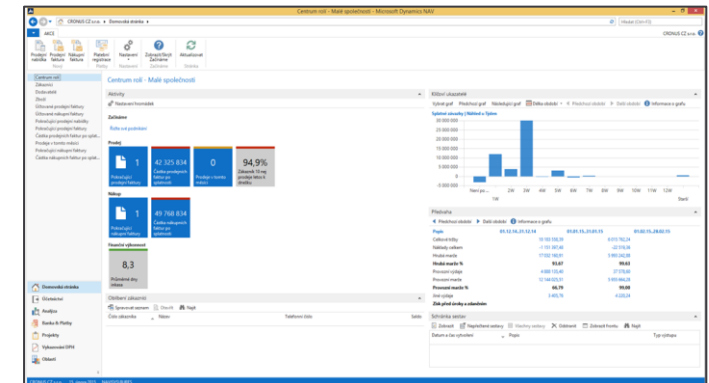
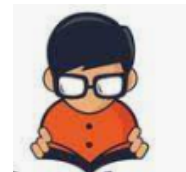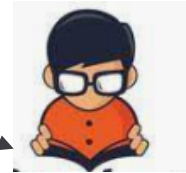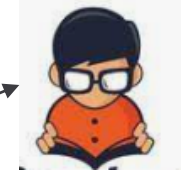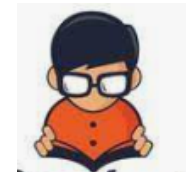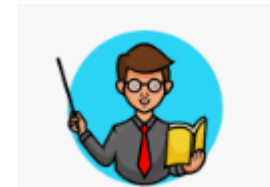Expanding to cover more advanced warehouse
management and the financial reporting
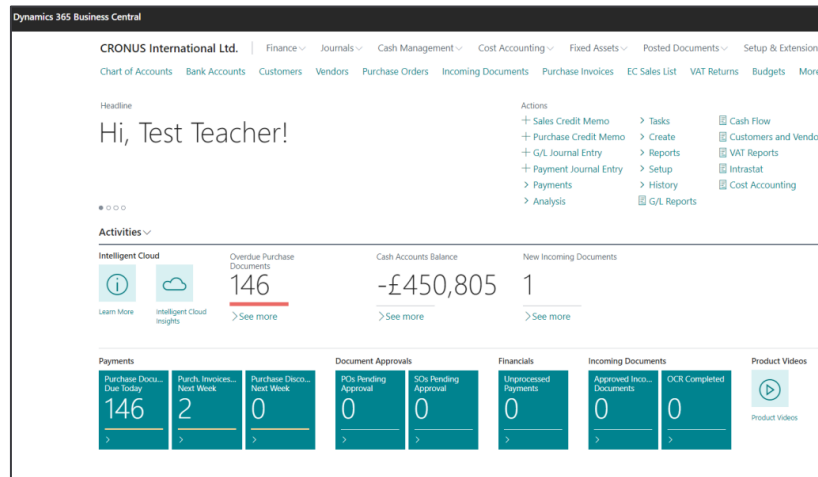such as cash flow, cost management and budgeting

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

CLOUD COMPUTING

Used in teaching the subject MPH_AOPR (Classess 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
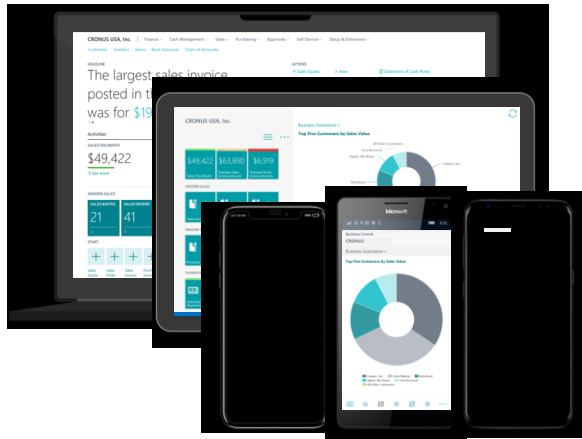
All-in-One business management system for small and medium-sized businesses

