

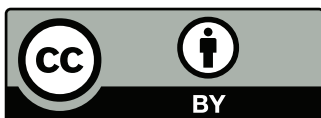
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List of abbreviations

| Abbreviation | |
|--------------|---|
| AI | Artificial intelligence |
| BSW | <i>Behörde für Stadtentwicklung und Wohnen</i> |
| BUKEA | <i>Behörde für Umwelt, Klima, Energie und Agrarwirtschaft</i> |
| GLA | <i>Geologisches Landesamt</i> (Geological State Office) |
| IDM | Intelligent Dialogue Management |
| SKA | Brief written inquiries (<i>Schriftliche Kleine Anfragen</i>) |

Business case

Executive Summary

This document elaborates and analyses three different alternatives for automation for each of the five short listed processes that were defined in Activity 2 (Elaboration of a Business Case).

Therefore, for each process, two different scenarios (alternatives) with a varying degree of automation were developed. This includes an alternative with minimum to intermediate adjustments (alternative 2) and an alternative with more advanced AI features that would contribute to considerably automate the respective process (alternative 3).

The alternatives were analysed regarding their feasibility, risks and driving and restraining forces. Furthermore, for each process, an analysis of the alternatives regarding the stakeholder demands, the technological readiness and their impacts was conducted.

Concluding from the analysis of the alternatives for each process, this document proposes a preferred alternative (business case) for each of the five short-listed processes:

- For the brief written inquiries (SKA): alternative 3
- For the senate printed matters coordination: alternative 2
- For the info boxes: alternative 3
- For the imputing procedure: alternative 3
- For the info boxes: alternative 3
- For the knowledge management: alternative 3.

The preferred alternatives constitute the business case for each process and will be specified and further worked out in Deliverables 6 and 7.

Introduction

This document elaborates and analyses three different alternatives for automation for each of the five short listed processes that were defined in Activity 2 (Elaboration of a Business Case). The aim of this assessment is to support the decision-making process of the City of Hamburg to determine the preferred alternative for each process.

Therefore, for each process, two different scenarios (alternatives) with a varying degree of automation were developed. This includes an alternative with minimum to intermediate adjustments and an alternative with more advanced AI features that would contribute to considerably automate the respective process. These alternatives are not conclusive and can continue to be adapted during implementation.

Having described the status quo (alternative 1), the alternative with medium adjustments (alternative 2) and the alternative with the largest automation potential (alternative 3), the alternatives were assessed regarding their feasibility, risks and driving and restraining forces. Furthermore, for each process, an analysis of the alternatives regarding the stakeholder demands, the technological readiness and their impacts was conducted.

As a result of the description and assessment of the alternatives, for each process, the preferred alternative is presented. This preferred alternative constitutes the business case that will be specified and further worked out in Deliverables 6 and 7.

The development of the present document is largely based on the results of Deliverables 2, 3 and 4. The analysis of the short list processes, the analysis of the IDM tool and the iterative exchange with the Free Hanseatic City of Hamburg contributed to the creation of the present business models.

In addition, five additional workshops were conducted with stakeholders in the Free Hanseatic City of Hamburg to elaborate the alternatives. The aim of these workshops was to discuss and elaborate the alternatives in the BUKEA/BSW and the City of Hamburg and, based on this, to further refine the action alternatives.

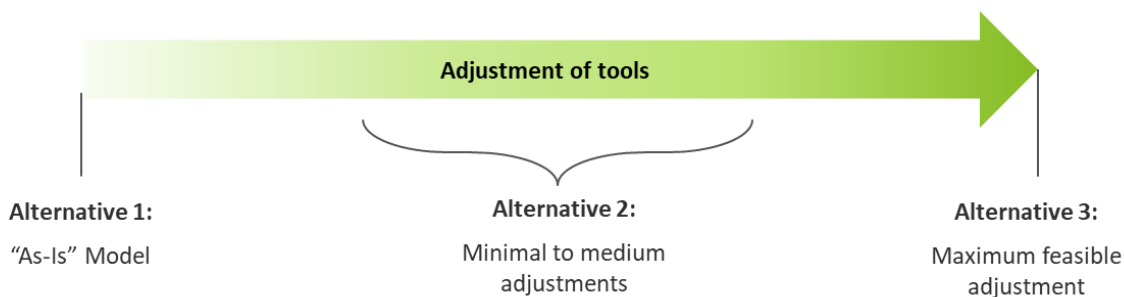
Methodology

Description of alternatives

The main purpose of this activity was to develop three possible alternatives for automation. The first alternative, the “As-Is” model, is the do-nothing scenario. This alternative serves as a comparison for the alternative scenarios as it would maintain the status quo. The second alternative is a range of scenarios, depending on the process under consideration, that would imply concrete additional features which are not already implemented in the IDM (*Intelligent Dialogue Management*) software or the current processes. Each of these features should be highly feasible for an implementation. The third alternative constitutes a high degree of digitization and utilizes a higher degree of adjustments to the current software (possibly including additional emerging technologies) or comprehensive adjustments to current processes in order to make them applicable to the existing software.

We **developed different alternatives** for each of the five processes identified.

Figure 1: Alternatives for the processes identified



Source: Deloitte (2022)

The developed alternatives for the five short-list processes were presented and discussed with the process owners during 5 workshops and the favoured alternatives were identified. The findings and preferred alternatives of the process owners were further presented and discussed with relevant stakeholders of the City of Hamburg and ultimately one favoured alternative per process was selected.

Analysis and assessment of the alternatives

Having described the three alternatives per process, the analysis of alternatives focuses on the assessment of the alternatives regarding their feasibility, impact and key restraining and driving forces that might influence the implementation and processing of the respective alternative.

The analysis **aims to support the decision-making process of the City of Hamburg** in determining the **preferred alternative** for each of the five processes. The analysis focuses on the assessment of alternatives 2 and 3 as alternative 1 of each process was analysed in detail already in Deliverables 2 and 3 of this project. We thereby apply the implicit assumption that both alternatives 2 and 3 are more preferred as compared to the status quo (alternative 1).

Acknowledging that all solutions based on alternative 2 base on the IDM workflow tool and that all solutions based on alternative 3 foresee additional and more advanced AI features and to minimise redundancy in the analysis, an **overarching assessment of the solutions based on alternative 2 against the solutions based on alternative 3** was performed. This assessment included:

- **Force-field analysis:** the force-field analysis is a tool to determine the driving and restricting forces of each alternative. For the different aspects of each solution, the driving and the restraining forces were worked out and put in contrast in a decisional balance sheet. The strength of each force was thereafter ranked according to a five-point scale. The values of the different aspects of the driving forces and the restraining forces were then added up to a total value. The analysis allows not only to determine which side of force prevails but also to provide an overview about the strength and weaknesses of these driving forces. Due to its complexity, the force-field analysis was only conducted for the solutions based on alternative 2 (IDM workflow tool). Key implications were, however, derived for both alternative 2 and 3.

- **Feasibility assessment:** the feasibility assessment was conducted to determine if the requirements of each alternative meet the given circumstances and if it is realistic that a given solution will be implemented. The feasibility assessment contained the analysis of both technical and non-technical feasibility aspects.

On the process level (for each of the five processes themselves), the following assessments were conducted:

- **Impact valuation:** the impact valuation assesses the effects and impacts on the organisation and culture, processes and the impacts at a technical level. This also includes potential legal, operational, organisational and technical implications at different levels.
- **Assessment of stakeholder demands:** the assessment of stakeholder demands examines the need, functionality and benefits for the stakeholders (including the process owners) that are involved in the respective process.
- **Technological readiness:** in order to determine the expected timeframe of a potential implementation and to assess the estimated adoption rate, the technological readiness, in particular related to solutions based on alternative 3, was examined.

Brief written inquiries (Schriftliche kleine Anfragen (SKA))

Brief written inquiries are inquiries on public matters, which are addressed to the Senate by members of the Parliament. These inquiries are transmitted forthwith to the Senate and are to be answered in writing by the Senate within eight days.

Alternatives for Brief written inquiries

In the following sections, the three alternatives and functionalities are explained along process graphs. Alternative 1 represents the continuation of the current solution (status quo), the so-called baseline scenario. The three alternatives are briefly presented below:

- **Alternative 1:** “As-is“ model
- **Alternative 2:** IDM Workflow, tool for workflow management, including a monitoring dashboard, deadline tracking, assignment of responsibilities, archiving and more
- **Alternative 3:** Elements of alternative 2 and assisted assignment of responsibilities and an intelligent search

The following table contains a brief overview of the main functionalities of the three alternatives:

Table 1: Addressed Business requirements for the alternatives of SKAs

| Functionalities | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---------------|---------------|---------------|
| Workflow management | - | + | + |
| Assignment of responsibilities (manually) | - | + | + |
| Archiving | - | + | + |
| Control/Monitoring Dashboard | - | + | + |
| Deadline Tracking | - | + | + |
| Comment and communication function | - | + | + |
| Assignment of responsibilities (assisted) | - | - | + |
| Intelligent search | - | - | + |
| Inter-authority access | - | - | + |
| Data export | + | + | + |
| (+) Feature available (-)Feature not available | | | |

Source: Deloitte (2022)

Alternative 1

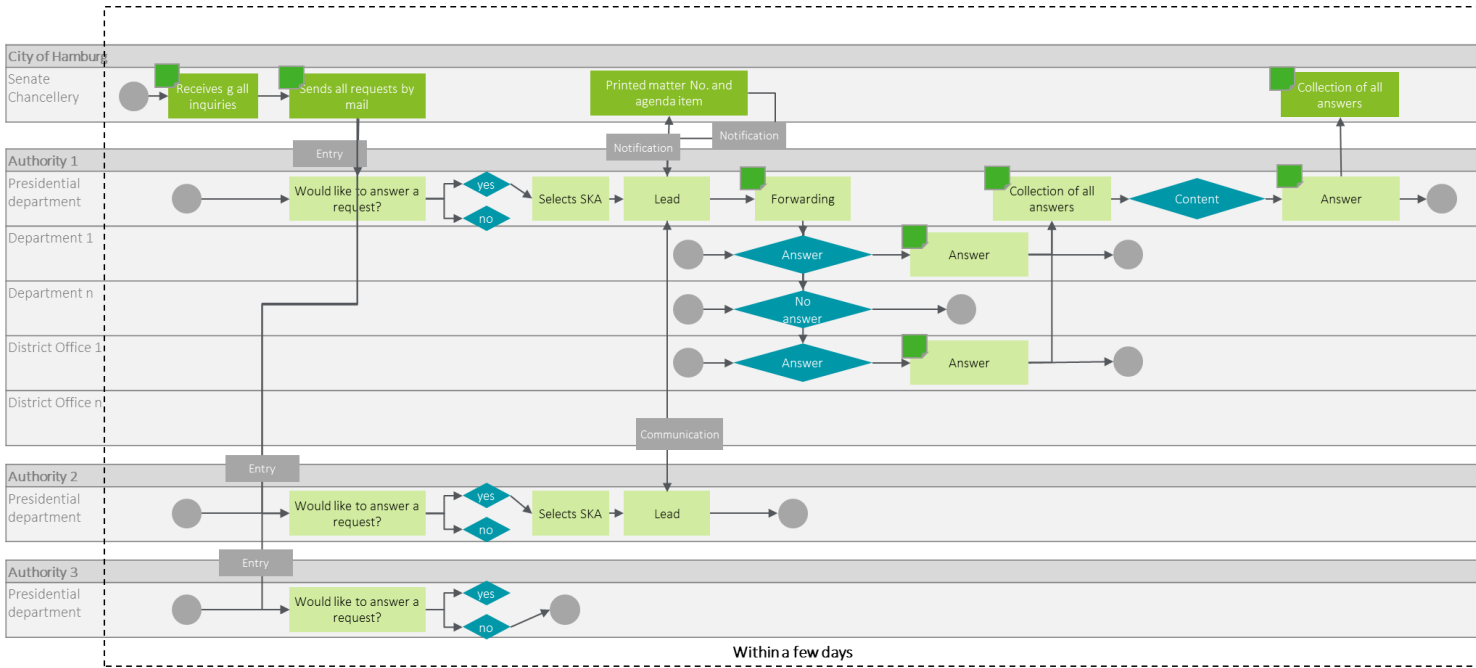
Alternative 1 refers to maintaining the status quo of the Brief written inquiries (*Schriftliche kleine Anfragen*) process unchanged. On a superordinate level, the process can be shown in the process flow chart below from the perspective of the Senate Chancellery. As an example, the process within an individual agency can be seen in the following process flow diagram. The process is briefly described below along the flowcharts.

The process involves inquiries from members of parliament to the Senate of the City of Hamburg, which is required to respond within a few days. The inquiries of the members of parliament are collected by the office of the citizenry (*Bürgerschaftskanzlei*) and transmitted to the Chancellery of the Senate (*Senatskanzlei*). The authorities decide among each other which one will take the lead in answering individual brief written inquiries and reports this to the Senate Chancellery, which forwards back the respective written inquiries number and the agenda item via the portal. After the leading authority has answered the inquiries and all other agencies involved have submitted their answers, the answer is forwarded to the Senate Chancellery, which collects all answers, and forwards them to the inquiry committee. This commission meets on Tuesdays and Fridays. Within the framework of this commission, the city councils discuss the proposals of the authorities and determine the final version of the response. The Senate Chancellery takes minutes of this meeting and incorporates the discussed changes into the answers

and finally forwards them to the office of the citizenry in bundled form. The office of the citizenry, in turn, sends the answered questions to the members of parliament.

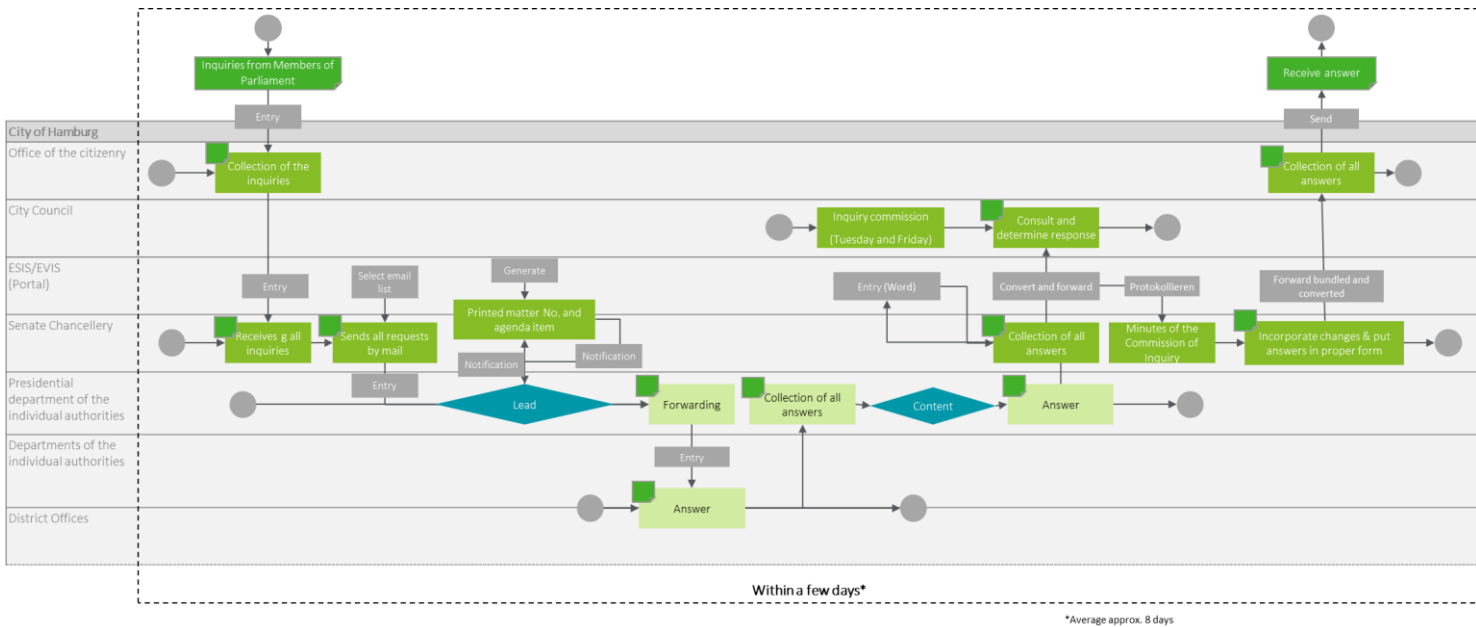
A detailed description of the status quo is provided in Report D3 (As-is Business process Model).

