Artificial Intelligence in Transfer Pricing

Application Possibilities of TP Tools – Practitioner Perspective

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This article summarizes the presentation and discussion of our Workshop at the Vienna University of Economics and Business Administration (WU) in Vienna on May 16th, 2018. It describes prerequisites of digitalization as the basis for artificial intelligence (AI) readiness in transfer pricing (TP), shows a TP documentation workflow tool and attempts to describe the variety of potential future TP applications from communication to operational and forensic TP.

1. Big Data and Digitalisation

How does a rocket appear to a man from the Stone Age? Probably like magic. In the last decades we became familiar with mobiles phones, electromagnetic induction, voice-over internet protocol, all kinds of imaging technologies, social media, drones, and a variety of fascinating applications dropping in all areas of daily life. Combining technologies leads to huge innovations, as we have seen in the past century.

And now: It's the bunch of data we are facing. Is it magic that parents learn from the diaper ads their teenage daughter receives that she may be pregnant? Not at all. How come that *Google Maps* is the best traffic jam predictor? It's the mass data they receive from all mobile phones on the motorway. We all leave our marks in the virtual world of data bases and we benefit from that, of course at the cost of privacy.

"According to analysts, by 2020 there will be 44 Zettabytes of IT storage data, which equates to over 5,300 Gb [gigabytes] of data for every man, women and child on the earth. Of this data only 15 % is expected be stored in the cloud. To put that in perspective: 44 Zettabytes is 44 trillion Gigabytes, estimated to be over 57 times the amount of all the grains of sand on every beach on earth. All Data is expected to double every two years through 2020."[1]

Data is the new oil[2] of nowadays, and AI is the refinery.

Coming to the world of taxes, how can tax directors leverage Big Data? TP managers and economists are usually greedy for data to support their analyses and models, and they are dreaming of self-optimizing systems.

Processes of the industry 4.0[3] are becoming digital and speedy. Data flows are bidirectional. Engine parts can tell the seller what happened to them so that the service engineers can be prepared and bring the right maintenance tools. In the *SAP* environment, *S4 HANA*, the new in-memory technology, offers terrific upload and download rates. Robotic process automation will replace human activities more and more. The buzzword is *"automated end-to-end-process"*. No human interaction is needed anymore.

On the tax side, we face worldwide transparency (BEPS) and digital fiscal authorities in various countries where tax returns and other tax relevant data have to be filed electronically and fiscal databases perform validations and plausibility checks, sometimes even on raw data. The amount of TP forms[4] to deliver increases tremendously. On the other hand, tax risks have to be minimized, and compliance and quality have to be assured. These objectives have to be reached under permanent cost pressure and productivity targets. Therefore, the **Tax Department** has to keep pace with the changing business environment and **assume a proactive role in the digitalization strategy** of a company. If the tax manager does not receive the correct data or does not understand the relevant data, she or he will most probably make the wrong decision.

2. Prerequisites of AI Readiness in Taxes

What is the prerequisite to benefit from an AI application? The answer is very simple: It's **Big Data.**[5] The *Google* algorithm is so successful because it has been collecting data for more than 20 years as the worldwide market leader for internet searches with more than 3 billion searches a day.

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1 Cf www.isystemsintegration.com/next-generation-storage (last accessed 1. 8. 2018).

2 Cf https://www.forbes.com/sites/bernardmarr/2018/03/05/heres-why-data-is-not-the-new-oil/#48637bae3aa9 (last accessed 1. 8. 2018).

3 Cf *WTS/DFKI* (German Research Center for Artificial Intelligence), Artificial Intelligence in the Taxation World, Innovation study on digitalisation and the potential of artificial intelligence in the taxation world (2017) figure 48, Maturity levels on the development path to Industry 4.0, 75.

