Studies •

Robert Müller-Török – Alexander Prosser

TEACHING REQUIREMENTS OF A DIGITISED PUBLIC ADMINISTRATION[1]

Robert Müller-Török, Professor, Hochschule für öffentliche Verwaltung und Finanzen Ludwigsburg, Robert.Mueller-Toeroek@hs-ludwigsburg.de

Alexander Prosser, Professor, University of Economics and Business, Vienna, alexander.prosser@wu.ac.at

The digitisation of public sector ICT is driven by a number of factors: Increased self-service via the Internet, the Internet of Things (IoT), real-time business intelligence and the advent of integrated information systems as the "backbone" of organisational ICT. This is accentuated by the Covid-19 pandemic. The paper presents an implemented university level teaching programme that covers the topics of integrated information systems for the environment described above. The paper also deals with the research question of how to embed such a programme in a conventional, public sector-oriented university course programme. It details the didactic specificities and analyses the feedback from the roll out and the prior knowledge required from students and the changes in other elements of a public administration course programme necessitated by digitisation orientation. It finally summarises the experience made and illustrates the necessity for further research.

KEYWORDS:
Public Sector Education, ERP, Covid-19, curricular development

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1. REAL-WORLD REQUIREMENTS

1.1. Technology drivers

ICT in the past two decades generally saw the advent of several technological innovations that have had a considerable impact on business information systems:

1. Web-based information systems for customer self-service, whether for ordering, booking services or banking, effectively eliminating whole industries that had acted as intermediaries before (cf. travel agencies).
2. A massive decrease in sensor prices which, together with cloud services, enabled the digitisation of infrastructure, both in manufacturing and in the city infrastructure.[2]
3. In the past few years, real-time business intelligence (BI) has become feasible due to in-memory[3] technology[4] that enables the analysis of unprecedentedly large data sets in sequential mode without building pre-defined aggregation structures.[5]

These innovations have also "arrived" in the public sector. Citizen-centric eGovernment enables citizens to quickly and time-independently process their requests and applications; however, it also means that citizens use self-service functions.[6] Sensor networks render a city infrastructure "intelligent" which then leads to the smart city concept,[7] whose data is input for real-time BI solutions. In this regard, public sector ICT has largely mimicked the evolution in the private sector.

1.2. Covid-19-compatible public administration

As of January 2021, "lockdown" has become a standard instrument of European governments in fighting the pandemic.[8] This typically involves home office. However,

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[2]   A Prosser, 'What the Smart City in the Danube Region can Learn from Industry 4.0', in *Proceedings of the CEE e|Dem and e|Gov Days 2018,* ed. by H Hansen, R Müller-Török, A Nemeslaki, A Prosser, D Scola and T Szádeczky (Wien: Facultas, 2018), 191–201.

[3]   "In-memory" means that even a multiple terabyte-sized database is loaded in main memory, not on disk any more. The difference in access time is milliseconds (disk) to nanoseconds (main memory), this is an acceleration by 10^6. Schematically speaking, a search task that can be done on disk in 11 days, will take 1 second in main memory. In Europe, particularly SAP has applied in-memory extensively in its product line, even for transactional systems.

[4]   T Zhu, D Wang, H Hu, W Qian, X Wang and A Zhou, 'Interactive Transaction Processing for In-Memory Database System', *Database Systems for Advanced Applications,* ed. by J Pei, Y Manolopoulos, Sh Sadiq and J Li (DASFAA, 2018), 228–246.

[5]   A Prosser and M-L Ossimitz, *Data Warehouse Management Using SAP® BW* (Stuttgart: UTB für Wissenschaft, 2001), Chapters 3.1, 6.1, 6.2.7.

[6]   Useful when formatted data is collected via the web interface, not just free text, for example, via email.

[7]   P Neirotti, A De Marco, A C Cagliano, G Mangano and F Scorrano, 'Current trends in Smart City initiatives: Some stylised facts', *Cities* 38 (2014), 25–36.