Figure 2: Process model Alternative 1 SKA - From the perspective of the individual presidential department



Source: Deloitte (2022)

Figure 3: Process model Alternative 1 SKA - From the perspective of the Senate Chancellery



Source: Deloitte (2022)

Alternative 2

Alternative 2 extends the as-is model of alternative 1 to include the IDM workflow management. This includes a **central access channel**, a **forwarding assistant** for determining the potentially responsible authorities and offices of the brief written inquiries, a **monitoring and deadline tracking** dashboard, a **comment and communication** function, and **archiving** of the inquiries and the process and response histories in a central database.

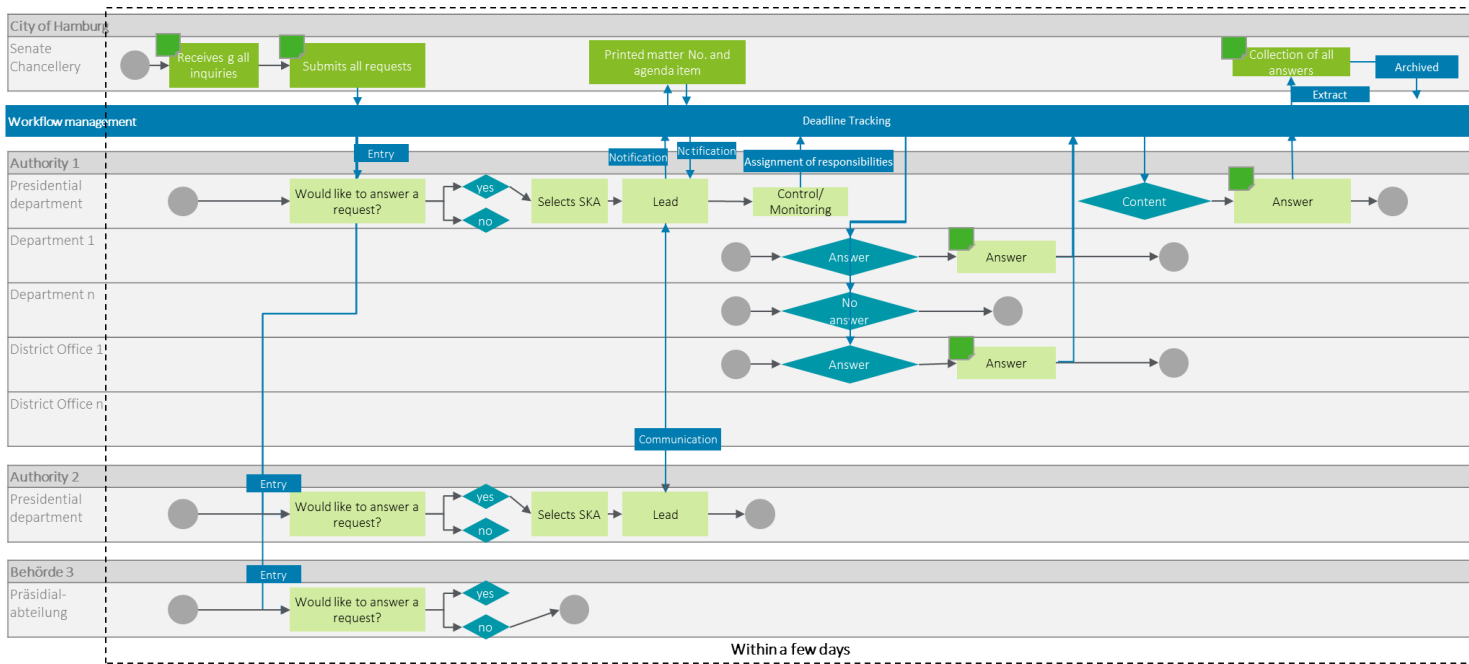
The process as such remains unchanged. The adapted process steps are shown in blue in flowcharts below, with the IDM tool as the intermediate point.

The inquiries of the members of parliament are collected by the office of the citizenry (*Bürgerschaftskanzlei*) and transmitted to the Chancellery of the Senate (*Senatskanzlei*) via the portal ESIS/EVIS.¹ The the Senate Chancellery then forwards the inquiries to all presidential departments of the authorities. This can be implemented in two ways: first, the Senate Chancellery itself can be given access to the IDM tool, thereby forwarding the requests, or an interface can be built between its existing system ESIS and the IDM tool.

The presidential departments of the authorities the receive a notification via the IDM tool that new inquiries have been received and decide whether any of the inquiries need to be answered by their authorities. The lead can be determined via the comment and communication module and reported to the Senate Chancellery via the IDM tool, which in turn reports the printed matter number and agenda item to the lead authority via the IDM tool. The presidential department manually enters the responsibilities of the individual departments and district offices, as well as the deadlines, and forwards the SKA via the IDM tool.

With the assistance of the IDM Tool, a central dashboard can be used to track the deadlines. The responses from the departments and district offices go back to the presidential department via the IDM tool. After consolidation and answering, the answer is forwarded to the Senate Chancellery via the IDM tool. After completion of the inquiry, the inquiry, the response, as well as the responsible authorities and departments and the timestamp of the processing are archived in a central database and can be retrieved by the user.

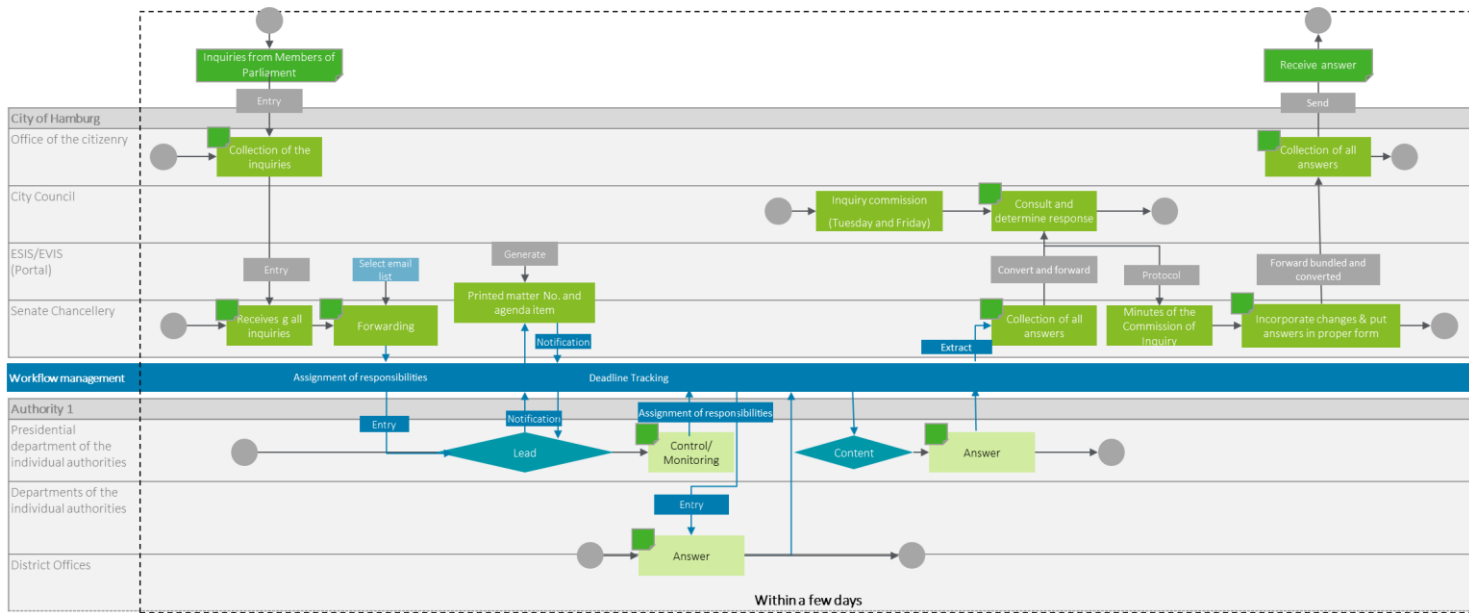
Figure 4: Process model Alternative 2 SKA - From the perspective of the individual presidential department



Source: Deloitte (2022)

¹ System and database for all SKA and meetings. The system serves as a database for all SKAs and meetings, allowing to create records with information and master data (e.g. rapporteurs, questioners, etc.). In this system, the collected requests are forwarded to the Senate Chancellery and serves as an interface between the Senate Chancellery, the office of the citizenry (*Bürgerschaftskanzlei*) and the City Council. The system serves the forwarding of the SKA by email, as well as the selection of different mailing lists. In addition, agendas and printed matter numbers can be generated and files can be converted into various formats (e.g. Word to PDF). The minutes are also documented in ESIS/EVIS.

Figure 5: Process model Alternative 2 SKA - From the perspective of the Senate Chancellery



Source: Deloitte (2022)

Alternative 3

Alternative 3 extends the alternative 2 to include an assisted assignment of responsibilities and an intelligent search.

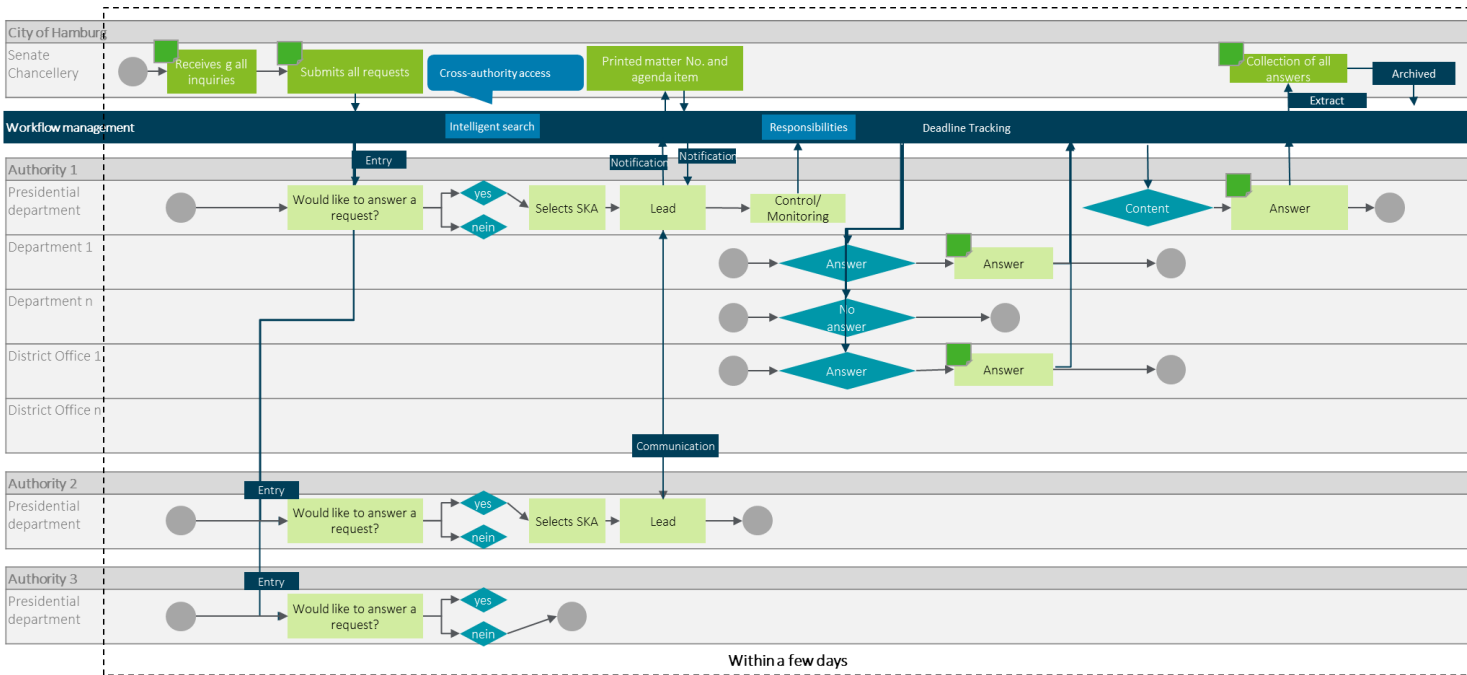
The process as such remains unchanged. The adapted process steps are shown in dark blue in flowcharts below, with the IDM tool as the intermediate point. And light blue the added functionalities of alternative 3. The functionalities of the IDM tool remain the same as described in the previous chapter. In addition, these are extended by two further AI (Artificial intelligence)-based modules: the (assisted) determination of responsibilities and an intelligent search. Both modules are explained in more detail below.

Through the module for the (assisted) **determination of responsibilities**, the user receives the potentially responsible authorities or offices determined by the forwarding assistant to answer the respective inquiry. The forwarding assistant determines the potentially responsible addressees of the inquiry by means of a machine learning system, which recognizes patterns in the responsibilities based on the continuous analysis of the inquiries received and forwarded in the past. Here, the result can consist of several potential addressees, each of which is provided with a probability about the responsibilities of the selected addressees.

The module for the **intelligent search** is based on a dense information retrieval, which in this case is an internal search engine backed by modern technologies such as AI and machine learning. It can be used asymmetrically, like a google search, by entering some keywords and finding relevant documents corresponding to the search query or symmetrically were e.g., a hole pdf document is used as search query to find similar documents. The dense information retrieval systems can be extended to search other documents as well. For example, an image can be used to find corresponding texts or video files in the internal system. Intelligent search can deliver smarter results faster and provides a single point of access to enterprise content sources, allowing data to be enhanced, searched, and analyzed in both structured and unstructured formats.

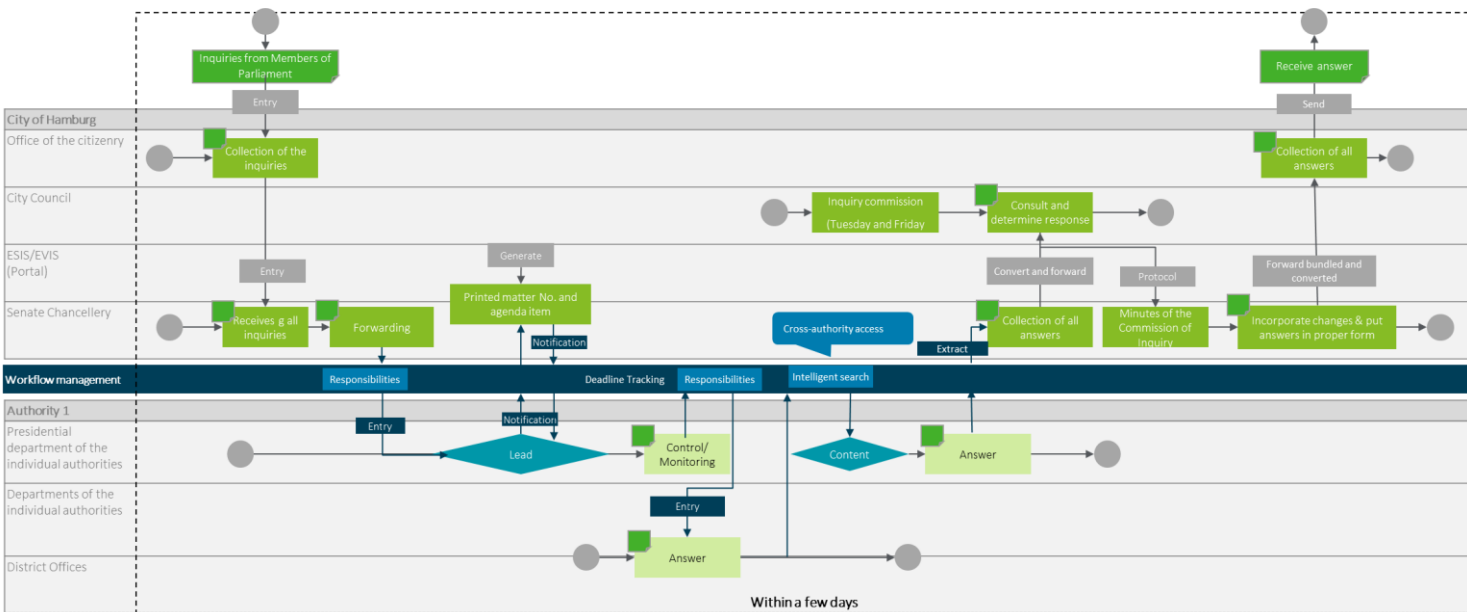
The intelligent search would allow for facilitated searches over the already answered inquiries, and thus simplify and accelerate the process, which would be advantageous in such a time-critical process. The access would be inter-agency and inter-departmental.

Figure 6: Process model Alternative 3 SKA - From the perspective of the individual presidential department



Source: Deloitte (2022)

Figure 7: Process model Alternative 3 SKA - From the perspective of the Senate Chancellery



Source: Deloitte (2022)

Analysis and assessment of alternatives

This subchapter contains the assessment of alternatives for the brief written inquiries. Therefore, three dimensions, namely the impact valuation, the stakeholder demands, and the technological readiness were examined.