D365 BC Multi-tenancy Architecture
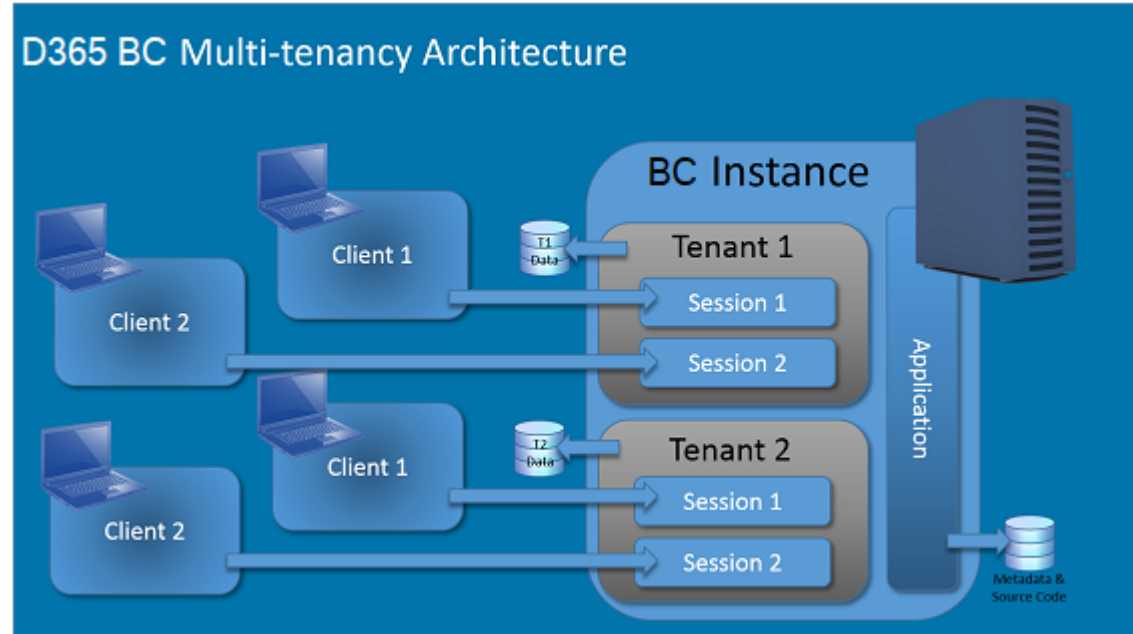
The environment has been designed by company Navertica including related scripts.
KPEM ESF and **CIKT** have collaborated on the implementation, testing and final setup.

Current state as of autumn 2023 - new approach
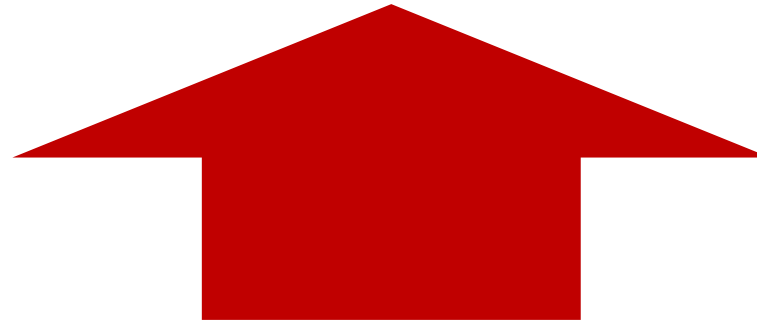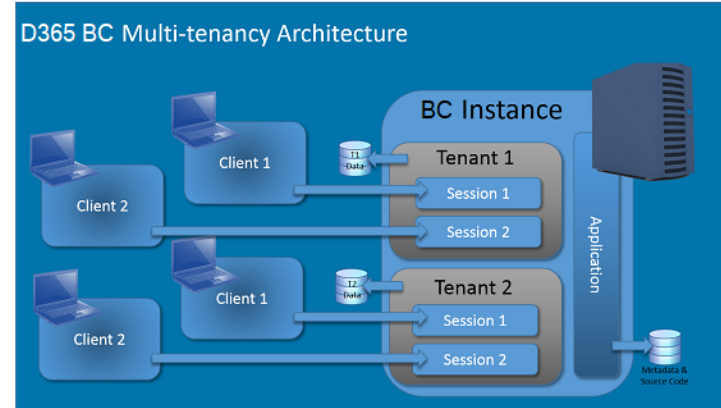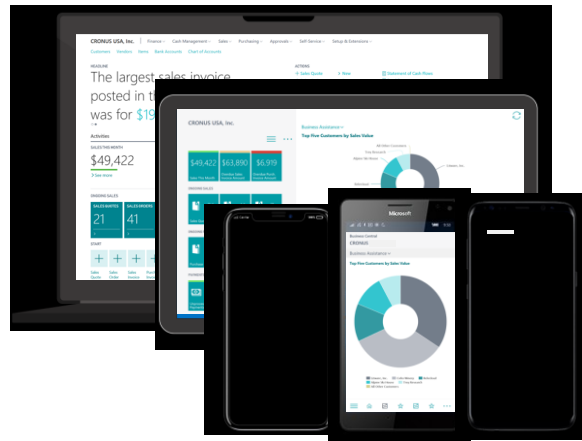
Corportate Information Systems
BPH_PIS1 & PIS2