[8]   For an updated overview of measures see https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Europe

home office of clerical public administration staff involves several minimal infrastructural requirements:

1. an electronic workflow system for processing administrative cases including financial and logistics applications
2. VPN[9] for securely accessing the applications
3. a digital interface of submitting applications to the authority feeding the electronic workflow system for processing the cases
4. a digital ID and signature solution both for citizens submitting applications and for civil servants processing them in the workflow component

Ideally this is supplemented by a component for the electronic service to the citizens of the resulting documents produced by the electronic workflow. Covid-19 brutally exposed deficiencies in this regard. Here are some examples from the media:

1. Criminal suspects had to be released because the constitutional time of detention had expired and public prosecutors were unable to fulfil their duties from their lockdown home office for a lack of digital infrastructure.[10]
2. Building activity ceased not only due to Covid-19 but also because building permits were not processed when civil servants were in home office.[11]
3. Students were virtually left to their own resources, when remote schooling was impossible under lockdown conditions.[12]

It is obvious that a massive surge in public sector digitisation is sorely needed, but this not only involves systems and applications, but above all trained personnel able to design, plan, procure and use digital systems in public administration. What does this mean for public administration education, particularly on a university level educating the future leaders in public administration? This paper describes a teaching programme jointly developed by several universities of the Danube Region and already implemented that addresses the issues in the field of ERP systems.

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[9]   A Virtual Private Network (VPN) provides encrypted and authenticated access from remote workstations to central applications and data of an organisation.

[10] Online: www.welt.de/wirtschaft/article207481187/Ausgesetzte-Strafbefehle-Das-Corona-Paradies-fuer-Kriminelle.html

[11] Online: www.tagesspiegel.de/berlin/corona-stau-bei-baugenehmigungen-berliner-bauwirtschaft-klagt-ueber-neue-buerokratische-huerden/25757122.html

[12] Online: www.deutschlandfunk.de/unterricht-im-corona-lockdown-die-huerden-der.724.de.html?dram:article_id=490259

2. THE TEACHING PROGRAMME

2.1. Why focus on Enterprise Resource Planning software (ERP)?

Web applications, mobile apps and sensor networks are but an interface to the "outside world"; they need to be supplemented by a core backbone application landscape of which an ERP system is typically the core, covering financials and logistics, service management, case management and the associated electronic filing and workflows. Sensor data for remote monitoring of maintenance requirements, for instance, or Web/app-based self-service input by citizens and businesses, need to be processed somewhere and linked to existing data. An example: Sensor input indicating that a spare part or component somewhere in the smart city is about to fail, must trigger a service order in the support system, and probably also a procurement process. The costs of such a service order need to be calculated and there has to be a link to the budgeting system. In the absence of such systems, the sensor input and related information will end up nowhere. Digitisation hence organically requires system integration. This is done in an ERP system.[13] ERP systems also increasingly interact with real-time BI applications – both providing input for analyses and receiving analytical results. This works particularly well if BI and ERP systems work on the same (in-memory) data basis.[14] ERP systems are being used in public sector ICT, however, it is our observation that such systems are effectively used only for accounting purposes, and even within accounting, mainly for Budget Management and General Ledger (G/L) Accounting. This, of course, is not the point of an integrated information system. But it appears to be foreseeable that ERP systems already in place will also be used for other purposes, such as materials and service management or procurement.

These systems require the corresponding skills, most importantly (but not exhaustively):
1. thinking in processes as well as tools and methods for process management
2. understanding of process implementation in integrated and customisable information systems (a.k.a. ERP)
3. fundamental understanding of ICT technologies and their application including ICT risk assessment, such as cybersecurity
4. skills in Business Analytics

The universities participating in the programme development agreed on a detailed syllabus and a "storyline" of the case study in each lecture. This involved reconciliation of prior knowledge and the course programme environment of the participants. Each lecture was piloted at least once. The original language of development and piloting was English (for the very practical reason that English was the only language understood by all partners). Additionally, German and Romanian versions were also derived. At the end of each pilot,

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[13]   A-W Scheer, *Wirtschaftsinformatik: Referenzmodelle für industrielle Geschäftsprozesse* (Berlin: Springer, 1997).
[14]   A Schmitz, *Was ist eigentliche SAP HANA*.