Impact valuation

Regarding **organisation and culture**, alternative 2 would aim to build upon a technological solution that is currently being set up at the City of Hamburg and therefore, it can be expected that the solution based on alternative 2 will be widely accepted. However, this alternative would not induce a cultural shift towards solutions with a high degree of automation. Alternative 3, in contrast, promises a considerable improvement in the effectiveness of the process, also due to the features the intelligent search would

introduce. This could lead to spill-over effects to other departments, also considering the strategic importance and relevance of the process. However, the integration of interfaces to the already existing solution ESIS/EVIS must be assessed. This could lead in both alternatives to an enhanced coordination effort in the implementation phase.

Regarding the **process** itself, both alternatives would only foresee slight changes in the process steps itself and do not require any fundamental transformation of the scope, order or activities of the process.

Assessment of stakeholder demands

The SKA process depends on a quick and effective allocation of the SKA, implying that an efficient assignment process is crucial. Alternative 2 would not fundamentally change the assignment process but rather introduce some additional supporting features. Alternative 3, in contrast, would contribute considerably to stakeholder demands as the automation would reduce the various manual steps and reduce high coordination efforts.

Technological readiness

The technological readiness of both alternatives was determined as follows:

Table 2: Technological readiness of the alternatives of the brief written inquiries process

| Alternative | Technological readiness | Details |
|--|---|---|
| Alternative 2: IDM Workflow tool incl. dashboard with status and tracking functionalities | High / medium / low | As this alternative builds on the IDM tool, which is currently being set up at the City of Hamburg, it could be implemented as soon as this tool is ready. |
| Alternative 3: Alternative 2 + intelligent search and assisted assignment | Intelligent search: High / medium / low Assisted assignment: High-medium / low | Intelligent search: The readiness of the intelligent search is expected to be high as pre-trained models with good results are already available. Assisted assignment: Solutions on the market are ready, but adaptations are expected to be necessary. The readiness is expected to be medium-high as good process data is available. |

Source: Deloitte (2022)

Senate printed matter coordination (Senatsdrucksachenabstimmung)

Senate printed matter coordination are issues of fundamental importance, which are decided by the Senate. These issues are regulated on the Senate's Rules of Procedure (*Geschäftsordnung*) and are addressed by the respective departments of the authorities (e.g. in the case of ordinances or draft laws). This is a completely internal process.

Alternatives for Senate printed matter coordination

In the following sections, the three alternatives and functionalities are explained along process graphs. Alternative 1 represents the continuation of the current solution (status quo), the so-called baseline scenario. The three alternatives are briefly presented below:

- **Alternative 1:** "As-Is" model
- **Alternative 2:** IDM Workflow, tool for workflow management, including dashboard for mapping responsibilities, deadlines, status etc.
- **Alternative 3:** Elements of alternative 2 and assisted assignment of responsibilities and automated template filling

The following table contains a brief overview of the main functionalities of the three alternatives:

Table 3: Addressed Business requirements for the alternatives of Senate printed matter coordination

| Functionalities | Alternative 1 | Alternative 2 | Alternative 3 |
|--|---------------|---------------|---------------|
| Workflow management | - | + | + |
| Assignment of responsibilities (manually) | - | + | + |
| Archiving | - | + | + |
| Control/Monitoring Dashboard | - | + | + |
| Deadline Tracking | - | + | + |
| Comment and communication function | - | + | + |
| Assignment of responsibilities (assisted) | - | - | + |
| Automated filling of the template | - | - | + |
| (+) (+) Feature available (-) Feature not available | | | |

Source: Deloitte (2022)

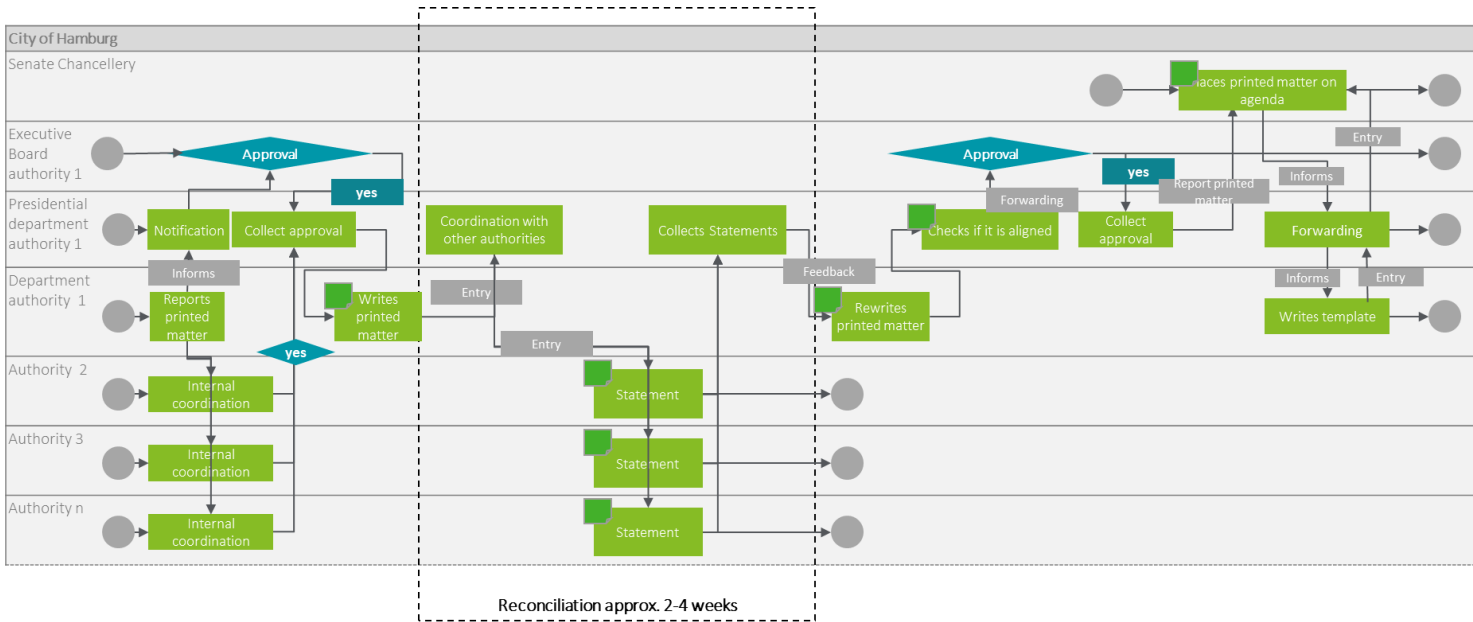
Alternative 1

Alternative 1 refers to maintaining the status quo of the Senate printed matter coordination (*Senatsdrucksachenabstimmung*) process unchanged. On a superordinate level, the process of Senate printed matter coordination can be shown in the process flow chart below. In the following, the process is briefly described along the flowchart.

Senate printed matters are items on which the Senate is to make a decision. In general, the Senate decides on items of fundamental importance, those items are regulated in the Senate's Rules of Procedure (e.g. in the case of ordinances or bills). Before the Senate votes on the printed matter, the bills are coordinated with all involved authorities and forwarded by the Presidential Department.

A detailed description of the status quo is provided in Report D3 (As-is Business process Model).

Figure 8: Process model Alternative 1 Senate printed matter coordination



Source: Deloitte (2022)

Alternative 2

Alternative 2 extends the As-Is model of alternative 1 to include the IDM workflow management. This includes a **central access channel**, a **forwarding assistant** for determining the potentially responsible authorities and offices of the printed matters, a **monitoring and deadline tracking** dashboard, a **comment and communication** function, and **archiving** of the printed matters and the process and response histories in a central database.

The process as such remains unchanged. The adapted process steps are shown in blue in the following flowchart, with the IDM tool as the intermediate point.

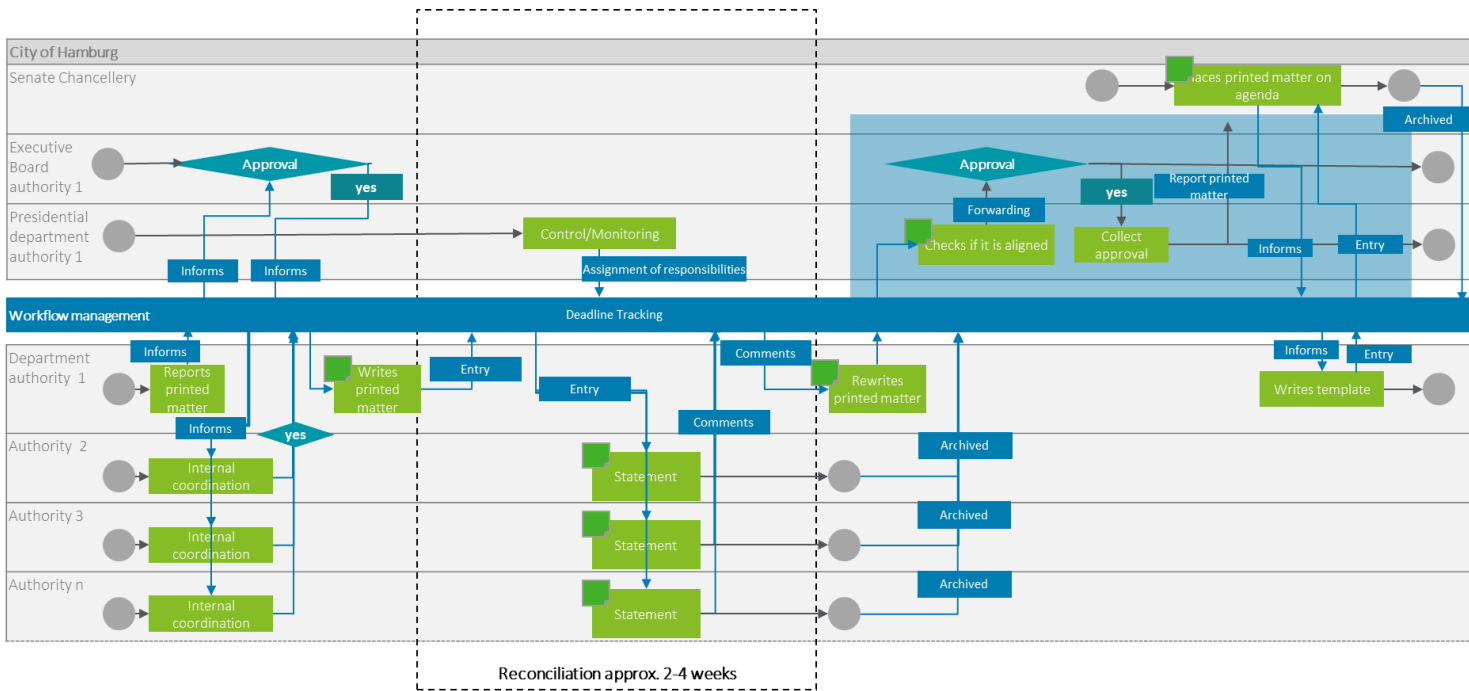
In the case of a new printed matter, the authority informs the Authority Directorate (*Behördenleitung*) via the IDM tool. The latter can grant approval via the IDM tool. As soon as the approval has been granted, the authorities involved are informed via the IDM tool, which can also enter their approval in the IDM tool. The approvals are accessible in the IDM tool and once all are submitted, the department (*Fachamt*) of the indicating authority writes the printed matter. This is forwarded via the IDM tool to collect statements from the authorities involved. The authorities involved are informed by the tool and can enter their comments in the communication and comment function. These are viewable via the IDM tool for the indicating authority, which incorporates the statement and rewrites the printed matter accordingly.

With the assistance of the IDM tool, a central dashboard can be used to track the deadlines and responsibilities.

Via the IDM tool, the finished printed matter is forwarded to the presidential department (*Präsidialabteilung*) and the Authority Directorate (*Behördenleitung*), and after its approval, the matter is reported to the Senate Chancellery. As soon as the printed matter is placed on the agenda of the Senate Chancellery (*Senatskanzlei*), the initiated authority is informed about this via the IDM tool. After the authority is informed, it writes a template (*Waschblatt*) and submits it through the IDM tool in turn to the Senate Office. This template summarizes and explains the contents of the printed matter.

The statements of the involved authorities as well as the finalized printed matter are **archived** in a central database.

Figure 9: Process model Alternative 2 Senate printed matter coordination



Source: Deloitte (2022)

Alternative 3

Alternative 3 extends the alternative 2 to include an assisted assignment of responsibilities and an automated template filling.

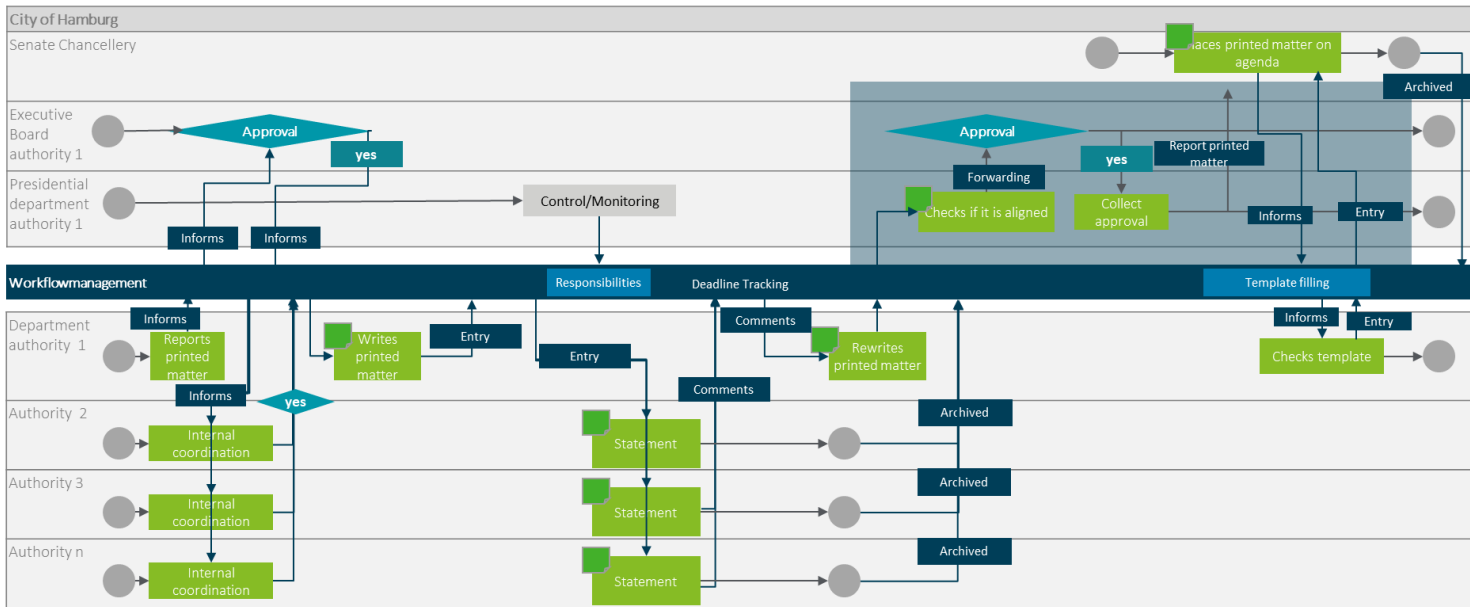
The process as such remains unchanged. The adapted process steps are shown in dark blue in flowchart below, with the IDM tool as the intermediate point. And light blue the added functionalities of alternative 3. The functionalities of the IDM tool remain the same as described in the previous chapter. In addition, these are extended by two further AI-based modules: the (assisted) determination of responsibilities and an automated template filling

Both modules are explained in more detail below.

Through the module for the (assisted) **determination of responsibilities**, the user receives the potentially responsible authorities or offices determined by the forwarding assistant to answer the respective printed matter. The forwarding assistant determines the potentially responsible addressees by means of a machine learning system, which recognizes patterns in the responsibilities based on the continuous analysis of the printed matters received and forwarded in the past. Here, the result can consist of several potential addressees, each of which is provided with a probability about the responsibilities of the selected addressees. The (assisted) determination of responsibilities enables a quicker identification of which authority should be involved in the printed matter.

The second module is used for an automated filling of the template, which is forwarded to the Senate to vote, is based on **named entity recognition/extraction**. Name entity recognition is a subtask of Natural Language Processing that seeks to locate and classify named entities mentioned in unstructured text into pre-defined categories such as person names, organizations, etc. With named entity extraction, it is possible to understand the subject or theme of a body of text and quickly group texts based on their relevancy or similarity. This technology could be used to extract from the written printed matter the information which is presented in the template.