Operations Research and ERP
MPH_AOPR

A bit of technology - Server Start
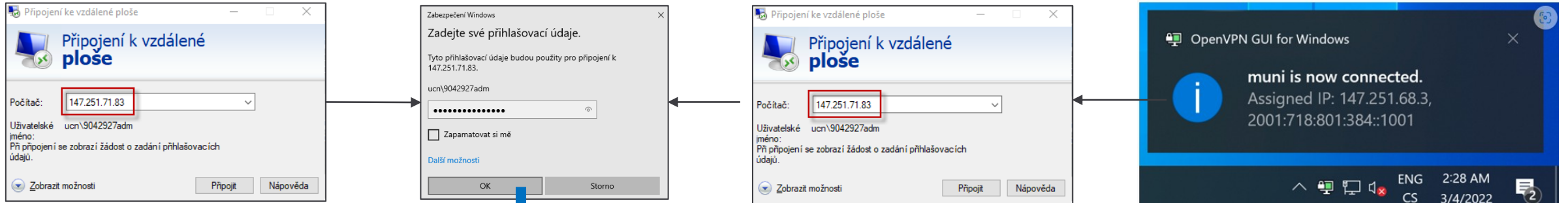
From the computers at the faculty

From home computers - remote access
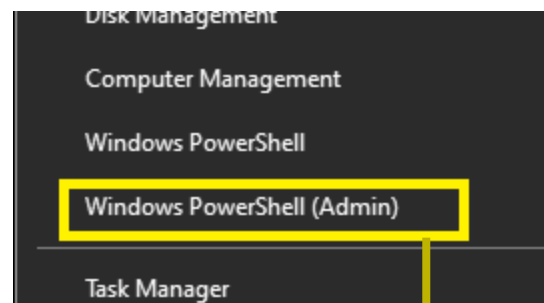
A bit of technology - Access to scripts and tools
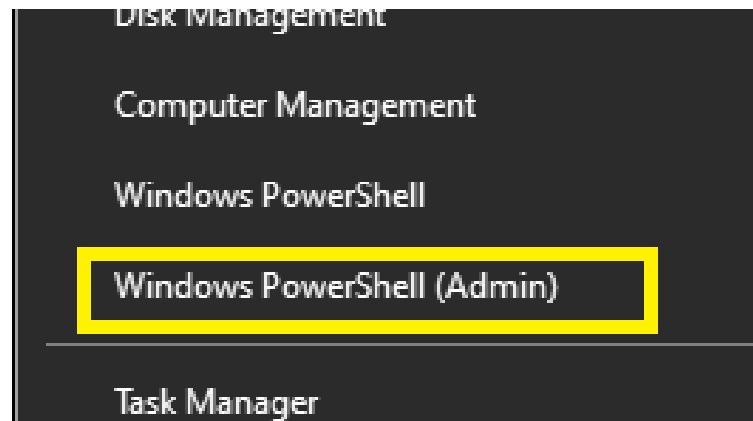
Thanks to the scripts, it is possible to create or delete new instances and to list the created instances
 in the logic one instance = one student (UČO)