Studies •

feedback meetings were held, which included attendees in the pilot lectures used to improve the lecture design. This did not only comprise didactic issues but also inconsistencies in the case or the storyline. Only after a stable state for the cases had been achieved, the book in English language was concluded[15] and the other language derivatives were written.[16]

Technically, the content is implemented in two master clients in SAP ECC, which are copied into the operational client systems, where the lectures are then held.

2.2. The content

The teaching programme consists of three subjects (two semester hours each), implementing a municipality *Civitas.* All subjects have already been rolled out:

A. Process and data modelling with Business Process Modelling Notation (BPMN) 2.0[17] and Entity-Relationship Modelling (ERM)[18] followed by public sector budgeting with SAP˚ ECC, including budget execution and auditing in the municipality.

The prerequisites are knowledge in accounting, public sector budgeting, auditability principles and – like all the other subjects – a basic understanding of computing.

B. The "service yard" (of the municipality of Civitas) specifically for road cleaning as a case study, that covers cost accounting, materials management and procurement as well as service orders (operations management and execution); this section is also implemented in SAP˚ ECC.

The prerequisites are knowledge in accounting, materials management and basics of operations management. Lecture A is not a prerequisite.

C. Business Intelligence for formatted and unformatted data implementing analysis of voice clips of a hotline for the sentiment in which callers speak about various topics.

The prerequisites are general knowledge of the public sector. Lectures A and B are not a prerequisite.[19]

The development and rollout partners are: the University of Public Service (NKE) and the University of Technology and Economics (BME), both in Budapest, the National Public Administration Academy (AAP) in Chișinău (Moldova), the University for Public Administration and Finance (HVF) Ludwigsburg and the University of Economics and Business, Vienna (WU). These institutions engage – either exclusively (AAP, NKE, HVF) or at least also (WU) – in public administration education on a university level. Only BME

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15   R Müller-Török and A Prosser, *SAP˚ ECC in the Public Sector* (Wien: Facultas, 2019).

16   R Müller-Török and A Prosser, *SAP® ECC in der öffentlichen Verwaltung* (Wien: Facultas, 2019); R Müller-Török, A Prosser, I Cojocaru and I Cojocaru, *Sistemul de planificare a resurselor întreprinderii SAP în sectorul public,* 2019.

17   ISO/IEC 19510:2013.

18   P P Chen, 'The Entity-Relationship Model – Toward a Unified View of Data', *ACM Transactions on Database Systems* 1, no 1 (1976), 9–36.

19   A Prosser, D Bagnato and R Müller-Török, *Business Computing with SAP* (Wien: Facultas, 2021).

offers a technically-oriented education and will hence not be considered any further.[20] Parts of Lecture C are currently (January 2021) converted into an English-language web-based course to be rolled out in the Danube region.

Considering the programme in its entirety, the content covers 1. accounting/budgeting, cost accounting; 2. materials management/basics in operations management, 3. basics in ICT; 4. Business (or organisational) Analytics; and 5. process and data modelling/management. These elements are arguably not standard elements in public sector education.

The lectures are hands-on and every student implements the respective case study in his/her own virtual municipality. The ICT tools used are: 1. for process modelling Adonis° modeller; 2. for data modelling Visual Paradigm°; 3. for natural language analysis IBM Watson° and RStudio°; and 4. for the other elements SAP ECC° and HANA°. There is a host of Web trainers for data and process modelling, screen cam shows of decisive or error-prone steps in the process implementation and a text book detailing the implementation steps and which can also serve as a reference later on when students again encounter such topics.[21] The materials are available in English and (for Lectures A and B) in German and Romanian.

2.3. The technical lecture cycle

In terms of hosting, the tools used impose vastly different technical requirements.