Figure 10: Process model Alternative 3 Senate printed matter coordination



Source: Deloitte (2022)

Analysis and assessment of alternatives

This subchapter contains the assessment of alternatives for the senate printed matter coordination process. Therefore, three dimensions, namely the impact valuation, the stakeholder demands, and the technological readiness were examined.

Impact valuation

Regarding **organisation and culture**, alternative 2 would build upon the solution that is currently being developed at the City of Hamburg. Alternative 3, however, would entail considerable risks regarding its implementation given the high degree of stakeholder involvement and the importance of achieving a quick allocation. Considering the low number of senate printed matters, stakeholders might question for alternative 3, whether such changes are necessary.

Regarding the **process** of the senate printed matters, alternative 2 only foresees slight changes in the process steps. Alternative 3, in contrast, would require more adjustments as the interaction between other tools and IT solutions that are already being used for the senate printed matters must be assessed.

Assessment of stakeholder demands

As an effective and quick coordination is crucial for this process and also considering the high number of stakeholder involvement, a solution that only involves a lower degree of automation might be sufficient.

Technological readiness

The technological readiness of both alternatives was determined as follows:

Table 4: Technological readiness of the alternatives of the senate printed matter coordination process

| Alternative | Technological readiness | Details |
|--|----------------------------|--|
| Alternative 2: IDM Workflow tool incl. dashboard for status and tracking | High / medium / low | As this alternative builds on the IDM tool, which is currently being set up at the City of Hamburg, it could be implemented as soon as this tool is ready. |

| Alternative | Technological readiness | Details |
|---|---|---|
| Alternative 3: Alternative 2 + assisted assignment of responsibilities and automated template filling | Assisted assignment: High / medium / low Automated template filling: High / medium-low | Assisted assignment: given that this process is not frequently used, there might be the risk that not enough data to train the models is available. Automated template filling: The automated template filling works better the more data are available. As the number of senate printed matters is not high, the automated template filling might be difficult to train and hence to implement. |

Source: Deloitte (2022)

Imputing procedure (Imputing-Verfahren)

Regarding the general process "imputing procedure", the process analysis performed in activity 2 of this project found several processes that can be used to illustrate the imputing procedure. For the short list and for the purpose of illustrating this category of processes in the present deliverable, the process of drilling reports, allocated in the Geological State Office (*Geologisches Landesamt*) at BUKEA, was selected.

Alternatives for Imputing procedure

In the following sections, the three alternatives and functionalities are explained along process graphs. Alternative 1 represents the continuation of the current solution (status quo), the so-called baseline scenario. The three alternatives are briefly presented below:

- **Alternative 1:** "As-Is" model
- **Alternative 2:** IDM Workflow, tool for workflow management, including dashboard for mapping responsibilities, deadlines, status etc.
- **Alternative 3:** Elements of alternative 2 and an automated completeness and plausibility check as well as imputing of missing values

The following table contains a brief overview of the main functionalities of the three alternatives:

Table 5: Addressed Business requirements for the alternatives of Imputing procedure

| Functionalities | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---------------|---------------|---------------|
| Workflow management | - | + | + |
| Assignment of responsibilities (manually) | - | + | + |
| Archiving | - | + | + |
| Control/Monitoring Dashboard | - | + | + |
| Deadline Tracking | - | + | + |
| Comment and communication function | - | + | + |
| Export database | - | - | + |
| Completeness check (automated) | - | - | + |
| Imputing | - | - | + |
| Plausibility check (automated) | - | - | + |
| (+) Feature available (-)Feature not available | | | |

Source: Deloitte(2022)

Alternative 1

Alternative 1 refers to maintaining the status quo of the BohrIS process unchanged. This process consists of two interrelated sub-processes and is part of the higher-level process "edit drilling reports", which is located at the Geological State Office of BUKEA. This overarching process is already maintained in the Aris database and describes the various steps involved in processing and completing the drill listings. The first sub-process relates to checking the timely receipt and completeness of the specific drilling data, the second sub-process is a process that is required by law as part of the Geological Data Act and includes the tracking of data that has not been received.

On a superordinate level, these processes of BohrIS can be shown in the following process flow charts. The process is briefly described below along the flowcharts.

The Geological State Office operates a **database (BohrIS)** that collects various data on boreholes carried out in the City of Hamburg. Upfront to these sub-processes, the reporting party who is carrying out the drilling provides information about the planned drilling via the NoBo portal (data portal that the City of Hamburg operates together with other neighbouring Federal States) and, if necessary, uploads verification data (meta information) about the drilling via this portal to the BohrIS database. The responsible department

checks the receipt of the verification data and accompanies the drilling professionally if necessary. If it is not received, the responsible department will request the verification data from the person making the notification by email and by telephone.

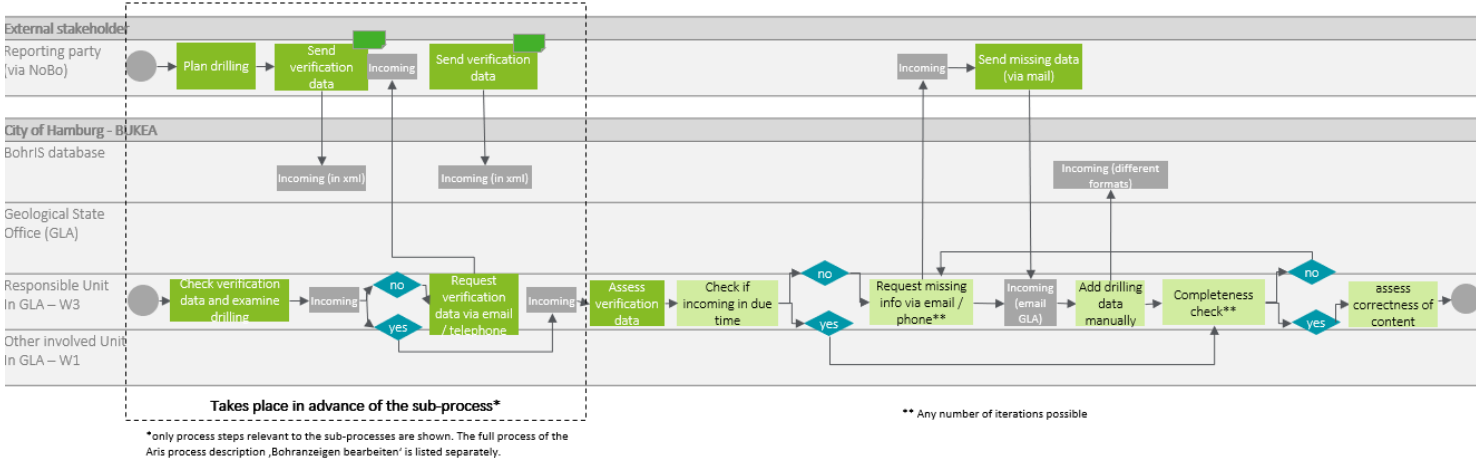
Upon receipt of the verification data, the sub-processes relevant to the scope of this project begin:

The first sub-process, **review of incoming drilling data**, begins with W3 verifying the timely receipt of verification, specialist and (where relevant) evaluation data. If the data is not received by the deadline, W3 will request this data from the person making the notification by email or telephone. The reporting party can then send the missing data to the Geological State Office (W3) by email. W3 then enters this drilling data manually into the BohrIS database. It should be noted that the datasets have different formats and a different level of detail. Thereafter, the completeness of the data records is checked. If the data is received on time, the completeness check is carried out immediately after the receipt on time. The completeness check is currently carried out manually. If W3 comes to the conclusion that the data is not complete, the applicant will be asked again by email and telephone and the subsequently incoming drilling data will be entered manually in BohrIS. This iteration continues until the data set is complete, i.e. contains all legal requirements. Once the data set is complete, the data is checked for correctness in terms of content.

The second sub-process, **tracking the incoming drilling data** starts immediately after checking for completeness. If the drilling data requested is not complete, the follow-up process will be initiated by W3. A reminder letter will manually be created by W3, which W3 sends to the person making the notification. It is then checked whether the reporting party has sent the drilling data to W3 by email within the legally stipulated period (varies depending on the type of drilling). If the data is not received within the deadline, various escalation steps such as reminders and fee notifications are initiated. If it is received within the specified period, the data received by email from W3 is entered manually in BohrIS and the data is compared again for completeness (see sub-process 1). If the data is still incomplete, the tracking process is restarted. This iteration takes place until the requested data is complete.

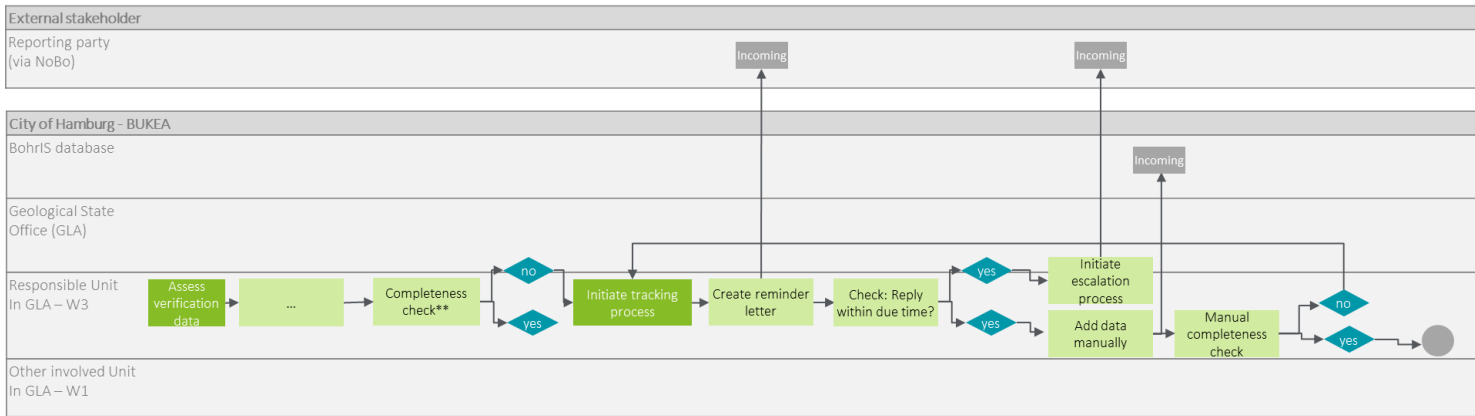
A detailed description of the status quo is provided in Report D3 (As-is Business process Model).

Figure 11: Process model Alternative 1 BohrIS completeness check



Source: Deloitte (2022)

Figure 12: Process model Alternative 1 Tracking of missing BohrIS data



** Any number of iterations possible

Source: Deloitte (2022)

Alternative 2

Alternative 2 extends the As-Is model of alternative 1 to include the IDM workflow management. This includes a **central access channel**, a **monitoring and deadline tracking** dashboard, a **comment and communication** function, and **archiving** the process and response histories in a central database.

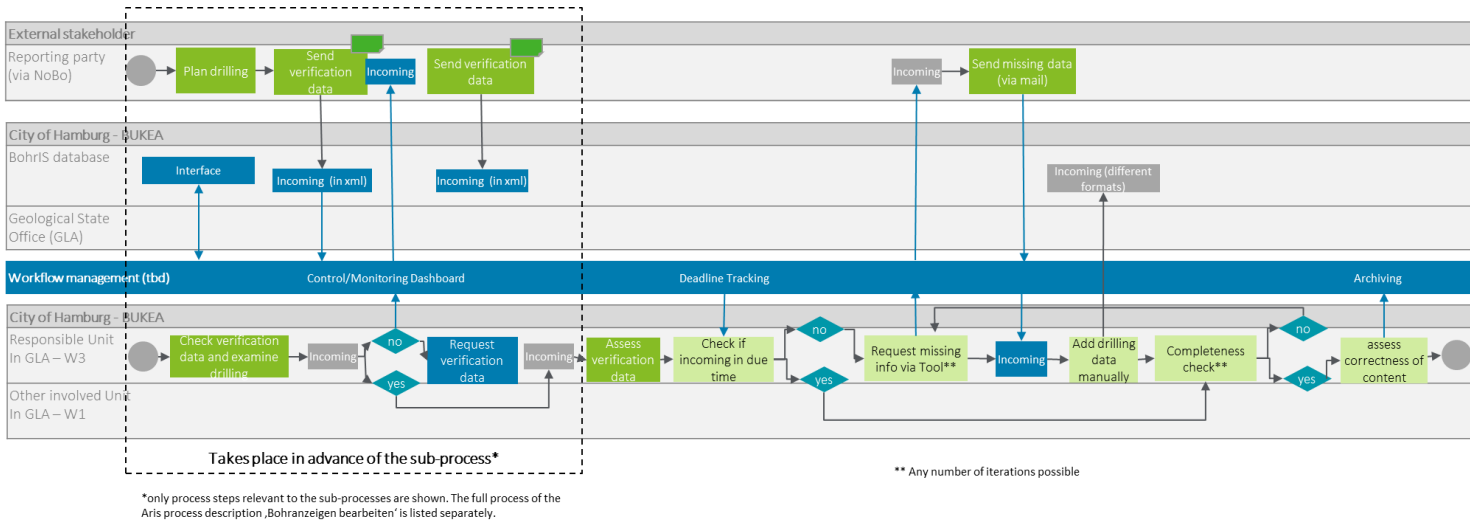
The process as such remains unchanged. The adapted process steps are shown in blue in figures below, with the IDM tool as the intermediate point.

The first sub-process, **review of incoming drilling data**, will be controlled via the IDM tool. The incoming data is imported into the BohrIS database and the responsible department is notified through the IDM tool. Using the IDM tool W3 can start the workflow process, by entering the deadlines and dates into the IDM tool, and therefore use the deadline tracking functionality. If the data is not received within the deadline, W3 will request the data from the person making the notification through the IDM. The interaction for missing data and deadline tracking is therefore covered by the IDM tool.

The second sub-process, **tracking the incoming drilling data**, will also use the IDM tool as a workflow management tool. It functions as a monitoring dashboard of the ongoing drilling data request. After checking for completeness, if the drilling data requested is not complete, the follow-up process will be initiated by W3. A reminder letter will be created through the IDM tool by W3, which will be sent to the person making the notification. All information, regarding the communication and received data will be stored in the IDM tool. This allows the responsible to set deadlines, which are tracked by the tool. If the data is not received within the deadline, various escalation steps such as reminders and fee notifications are initiated through the IDM tool. If it is received within the specified period, the data received by email from W3 is entered manually in BohrIS and the data is compared again for completeness (see sub-process 1). If the data is still incomplete, the tracking process is restarted. This iteration takes place until the requested data is complete.

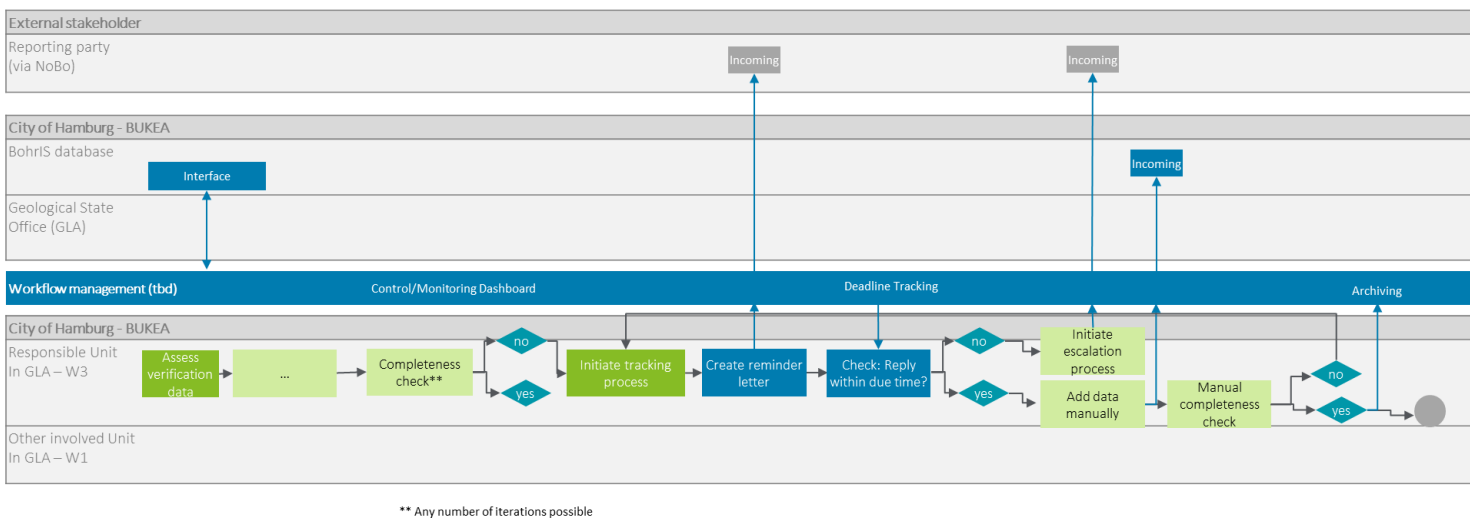
The data and notifications are **archived** in a central database.