4 TP documentation compliance and transactional tax forms, e.g. IRS form 5472 in US and form 3CEB in India.

5 Cf TPweek, Tax Technology Roundtable: German MNEs eye AI dividends, 4/5/2018, 4/10.

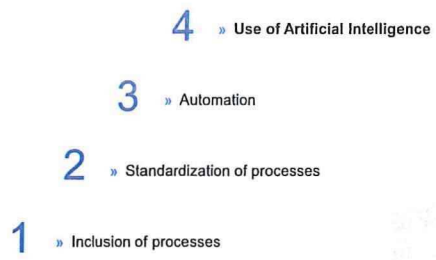
In the following, we would like to outline the necessary steps that have to be taken to gain from the use of an AI with the focus on the TP topic.

At an early stage, processes are carried out without planning, tools are not integrated and internal controls do not exist. In an **initial planning process**, responsibilities have to be defined, i.e. who decides on price changes, who approves them, who is informed, etc. In this step, there is no standardized documentation, and tools are hardly integrated. Internal controls – if any – are not documented.

The next level comprises the **standardisation** and documentation of processes. E.g. TP monitoring and steering are laid down in manuals; functional concepts are documented. However, deviations from standard processes are not tracked, as they may depend on individual decisions. The ERP (enterprise resource planning) system only partly complies with tax requirements. Tools are fractionally integrated. Compliance of minimum standards is achieved.

The third step would lead to an **automation**. Process monitoring is done, and deviations from standard are recognized as soon as possible (e.g. out of the range margins). The focus lies on the improvement and efficiency of the process. The TP tools and applications are integrated in the IT infrastructure. Data is automatically obtained from pre-systems (e.g. purchase orders, sales orders, material masters). Process risks are documented. Internal controls, protocols, and validity checks support the monitoring. An example would be a deliberate decision to incur a strategic loss in TP substantiated by a clear business plan.

In an **optimized** level, business processes are efficient, easily transferable, and documented. Process improvements are constantly collected and implemented. Stakeholders have electronic access to all necessary information via mobile real-time dashboards. Internal controls are integrated in processes and tools. The results are of high value, traceable, and meaningful.



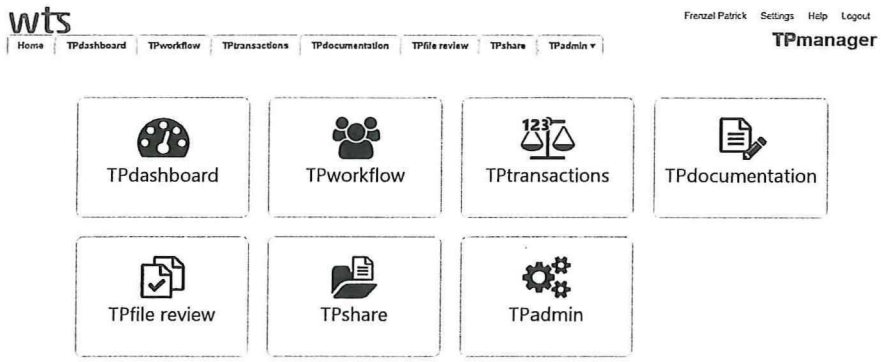
Caption 1: Step approach for usage of AI

3. Use of Transfer Pricing Tools

In a multinational organization doing business all around the globe, TP calls for **centralized and consistent approaches** in compliance, monitoring, and price setting, as well as in risk management. The usage of IT tools combining a TP task workflow, worldwide cooperation, and operational TP is simply inevitable.

Action Point 13 of the OECD BEPS Initiative[6] is a three-tiered approach consisting of the master file (a high-level overview with general information of the MNE for TP purposes), the local TP report containing intercompany transactions (which provides more detailed information relating to the business entities of the MNE) and country-by-country reporting (a tax-jurisdiction-wide key-figure overview and disclosure of business activities).

Caption 2 illustrates how the implementation of Action Point 13 into local law can be transferred into real life.



Caption 2: *"TPmanager"* overview

[6] Cf *OECD*, Transfer Pricing Documentation and Country-by-Country Reporting, Action 13 – 2015 Final Report, OECD/G20 Base Erosion and Profit Shifting Project.