Adonis and Visual Paradigm are PC-based tools and are available in community editions. Also RStudio is a PC-based system and is available under a GNU AGPL licence.[22] They simply have to be installed in the PC labs used, no central server component is needed.

SAP ECC used for Lectures A and B is hosted centrally at WU. Both for the English and German language versions there is a master client, which is copied into the teaching client for a lecture. The administrative requirements include a change of the financial year at the beginning of each calendar (=financial) year. The GUI itself is rather easy to install and works both in MAC and Windows 10 environments. This facilitates remote teaching under lockdown conditions as each student can download the GUI from a university server, install and use it according to the server connection parameters given by the lecturer.

The software stack for HANA is a lot more complex as HANA uses Eclipse° and a number of plug-ins instead of the "classical" SAP GUI. This software stack is simply too complex to install for students, hence a viable solution is a remote desktop login to PCs in a lab to remotely work with the PCs as if students were sitting in front of the PC. This of course requires a VPN connection. WU actually went one step further: After an excellent

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[20]   Coming from the IT side, the issue at BME is the exact inverse of the issue discussed in the paper; at least one course that requires strong public sector knowledge (that is Course A) is offered to students who are not trained in this direction.
[21]   Online: www.wu.ac.at/erp
[22]   Online: www.gnu.org/licenses/agpl-3.0.de.html

Studies •

experience of the remote desktop solution with remote online teaching in the first Covid-19 semester in spring 2020, WU installed virtual PCs on its central infrastructure that do not correspond to any physical "real" PC any more and only exist virtually for remote desktop solutions. These virtual PC labs can be booked under online teaching conditions like physical PC labs[23] and can be accessed with remote desktop service. The physical PCs are therefore no longer a bottleneck. As an alleviating factor in managing the infrastructure, the BI component of SAP HANA does not need a year change and from its content is virtually maintenance free given an existing lecture. The HANA BI system, however, is not client capable. Therefore, unlike ECC, the "master client" is a state of the system on backup media and the entire system needs to be reset after a lecture.[24]

2.4. The challenge of multi-country content

The course programme, from its very inception, was designed to be usable throughout the Danube region. The obvious issue in this regard is the topic of language. However, other topics at least equally significant include:

1. Currencies and national calendars (the latter quite a common entry in logistics as it determines the factory calendar for scheduling): Our solution was to choose EUR, even though two of the original partner countries do not have EUR as currency; the Austrian industrial calendar was chosen as a default.
2. Naming; each case study needs actors in the storyline including actors already created in the system: Our solution was to choose Latin names as this is some kind of common denominator in Europe.
3. VAT treatment of invoices, that is, whether VAT is deductible or not for public sector entities (key in accounting/budgeting, not so relevant for logistics); rates also vary, of course: Our solution was to show and prepare both variants in the system and let the lecturer choose, the VAT rate chosen was 20 per cent (Austria and Moldova).
4. General legal provisions about how a municipality works, which units it comprises; as an example, municipalities in some countries have police units, others do not, some maintain their own cadastres, and so on; also the fiscal transfer is organised in vastly different ways: Here we ran the very real risk of being confronted with criticism that the case study to be implemented is not "correct". We countered the risk by picking areas as neutral as possible and by pointing this issue out prominently.

Issues 3 and 4 are the most stringent. They, however, mainly apply to Lecture A. Lectures B and C are more generic and less driven by legal provisions than the Accounting content

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[23] Online: https://learn.wu.ac.at/open/distanzlehre/virtuellpc
[24] The technical reason for this, in brief, is that an ERP system uses a given database structure and populates it with data; a data warehouse/BI system creates tables in a database, hence client capability is a lot more complex to realise.

in A. Best practice business processes in cost accounting, logistics and BI are the same or very similar everywhere. For instance, consumption-based materials management is the same whether done in Stuttgart, Vienna, Budapest or Chişinău. Budgeting and Financial Accounting but also the design of public sector workflows, however, very closely follow the national legislation.