Figure 13: Process model Alternative 2 BohrIS completeness check



Source: Deloitte (2022)

Figure 14: Process model Alternative 2 Tracking of missing BohrIS data



Source: Deloitte (2022)

Alternative 3

Alternative 3 extends the alternative 2 to include an automated completeness and plausibility check as well as imputing of missing values

The processes as such remain unchanged. The adapted process steps are shown in dark blue in figures below with the IDM tool as the intermediate point and light blue the added functionalities of alternative 3. The functionalities of the IDM tool remain the same as described in the previous chapter. In addition, these are extended by further modules: an automated completeness and plausibility check as well as imputing of missing values.

All modules are explained in more detail below.

The **completeness check** module automatically checks the received data for completeness in the two processes "Incoming Drilling Data Check" and "Incoming Drilling Data Tracking" by searching for missing values. This module can be based on a rule-based approach. If missing data is detected, the responsible person is notified via the IDM tool and can also send a follow-up request to the person responsible for the delivery.

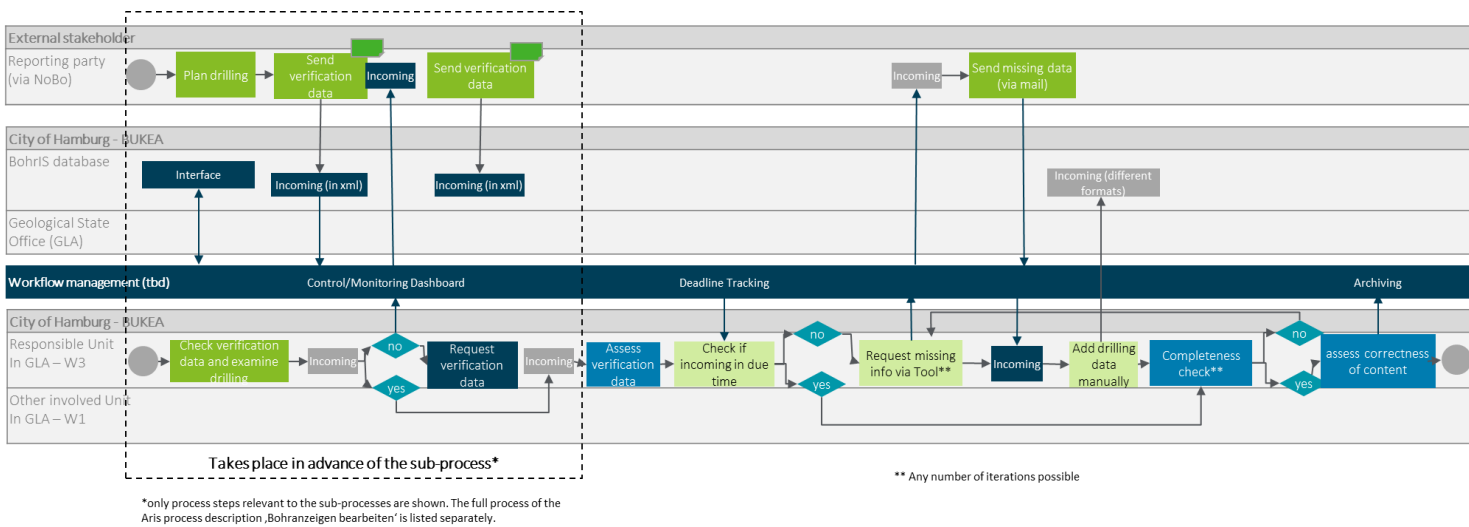
The **plausibility check** module provides the possibility to check the delivered data for plausibility. This can be done either on the basis of a rule-based approach or an AI module. Which approach is more suitable must

be checked in the context of the supplied data. The data will be checked for correctness in terms of content.

In the second process “tracking the incoming drilling data”, an unlimited number of iterations are performed until all data is delivered completely. This turns out to be a rather time-consuming process. A good alternative would be to introduce an **imputing process**: after a certain number of subsequent requests via the IDM tool, the missing data can be imputed. A popular approach to imputing data is to calculate a statistical value for each column (e.g., a mean) and replace all missing values for that column with that statistical value. The imputed values can be an estimate or an implicitly derived value with no uncertainty. This module would be introduced as an “assisted module”. This means that suggestions for the missing data are displayed, which must be checked and accepted by a responsible person.

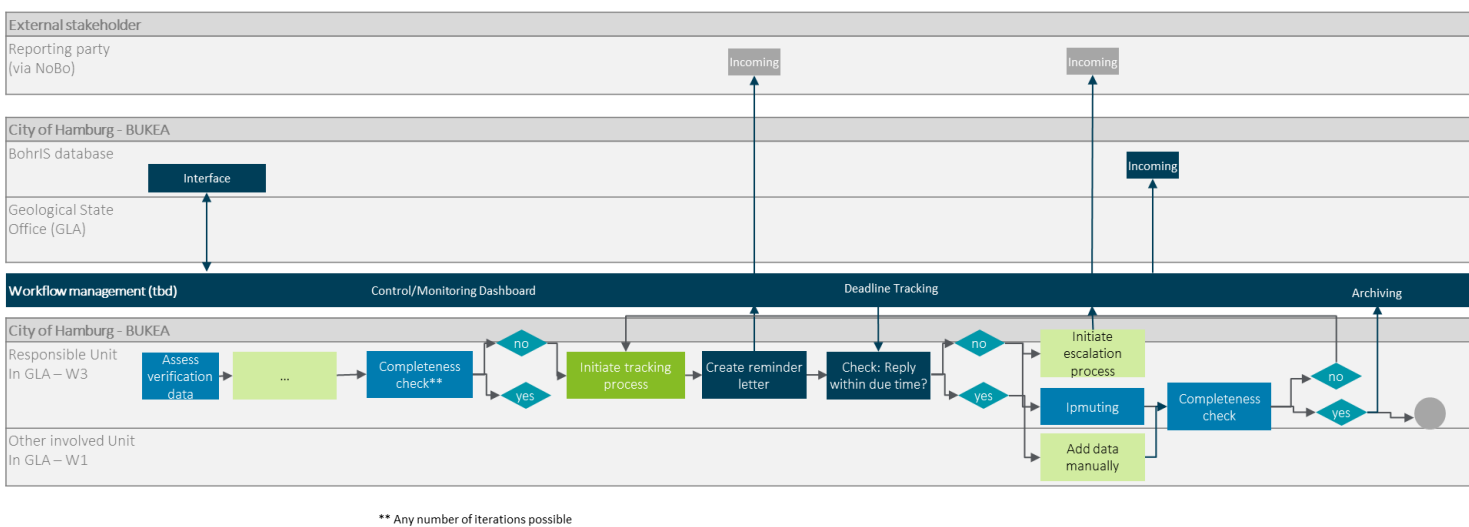
For this process, it may also be possible to deploy another Hamburg internal solution, the Module- F². The possibilities of using the IDM tool and Module- F will be examined during a meeting in mid-September, for further specification regarding the to-be process.

Figure 15: Process model Alternative 3 BohrIS completeness check



Source: Deloitte (2022)

Figure 16: Process model Alternative 3 Tracking of missing BohrIS data



Source: Deloitte (2022)

² MODUL-F (Modular Solution for Specialized Procedures) is a platform that provides basic building blocks for the fast and economical development of specialized procedures as well as a space for the resulting specialized procedures.

Analysis and assessment of alternatives

This subchapter contains the assessment of alternatives for imputing procedure. Therefore, three dimensions, namely the impact valuation, the stakeholder demands, and the technological readiness were examined.

Impact valuation

Regarding **organisation and culture**, alternative 2 would not manage to build upon the already quite advanced process features the GLA has already introduced and also foresees for the future. Alternative 3, in contrast, promises a high degree of effectiveness, in particular regarding the automated completeness and the plausibility checks. The introduction of such features could have spill-over effects to other departments given its clear benefits in substantially reducing manual work.

Regarding the **process** itself, alternative 2 would only foresee slight changes of the process steps. In turn, however, no quick wins will be expected from implementing this alternative. Alternative 3 would have the advantage that it would introduce an automated solution for a (partly) new process that will be required by law. By implementing alternative 3, this process can therefore directly be set up with a highly automated solution which can unfold considerable time and efficiency savings. Hence, alternative 3 could easily pick the low-hanging fruits.

Assessment of stakeholder demands

To achieve time savings and to reduce the high degree of manual workload are crucial for this process. Alternative 2 would not lead to considerable time savings. Alternative 3, in contrast could highly contribute to the stakeholder demands as automation would reduce the time-intensive manual checks of data. Furthermore, the stakeholders at GLA highly support the solution that would be based on alternative 3.

Technological readiness

The technological readiness of both alternatives was determined as follows:

Table 6: Technological readiness of the alternatives of the imputing procedure

| Alternative | Technological readiness | Details |
|--|----------------------------|---|
| Alternative 2: IDM Workflow tool including tracking dashboard with status and responsibilities | High / medium / low | As this alternative builds on the IDM tool, which is currently being set up at the City of Hamburg, it could be implemented as soon as this tool is ready. |
| Alternative 3: Alternative 2 + imputing and data export functionalities | High-medium / low | The readiness of the use of imputing depends on the data (and the context of the process). Following the explanations and descriptions of the stakeholders at GLA, the data at GLA would be very promising to set up quickly this alternative. The imputing of texts would however be more complex. |

Source: Deloitte (2022)

Info boxes (Infoboxen)

The process 'info boxes' resides in unit V 213 (Internal Operations) at BSW and represents a collection point for a wide variety of inquiries and requests (e.g., from citizens, applications for tender procedures, awarding, EU inquiries and letters from citizens). The receipt of the inquiries is exclusively a digital receipt via an email inbox. The assignment and forwarding usually takes place on the same day.

Alternatives for Info boxes

In the following sections, the three alternatives and functionalities are explained along process graphs. Alternative 1 represents the continuation of the current solution (status quo), the so-called baseline scenario. The three alternatives are briefly presented below:

- **Alternative 1:** "As-Is" model
- **Alternative 2:** IDM Workflow, tool for workflow management, including dashboard for mapping responsibilities, deadlines, status etc.
- **Alternative 3:** Elements of alternative 2 and assisted assignment of responsibilities

The following table contains a brief overview of the main functionalities of the three alternatives:

Table 7: Addressed Business requirements for the alternatives of Info boxes

| Functionalities | Alternative 1 | Alternative 2 | Alternative 3 |
|--|---------------|---------------|---------------|
| Workflow management | - | + | + |
| Assignment of responsibilities (manual) | - | + | + |
| Archiving | - | + | + |
| Control/Monitoring Dashboard | - | + | + |
| Deadline Tracking | - | + | + |
| Comment and communication function | - | + | + |
| Access across authorities | - | + | + |
| Data export | - | + | + |
| Assignment of responsibilities (assisted) | - | - | + |
| (+) Feature available (-) Feature not available | | | |

Source: Deloitte (2022)

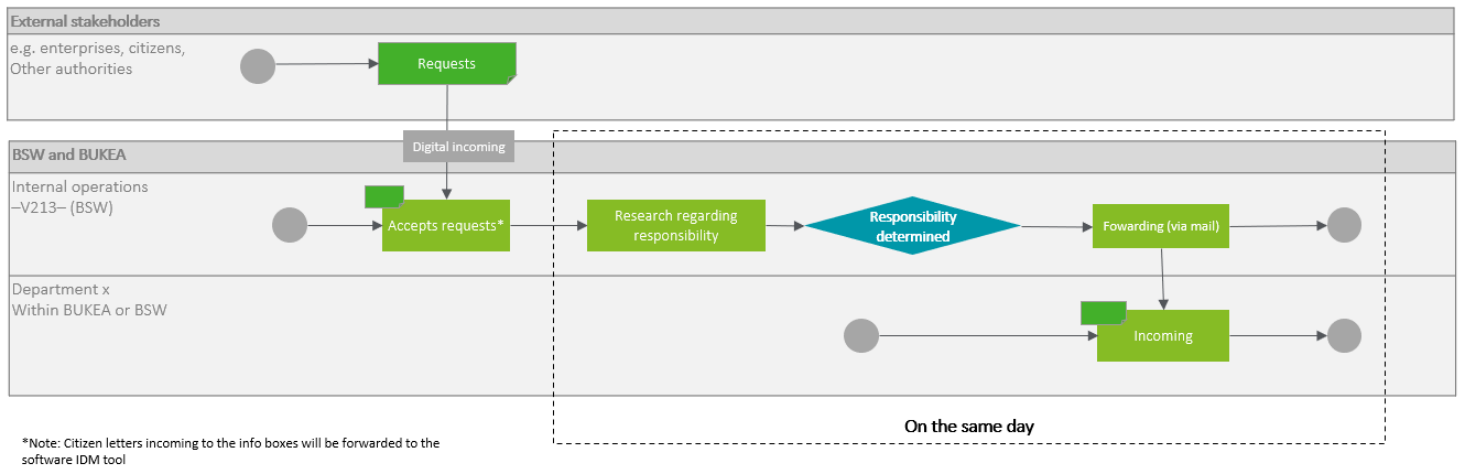
Alternative 1

Alternative 1 refers to maintaining the status quo of the info boxes (*Infoboxen*) process unchanged. On a superordinate level, the process of info boxes can be shown in the process flow chart below. In the following, the process is briefly described along the flowchart.

The assignment or research regarding the responsibility of the respective request within BUKEA and BSW is currently mainly carried out by using implicit knowledge and by additionally conducting research in the organizational charts of BSW and BUKEA. The process owner and employee in unit V 213 has been entrusted with this process for years and therefore has extensive experience in the assignment to the respective contact persons. The volume of inquiries varies from year to year and also depends on external factors and current events. During the corona pandemic, the number of inquiries tended to decrease somewhat and, according to V 213, amounted to around 1,000 inquiries per year (approx. 3-4 inquiries per day).

A detailed description of the status quo is provided in Report D3 (As-is Business process Model).

Figure 17: Process model Alternative 1 Info boxes



Source: Deloitte (2022)

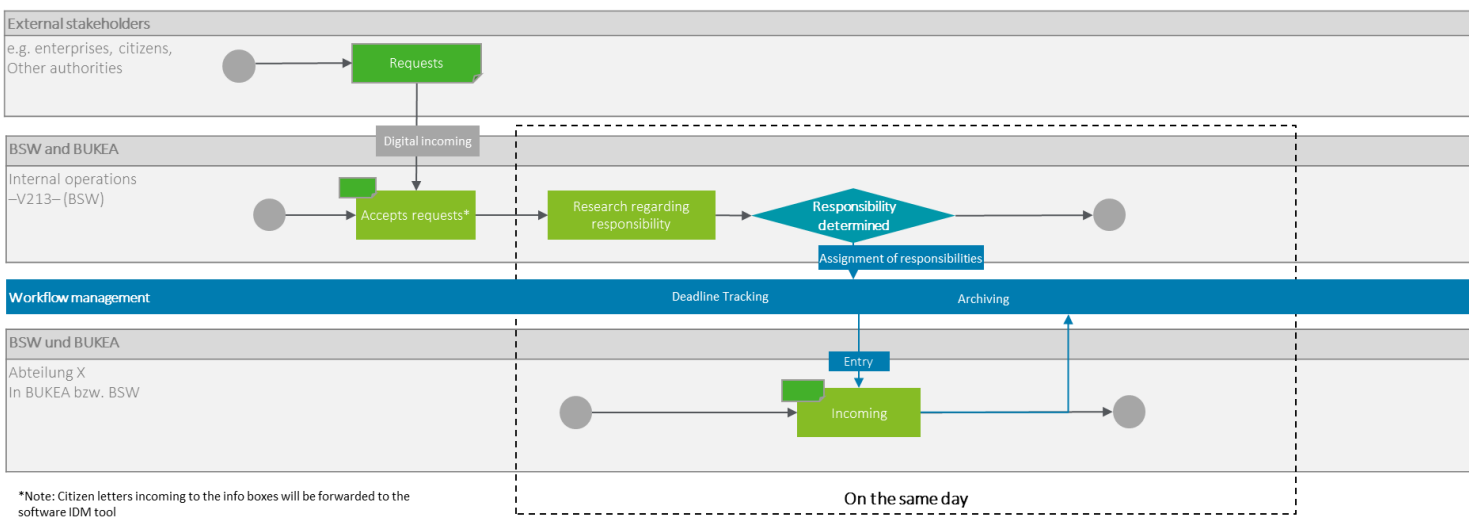
Alternative 2

Alternative 2 extends the As-Is model of alternative 1 to include the IDM workflow management. This includes a **central access channel**, a **forwarding assistant** for determining the potentially responsible authorities and offices, a **monitoring and deadline tracking** dashboard, a **comment and communication** function, and **archiving** of the inquiries and the process and response histories in a central database.

