**Interview guideline I**

**ARTIFICIal INTELLIGENCE IN pROCUREMENT**

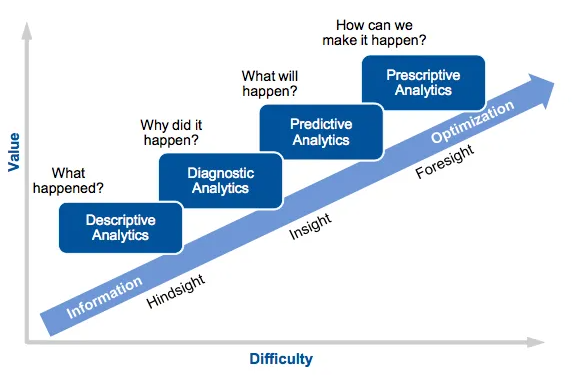
Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Premium automotive manufacturer
* What is your current position? How many years have you been in this position?  
    
  Procurement Digitization Business Intelligence Manager for 3 years
* What is your understanding of artificial intelligence?  
    
  Use of technologies to optimize a business process and make informed decisions. Often it is no longer understandable why the technology arrives at this result. Can be distinguished from BI and RPA.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Not much yet, we had some ideas for pilot project. Yet, no concrete experience - more in the area of RPA or general analytics.
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?

Rather “basic work”, data landscapes issues, data silo, and inadequate data quality. Creating acceptance for digitization topics in general.

* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?



*Figure 1. Gartner’s “Analytics Maturity Framework” (Gartner, 2018)*

**Section 2: Evaluation of use cases**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table I. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | **Procurement strategy (#3)** | 1 | 3 | 5 | 5 | 1 | 3 |
| **Strategic supplier management (#2)** | 4 | 4 | 1 | 5 | 3 | 1 |
| Supplier sustainability | 1 | 1 | 5 | 5 | 5 | 3 |
| Tactical | Supplier pre-qualification | 1 | 5 | 3 | 5 | 1 | 3 |
| Cost analysis | 3 | 3 | 1 | 5 | 2 | 2 |
| Negotiation support | 2 | 5 | 2 | 5 | 4 | 1 |
| Automated negotiation | 1 | 4 | 1 | 5 | 3 | 5 |
| **Supplier selection (#1)** | 5 | 1 | 5 | 5 | 2 | 5 |
| Operational | Risk monitoring | 1 | 1 | 1 | 5 | 1 | 1 |
| Ordering | 1 | 5 | 1 | 5 | 2 | 5 |
| Supplier evaluation | 1 | 3 | 4 | 5 | 1 | 1 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**INTERVIEW GUIDELINE II**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Premium automotive manufacturer in Germany
* What is your current position? How many years have you been in this position?

Funnel manager for > 300 AI use cases-🡪Determine business value and ease of implementation across all business units. For one year, previously middle ware developer

* What is your understanding of artificial intelligence?
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

More pragmatic, different thinking! Direct and indirect savings also with a long-term perspective and a clear focus on data quality

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table II. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | **Procurement strategy (#2)** | 5 | 5 | 5 | 4 | 3 | 2 |
| Strategic supplier management | 4 | 3 | 3 | 3 | 2 | 2 |
| **Supplier sustainability (#3)** | 4 | 2 | 4 | 2 | 2 | 2 |
| Tactical | Supplier pre-qualification | 4 | 1 | 3 | 2 | 3 | 3 |
| Cost analysis | 5 | 4 | 5 | 4 | 4 | 4 |
| Negotiation support | 2 | 2 | 2 | 3 | 3 | 3 |
| Automated negotiation | 4 | 4 | 4 | 3 | 4 | 3 |
| Supplier selection | 4 | 2 | 4 | 4 | 3 | 3 |
| Operational | Risk monitoring | 4 | 4 | 3 | 2 | 3 | 2 |
| **Ordering (#1)** | 5 | 4 | 5 | 4 | 3 | 4 |
| Supplier evaluation | 3 | 2 | 3 | 4 | 4 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
    
  Operational, fast adaption possible.
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**INTERVIEW GUIDELINE III**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Premium automotive manufacturer in Germany
* What is your current position? How many years have you been in this position?  
    
  For 3 years, IT product owner for procurement systems. Part of several large programs mainly in the area of non-production material.
* What is your understanding of artificial intelligence?  
    
  Intelligence of machines. From Machine learning to natural language processing, approximate human thought. For corporations this mainly means automation, and on a strategic level guiding recommendations.   
  I also think of AI prospectively as an operative and strategic problem solver!
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

Use case evaluation for procurement internally and with IT systems providers. An example is news crawling and social media analysis. Risk management use cases seem very attractive, for instance using Google GDELT with meta-data of billions of historic and current news sources. Also interesting are predictive use cases for pricing.   
  
Yet first we must lay a solid data analytics foundation and later add further analytics capabilities. There must be a descent data quality!

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Reasons for non-investment: Budget! Often refocusing on legacy systems. Furthermore, it is important to consider synergies and data availability in the group.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?  
    
  Data is the new oil for corporations worldwide. I often deal with structured data, e.g., from procure to pay and all kinds of data from procurement.   
    
  It would be great to process data E2E in the supply chain, e.g. production supplier with tooling overall equipment effectiveness (supplier integration). This could enable further use cases, e.g. predicative maintenance or for switching production capacities in a switch manner. Thereby, AI has the ability to clean and sort data.
* What kind of information system are you currently using such as enterprise resource planning tools?  
    
  SAP ERP, SAP BW on HANA, SAP Analytics Cloud, SAP Analysis for Office, SAP HANA Studio  
  In the project: SAP S / 4HANA (with Firo Apps).
* Where would you rate your current analytics capability and why?

Today mostly reporting. Less actual business intelligence (includes strategies, processes, procedures, methods and tools for the systematic analysis of internal and / or external company data).

* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?

Yes, definitely. Robotic process automation is already in use in the organization.

* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table III. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 4 | 5 | 1 | 2 | 1 |
| Strategic supplier management | 4 | 4 | 5 | 3 | 3 | 2 |
| **Supplier sustainability (#2)** | 4 | 5 | 4 | 1 | 2 | 3 |
| Tactical | Supplier pre-qualification | 3 | 2 | 3 | 3 | 3 | 3 |
| **Cost analysis (#3)** | 4 | 2 | 3 | 3 | 3 | 4 |
| Negotiation support | 4 | 2 | 1 | 3 | 3 | 3 |
| Automated negotiation | 3 | 2 | 2 | 3 | 3 | 3 |
| Supplier selection | 4 | 4 | 4 | 1 | 2 | 1 |
| Operational | **Risk monitoring (#1)** | 4 | 4 | 1 | 4 | 4 | 4 |
| Ordering | 1 | 1 | 1 | 5 | 5 | 4 |
| Supplier evaluation | 2 | 2 | 2 | 5 | 5 | 5 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
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* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**Interview guideline IV**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Start up 2017 in Germany, about 20 employees, about 1 million revenue with small procurement spent  
  First chat bot in automotive in collaboration with a German automotive OEM - with that know-how founded the company  
  Develop chat bot in particular for enterprises, now also platform where enterprises can develop their own bots
* What is your current position? How many years have you been in this position?  
    