TPmanager is a web-based tool to support active TP management and structuring of worldwide documentation. It is a practical IT solution for implementing and supporting company-specific TP systems and documentation concepts. It also serves as centralized documentation storage. The functional and risk analysis is integrated as well.

A visual **TP dashboard** provides a quick regional country or company TP overview. The module shows detailed information, such as responsibilities, inbound and outbound transactions, and the next due dates.

Caption 3: *"TPdashboard"*

The **TP workflow** reflects the TP documentation workflow. This includes responsibilities and respective tasks for each TP document. For each task a deadline and status tracking are available.

In the module **TP transactions** you receive an overview of all relevant intercompany cross-border transactions, including respective volumes which are split into inbound and outbound transactions and which are categorized into transaction types.

The icon **TP documentation** is for maintaining and creating the individual TP documentation. The initial creation of the documents can be done centrally for a group-wide standard.

The **TP file review** contains the log functionalities. It displays the status of documents after changes were made. It includes who, when, and what with regard to changes made.

The **TP share** stores all relevant underlying documents as well as the final TP documentation. You may set specific permission levels (public, internal, confidential) for the uploaded documents. Additionally, TP relevant documents can be flagged as audit relevant.

The module **TP admin** provides settings and functions for administration purposes and tasks regarding all functions of the application.

Obviously, all tools offered in the market are more or less flashy front-ends. But the music plays in the back-end where data harmonization and customizing are key. The fifty year old principle *garbage in, garbage out* is still valid.

4. AI Application Fields for Transfer Pricing

TP cases with AI support can be grouped into three sections: first, transactional data analyses; second, communication and data flow applications for frequently asked TP questions; and third, TP consulting and compliance issues.

4.1. Transactional Data Analyses

All transactional data analyses belong to the field of operational or forensic TP. Transactions, invoices, contracts are aggregated, categorized, and compared. Anomalies can be detected. Facts for TP cases can be assessed by identifying value chains. Reconciliations can be supported, e.g. deviations from local GAAP vs IFRS comparisons. This is also crucial for benchmarking and has recently become very important for country-by-country reporting (CbCR). AI applications show recommendations and give probability ratios.

4.2. Frequently Asked TP Questions

Here we subsume chatbot and ticketing solutions. A decent chatbot answers standard questions on deadlines, tax rates, thresholds, TP requirements in certain countries, amplifies parts of a TP documentation and process, TP methods, APA procedures, country contact persons, CbCR notifications. Whereas the dialogue system can lead you to the right direction, a ticketing, tracking or data flow system is useful for specific questions with more responsible people and processes involved. Emails sometimes vanish into nirvana. Tickets can be tracked where they are stuck. Both applications collect