2.5. Rollout

A core issue with any curricular development project is sustainability. To achieve this, local teaching personnel must be found and educated that 1. has a long-term perspective in the respective teaching institution; 2. has the necessary pre-requisites; and 3. is intrinsically motivated to absorb the knowledge necessary to effectively teach the subjects.

The dissemination approach we chose and which proved itself was to hold a first – pilot – lecture with our staff and the prospective lecturer/s attending as students. Lecturers could also go through the subjects and practice by themselves after the lecture, thus familiarising themselves with the content. The second lecture of each type was then held by the local lecturers with one of the developing staff in attendance. From the third "run" on, lecturers hold the subjects themselves. They are also free to adapt the transparencies to their specific needs.

This is supplemented by a lecturers' guide. This guide informs lecturers about typical issues during the subjects and how to solve them. When for instance, a cost allocation in cost accounting does not work, there are four or five standard mistakes, why this may happen. They are listed in the guide, which also shows how to discern and fix them. The guide also informs the lecturer about additional content that may be taught, as well as additional exercises.

3. DIDACTICS OF REMOTE TEACHING

The teaching programme was originally designed for classroom teaching. Also the pilot lectures and the rollout of Lectures A and B was entirely in-class. The classroom was of course supplemented by blended learning[25] and self-study. A typical blended design in ERP teaching would, for instance, encompass:[26]

1. web trainers for teaching and practicing process and data modelling before class
2. implementing an ERP case study in class using the modelling methods
3. implementing an extended case in homework
4. discussing the extended case in class and building on it

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[25]   N Friesen, *Report: Defining Blended Learning*. 2012; K Lothridge, J Fox and EFynan, 'Blended learning: efficient, timely and cost effective', *Australian Journal of Forensic Sciences* 45, no 4 (2013), 407–416.
[26]   See for an example www.wu.ac.at/erp

Studies •

5. providing supplementary material for self-study and review, such as screen cam shows for the ERP content

However, in remote teaching under Covid-19 conditions, the challenges increased. There was no physical contact between lecturer and students, but also no direct interaction among students, which would typically be fostered in a classroom environment.[27] The out-of-classroom interaction in both cases strongly depends on the infrastructure provided by the university. At WU for instance, the university learning support application learn@wu provides such interactive tools in a closed, lecture-specific user group that also offers chat and workgroup functionalities.[28] Otherwise students are left to organise themselves via general social media, which has many issues in terms of user access and dissemination of materials. However, the interaction between lecturers is also impeded. Experience would usually be shared by mentoring and in-lecture coaching as described above in the rollout approach. This is a lot less practical in video-based lecture formats.[29]

It is, however, also the experience of the authors that teaching with complex ICT systems via video lectures has massive drawbacks in general. In classroom teaching, an experienced lecturer immediately recognises when students have software issues and fall behind. The lecturer may then immediately approach the student and directly offer help at the student's PC. In a video format, when student video streams are switched off resulting in an essentially one-way communication, lecturers do not get any immediate feedback on how students fare. Some students may not be active enough to interrupt the lecturer when they have issues and hence the lecturer has to regularly poll students for issues. The "hand" function offered by video conferencing tools may help here, but in the view of the authors it cannot replace direct interaction with students. Hence, the more technically complex the system environment becomes, the less a remote video format appears to be appropriate for teaching.

4. CONTENT SPECIFICS AND REQUIREMENTS

4.1. The process view

In many cases, public sector education appears to be legally oriented and focused on structures and cases. A procedural view of the Law in general and of administrative regulations in particular is not standard. However, a legal regulation can always be seen as

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[27] P Sendall, W Ceccucci and A R Peslak, 'Web 2.0 Matters: An Analysis of Implementing Web 2.0 in the Classroom', *Information Systems Education Journal* 6, no 64 (2008).

[28] M Andergassen, F Mödritscher and G Neumann, 'Practice and Repetition during Exam Preparation in Blended Learning Courses: Correlations with Learning Results', *Journal of Learning Analytics* 1, no 1 (2014).