  CEO Products, responsible for product development team since about 3 years
* What is your understanding of artificial intelligence?  
    
  Overall term, machines that are intelligent. We mostly work with machine learning techniques where decisions must be made based on big data decisions in order to solve problems
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

For chat bots and voice bots, we mainly use pre-trained language models, e.g., from Google and adapt it to the project needs. Goal is to use natural language processing to understand the intent of the customers  
  
Chat bot have the advantage to analyses/ cluster search terms and behavior, this can be used to improve the chat bot. This relies on unstructured data, e.g. if the bot can answer 8k from 10 k queries, thereby i.e. the embedding can be utilized

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Motivation: Previously digitalization and innovation, today more problem-focused. Often bad customer service, long service time🡪Improve quality. Not often cost reduction so far. Very often, increase product sales. At least 3x ROI expected. An example are “consulting-intense” services with TUI cruise for luxury cruises vacations.   
    
  For procurement, an interesting use case is automated negotiation in particular automated C-rated requisitions that have previously not been negotiated. Another example is “order center” for internal stakeholder🡪where is my order? ☺
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table IV. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 3 | 4 | 5 | 2 | 3 | 2 |
| Strategic supplier management | 3 | 3 | 3 | 4 | 3 | 3 |
| Supplier sustainability | 1 | 4 | 4 | 4 | 3 | 4 |
| Tactical | Supplier  pre-qualification | 3 | 2 | 2 | 2 | 2 | 4 |
| **Cost analysis (#2)** | 3 | 3 | 2 | 5 | 4 | 4 |
| Negotiation support | 4 | 3 | 4 | 3 | 3 | 3 |
| **Automated negotiation (#1)** | 5 | 3 | 4 | 3 | 2 | 3 |
| Supplier selection | 4 | 3 | 3 | 4 | 3 | 2 |
| Operational | **Risk monitoring (#3)** | 4 | 4 | 4 | 2 | 4 | 4 |
| Ordering | 3 | 4 | 3 | 3 | 3 | 3 |
| Supplier evaluation | 3 | 3 | 4 | 2 | 3 | 3 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
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* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**Interview guideline V**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Strong in commerce and tourism, e.g. in Europe with brands like Penny, REWE, Toom. Founded in 1927 with decentralized history and different geo-centers. Since 2001 more centralized with clear branding. 1.200 employees in logistics, over 360 k employees worldwide, 63 billion revenue. Central procurement in Cologne, Germany local decisions in collaboration with sales in the regions.
* What is your current position? How many years have you been in this position?  
    
  Since early 2019 director distribution logistics South-West Germany
* What is your understanding of artificial intelligence?  
    
  There are many different ideas and perspectives. Many talk about imitation of human minds, but human mind is very complex. I associate AI with solving complex problems and automation that try to solve problems like a human using a machine.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind? When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Operative use case, assistance system for freight trucks. Already state of the art, but better marketing with “AI logo”. Regulatory requirement for freight truck assistance system due to safety concerns. Fleet drives 18 x around the world on one day, similarly USP trucks already turn left for safety reasons even if that means longer trips   
    
  Predictive use case for warehouse planning based on seasonal factors, e.g. holidays. X-Mas is not X-Mas when it’s on different days of the week. Long term, short-term forecast to consider different input factors, e.g. number of warehouses and capacity planning of the warehouses. Main motivation was costs as most cost driver is human labor costs.  
    
  Ordering systems automated and optimized for vacation, public holidays, temperature today, temperature 14 days forecast🡪”Our life insurance”. Efficiency/ quality/ costs. Own tool, 25 years, mostly multiple regression
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?   
    
  Regional: Often 1 and 2, central organization 3 and 4
* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?  
    
  They invest more and are willing to make the first move to gain long-term. We are traditionally rather fast-follower and AI is to be honest not our core competency. They have 100 % of direct customer data (personality and buying data), we must rely on customer loyalty programs such as Payback.

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table V. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 2 | 2 | 4 | 1 | 2 | 4 |
| Strategic supplier management | 3 | 3 | 3 | 2 | 3 | 4 |
| Supplier sustainability | 4 | 4 | 4 | 2 | 2 | 5 |
| Tactical | Supplier  pre-qualification | 3 | 3 | 3 | 2 | 2 | 2 |
| **Cost analysis (#1)** | 4 | 2 | 4 | 3 | 3 | 4 |
| Negotiation support | 2 | 2 | 2 | 3 | 3 | 1 |
| Automated negotiation | 2 | 2 | 2 | 3 | 3 | 1 |
| Supplier selection | 4 | 4 | 4 | 3 | 3 | 4 |
| Operational | **Risk monitoring (#2)** | 5 | 5 | 4 | 2 | 2 | 5 |
| Ordering | 3 | 3 | 2 | 1 | 2 | 2 |
| **Supplier evaluation (#3)** | 5 | 5 | 4 | 2 | 2 | 5 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
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* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
    
  Tactical level, with cost analysis and supplier selection. Very important for the business and there is sufficient data on that. Strategic level doesn’t really need AI, e.g. individual consulting-intensive mega trend scouting
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**Interview guideline VI**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Leading research institute in Europe
* What is your current position? How many years have you been in this position?  
    
  Professor for 11 years
* What is your understanding of artificial intelligence?
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Three different projects so far:  
    
  Research vs development classification, 92 % accuracy

Student projects, built spam filters, works great  
One failed project with two different software, e.g. with Watson technology based on key words. What is an interesting customer? E.g. in India, China.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Main interest was strategic insights and innovation, efficiency
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?  
    
  Some structured and unstructured but not many data sets
* What kind of information system are you currently using such as enterprise resource planning tools?  
    
  Currently implementing an electronic procurement system
* Where would you rate your current analytics capability and why?

1 or 2

* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?

No, but there is interest in robotic process automation as this seems very simple also for student projects

* What do you think do AI champions such as Amazon, Alibaba, or Google differently?  
    