The process as such remains unchanged. The adapted process steps are shown in blue in the flowchart below, with the IDM tool as the intermediate point.

Incoming inquiries and requests are accepted by the department V213. The assignment or research regarding the responsibility of the respective request within BUKEA and BSW is determined by the responsible through research. After a responsible department has been identified, the request or inquiry is forwarded to the department via the IDM tool. This offers the possibility of deadline tracking and archiving, as well as facilitating the use of the IDM tool for the upstream process of responding to the request within the department.

Figure 18: Process model Alternative 2 Info boxes



Source: Deloitte (2022)

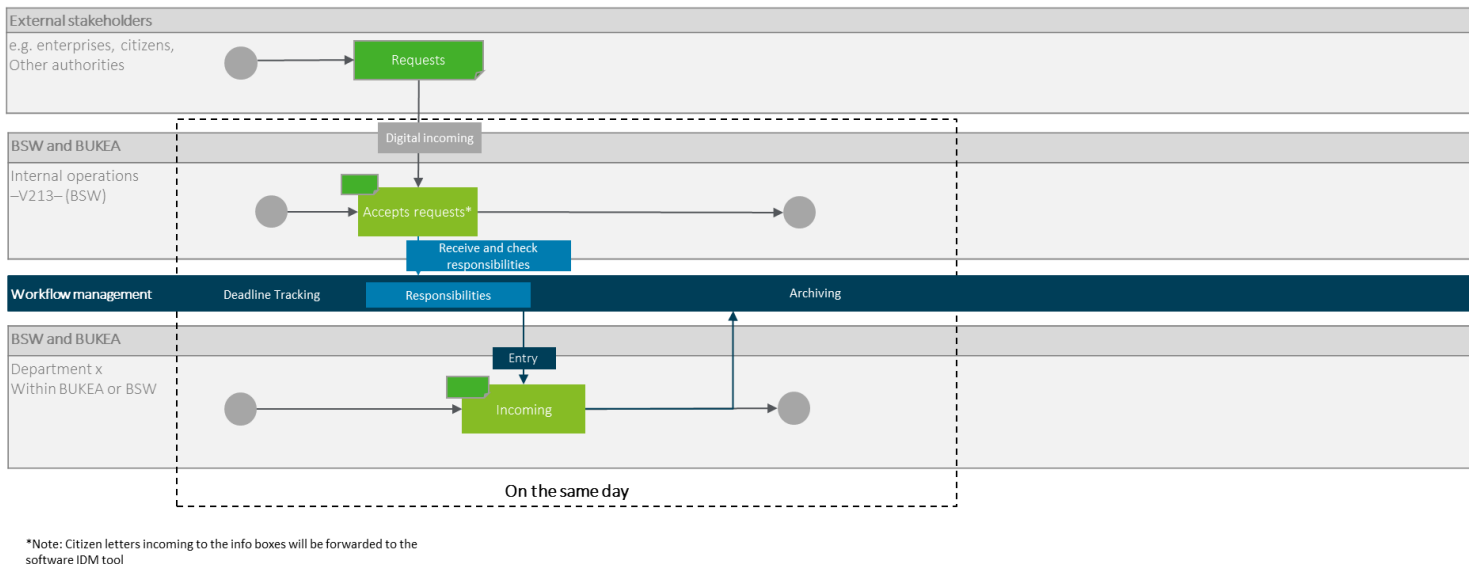
Alternative 3

Alternative 3 extends the alternative 2 to include an assisted assignment of responsibilities.

The process as such is reduced by the steps of the manual research. The adapted process steps are shown in dark blue in figure below, with the IDM tool as the intermediate point. And light blue the added functionalities of alternative 3. The functionalities of the IDM tool remain the same as described in the previous chapter. In addition, these are extended an AI-based module: the (assisted) determination of responsibilities. The module is explained in more detail below.

Through the module for the (assisted) **determination of responsibilities**, the user receives the potentially responsible authorities or offices determined by the forwarding assistant to answer the respective request or inquiry. The forwarding assistant determines the potentially responsible addressees of the request or inquiry by means of a machine learning system, which recognizes patterns in the responsibilities based on the continuous analysis of the requests or inquiries received and forwarded in the past. Here, the result can consist of several potential addressees, each of which is provided with a probability about the responsibilities of the selected addressees.

Figure 19: Process model Alternative 3 Info boxes



Source: Deloitte (2022)

Analysis and assessment of alternatives

This subchapter contains the assessment of alternatives for the info boxes process. Therefore, three dimensions, namely the impact valuation, the stakeholder demands, and the technological readiness were examined.

Impact valuation

Regarding **organisation and culture**, both alternatives could be quick wins, as this alternative would not introduce major disruptions into the process. Given the potentially high effectiveness of the assisted assignments, alternative 3 could in particular lead to a cultural shift towards more automation.

Both alternatives only require slight adjustments in the **process** steps and are therefore not expected to have any considerable impacts on the functioning of the process itself.

Assessment of stakeholder demands

As the process owners have pointed out, an effective and quick allocation of the incoming requests are crucial for this process. It is important to note in this context that the process owners of this process seemed reluctant regarding the implementation of both alternatives as they do not see the added value of any automated solution for this process. In this case, both alternatives would not meet the stakeholder demands for this process.

Technological readiness

The technological readiness of both alternatives was determined as follows:

Table 8: Technological readiness of the alternatives of the info boxes process

| Alternative | Technological readiness | Details |
|---|-------------------------|--|
| Alternative 2: IDM Workflow tool incl. dashboard for status and tracking | High / medium / low | As this alternative builds on the IDM tool, which is currently being set up at the City of Hamburg, it could be implemented as soon as this tool is ready. |
| Alternative 3: Alternative 2 + assisted assignment of responsibilities | High / medium / low | The technological readiness is expected to be high in this case, assuming there is enough data available. As the process owners however have not provided explanations on the data, it must be assessed in further steps to which extent this assumption holds true. |

Source: Deloitte (2022)

Knowledge management (Wissensmanagement)

The process 'knowledge management' describes a process of storing and accessing information and data via a drive that can be accessed within a unit. This process is allocated in the presidential departments (*Präsidialabteilungen*) at BUKEA and BSW, respectively, but can be found in many other departments of the City of Hamburg as well.

Alternatives for Knowledge management

In the following sections, the three alternatives and functionalities are explained along process graphs. Alternative 1 represents the continuation of the current solution (status quo), the so-called baseline scenario. The three alternatives are briefly presented below:

- **Alternative 1:** "As-Is" model
- **Alternative 2:** Dashboard.
- **Alternative 3:** Elements of alternative 2 and intelligent search

The following table contains a brief overview of the main functionalities of the three alternatives:

Table 9: Addressed Business requirements for the alternatives of knowledge management

| Functionalities | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---------------|---------------|---------------|
| Search functionality (keyword search) | + | + | + |
| Interdepartmental access | - | + | + |
| Processing of all relevant data formats | - | + | + |
| Data export | - | + | + |
| Modification of data | - | + | + |
| Dashboard (central view) | - | + | + |
| Criteria-based data analysis | - | - | + |
| Additional analyses | - | - | + |
| Intelligent search | - | - | + |
| (+) Feature available (-)Feature not available | | | |

Source: Deloitte (2022)

Alternative 1

Alternative 1 refers to maintaining the status quo of the knowledge management (*Wissensmanagement*) process unchanged. On a superordinate level, the process of knowledge management can be shown in the process flow chart below. In the following, the process is briefly described along the flowchart.

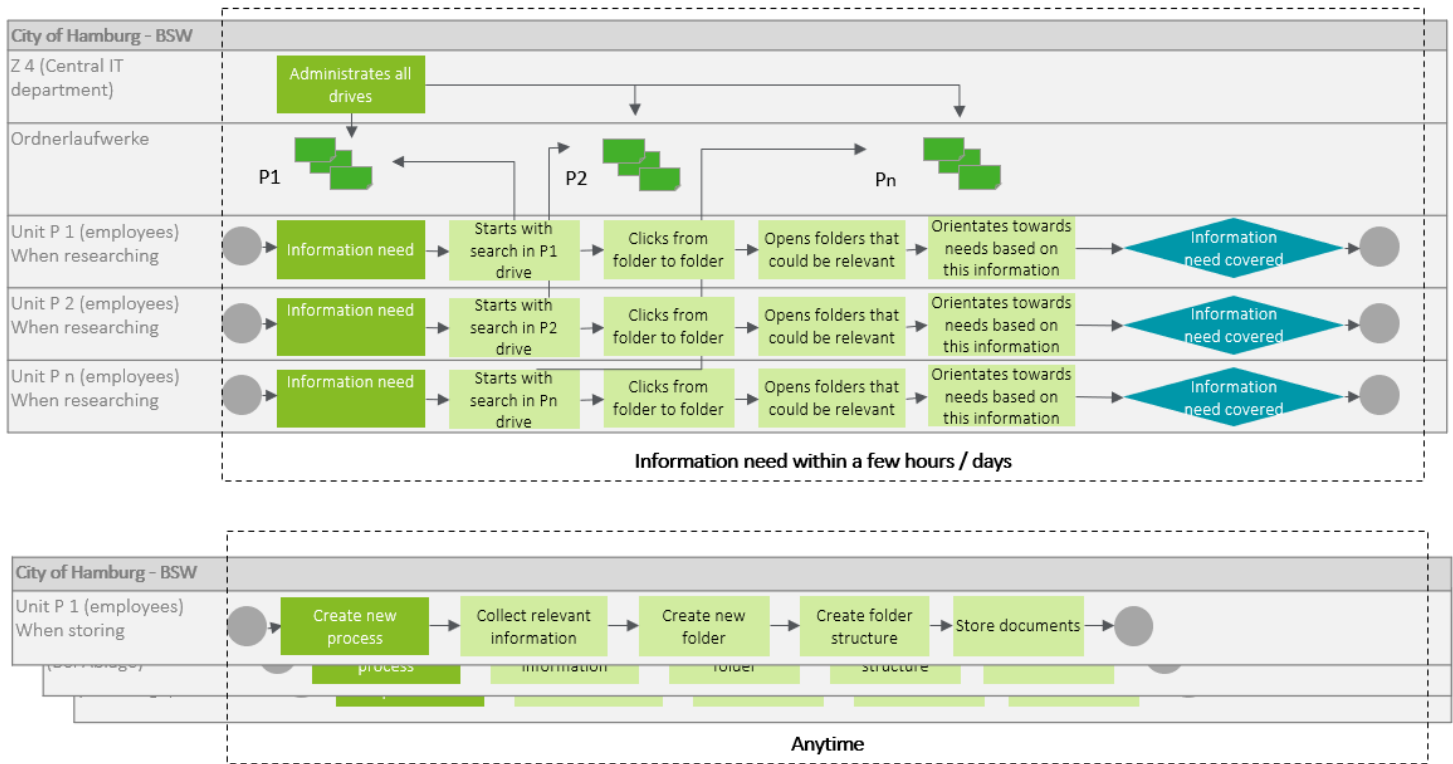
Within the as-is process knowledge management all departments of the presidential department of the BSW currently have their own folder drives, which are managed by the central IT department Z4. The folder drives have an extensive unit-specific structure and have been maintained for many years. All members of a unit have access to the department drive, external departments can only gain access under special conditions and with an application.

Each member of the department can create a new process in this folder drive at any time by compiling relevant information, creating a new folder, setting up a suitable folder structure and filing documents.

Information searches are performed on the respective drive. The information needs of an official are usually very time-critical and must be met within a few hours or days. Therefore, the user can start a search in the folder drive. The official clicks through individual folders, opens documents that may be relevant and then orients themselves further until the information requirement is covered. This ends the process. The folder drive is used regularly (approximately daily to twice a week per person) to search for data and information. There is also a large amount of implicit (unwritten) knowledge about folder structures and content that individuals have built up over the years.

A detailed description of the status quo is provided in Report D3 (As-is Business process Model).

Figure 20: Process model Alternative 1 knowledge management



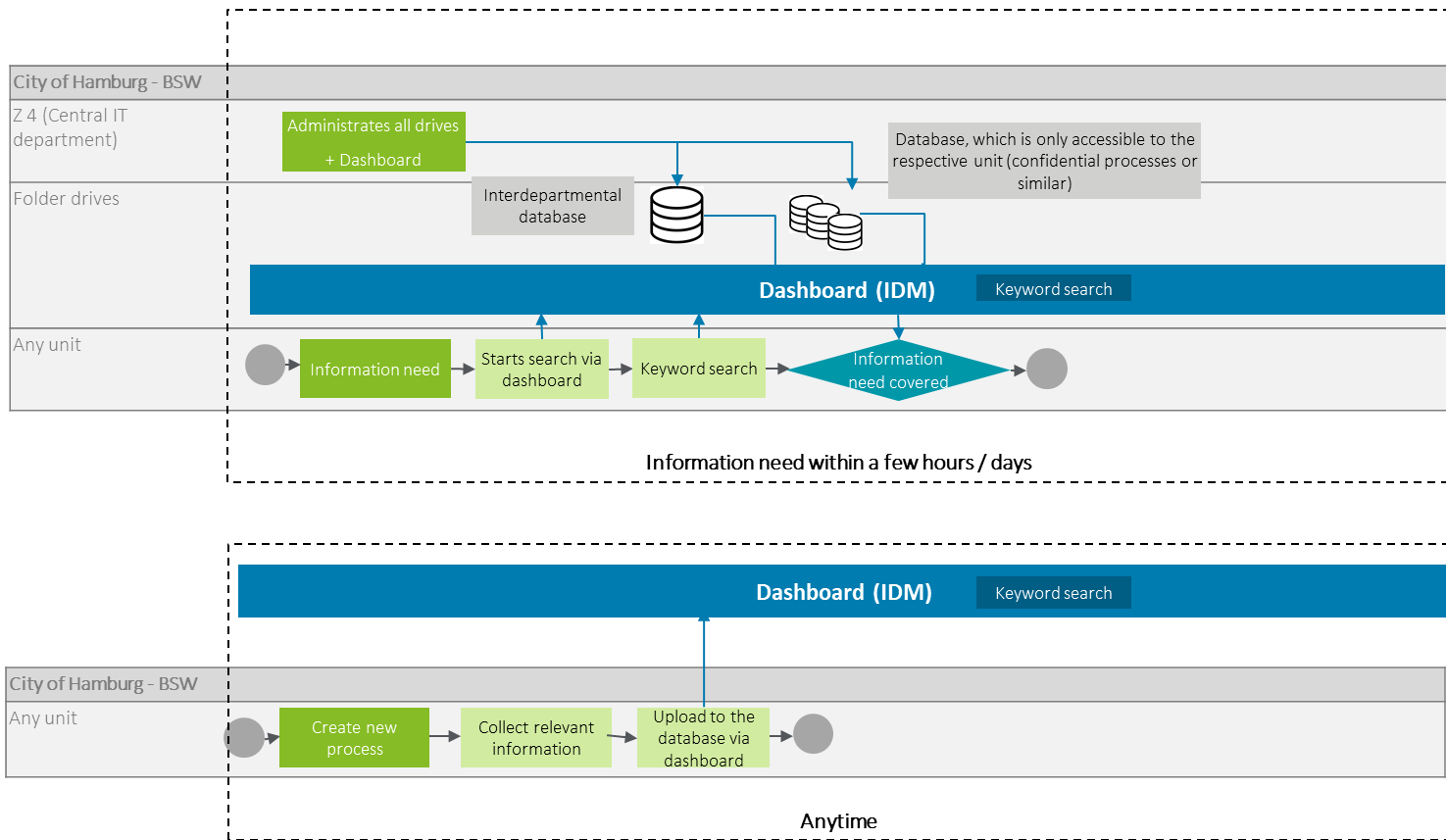
Source: Deloitte (2022)

Alternative 2

Alternative 2 extends the As-Is model of alternative 1 to include a dashboard. This makes it possible to access a **cross-departmental database** with accesses to an overall **dashboard** intended for the department. Within the dashboard, a **keyword search** can be used to facilitate information requirements. The database and dashboard are administered by Z4. The database allows the processing of all relevant data formats, the modification of data as well as the import and export of data. When new data or information is to be provided by any department, the department initiates the process, compiles the relevant information, and uploads it to the database via the dashboard.