Script operations when creating new instances

uco.txt - Notepad

File Edit Format View Help

514411;Bajnok Jan
533335;Akter Sharmin
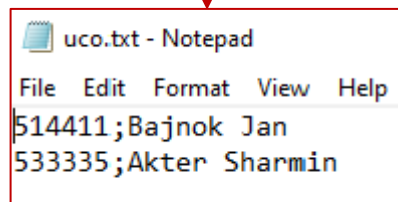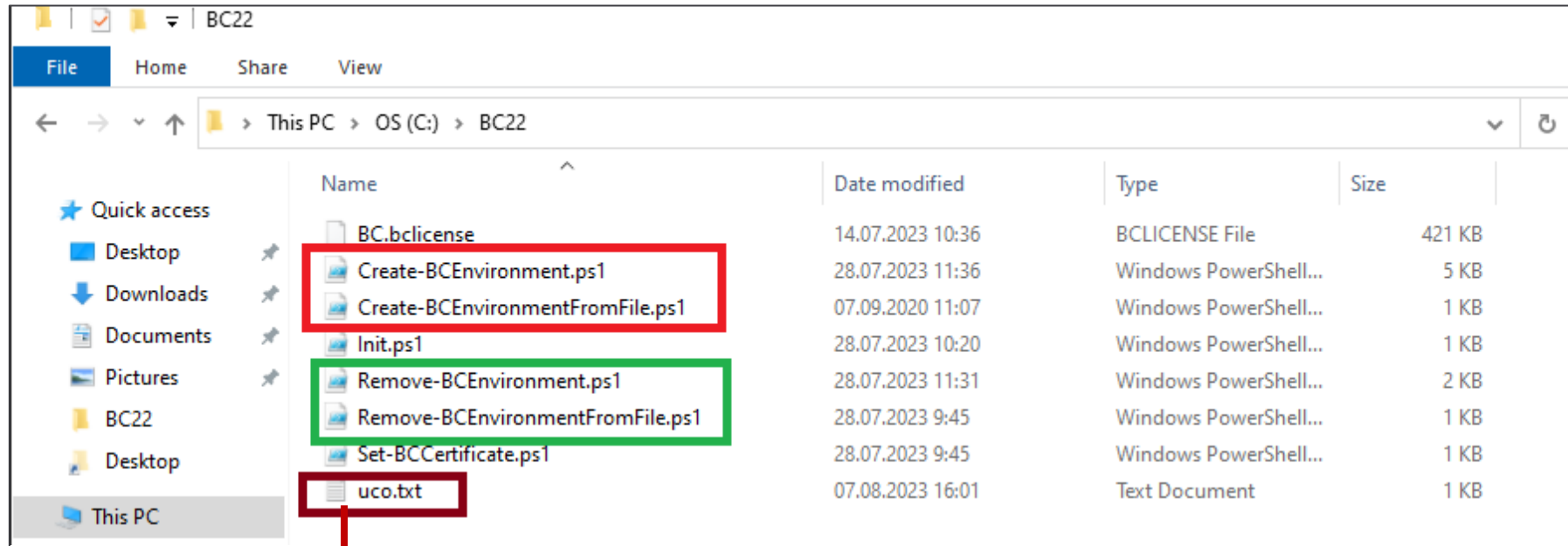
Students for whom the new Business Central environment is being created (batch approach)

The process of creating one student environment

Disk Management
Computer Management
Windows PowerShell
Windows PowerShell (Admin)
Task Manager

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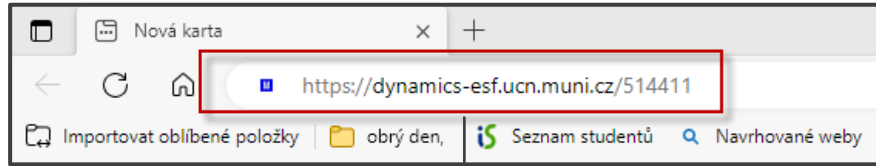
Either straight from the classroom (VT206) or remotely from home (using a VPN)

Business Central

Current status as of autumn 2023

2023-? (BPH_PIS1 &PIS2 & MPH_AOPR)