  Better marketing ☺ IT giants have real-time big data in contract to classical manufacturing companies. Therefore, it is difficult to compare. Learning works better with large amounts of data. Now what is big data is fact? Hundred cases, ten thousands? Often in procurement and B2B not enough data, B2C has more data in an hour than a typical manufacturing procurement organization in a whole year

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table VI. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 2 | 2 | 1 | 1 | 2 | 2 |
| Strategic supplier management | 2 | 2 | 2 | 1 | 2 | 2 |
| Supplier sustainability | 2 | 4 | 4 | 2 | 4 | 3 |
| Tactical | Supplier  pre-qualification | 2 | 2 | 1 | 2 | 2 | 2 |
| **Cost analysis (#2)** | 2 | 4 | 2 | 1 | 4 | 3 |
| Negotiation support | 2 | 2 | 1 | 1 | 4 | 3 |
| **Automated negotiation (#1)** | 5 | 4 | 4 | 4 | 3 | 3 |
| Supplier selection | 2 | 2 | 3 | 3 | 4 | 1 |
| Operational | Risk monitoring | 4 | 4 | 4 | 1 | 3 | 2 |
| **Ordering (#3)** | 2 | 3 | 2 | 4 | 4 | 4 |
| Supplier evaluation | 2 | 2 | 2 | 4 | 5 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
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* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
  Operative procurement as there is more data, good examples from practice
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**Interview guideline VII**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Leading global information technology partner
* What is your current position? How many years have you been in this position?  
    
  For 20 years in consulting, lead architect for connected customer, currently since six-year strategy and innovation focusing on “cool stuff” with AI, block chain, etc.
* What is your understanding of artificial intelligence?

Good AI is when we cannot differentiate between human and machine such as Alan Turing said. Strong technology, open AI with NLU, “future proof”

* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  In the 1990 had some AI classes in university. Now we see that AI can actually do something. First assistant in Office “Clippit”, not too successful yet.   
    
  AI does require a lot of investment; mostly large companies can make this investment. Our mission is to make technology available to everybody. Thus, AI can be found in many products. Still some products are not perfect yet, such as the language translation. Yet, the assistant can help to improve productivity, e.g. increase spare time in your calendar, call more/ less or in Excel suggest a graphical representation. Most services can be used through the cloud by build-in services.  
    
  AI needs data to improve the services. Rights on data interesting topic as well as code review through AI.   
    
  

AI as least on pair with humans on visual processing.



There is a saying in German business: “If only Siemens knew what Siemens knows, it would be a rich company.” Knowledge management is key!

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Cost seems to be main motivation. Sometimes process efficiency, e.g. health 1st help support during pandemic. Leading to better quality and improves over time, already same level of quality no matter of sickness or mood.  
    
  Call center for standard bots, e.g. automotive winter tires plan schedule for efficiency. Another good example is help desk translation. Knowledge mining, e.g. test protocol make them searchable to analyzable including re-use.   
    
  For procurement:   
  1. This is very important in particular to reduce complexity and variants, e.g. of standard parts such as screws  
  2. Check offer vs requirements  
  3. Similar legal issue, e.g. to quickly identify strange warranty clause or IP issues  
    
  AI can help to shine, sometimes even totally useless for marketing purposes☺.   
    
  After-sales package, how to handle the returns, e.g. through visual inspection to increase turnover rate  
    
  Inbound quality control, production control, e.g., weld point identification
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?

Until insights well covered. Predictive many use cases and strong capability, for prescriptive already some good approaches. Example: ThyssenKrupp with “elevator as a service” as managed service or Rolls Royce for turbines. Technology to improve uptime and minimize fixing costs – also for mechanics preparation for repair leading to new business model. Another example are data centers, where studies show that people cause problems.

* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table VII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change impact |
| Strategic | Procurement strategy | 4 | 4 | 5 | 1 | 2 | 3 |
| **Strategic supplier management (#1)** | 5 | 5 | 4 | 4 | 3 | 5 |
| Supplier sustainability | 2 | 3 | 4 | 4 | 3 | 4 |
| Tactical | **Supplier pre-qualification (#2)** | 4 | 1 | 4 | 4 | 4 | 5 |
| **Cost analysis (#3)** | 5 | 3 | 5 | 4 | 3 | 2 |
| Negotiation support | 4 | 2 | 3 | 2 | 3 | 4 |
| Automated negotiation | 5 | 2 | 2 | 3 | 3 | 4 |
| Supplier selection | 5 | 3 | 4 | 1 | 2 | 1 |
| Operational | Risk monitoring | 3 | 4 | 2 | 2 | 2 | 1 |
| Ordering | 4 | 1 | 4 | 4 | 2 | 5 |
| Supplier evaluation | 4 | 1 | 4 | 4 | 2 | 5 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.

See above.

* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Linking production and production data🡪capacity management, how can I react flexible? Automatic automation, suggest building up new suppliers

**Interview guideline VIII**

**ARTIFICIal INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Grown start up from Germany
* What is your current position? How many years have you been in this position?  
    
  Co-founder and CEO since a six year
* What is your understanding of artificial intelligence?  
    
  Not easy to define, often marketing. Simulation / approach on computer to mimic the cognitive performance of living organism – combined with a learning system that is data-driven, instead of program-based
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Research in the area of self-organization of AI in cancer research  
    
  First technical feasibility 3D Print use case 🡪Commercially, pricing finding  
    
  Narrow AI good performance, e.g., with deep learning. Train module, highly complex optimized. Works well with natural language processing. It becomes strange to think about an application that is not smart. We think first AI, then software (“inverse”).  
    
  Tire change, up sale and proactive customer interactions
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Availability of service level🡪Quality. Customer interactions, e.g. in retail with real-time interaction. Different quality of service and new ways to interact with the customers. Not only cost reduction, but also customer experience.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?  
    
  Mostly unstructured data, speech data, product quality assurance data, customer relational management, production master data, back office
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?   
    
  Mostly descriptive and diagnostic. Something is missing in this scale, proactive interaction with customer somewhere e.g. proactive process control and tips or pricing proposals
* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table VIII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 4 | 5 | 3 | 3 | 4 |
| Strategic supplier management | 4 | 3 | 3 | 2 | 2 | 4 |
| Supplier sustainability | 2 | 2 | 3 | 4 | 4 | 3 |
| Tactical | Supplier  pre-qualification | 3 | 3 | 3 | 3 | 3 | 3 |
| **Cost analysis (#1 “sexy”)** | 5 | 5 | 5 | 4 | 4 | 5 |
| Negotiation support | 4 | 4 | 4 | 3 | 4 | 4 |
| Automated negotiation | 3 | 3 | 3 | 4 | 4 | 3 |
| Supplier selection | 3 | 3 | 3 | 1 | 1 | 3 |
| Operational | **Risk monitoring (#3)** | 4 | 4 | 5 | 4 | 2 | 4 |
| **Ordering (#2)** | 4 | 4 | 5 | 3 | 3 | 4 |
| Supplier evaluation | 4 | 4 | 5 | 4 | 4 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
    
  Based on input data weight against business value
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Top down, e.g., assistance could provide strong value proposition for procurement strategy.