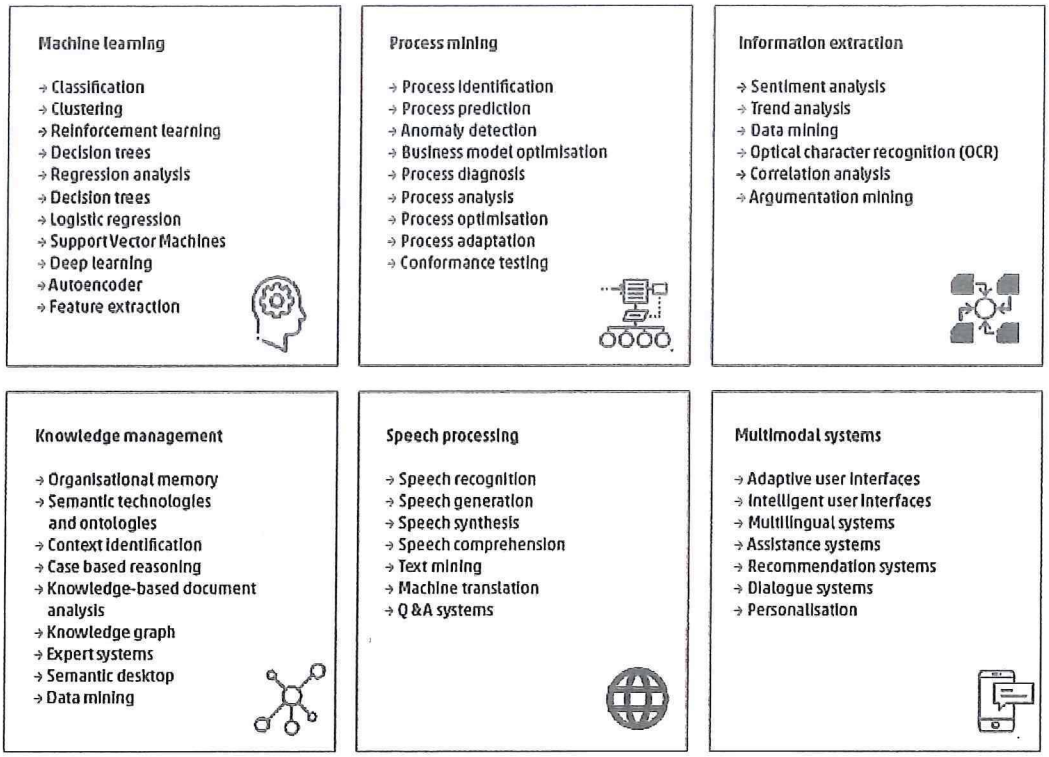
questions and answers and will finally lead to a machine learning process to improve the quality of the answers.

4.3. TP Semantics

This topic group refers to all text-related solutions such as translation of TP texts, verdicts, opinions. AI could identify and encompass similar tax cases and opinions from the past. Consistency checks of multiple TP reports are becoming more and more important, as heterogeneous data sources could trigger TP risks. Consistency checks would comprise inbound and outbound volumes, business descriptions, functions and risks listed, value chains, TP methods, profit level indicators (PLI), interquartile ranges, and screening processes.

Benchmarking can be done by virtual or electronic assistants. Economists will no longer have to browse up to one thousand internet sites to check comparability.[7] Data assistants will give them recommendations for an accept/reject-list which economist and TP manager have to approve on a risk-based decision.

Caption 4 gives an overview of potential AI technologies and applications for the tax area in general.[8]



Caption 4: Overview of potential AI technologies for the tax area

5. End-to-End Transfer Pricing

Everyone responsible for TP in a multinational organization is looking forward to having a fully integrated **end-to-end (E2E) TP process** from a point of **single transaction to TP compliance and price setting**, where a "magic" AI identifies and extracts intercompany transactions, business functions, attributable profit margins, segregated financials from differently customized ERP and non-ERP sources. It calculates the tested party results, performs benchmarking analyses, documents the screening, produces master file and respective local TP reports, and fills in all tax forms automatically. AI solutions could correct out-of-range prices or make dynamic adjustments in a self-optimizing IT environment.

This means that **tax function, accounting, controlling, and IT** would have to work together. Isolated solutions will not work or create redundant and probably contradictory data and slow processes.

Very often harmonizing and automation efforts are not worth doing or not possible at all, especially when acquisitions or spin-offs happen on a "daily basis". In this context, **data lakes** may be the only way out and could absorb all the financials. However, if you are not able to navigate through the data jungle, it is just a data dump. Data mining can mitigate some constraints by putting data together in a structured form, but if you do not know table or field names at all, it will not be rewarding.

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7 Cf *WTS/DFKI*, AI in the Taxation World, 40.