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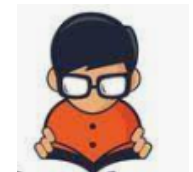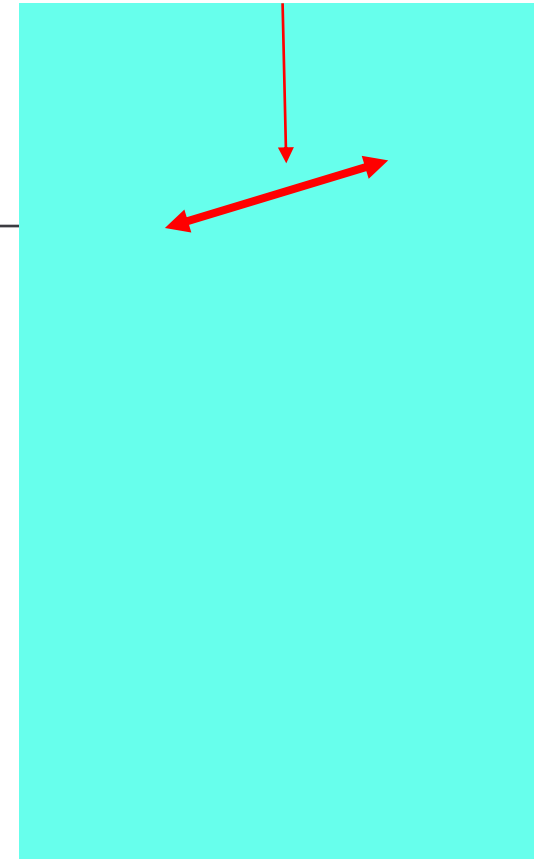
Supporting materials