**Interview guideline IX**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.  
    
  Leading AI research institute in Germany.
* What is your current position? How many years have you been in this position?  
    
  Senior Researcher for 20 years, studied Informatics at Saarbrücken with Professor Wahlster. Projects at the institute, large research and applied projects from the Federal Government with many partners. Worked on “first” Industry 4.0 projects with production on workers.
* What is your understanding of artificial intelligence?  
    
  Mimic cognitive capability. Current also a slogan / marketing. Important from my point of view is AI for humans, with human centric AI. An example is to be able to interact through natural language with a machine that can learn and continuously improve.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

Mostly weak AI that is applied research. Idea is to take the associated university research into application together with industry partner. For instance in a project with large automotive tier 1. It is important to consider the requirements that arise from my production facilities with just in tie and production linkage characteristics.

Large multi-partner projects with natural language understanding. Robot assists humans, yet “self-awareness” of machines is still in an early phase. This is an important aspect for work safety.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Applied Research: Efficiency, quality, costs. All technical developments have this as a goal. Differently in different projects, often complemented with training.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?

We often work with qualitatively bad data and not much data at all. Digitalization must be seen E2E, it is not just having an intranet and a laptop instead of a fax machine. Many companies have understood that data is important; yet many departments individually also have understood that data is important and started to collect data on their own leading to data silos. It is good to data –and to link data and use it for purposes other than previously thought. Often data is collected several times without knowledge from the other silos and with very different approaches and partners. Digitization must fully assess the knowledge of the employees in order to function well.

* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?

The first three questions can be handled well today. AI is strong for model building, e.g. for complexity and variants management. One must consider each problem individually, not looking with the AI hammer for problems that seem similar. Predictive was in strong demand and still is, but there is already some market maturity. Prescriptive model building is more complex as it needs more data and connections between them.  
Uncertainty in data is thereby an important point to consider.   
  
However, the most interesting questions are not illustrated in the framework. Mainly, we have a problem XY and want to improve efficiency, cost, and quality. How can we use AI to improve? This question is asked from all sorts of industries from medicine, automotive, etc.

* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table IX. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 5 | 5 | 5 | 3 | 3 | 1 |
| Strategic supplier management | 5 | 5 | 5 | 4 | 5 | 3 |
| Supplier sustainability | 4 | 4 | 5 | 2 | 3 | 2 |
| Tactical | Supplier  pre-qualification | 5 | 5 | 4 | 2 | 3 | 3 |
| Cost analysis | 5 | 5 | 4 | 5 | 5 | 5 |
| **Negotiation support (#3)** | 4 | 4 | 5 | 4 | 4 | 1 |
| Automated negotiation | 4 | 4 | 4 | 3 | 3 | 1 |
| Supplier selection | 5 | 5 | 5 | 4 | 3 | 4 |
| Operational | **Risk monitoring (#2)** | 5 | 5 | 5 | 3 | 4 | 5 |
| **Ordering (#1)** | 5 | 5 | 5 | 3 | 4 | 5 |
| Supplier evaluation | 4 | 4 | 4 | 2 | 2 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
    
  Important showstopper vs nice to have. Operative use cases first, based on ease of model building through data.
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.  
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Linking production and supplier with real-time demands. Important capability management impact as in connection with automated negotiation and risk management. Yet, digitization is expensive. Investments must be made in order to reap benefits. Therefore, it must be smartly thought off where to invest.   
    
  New Industry 4.0 https://www.acatech.de/publikation/industrie-4-0-maturity-index-update-2020/

**Interview guideline X**

**ARTIFICIAL INTELLIGENCE IN pROCUREMENT**

Thank you for your interest and taking time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Premium automotive manufacturer based in Germany.
* What is your current position? How many years have you been in this position?  
    
  Leading the procurement strategy organization including processes and systems.
* What is your understanding of artificial intelligence?  
    
  Algorithm development, retrieve data, able to identify cluster and interpret these results to make them useable.

As an example, what kind of negotiation should be conducted? An approach could be to recommend an action through the analysis of the spread of offers and cost breakdowns to determine a high or low competitive situation. If high, do that. When low, do that. This could be kind of a “navigation system” for procurement.

* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Regrettably not so much yet.
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Regrettably not so much yet.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? In addition, which decisions must you take based on this data?  
    
  Risk monitoring🡪With recommendation action! Potentially connected with capacity management, e.g. to switch production in a timely manner.   
    
  Logistics fleet management with sustainability and risks aspect🡪Determine risk factor based on analysis,  
  utilizing the GPS position
* What kind of information system are you currently using such as enterprise resource planning tools?  
    
  Broad spectrum from piloting new tools to established enterprise resource systems and large legacy systems
* Where would you rate your current analytics capability and why?   
    
  We can answer well what and why something happened. Predictive analytics for future behavior is the next step.
* Are you likely to adopt robotic process automation or AI methods within the next two, five or ten years?  
    
  Yes, in particular for risk management.
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?  
    
  Other organizations such as Google must value flexibility, and therefore have adopted a very different mindset. For our organization, there is a classical efficiency focus with strong project steering and clear business plans. We are strong at understanding data and prices yet may overlook soft prices such as profiling. There is still a “risk aversion” thinking and culture, which leads to slower adaption. Yet, I believe that the mechanism of the past do not necessary work in the future and we must now set a solid foundation of it!

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high / easy:

Table X. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | **Procurement strategy (#3)** | 5 | 5 | 5 | 2 | 3 | 2 |
| Strategic supplier management | 4 | 4 | 4 | 2 | 1 | 3 |
| Supplier sustainability | 4 | 4 | 5 | 1 | 2 | 3 |
| Tactical | Supplier  pre-qualification | 4 | 3 | 5 | 2 | 3 | 2 |
| **Cost analysis (#2)** | 3 | 4 | 4 | 4 | 4 | 4 |
| Negotiation support | 3 | 3 | 3 | 3 | 3 | 4 |
| Automated negotiation | 3 | 3 | 2 | 4 | 3 | 4 |
| Supplier selection | 4 | 3 | 3 | 2 | 3 | 3 |
| Operational | **Risk monitoring (#1)** | 5 | 5 | 4 | 4 | 3 | 4 |
| Ordering | 2 | 3 | 3 | 3 | 3 | 3 |
| Supplier evaluation | 4 | 4 | 4 | 3 | 4 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategy orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep in the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Important remark during the interview: Most difficult to imagine the potential use case, interpretation degree of freedom is potentially too high. Different people may have a different understanding. Quality could be improved through stronger standardization.

**INTERVIEW GUIDELINE XI**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Leading global enterprise resource planning system provider.

* What is your current position? How many years have you been in this position?  
    