The adapted process steps are shown in blue in the flowchart below, with the dashboard as the intermediate point.

Figure 21: Process model Alternative 2 knowledge management



Source: Deloitte (2022)

Alternative 3

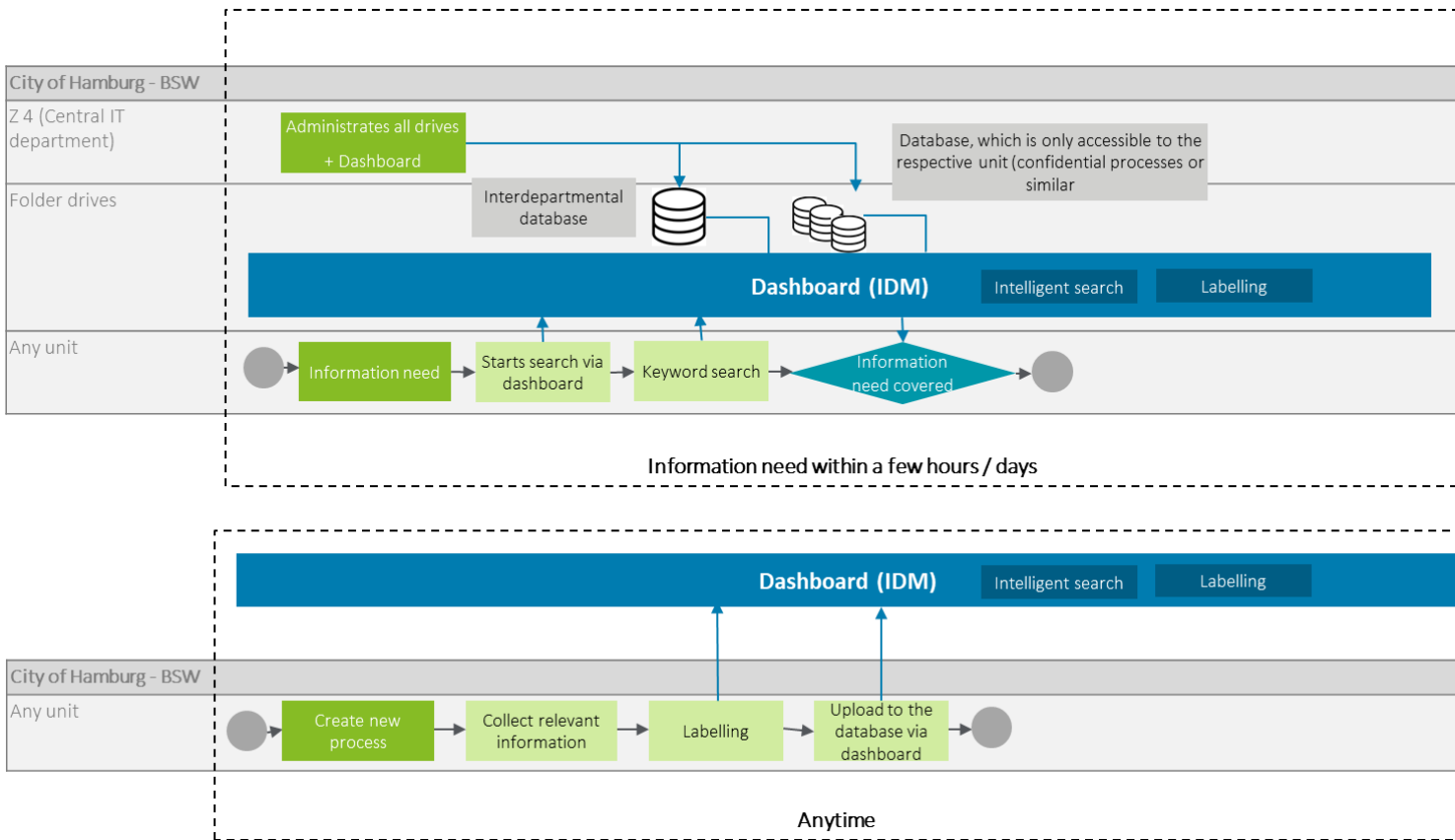
Alternative 3 extends the alternative 2 to include an intelligent search.

The process as such remains unchanged. The adapted process steps are shown in dark blue in the following flowchart, with the dashboard as the intermediate point and light blue the added functionalities of alternative 3. The functionalities of the dashboard remain the same as described in the previous chapter. In addition, the keyword search is replaced by an intelligent search.

The **intelligent search** is based on a dense information retrieval, which in this case is an internal search engine backed by modern technologies such as AI and machine learning. It can be used asymmetrically, like a google search, by entering some keywords and finding relevant documents corresponding to the search query or symmetrically where e.g., a whole pdf document is used as search query to find similar documents. The dense information retrieval systems can be extended to search other documents as well. For example, an image can be used to find corresponding text or video files in the internal system. Intelligent search can deliver smarter results faster and provides a single point of access to enterprise content sources, allowing data to be enhanced, searched, and analyzed in both structured and unstructured formats.

The intelligent search would allow for facilitated searches over the database, and thus simplify and accelerate the process. The access would be inter-agency and inter-departmental.

Figure 22: Process model Alternative 3 knowledge management



Source: Deloitte (2022)

Analysis and assessment of alternatives

This subchapter contains the assessment of alternatives for knowledge management process. Therefore, three dimensions, namely the impact valuation, the stakeholder demands, and the technological readiness were examined.

Impact valuation

Regarding the **organisation and culture**, alternative 2 would build on already available solutions but would not manage to achieve a considerable improvement as compared to the status quo. Alternative 3, in contrast, could effectively reorganise and improve the search functionalities. As this process is a fundamental process for many other processes and therefore has a particular relevance for the City of Hamburg, it is important to leverage any efficiency gains. Alternative 3 could highly contribute to leverage these gains.

Regarding the **process**, alternative 2 only foresees slight changes to the process steps, major adjustments would only be necessary regarding the introduction of a dashboard. Alternative 3 also only introduces slight changes and is expected to work intuitively. However, the labeling of data would require additional efforts. A clarification of who would be responsible for the labeling of existing documents must take place for alternative 3 in order to ensure an effective implementation.

Assessment of stakeholder demands

Stakeholders aim to get targeted information with this process. Alternative 2 would therefore only partially meet stakeholder demands as some crucial search functionalities are not available with this solution. Alternative 3, in contrast, is expected to considerably contribute to stakeholder demands as the intelligent search enables a more targeted and quicker search, also across various departments. Process owners highly support this alternative as it also foresees an easy and intuitive handling, similar to a Google search. Therefore, a low threshold for the introduction of this alternative can be expected.

Technological readiness

The technological readiness of both alternatives was determined as follows:

Table 10: Technological readiness of the alternatives of the knowledge management process

| Alternative | Technological readiness | Details |
|---|-------------------------|--|
| Alternative 2: Dashboard | High / medium / low | As this alternative builds on the IDM tool, which is currently being set up at the City of Hamburg, it could be implemented as soon as this tool is ready. |
| Alternative 3: Alternative 2 + intelligent search | High / medium / low | The criteria-based data analysis and the intelligent search are technologically ready to use. Process owners confirmed that there is an extensive database available which ensures that the model can be trained for an effective use. |

Source: Deloitte (2022)

Overarching analysis of alternatives

For all solutions based on alternative 2 and 3 respectively, their feasibility and their restraining and driving forces within a force-field-analysis were analysed.

Feasibility analysis

Technical feasibility

Technical feasibility of the solutions based on alternative 2

As this alternative is built on existing IT infrastructure and processes, the structural IT changes will not be as substantial as compared to the shared solution. However, an increased cooperation between the process owners and the IT departments will be necessary in order to customise and adapt parts of the IT infrastructure and processes, especially regarding the commonly used process steps and data needs. This, in turn, contributes to the technical feasibility of the individual solution which is expected to be slightly higher as the technical feasibility of solutions based on alternative 3.

Technical feasibility of the solutions based on alternative 3

A technical solution that (almost) fully integrates the databases, workflows and processes and provides advanced automated solutions would require an enhanced IT management to ensure the technical implementation and adequate use of the respective solutions. As most of the components will be newly implemented in terms of the technology, the feasibility from an infrastructural perspective must be assessed at a later stage.

Non-technical feasibility

Non-technical feasibility of the solutions based on alternative 2

For the solutions based on alternative 2, the business process itself and a procedure for the maintenance and governance of the data exchange must be implemented. Therefore, a coordination between the IT and the process owners must take place especially in the implementing phase. Thereafter, the IT department needs to more closely manage and administer relevant changes regarding the process and the exchange of data.

Non-technical feasibility of the solutions based on alternative 3

From a non-technical perspective, the solutions based on alternative 3 need a more thorough strategic management decision to reorganise (at least parts of the) process. Therefore, more stakeholders are involved and need to agree on or at least accept the solution. This agreement depends on structural and political factors, among others, in both BUKEA and BSW. The considerable advantages of the solutions based on alternative 3 such as the increased effectiveness and the high degree of automation can favour such a strategic consensus. However, budget constraints, differing strategic agendas and the management and administration of the new processes have the potential to impede the non-technical feasibility. Furthermore, an external service provider might be needed to implement or at least consult regarding the implementation of parts of the solution. This setup might increase the overall efforts and time spent on changes and operations.

Overall feasibility

Overall feasibility of solutions based on alternative 2

Solutions based on alternative 2 mostly build on existing IT infrastructure components which can more easily be customised. Coordination efforts are mostly needed to agree on data exchanges, databases and other functionalities.

Given that fewer IT infrastructure components and applications must be implemented, and fewer strategic alignments must be made, the feasibility of solutions based on alternative 2 is expected to be higher as compared to the shared solution.

Overall feasibility of solutions based on alternative 3

Overall, solutions based on alternative 3 require a deeper integration of IT and business processes. An automated process with reduced complexity that enables a close cooperation of involved process stakeholders has the potential to improve the effectiveness of the processes. However, considerable commitments, mostly from the IT departments, must be claimed. This, in turn, reduces the overall feasibility of this alternative.

Summary

Considering the technical and non-technical feasibility, the **result of the feasibility analysis** falls slightly in favour of the **solutions based on alternative 2**. While the solutions based on alternative 3 have more advanced features, the technological introduction such as the gathering of data to train the underlying AI is more complex, which, in turn, reduces the technical and non-technical feasibility of these alternatives.

Force-field analysis

The force-field analysis was carried out for solutions based on alternative 2. As described in chapter “Description of alternatives”, these solutions mostly rely on already existing infrastructure but integrate features that contribute to an automation of the respective process.

For solutions based on alternative 2, the following driving and restraining forces were determined and evaluated:

Driving forces

Table 11: Driving forces for solutions based on alternative 2 (partly automated solutions)

| Driving force | Valuation | Explanation |
|---|-----------|---|
| Build up on existing infrastructure components and applications | 4 | The solutions of alternative 2 are mostly based on existing infrastructure and applications (or infrastructure and applications that are already in development, such as Modul F and the IDM tool), which grants the advantage of already existing know-how and experience, both on the setup and the maintenance. This could reduce the implementation costs and time significantly. |
| Possibility of meeting individual needs of users and departments | 3 | The development, set up time and costs are reduced as compared to alternative 3. This might increase users’ acceptance. |
| Flexibility in the design of the solutions | 2 | Different components that will partly automate the process can be implemented in the processes. This introduces flexibility with regard to the design of the solutions, also in terms of the infrastructure components. |
| Reduced implementation effort | 5 | By using existing infrastructure components and applications, the effort for the implementation is significantly reduced due to already existing skills and knowledge (e.g. from Modul F and the IDM tool), which has not to be gathered as it would be by implementing completely new technology, especially in the onboarding and governance. |

Restraining forces

Table 12: Restraining forces for solutions based on alternative 2 (partly automated solutions)

| Restraining force | Valuation | Explanation |
|--|-----------|--|
| Potentially higher coordination effort in single process steps as not all steps are automated | 4 | As not all process steps with automation potential are automated, media breaks and lags could occur. This could lead to inconsistencies in the process itself. |

| | | |
|--|---|--|
| Remaining on existing processes and infrastructure can prevent disruptive changes | 3 | The usage of already existing technology has it's pros and cons. On the one hand, it reduces the implementation effort and is a proven way of running and maintaining similar processes. On the other hand, the implementation of best of breed solutions as it is used for example in other comparable foreign peer authorities can significantly increase efficiency and generate disruptive changes in collaboration. |
| Maintaining existing silos within the process | 5 | This setup maintains existing processual and technological silos, because of the individual setup as described in the respective alternatives 2 of the five processes. |
| Overarching traceability is connected with increased efforts (e.g., approvals, documentation) | 3 | The traceability as one of the process obstacles in the existing as-is state is just partly increased and due to the decentralized setup linked to an increased effort and complexity when it comes to documentation, approval history etc.. |

Summary

Based on the force field analysis and according to the overall sum, the solutions based on alternative 2 have **restraining forces that slightly outweigh the driving forces** (i.e. the positive aspects) of the solution.

Figure 23: Main driving forces and restraining forces of solutions based on alternative 2

| Driving force (positive) | Force strength | | | | | | | | | | | Restraining force (negative) | |
|--|----------------|---|---|---|---|---|---|---|---|---|---|------------------------------|--|
| | 5 | 4 | 3 | 2 | 1 | 0 | 1 | 2 | 3 | 4 | 5 | | |
| Build on existing infrastructure components and applications | 3 | | | | | | | | | | | 4 | Potentially higher coordination effort in single process steps |
| Possibility of meeting individual needs of users and departments | 3 | | | | | | | | | | | 3 | Remaining on existing processes can prevent disruptive changes |
| Flexibility in the design of the solutions | 2 | | | | | | | | | | | 5 | Maintaining existing silos within the process |
| Reduced implementation effort | 4 | | | | | | | | | | | 3 | Increased efforts to reach overarching traceability |
| Total Score | 12 | | | | | | | | | | | 15 | Total Score |

Source: Deloitte (2022)

As the result is ambiguous regarding the **solutions based on alternative 2**, it was concluded the following:

- In case there are **quick wins** that can be achieved with alternative 2, this alternative might be suitable
- in circumstances **where stakeholders have considerable doubts or are reluctant towards (fully) automated solutions**, solutions based on alternative 2 could be an initial cornerstone to create confidence among employees

However, **where the automation of processes has a clear advantage**, in particular regarding:

- **lifting information silos** in the process
- considerably **improve time and efficiency** of the process
- reach an **increased overall traceability** of the processed data,

solutions based on **alternative 3** that have a high degree of automation should be **favoured**.

The results of the analysis will further be taken into consideration when it comes to the development of the technical to-be models in Deliverables 6 and 7.