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
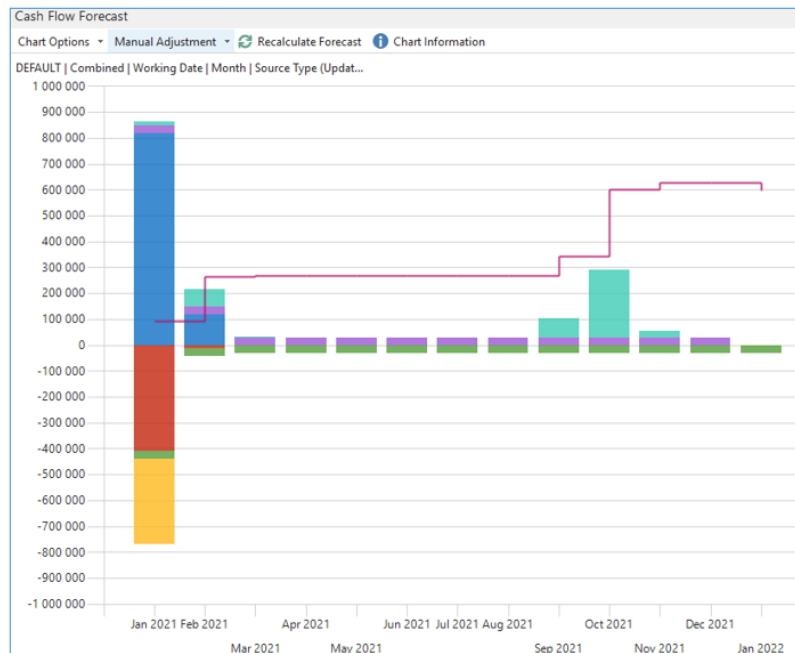
Intelligent Cloud Insight (Cash Flow) in BC
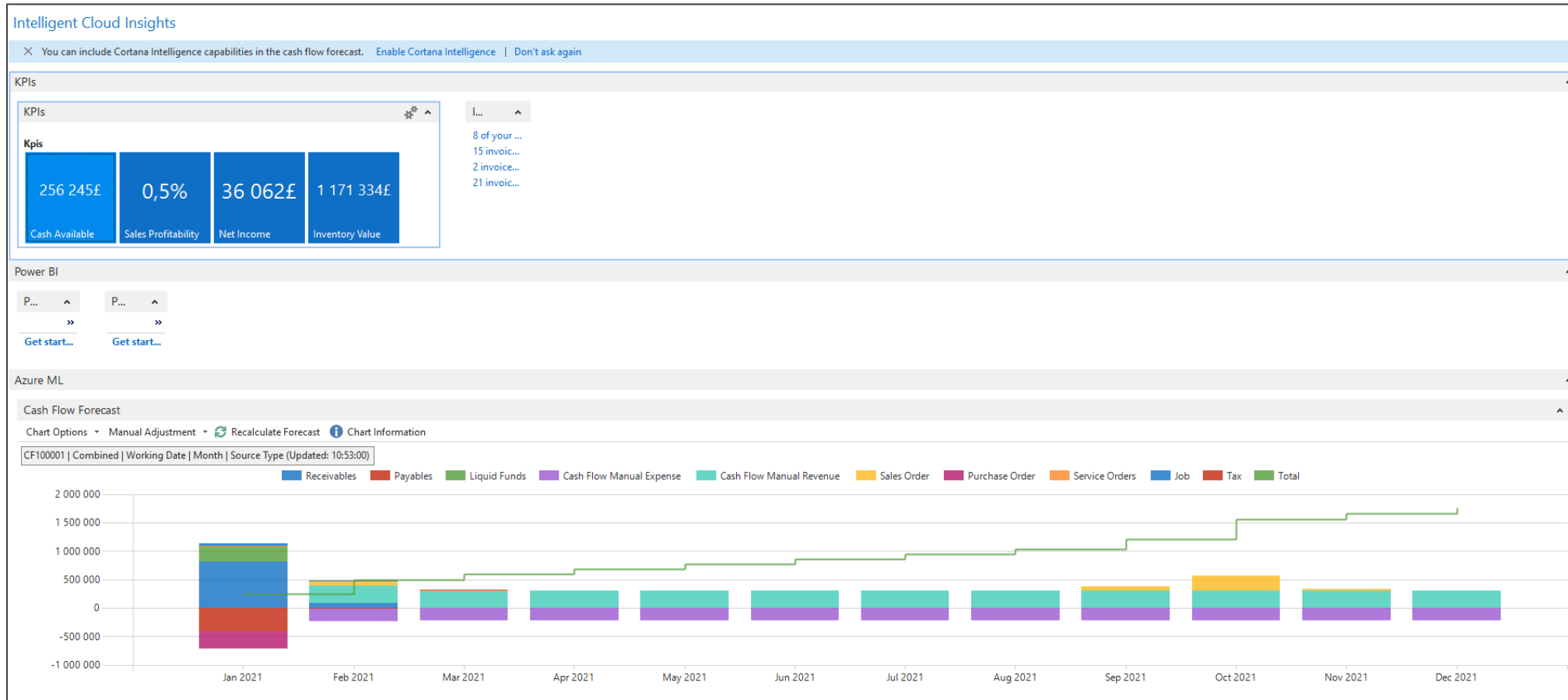
Benefits arising from the use of ERP in teaching at the faculty
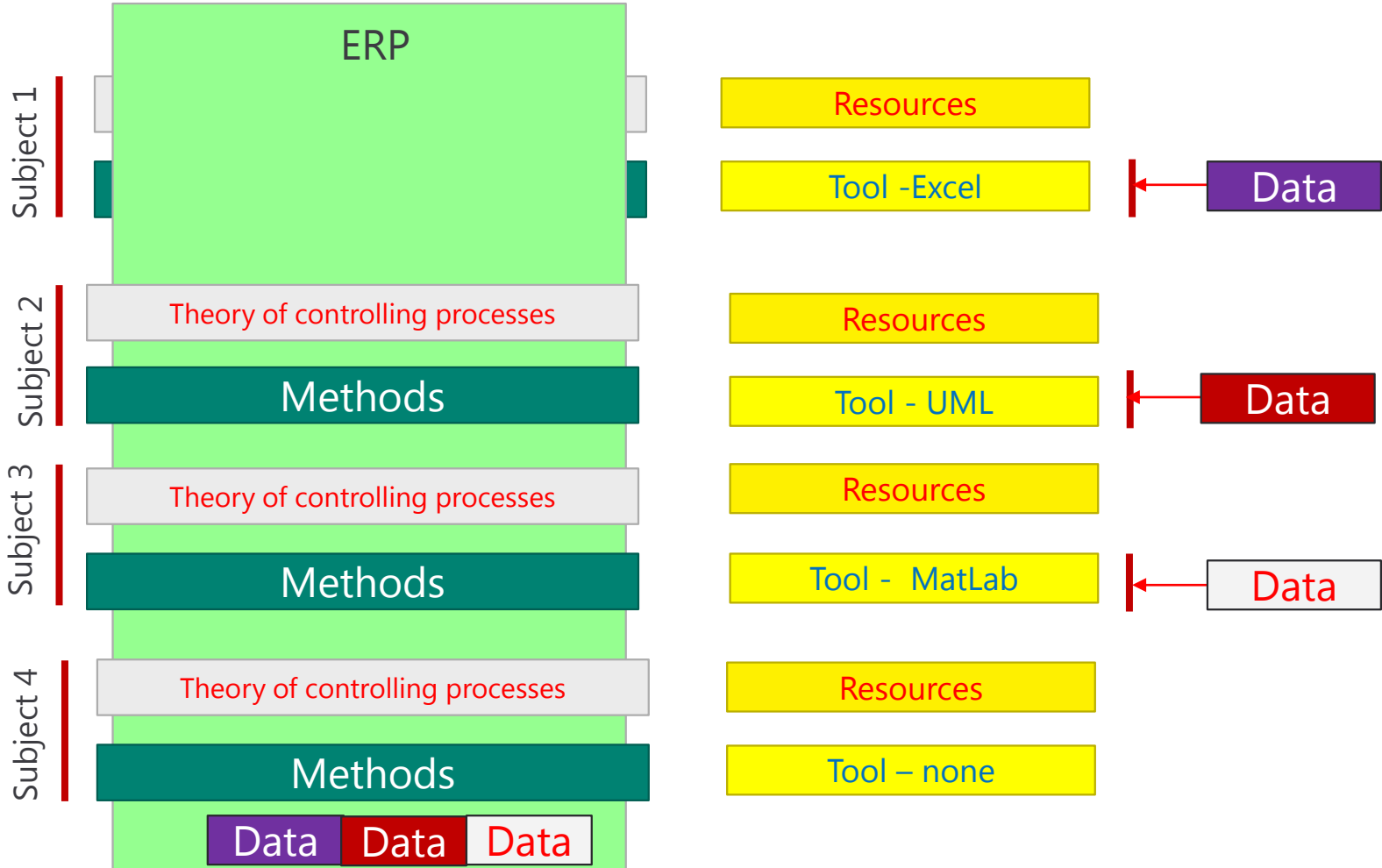
View across all companies