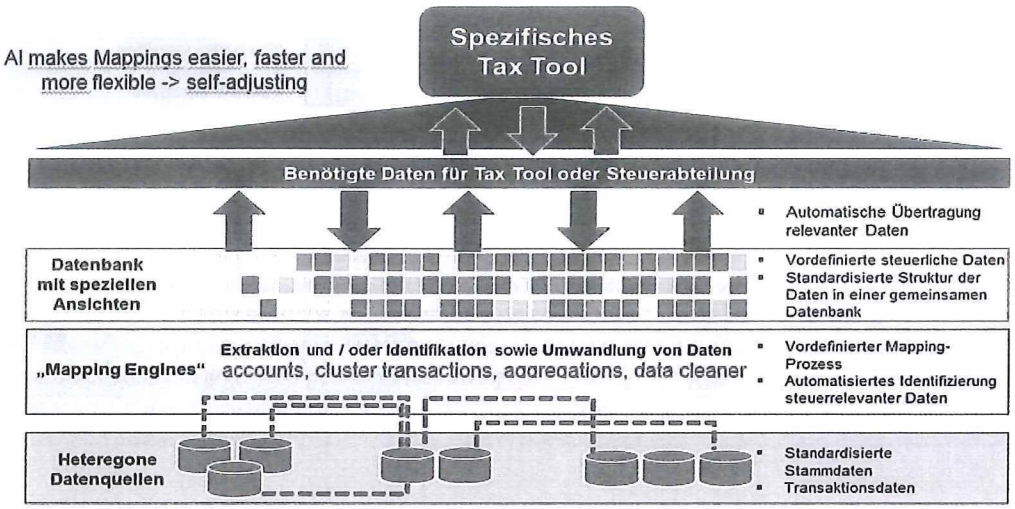
8 Cf *WTS/DFKI*, AI in the Taxation World, Figure 11: Overview of potential AI technologies for the tax area, 25.

Also, data volume plays an important role in machine learning. Smart algorithms need a huge amount of examples to be able to learn. Universities and scientists all over the world share their findings. Companies, even MNEs, are forced to put their data pools together to gain from Big Data. But business competition, trade secrets, and data protection will clearly restrain these endeavors.

Tax data enabling represents the fundamental base of the transformation process towards the digital tax function. It has to be clarified which data are relevant for tax. Which data sources are available?

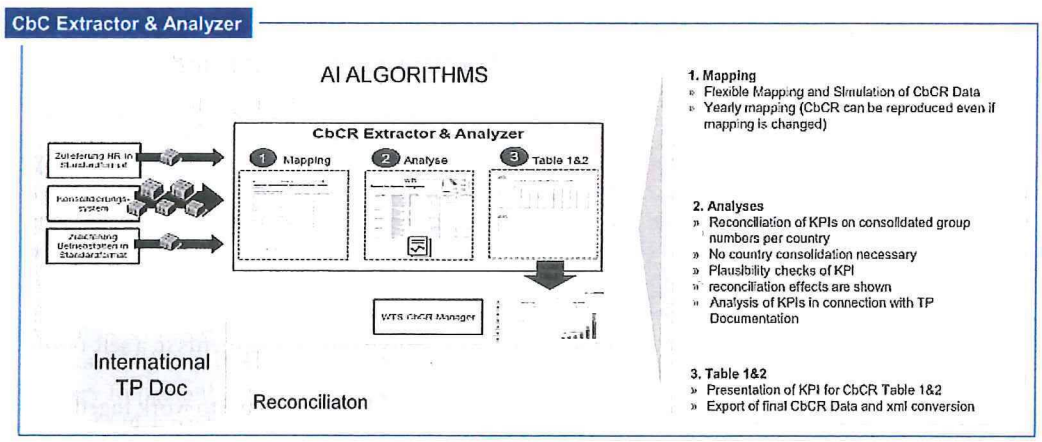
The classic example for automation is the **mapping engine**. Mappings have been existing for at least a decade. New accounts, material codes, transactions, organizational units had to be reviewed, and the mapping had to be changed until a new case came up. Thus, mapping processes were only done once or twice a year. Customizing ERP systems is a very challenging affair. Mappings and data cleaners should be used very carefully. It is an IT no-go to change raw data. Clear guidelines and documentation of changes are a must. Writing back corrected data to the original system is strongly recommended.

AI will make static mappings more **flexible and self-adapting** which will have a strong impact on data quality and reduce tax risks. Caption 5 illustrates how data could be gathered, categorized and aggregated for tax purposes.