  Previously at AstraZentra in house consulting working with procurement. For 15 years at the company from development of the supplier relationship management module, inhouse consulting, ramping up release teams, product management of the supplier relationship management module, now “innovation topics”
* What is your understanding of artificial intelligence?

Learning from data, cluster, predict. AI does not solve every problem. However, technology enables insights previously not retrievable based on data.

* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

Coordinated different product development projects for AI and ML projects.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Everybody is talking about it. “Hip”, strong management pressure, also expected from customers. Cloud as enabling technology available. Different skill set for developers required, e.g. statistical expertise. Need data ☺  
    
  Catalogue management, text analysis for special requisitions, expand the catalogue? Prediction, when the framework contract is fully consumed and trigger expansion. Or prediction, e.g. if an order will be delayed. Based on free text field suggest the eClass product class  
    
  Situation handling, how to get information to the end-user. What are relevant situations for buyers?   
  Smart launch pad for buyers. RPA process automation / ML technology / chat bots
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?  
    
  Mostly structured data, about 90 %. ERP Tables/ ARIBA Tables. Imaged-based buying for unstructured data. With [VUCA approach also for ERP], often retraining the model once a month. Data mostly from customers who agree to work with us on innovation topics. We build the foundation, the customers can build and train the model
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?

What happened? Easy. Why can be found out but may be better visualized for the end-users. What will happen? Technically feasible. Optimization is the most difficult, yet situation handling is starting to emerge [trigger, further information, and action recommendation].

* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XI. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 2 | 5 | 1 | 2 | 2 |
| Strategic supplier management | 5 | 2 | 5 | 2 | 2 | 2 |
| Supplier sustainability | 3 | 3 | 4 | 2 | 1 | 1 |
| Tactical | Supplier pre-qualification | 4 | 2 | 4 | 2 | 2 | 2 |
| **Cost analysis (#2)** | 5 | 1 | 4 | 4 | 4 | 5 |
| Negotiation support | 5 | 2 | 4 | 3 | 2 | 2 |
| Automated negotiation | 3 | 2 | 3 | 2 | 1 | 3 |
| Supplier selection | 3 | 2 | 4 | 2 | 3 | 3 |
| Operational | **Risk monitoring (#1)** | 3 | 4 | 3 | 5 | 4 | 5 |
| **Ordering (#3)** | 2 | 4 | 3 | 4 | 4 | 3 |
| Supplier evaluation | 4 | 2 | 4 | 2 | 3 | 3 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
  For the discussion section: Use cases can be interpreted in different ways and can be explained in different ways

**INTERVIEW GUIDELINE XII**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Boston Consulting Group is an American management consulting firm founded in 1963, headquartered in Boston, Massachusetts. The firm is the second largest consulting firm by revenue and one of the most prestigious in the world.

* What is your current position? How many years have you been in this position?

Leading digital transformation projects to define and deliver strategies to clients globally for procurement, supply chain and operations at BCG

* What is your understanding of artificial intelligence?

Artificial intelligence is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.

* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Has started with robotics process automation, which is not AI, but was the first step in a broader thinking of automation. Worked with an AI and ML team at SAP (it was a global of more than 400 employees) to match a huge amount of global business network data (approx. 3tn USD on procurement spend and more than 4m suppliers). Looked for use cases, e.g. market insights, spend behavior, risk management, predictive analytics.

A good example is matching supplier data for different catalogues to automatically update, standardize and make catalog entries comparable. Another one is using process mining to identify “process frictions”, e.g. from price difference in workflow processing, payments, and catalogues. The system can learn and further improve from the recommendations and from the changes done by the teams.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Clients are interested, whether it is possible to change business processes with viable results. Thereby, it is paramount to understand the current situation and explain the possibilities very well to succeed.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 3 | 5 | 2 | 2 | 2 |
| **Strategic supplier management (#3)** | 4 | 4 | 4 | 3 | 2 | 2 |
| Supplier sustainability | 1 | 4 | 4 | 1 | 2 | 1 |
| Tactical | Supplier pre-qualification | 2 | 1 | 3 | 3 | 2 | 2 |
| Cost analysis | 5 | 2 | 5 | 3 | 2 | 1 |
| **Negotiation support (#2)** | 4 | 1 | 4 | 4 | 4 | 3 |
| Automated negotiation | 4 | 1 | 2 | 2 | 1 | 1 |
| **Supplier selection (#1)** | 4 | 3 | 5 | 3 | 3 | 3 |
| Operational | Risk monitoring | 4 | 3 | 4 | 2 | 2 | 2 |
| Ordering | 1 | 1 | 3 | 5 | 5 | 5 |
| Supplier evaluation | 4 | 1 | 3 | 2 | 2 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?

Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
See above.

* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Important is to view the technology people-centric and advise clients well through Vision 🡪Mission🡪Value proposition🡪AI strategy🡪AI use cases.

**INTERVIEW GUIDELINE XIII**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Leading automotive manufacturer from Germany.
* What is your current position? How many years have you been in this position?  
    
  Leading digitalization innovations in procurement in the group, for instance, robotics process automation, cloud, and machine learning🡪focusing on current issue in procurement with a data-driven and user-centric approach.
* What is your understanding of artificial intelligence?  
    
  With the help of digital available data, autonomously generate information in order to solve problems.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Reviewed procurement process and methods to identify potential of AI application in procurement. Thereby, consider working methods and processes, communication to external stakeholder, relationship with our suppliers. Relevant questions are, for example, if a manager makes wrong decisions, you can fire him or her. Can you “fire” AI? Are there wrong decisions by AI?
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Currently often proof of concepts only, for instance with image recognition, search algorithms, and text processing. Work with small solutions with more or less exiting technology and successfully build upon it. As an example, there are interesting applications of target automation utilizing benchmarking. Building on this solution, we can we do next with this data and extend this solution. We have about one million general procurement tenders with text data from offers as well as of requirements document, e.g. are there confidential information included, is the specification well enough described, or too specific towards one supplier?  
    
  Thereby through this German step-by-step approach with incremental steps, you can “take your customer” with you on this journey. However, AI in a leap-frog. It can much more potential if we consider it like this. I am often asked, what kind of problems do you have in procurement that we cannot solve with today’s methods? 🡪There is a strong effectiveness consideration. As an example, offer comparison can be qualitatively better and maybe even faster. This is difficult to quantify in a German engineering view with business case.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?

Mostly structured data as large organization, we must structure our processes. Unstructured for scouting and risk management. But even with structured data, there are issues with data quality and data consistency. Data sources are usually databases and/ or documents on some server or in the cloud.

* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?   
    
  Currently between level 2 and 3. We are currently still focused on the past, e.g. error analysis, why do we have this shortage? We should focus more on what could happen utilizing scenario thinking. So for instance, what would happen, if this supplier goes out of business? Which alternatives are there? Very strong focus on the here and now.
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?  
    