[29] G Salmon, J Gregory, D K Lokuge and B Ross, 'Experiential online development for educators: The example of the Carpe Diem MOOC', *British Journal of Educational Technology* 46, no 3 (2015), 542–556.

a process – and it arguably helps to see it as a process.[30] For students of Business, process modelling and process management have become a standard feature. At WU, for instance, every student of whatever course programme has to pass "Business Information Systems I" very early on in the respective course programmes, where event-driven process chains[31] are taught. In public sector-oriented education, a process view on activities is often missing, where the lectures introduce not only a new topic but also a radically different view on the entire discipline.

4.2. The ICT view

"eGovernment" has become a buzzword in public administration, however, many pertinent education programmes do little to prepare students in this regard. We maintain that a profound ICT education is an *essential and integral* part of any public administration course programme. This not only concerns an introduction to web applications and digital signatures/eID/registers behind the eID, but also to topics, such as data protection, cybersecurity and intellectual property rights in cyber; the latter three could be considered part of IT management, which of course also encompasses more traditional items, such as life cycle cost assessment for IT projects, IT project management and IT procurement. Also base technologies, such as the Internet of Things (IoT), should be understood. Some methods, such as process modelling, often associated with ICT, are in fact general business/organisational methods that can be disassociated from any ICT application, for instance depicting a legal process as such to better analyse it.

Hence, integrated information systems are only one of many topics, but may serve as an introductory initiative, much like a "feeder", to introduce a broader technology orientation into the curriculum. This leads to an ICT common body of knowledge, which as we believe should be defined for each public sector-oriented course programme ranging from the "basics" of web/IoT technology, registers and eID to IT management in a broader sense.

4.3. Accounting

In our experience, accounting knowledge is quite broadly taught in public sector education course programmes and hence accruals accounting and budgeting can be pre-supposed

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[30] See for example A Prosser, R Müller-Török and A Pautsch, 'Legal Aspects of Cross-Border Delivery of Voting Documents: a Neglected Issue?', in *Proceedings of the 2015 2ⁿᵈ International Conference on Electronic Governance and Open Society: Challenges in Eurasia,* ed. by Y Misnikov and D Trutnev (New York: Association for Computing Machinery, 2015), 123–128; A Balthasar and A Prosser, 'Die Europäische Bürgerinitiative – Gefährdung der Glaubwürdigkeit eines direktdemokratischen Instruments?', *Journal für Rechtspolitik* 18, no 3 (2010), 122–132.
[31] G Keller, M Nüttgens and A-W Scheer, *Semantische Prozeßmodellierung auf der Grundlage „Ereignisgesteuerter Prozeßketten (EPK)"* (University of the Saarland, 1992).

Studies •

as common knowledge. This applies less to cost accounting, which may be offered in a preparatory course. It should be noted that – completely in line with private sector accounting practices – also the public sector is moving to the triad of cash-based accounting (classical "cameralistics" budgeting) – accruals accounting with periodicity – cost accounting; cf. as an example the Austrian Bundeshaushaltsgesetz BHG 2013,[32] which obliges all federal agencies to provide this triad.

4.4. Logistics

Logistics is an area where organisations may gain or lose substantial amounts of money.[33] The more ICT-based systems are used to manage logistics the more advanced concepts of materials and operations planning may be implemented. Methods which on a paper or near-paper basis (think MS Excel) are not viable, become viable in state-of-the-art ICT-based logistics systems.

We observed that classical public administration course programmes provide little to no introduction to these concepts. Here a lot of future optimisation potential is lost due to the fact that next generation public administration leaders simply are not aware of the potentials to optimally organise and run their logistics and operations.