Caption 5: Tax data enabling

An example for a data extractor for CbCR is shown below. By selecting accounts, business activities, and other attributes one could build up a CbCR database, apply mapping procedures, analyse data, conduct reconciliations with TP reports, do plausibility checks and country consolidation, calculate KPIs, and execute the xml conversion.



Caption 6: *"CbC Extractor & Analyzer"*

6. Pattern Recognition and Prediction

6.1. Pattern Recognition

Neuronal network's core competency is pattern recognition, which, from our own experience, is very difficult to learn for AI but has **enormous learning curves** and can recognize patterns that humans cannot detect or can only recognize after many years of training and experience.

Data comparisons for multiple years can be easily done by the machine. Developments of profit margins, screening comparisons over years, comparable companies accepted and rejected are popular TP audit issues. Distinguished algorithms will be able to perform root-cause analyses for out-of-the-range transactions like consecutive losses, wrong business models, market downturns.

Value chains can be tracked from original production to the end customer. It will be possible to visualize value contributions, which will be especially beneficial for the DEMPE (development, enhancement, maintenance, protection, exploitation) functions of intangible valuations. New business transactions[9] and accounting procedures can be identified. Many cases are M&A activities as indicators for business restructurings.

6.2. Prediction

Prediction functionalities will be a *conditio sine qua non* in future TP. This includes the prediction of market prices, all sorts of direct and indirect cost and sales revenue, impacts of TP adjustments on the effective tax rate, assessment of TP provisions by bottom-up approach, an also interdependencies of price changes between TP, VAT and customs, and effects of audit results on financial statements.

7. What Does AI in Transfer Pricing Mean for the MNE Organization?

We have discussed above that digitalization and AI will achieve faster and – depending on the implementation – better results. But what about leadership and other surrounding aspects?

Every TP manager knows the **trilemma** between **resource allocation**, **incentive system**, and **tax compliance**. You have to save costs in controlling – make the internal service ten times more expensive, then nobody will bother them anymore. The country managers fight like hell on TP or draw money from the parent's pocket instead of working for their customers, in order to receive a bonus. Both cases are violations of the arm's length principle. If an algorithm sets the transfer price on certain conditions, there will be transparency. The whole decision-making process would be clear, and there will probably be fewer disputes towards closing. Responsibilities and decision overrun would be documented.

But decision-making transparency is still an issue, as neuronal networks are somehow experienced to be a black box where results cannot be explained so easily – in contrast to rule-based machine learning.

Additionally, there seems to be a psychological phenomenon: Humans absolutely trust in computers. Even students follow an "emergency guide robot" into a fire although they have been shown the emergency exit and have been told that the robot may have an error.[10] Uncritical behavior is not advisable.

Could AI be talked down just by the power of a voice? Not at all. AI solutions are not affected by incentives. And finally, a *human being* will be held responsible for decision making.

In a Nutshell: Key Take-Aways

We have outlined our perspective on the practitioner's future work with TP issues. Big data will revolutionize our daily work, and the tax department has to assume a proactive role in the digitalization strategy of a company. In chapter 2, we described the single steps and prerequisites of AI readiness in an organization. In the third part, we emphasized how important it is to have a centralized and consistent TP approach in an MNE and presented an example for a tool-based TP application with dashboard, data flows, display and arrangement of transactions and storage. Chapter 4 tried to give a comprehensive collection of digitalization and AI application examples ranging from transactional analyses to dialogue systems and semantics. The next section covered integrated data flows, end-to-end processes, and self-adjusting systems. Then we had a glance on pattern recognition and prediction. The last section was dedicated to organizational perceptions in a man-machine interaction.

What we want you to remember is that building up an AI infrastructure is not magic. It is not rocket science. It is pure handcraft by many passionate humans.

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9 Cf *WTS/DFKI*, AI in the Taxation World, Figure 21: Potential of AI in the transfer price area, 41.

10 Cf *Weinersmith/Weinersmith*, Bald! 10 revolutionäre Technologien, mit denen alles gut wird oder komplett den Bach runtergeht (2017) 166 et seq.