  Thinking out of data, innovations jumps”. It’s a mixture of culture, mentality, and the degree of saturation

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XIII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 5 | 2 | 5 | 1 | 1 | 1 |
| Strategic supplier management | 3 | 2 | 3 | 3 | 3 | 3 |
| Supplier sustainability | 2 | 4 | 4 | 1 | 2 | 1 |
| Tactical | Supplier pre-qualification | 2 | 2 | 2 | 3 | 3 | 4 |
| **Cost analysis (#1)** | 4 | 4 | 5 | 4 | 4 | 4 |
| Negotiation support | 3 | 3 | 3 | 3 | 3 | 3 |
| Automated negotiation | 5 | 3 | 5 | 2 | 2 | 2 |
| Supplier selection | 5 | 3 | 4 | 2 | 2 | 1 |
| Operational | **Risk monitoring (#2)** | 3 | 3 | 3 | 4 | 4 | 5 |
| Ordering | 2 | 2 | 2 | 5 | 4 | 5 |
| **Supplier evaluation (#3)** | 4 | 3 | 5 | 3 | 3 | 2 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?  
    
  RPA = Operational, mass data. ML and AI can be very interesting also for complex decision-making based on intuition, based on experience, with high complexity. Potential explanation, why operative use case are less. “Operative domain” rule-based. ML is about making decisions, stronger in tactical domain. Understanding of information, considering and prioritizing, recommendation based on the context.
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Picture of chess playing. It is a creative process and work. Another good picture: AI could be a great consultant for a buyer to prepare negation  
    
  For customer value, this may could have been better considering the value to the “internal” customer of the procurement.

Especially in strategic procurement important to consider the change management and complexity. In change management especially in procurement, it is important to consider internal and external stakeholder. AI has the potential to further develop our relationship with our suppliers. This is a major consideration for further procurement organization, strategy, and people development.

**INTERVIEW GUIDELINE XIV**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Global leader in information technology.

* What is your current position? How many years have you been in this position?  
    
  Procurement leader in general procurement
* What is your understanding of artificial intelligence?  
    
  Firstly, try to get things done by a computer that humans do not like to do

Secondly, by considering ethics and data privacy ultimately learning to make own decision (Yet: Science fiction such as Terminator and Star Wars already foresee the dark side of the potential of this technology)

* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Bots take over the standard jobs, there is potential for either less buyers or more time for strategic consideration with negotiation of long-term contracts, cost reductions, and relationship building. A good example is contract comparison in different formats with versions management. Another example are standard goods with catalogues for self-service of requestors (just like Amazon “hands off catalogue”) where buyers can support “hands on catalogue” e.g. for special goods.
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Effort reduction with cost orientation. What can be offshored, can also be automated by AI as the next step.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?   
    
  We are strong on level 1 und 2, yet predictive still is not good enough
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XIV. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 3 | 3 | 4 | 5 | 4 | 4 |
| Strategic supplier management | 2 | 2 | 3 | 2 | 2 | 3 |
| Supplier sustainability | 2 | 3 | 3 | 2 | 2 | 2 |
| Tactical | Supplier pre-qualification | 3 | 4 | 3 | 4 | 4 | 4 |
| **Cost analysis (#2)** | 5 | 5 | 4 | 4 | 3 | 4 |
| **Negotiation support (#1)** | 5 | 5 | 4 | 4 | 4 | 4 |
| Automated negotiation | 3 | 3 | 3 | 4 | 4 | 4 |
| Supplier selection | 4 | 4 | 4 | 3 | 3 | 4 |
| Operational | Risk monitoring | 4 | 4 | 4 | 4 | 3 | 4 |
| Ordering | 4 | 4 | 4 | 4 | 3 | 4 |
| **Supplier evaluation (#3)** | 2 | 4 | 4 | 5 | 5 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  For strategic management exclude relationship management. “Trust your supplier” can be an interesting tool. For supplier selection, this may be seen as extension of reserve auctions already available today, e.g. by SAP Ariba.

**INTERVIEW GUIDELINE XV**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Leading global information technology provider based in China

* What is your current position? How many years have you been in this position?

Senior Business Development Manager and Finance Leader for our map solution

* What is your understanding of artificial intelligence?  
    
  Let a machine think and act like humans. The technology has the potential to reduce costs, improve quality, and automate decisions.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

Yes, a good example is Ding Talk communication application as chat bot as automatic FAQ, for instance, what is the address of the HQ? It can continuously learn also based on the context.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?

First priority is to further improve efficiency.

* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?  
    
  Relevant data comes mostly from databases, therefore structured with are enriched by further unstructured input from main business stakeholder.
* What kind of information system are you currently using such as enterprise resource planning tools?   
    
  Excel ☺ and ERP system.
* Where would you rate your current analytics capability and why?

Between level 2 and 3. Process order and payment data for production planning, analyzing hindsight well, predicting the future is still often a manual process.

* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?  
    
  Group level strong commitment based on the company strategy, e.g. pattern recognition, exploit the technology internally and also externally with clients. Goal is improving efficiency, for instance, PRA is used in map production lines – many steps have been already automated (still outsourcing is widely used).
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

In China, there is a strong surge in AI technology not just of the big corporations but also on a broad scale.

Within the group, there are difference in maturity. But: Strong advantage of many users, thus can learn quickly.

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XV. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 5 | 4 | 4 | 3 | 2 | 3 |
| Strategic supplier management | 4 | 4 | 5 | 2 | 2 | 3 |
| Supplier sustainability | 3 | 3 | 3 | 2 | 2 | 2 |
| Tactical | **Supplier pre-qualification (#2)** | 3 | 5 | 4 | 4 | 4 | 4 |
| **Cost analysis (#1)** | 5 | 2 | 5 | 5 | 5 | 3 |
| Negotiation support | 4 | 3 | 3 | 4 | 4 | 3 |
| Automated negotiation | 4 | 4 | 3 | 4 | 3 | 3 |
| Supplier selection | 4 | 2 | 2 | 4 | 4 | 3 |
| Operational | **Risk monitoring (#3)** | 5 | 3 | 4 | 4 | 4 | 3 |
| Ordering | 4 | 3 | 4 | 3 | 3 | 3 |
| Supplier evaluation | 4 | 3 | 3 | 3 | 4 | 3 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**INTERVIEW GUIDELINE XVI**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Leading German management consultancy
* What is your current position? How many years have you been in this position?  
    
  Associate Partner since early 2020, leading initiatives focusing on procurement of the futures
* What is your understanding of artificial intelligence?  
    