4.5. Business analytics and artificial intelligence

Commercial entities perform analytics of their business on a routine basis. Public sector organisations may find it a relatively new idea. However, process mining[34] may be an area to discover ways to improve one's service delivery to citizens. Also, the systematic semantic analysis of social media posts on the organisation or specific topics can yield valuable insights. Specifically, the combination of Analytics and Artificial Intelligence can be incorporated in service delivery itself, for instance the usage in pre-filtering interesting cases in an analysis for fraudulent behaviour of any kind. However, the application potential is pervasive as may be demonstrated by an example: To register a dog at the authorities via an app, the holder uploads a smart phone photo, which is analysed by an AI component that discerns problematic dog breeds. If no such breed is discerned by the AI component, the registration process can be concluded purely online; otherwise, the dog must be inspected.[35] This example in its complete mundanity shows how pervasive

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32 Bundeshaushaltsgesetz 2013. Online: www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage= Bundesnormen&Gesetzesnummer=20006632

33 Cf. S Chopra and P Meindl, *Supply Chain Management* (Pearson, 2014), Chapter 1.6 and 6.4 with examples.

34 W vd Aalst, *Process Mining. Discovery, Conformance and Enhancement of Business Processes* (Berlin: Springer, 2011).

35 Online: https://news.sap.com/germany/2019/08/cloud-oeffentliche-verwaltung

AI components are about to become in public sector applications. Future leaders in public service should understand the technology, its potential, but also its limitations.

5. FINDINGS AND FURTHER WORK

From the above discussion we may derive the following refutable hypotheses:
    H1: Covid-19 accelerated the need for ICT-related training in public sector education.
    H2: Public sector education, while still being distinctly different from business education, approaches the latter in some key aspects.
    H3: ERP-related subjects serve as a catalyst for curricular change in non-ICT-related areas.

In Section 1 we discussed the technology drivers for strengthening the ICT component in public sector university training. Covid-19 arguably plays an important role in this transformation and it is a safe bet to say that the pandemic has played an essential part in the digital transformation.

Section 2 presented the content of the lecture series showing the inter-relationship between this new type of public sector education and ICT training for the private sector. Specifically, we identified at least four areas where ERP-based teaching content requires or at least promotes non-conventional content for public sector education: Process management, ICT common body of knowledge, logistics and Business Intelligence. Section 3 discussed some didactic issues in teaching such content, which shows little difference between private and public sector-oriented ICT education strengthening the case for H2.

Section 4 discussed the requirements from the non-ICT parts of the university training in order to embed the content of the lecture series. We also hold that these items, which are standard curricular items[36] in business education, will also become standard features in public sector education. This will not negate the specificities of public sector education. However, it will tend to bring both strands of administration education – business and public administration – closer together.

It will be an interesting and worthwhile task to test the hypotheses once a sufficient sample of educational programmes has embedded them or similar content. Particularly if H3 proves to be valid, ERP-related teaching would then have essentially contributed to move public sector university level education into the 21st century.

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[36] P Mertens, 'Lehre und Lehrinnovationen', in *Verband der Hochschullehrer für Betriebswirtschaft e.V., Der Verband der Hochschullehrer für Betriebswirtschaft – Geschichte des VHB und Geschichten zum VHB,* ed. by W Burr and W Wagenhofer (Wiesbaden: Gabler, 2012), Chapter 13, 282ff.

Studies ●

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Robert Müller-Török, PhD, obtained his PhD in 1997 from the University of Economics and Business Administration Vienna. He moved to Germany and was a Business Consultant in the Financial Services Sector, held positions in municipal Asset Management and the Automotive Industry and regularly taught Small Business Management and Computer Science from 1997 to 2012 in Debrecen and Vienna. In 2012 he was appointed Full Professor in Ludwigsburg. His research areas include citizen participation, e-democracy in general and, with a view on Computer Science, all applications of Business Processes and ERP-Systems. Electoral affairs are his special research interest.

Alexander Prosser, PhD, habilitated at WU in 1998 and held positions at HEC, Paris and the University of Technology, Sydney. His research fields are eGovernment and electronic citizen participation. He co-organises the Central and Eastern European eGov Days. Alexander's teaching focus has been on ERP and business intelligence using SAP systems since 1994. He built up the SAP-based teaching programmes at the University of Technology Sydney, Fachhochschule Salzburg and WU. Among other prizes, Alexander won a European eGovernment Award together with the Austrian Federal Procurement Agency.

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