Microsoft Dynamics 365 Business Central – **very high level tour of the capabilities of Business Central**
~~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,
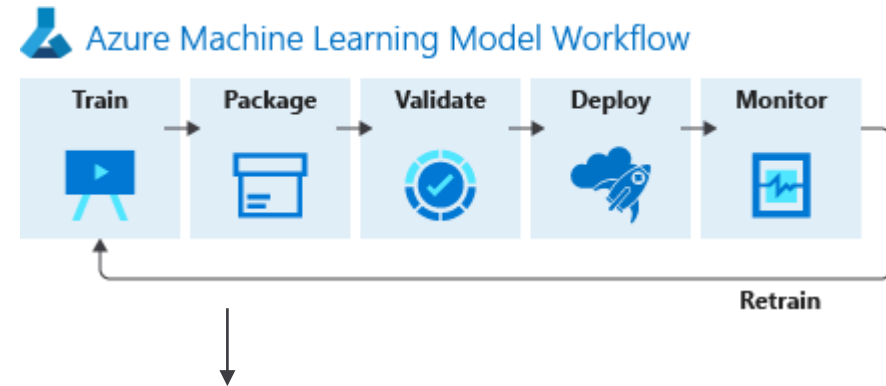especially in the future.

Use Artificial Intelligence
in Microsoft Dynamics 365 Business Central

Prediction of Late Payments

Cash Flow Forecasting

Sales and Inventory Forecasting

Azure Machine Learning Model Workflow

Train → Package → Validate → Deploy → Monitor

Retrain

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 researech...

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)