  Methods that can, e.g. for procurement, on the one hand optimize processes and on the other hand increase value
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Partnership with a German startup venture, e.g. for management and technical training

However, in practice not many concrete applications have been observed in procurement. There are, however, more and more AI-enabled services, for example, the German start up Scoutbee where AI technology is part of a solution for procurement. Another good example is AI-enabled cost analysis, in particular for indirect material. Another example is the analysis of specifications and technical drawings, in particular for early phase concept. One more example is the bundling generator with similarity analysis.  
  
Other use cases cluster around master data and business logic adaption, e.g. from the brewery business for data quality (“use technology to tidy up the basement”)

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Overall efficiency-focused, but not only efficiency. The crux is so to say that technical specific use case do not scale (“gimmick”), or vice-versa are technically too complex. The sweet spot is in the middle.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?   
    
  Own procurement department as a consultancy is relatively small with level 1-2. Big corporations such as Siemens are leading with level 3 -4 in contrast to automotive suppliers with around level 2. The spectrum of what is understood with digitalization is very broad from e-payment to autonomous negotiation agents. Most clients can be separated in German and Anglo-American that are more open, less privacy-focused. Cultural differences between e.g. German and American, influence technology adaption as well as the organizational type with more decentral “grass route” and centralized approached
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XVI. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 2 | 1 | 2 | 3 | 2 | 4 |
| Strategic supplier management | 4 | 1 | 2 | 4 | 4 | 2 |
| **Supplier sustainability (#2)** | 3 | 3 | 3 | 3 | 3 | 4 |
| Tactical | Supplier pre-qualification | 1 | 1 | 1 | 4 | 4 | 3 |
| Cost analysis | 4 | 3 | 3 | 2 | 4 | 2 |
| Negotiation support | 3 | 1 | 3 | 3 | 2 | 3 |
| Automated negotiation | 2 | 1 | 1 | 5 | 4 | 5 |
| Supplier selection | 4 | 3 | 3 | 3 | 2 | 2 |
| Operational | **Risk monitoring (#1)** | 3 | 2 | 3 | 5 | 4 | 5 |
| Ordering | 2 | 1 | 1 | 4 | 4 | 3 |
| **Supplier evaluation (#3)** | 2 | 1 | 3 | 4 | 5 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
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Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
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Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
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**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Interesting use case combining contract management and ordering. Compare prediction and actual for contract, e.g., volume bonus and price brackets. Combined with ordering decisions this becomes an interesting optimization problem. In addition, based on demand prediction it would be possible in the future to suggest optimal volume price brackets.   
    
  As consultancy, staffing is a core process where AI-enabled staffing is an interesting use case.

Generally, it is important to consider where the change happens and if there is today someone who does the job. Moreover, task mining is an interesting method, for instance to identify potential RPA application (important to consider data privacy and the work council). Lastly, often people disbelieve data analysis, even with most basic data (“the world was already flat”). This means in particular for AI technology that is must be explainable to increase user acceptability.

**INTERVIEW GUIDELINE XVII**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  Leading global consultancy.
* What is your current position? How many years have you been in this position?  
    
  20 years of expertise in procurement technology.
* What is your understanding of artificial intelligence?  
    
  Mimic human intelligence, faster, more precise can handle data, scenario, complexity.   
  Differentiate to PRA, e.g. FAQ.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  Digital safari with clients since more than 6 years.   
    
  If it is difficult to model something in a process flow or put it into an ERP system, AI might be a solution.   
  🡪A good example is mapping logic for free text requisitions with semantics. More complex are contracts and specifications.  
    
  Solutions to extract demands to structure them into specifications and optimize tender design, e.g. globality. Specific enough but not more, optimize specification in understanding, optimize bidders list.  
    
  Strong interest when you know that humans cannot handle that much data, scenarios, complexity.  
    
  Merge companies as “M&A consultant” to identify savings   
    
  Web crawling, patent database   
    
  Track record of a supplier, “business intelligence” about your supply base.
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Primary driver is quality of decisions. Scalability, you can review 5 million contracts vs 500, additional savings, etc.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XVII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 3 | 4 | 2 | 3 | 2 |
| **Strategic supplier management (#3)** | 3 | 2 | 5 | 2 | 4 | 2 |
| **Supplier Sustainability (#2)** | 2 | 3 | 4 | 3 | 3 | 5 |
| Tactical | Supplier pre-qualification | 1 | 2 | 3 | 3 | 3 | 3 |
| Cost analysis | 4 | 2 | 2 | 3 | 2 | 4 |
| Negotiation support | 5 | 2 | 1 | 2 | 4 | 4 |
| Automated negotiation | 5 | 2 | 1 | 2 | 2 | 2 |
| Supplier selection | 3 | 1 | 3 | 3 | 4 | 3 |
| Operational | **Risk monitoring (#1)** | 3 | 2 | 5 | 3 | 3 | 5 |
| Ordering | 2 | 1 | 1 | 5 | 5 | 3 |
| Supplier evaluation | 1 | 2 | 4 | 4 | 3 | 3 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
* Strategic supplier management concerns the overall supplier portfolio and procurement spent
* Sustainability considers environmental aspects
* Supplier pre-qualification determines the potential suppliers
* Cost analysis dives deep into the costs to identify saving potentials
* Negotiation support is the preparation and assistance of buyers
* Automated negotiation means machine-based negotiation
* Supplier selection determines the framework to select the right suppliers
* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.

**INTERVIEW GUIDELINE XVIII**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Leading global connectivity provider

* What is your current position? How many years have you been in this position?

Procurement leader for 20 years with R&D, marketing and sales background.

* What is your understanding of artificial intelligence?  
    
  Mimic human capabilities from prognostics to decisions – without human interactions.   
  While AI is able to do quality checks and verification, shit in, shit out still holds true.
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

For instance, social media analysis with link to ordering and production planning for raw material procurement. Design to cost can be a high impact use case using different internal and external data sources that takes much effort on data quality/ preparation on different levels focusing on overall profitability.

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?

Efficiency focus, on all level often with issues on data quality and trustworthiness.

* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?
* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?  
    
  They are straight-forward with a clear focus and business plan – with the right to fail and longer investment cycles.

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XVIII. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 4 | 4 | 5 | 1 | 3 | 3 |
| Strategic supplier management | 4 | 3 | 5 | 3 | 3 | 2 |
| Supplier sustainability | 2 | 3 | 4 | 2 | 3 | 2 |
| Tactical | Supplier  pre-qualification | 4 | 4 | 4 | 2 | 2 | 3 |
| **Cost analysis (#2)** | 4 | 4 | 5 | 3 | 4 | 4 |
| Negotiation support | 4 | 4 | 4 | 3 | 4 | 4 |
| Automated negotiation | 4 | 5 | 5 | 2 | 3 | 3 |
| **Supplier selection (#1)** | 5 | 5 | 5 | 3 | 3 | 3 |
| Operational | Risk monitoring | 5 | 4 | 5 | 3 | 2 | 3 |
| **Ordering (#3)** | 4 | 4 | 4 | 4 | 4 | 4 |
| Supplier evaluation | 3 | 3 | 4 | 3 | 3 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
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Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
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* Risk monitoring identify risks along the process
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* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
    
  Cost analysis can also be strategic – as data foundation procurement strategy! For instance, design to cost. Some time ago there was an interesting panel discussion with Deloitte where a use case was discussed on real-time raw material logistics tracking weather, political environment, etc. Could be interesting to build a platform for tail spend There is no single solution and prioritization for every organization. In general, prioritize use cases where there is a strong data foundation. Take the biggest cost driver, e.g. construction and installment of cables. And really understand this market through AI utilizing transparency. There are so many different data sources private and publicly available. Analyze everything. Understand trends and prediction, based on data.

**INTERVIEW GUIDELINE XIX**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?

Leading German premium automaker

* What is your current position? How many years have you been in this position?
* What is your understanding of artificial intelligence?
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?

Funnel management, i.e. early phase of innovation / evaluation and classification of problem / ideation as well as AI training for employees  
  
Bayesian network, e.g. for controlling understanding better the margin for different options the customers can choose – combining production numbers, sales numbers, and restrictions – also connected with retailing communication  
  
Vision recognition, e.g. for invoice routing

* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Main motivation is process optimization, mostly cost driven.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?

Mostly use Excel, therefore mostly what happened. Starting with why it is becoming difficult…

* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

A big difference is stemming from the business model, history, and organizational structure.  
Either born digital or living from software and data such as Google or for instances banks

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized following van Weele, 2018. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XIX. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | **Procurement strategy (#3)** | 3 | 1 | 5 | 5 | 3 | 3 |
| Strategic supplier management | 4 | 2 | 4 | 2 | 3 | 4 |
| Supplier sustainability | 1 | 5 | 5 | 2 | 1 | 2 |
| Tactical | **Supplier pre-qualification (#2)** | 4 | 3 | 2 | 4 | 4 | 4 |
| Cost analysis | 5 | 3 | 2 | 2 | 3 | 1 |
| Negotiation support | 3 | 1 | 1 | 2 | 2 | 2 |
| Automated negotiation | 4 | 1 | 2 | 4 | 4 | 3 |
| Supplier selection | 4 | 3 | 2 | 3 | 3 | 2 |
| Operational | **Risk monitoring (#1)** | 4 | 4 | 4 | 2 | 2 | 5 |
| Ordering | 2 | 2 | 2 | 5 | 4 | 1 |
| Supplier evaluation | 2 | 4 | 3 | 2 | 4 | 4 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
* Customer value targets service quality, product quality, and process improvements
* Strategic value views sustainability, degree of innovation, and differentiation

Ease of implementation:

* Input data considers data quality, availability, and complexity of the data sources
* Required know-how assesses the required domain and technical knowledge
* Change effort considers process changes, system adaptations, and culture

Use case cluster:

* Procurement strategy sets the strategic orientation of procurement
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* Risk monitoring identify risks along the process
* Ordering considers the workflow to complete the order
* Supplier evaluation monitors the performance of selected suppliers

**Section 3: Closing questions**

* At which level of procurement (strategic, tactical, and operational) is AI likely adopted the quickest?
* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
  Customer value assessment might be better for internal customers in case of procurement.

**INTERVIEW GUIDELINE XX**

**ARTIFICIAL INTELLIGENCE IN PROCUREMENT**

Thank you for your interest and for taking the time for this interview!

**Section 1: Background understanding**

* Could you briefly describe your organization, e.g. headquarter, history, number of employees, products, revenue, procurement volume, etc.?  
    
  IT solution provider with about 70 employees based in Germany.
* What is your current position? How many years have you been in this position?  
    
  Founder of IT technology company for 5 years focusing on data value chain.
* What is your understanding of artificial intelligence?
* Have you had experience with artificial intelligence methods at your work? If yes, what kind?  
    
  A prominent example for growth are modules for a recommendation system at a customer web shop – more generally, semi or fully autonomous processes
* When you have implemented AI technology, what was the influence of processes and results? What is your main motivation for this investment (efficiency/ quality/ costs)?  
    
  Generally, process knowledge is key for project success. Main motivation is process automation, which is also very elegant way to start (“door”). It is an easier start than building new AI-services.
* What kinds of structured and unstructured data do you often process and analyses? Where does the data come from? Besides, which decisions must you take based on this data?
* What kind of information system are you currently using such as enterprise resource planning tools?
* Where would you rate your current analytics capability and why?

Focus on predictive analytics with clients.

* Are you likely to adopt robotic process automation or AI methods within the next two, five, or ten years?
* What do you think do AI champions such as Amazon, Alibaba, or Google differently?

Inserted Figure 1

**Section 2: Evaluation of use case clusters**

In the literature, several clusters have been identified and categorized based on van Weele, 2014. Please rank them on their business value and ease of implementation from one denoting very low/ hard to five denoting very high/ easy:

Table XX. Use case cluster assessment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Category | Use case | Business Value | | | Ease of implementation | | |
| Financial value | Customer value | Strategic value | Input data | Know-how | Change effort |
| Strategic | Procurement strategy | 1 | 1 | 1 | 1 | 1 | 1 |
| Strategic supplier management | 3 | 5 | 4 | 4 | 3 | 4 |
| Supplier sustainability | 4 | 5 | 5 | 3 | 4 | 3 |
| Tactical | Supplier pre-qualification | 3 | 5 | 4 | 5 | 4 | 5 |
| Cost analysis | 5 | 5 | 5 | 4 | 2 | 2 |
| Negotiation support | 5 | 3 | 3 | 5 | 5 | 5 |
| Automated negotiation | 2 | 2 | 3 | 2 | 2 | 1 |
| Supplier selection | 4 | 4 | 4 | 5 | 5 | 4 |
| Operational | **Risk monitoring (#1)** | 5 | 5 | 5 | 5 | 5 | 5 |
| **Ordering (#2)** | 5 | 5 | 5 | 5 | 5 | 5 |
| **Supplier evaluation (#3)** | 5 | 5 | 5 | 5 | 5 | 5 |
| Own identified I | |  |  |  |  |  |  |
| Own identified II | |  |  |  |  |  |  |

Business value:

* Financial value considers the savings and sales growth potentials
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* Which of the use cases would you rank #1, #2, and #3? These will be marked above with bold script.   
  See above.
* Which other interesting use cases could you see? They can be added accordingly in the Table above.  
  For automated negotiations, does a machine actually negotiate more often or more strongly than humans?   
  For ordering, JIT is critical process where AI could deliver value. Machine might be better than humans at some point – in terms of statistical accuracies, which could lead to considerable process improvements for JIT.