Summary and presentation of the business cases

Based on the workshops conducted as well as the analysis performed to compare the different alternatives of each process, the following alternatives were determined as the preferred solution:

Table 13: Summary of the description, analysis and results of the alternatives and business cases

| # | Process | Description of alternative 2 | Description of alternative 3 | Hamburg-internal Steering Committee | Results of the analysis of Deliverable 5 | Decision and business case |
|---|------------------------------------|--|---|--|---|----------------------------|
| 1 | Brief written inquiries | IDM Workflow <ul style="list-style-type: none"> Dashboard (status, deadlines, etc.) Assignment of responsibilities (manual) Deadline tracking Comment and communication function | IDM Workflow + AI module <ul style="list-style-type: none"> Intelligent search (answer finding) Assisted assignment of responsibilities | Alternative 3 <ul style="list-style-type: none"> Iterative implementation Focus on Intelligent Search | <ul style="list-style-type: none"> Assisted assignment of responsibilities as foreseen in alternative 3 could considerably reduce coordination efforts Assumption that good data available, which facilitates automation | Alternative 3 |
| 2 | Senate printed matter coordination | IDM Workflow <ul style="list-style-type: none"> Dashboard (status, deadlines, etc.) Assignment of responsibilities (manual) Deadline tracking Comment and communication function | IDM Workflow + AI module <ul style="list-style-type: none"> Assisted assignment of responsibilities Automatic template filling | Alternative 2 <ul style="list-style-type: none"> Provides more advantages Easier to implement | <ul style="list-style-type: none"> As process is not used frequently, alternative 2 would meet stakeholder demands and still introduce efficiency gains (quick win) Database and interaction with other IT features need to be assessed | Alternative 2 |
| 3 | Imputing Procedure | IDM Workflow <ul style="list-style-type: none"> Dashboard (status, deadlines, etc.) Deadline tracking Archiving | IDM Workflow + AI module <ul style="list-style-type: none"> Imputing Completeness check- automated Plausibility check- automated | Alternative 3 Check possibilities of Module-F and IDM | <ul style="list-style-type: none"> Considerable efficiency gains and reduction of manual work with alternative 3 Stakeholders highly support alternative 3 | Alternative 3 |
| 4 | Info boxes | IDM Workflow <ul style="list-style-type: none"> Dashboard (status, deadlines, etc.) Assignment of responsibilities (manual) Archiving | IDM Workflow + AI module Assisted assignment of responsibilities | Alternative 3 Start with alternative 2, the extend to alternative 3 | <ul style="list-style-type: none"> Comparably easy implementation of both alternatives Stakeholders, however, reluctant regarding both alternatives | Alternative 3 |
| 5 | Knowledge Management | Dashboard <ul style="list-style-type: none"> Search functionality (keyword search) Cross-unit access | Dashboard + AI module <ul style="list-style-type: none"> Intelligent search Criteria-based data analysis Additional analyses | Alternative 3 Extended search functions imaginable (e.g. FHH portal) | <ul style="list-style-type: none"> Considerable efficiency gains with alternative 3 to be expected Intuitive handling and good database favours alternative 3 | Alternative 3 |

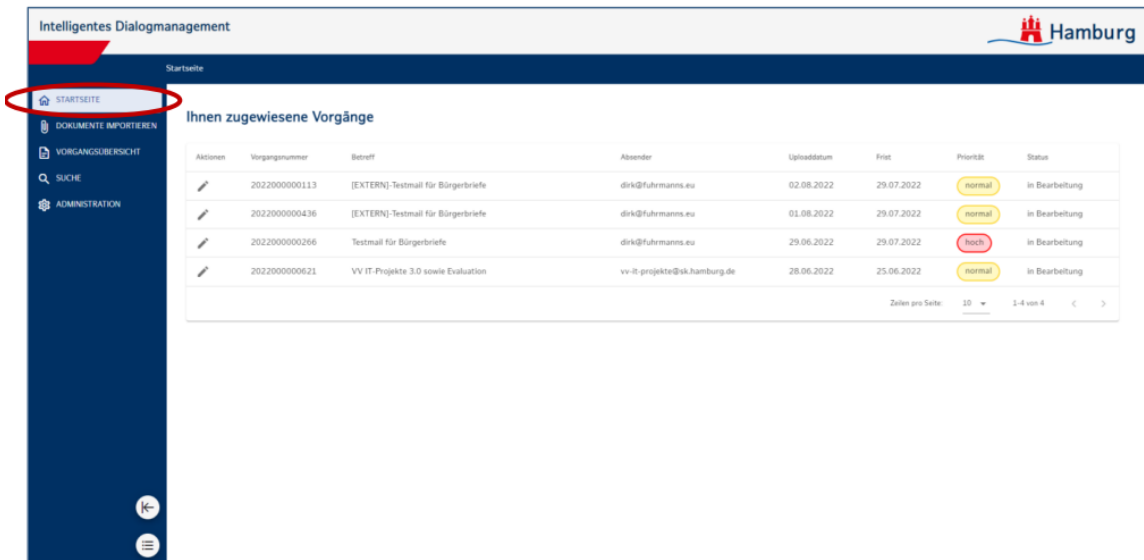
Source: Deloitte (2022)

Annex

Screenshots of the IDM tool

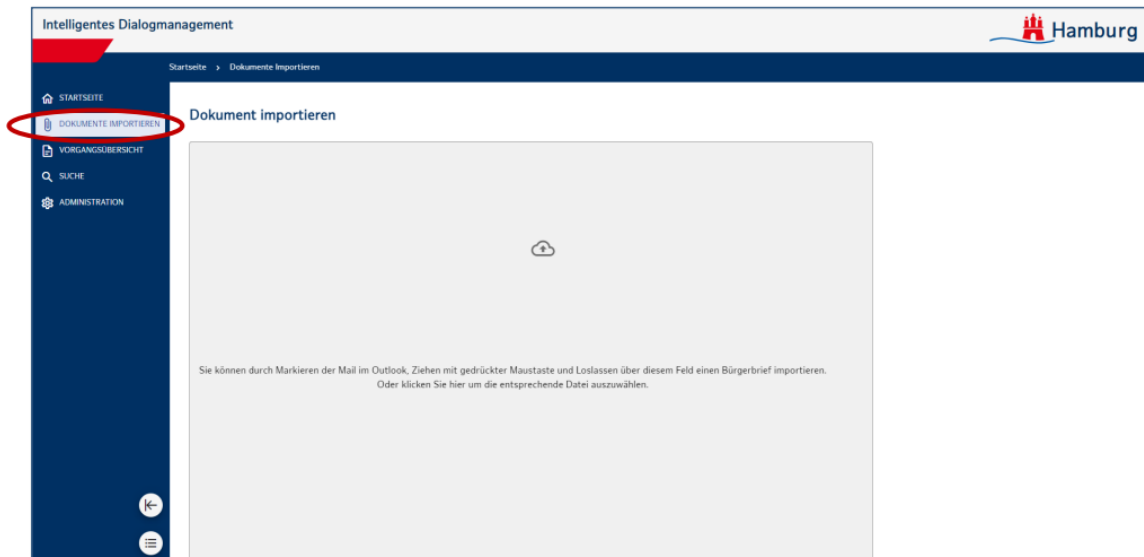
The following screenshots provide an overview of the functions of the IDM tool, which are currently developed. Due to the fact that the application language of the IDM tool is German, the screenshots are only available in the German language.

Figure 24: IDM tool: Main menu - home page



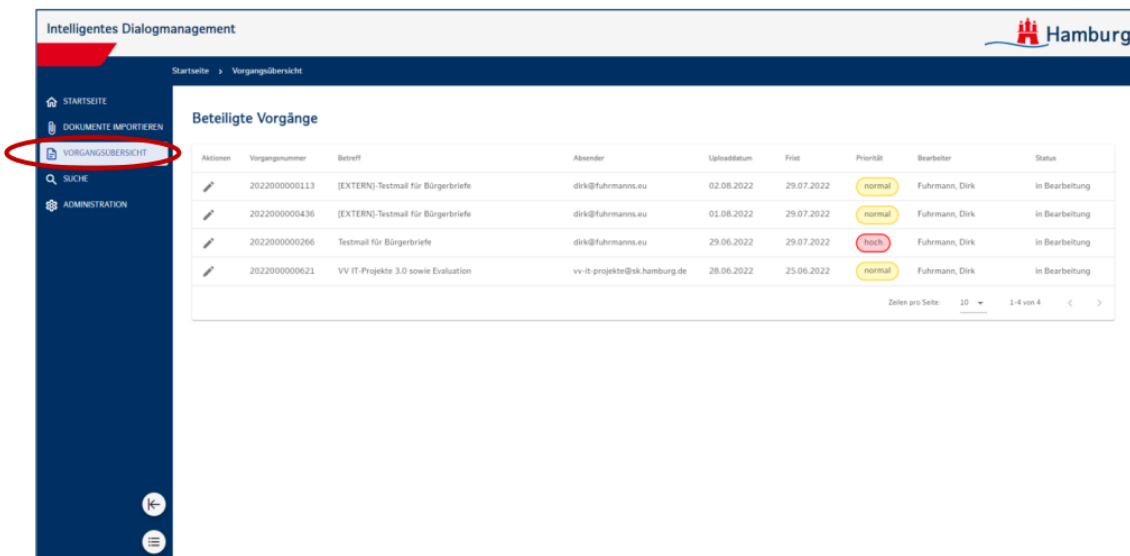
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 25: IDM tool: Main menu - import documents



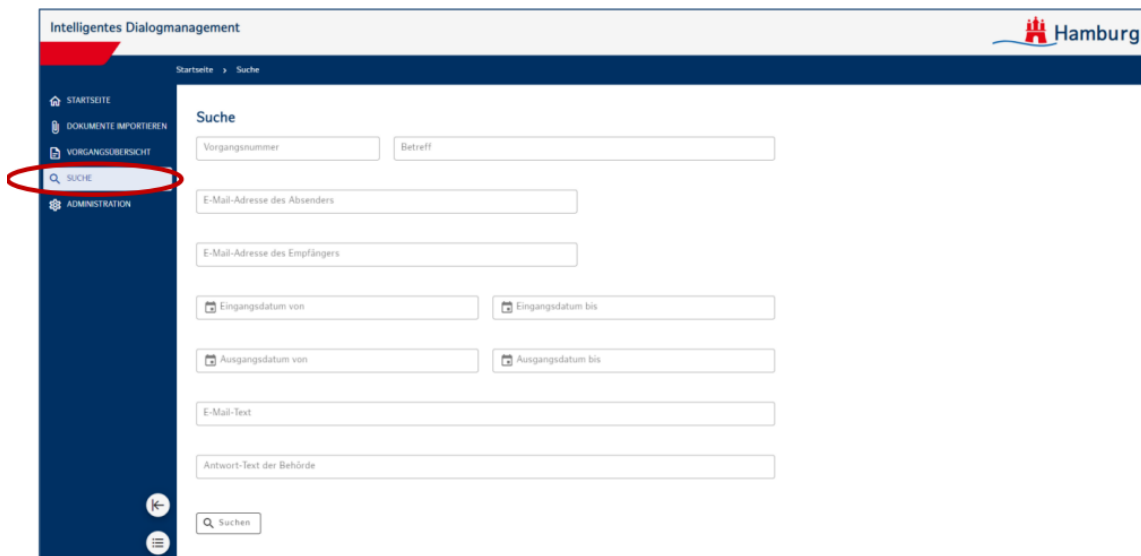
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 26: IDM tool: Main menu - process overview



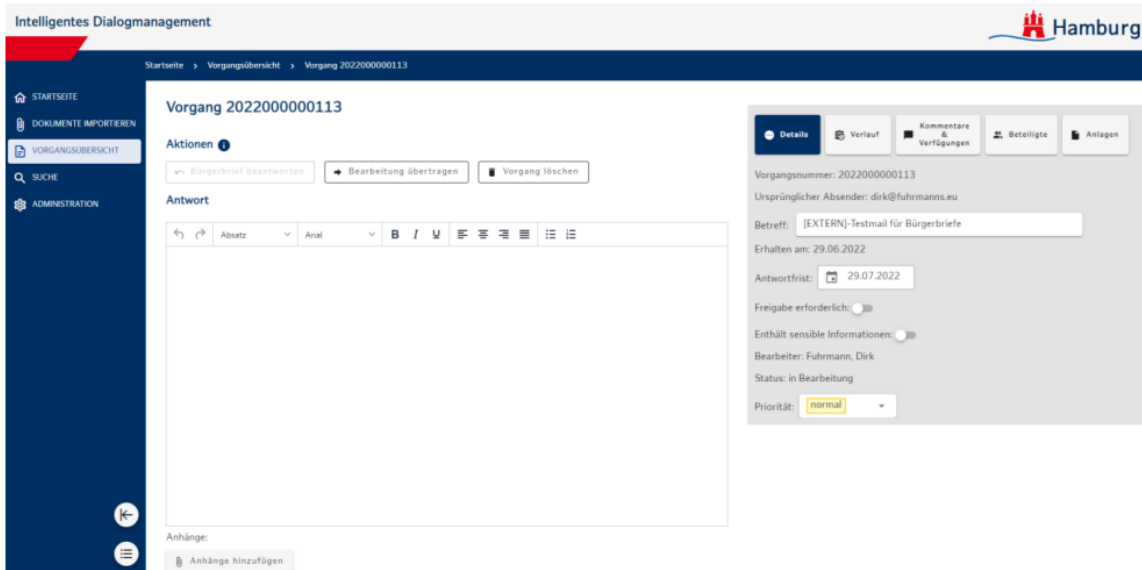
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 27: IDM tool: Main menu - search



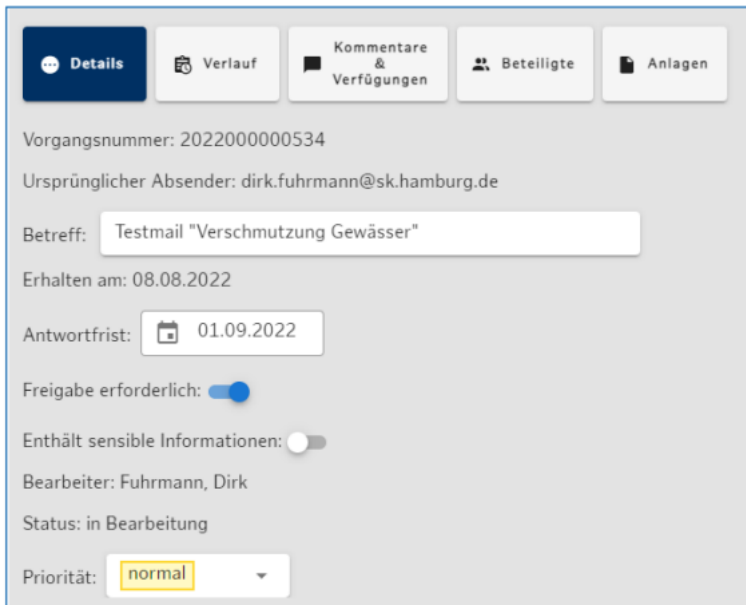
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 28: IDM tool: Create new process - edit view (1/2)



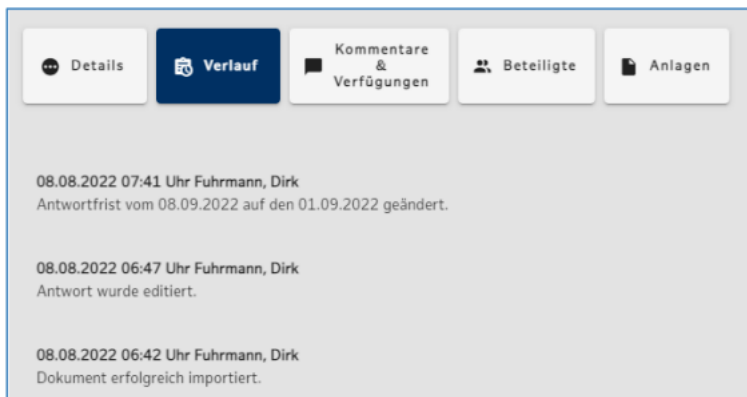
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 29: IDM tool: edit view - details



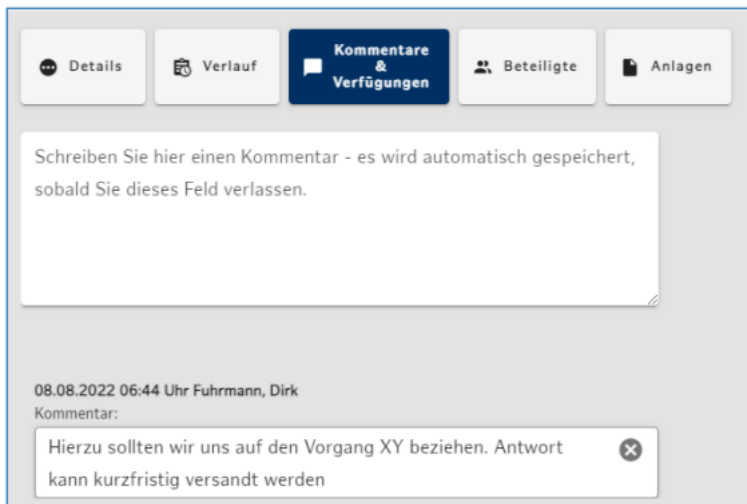
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 30: IDM tool: edit view - history



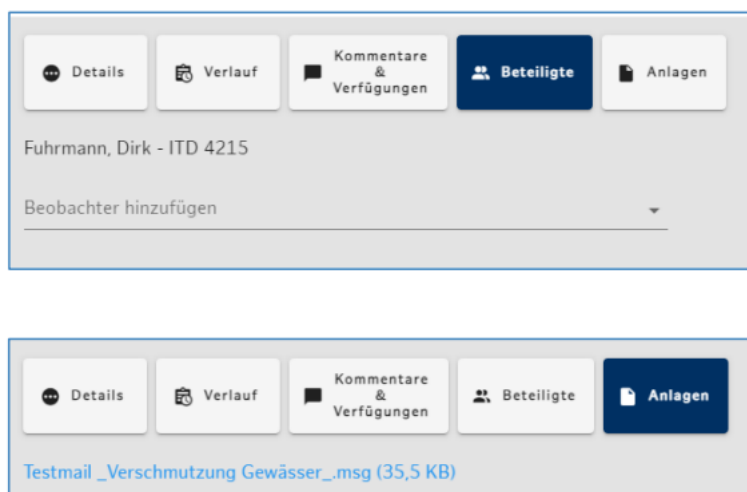
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 31: IDM tool: edit view - comments & availabilities



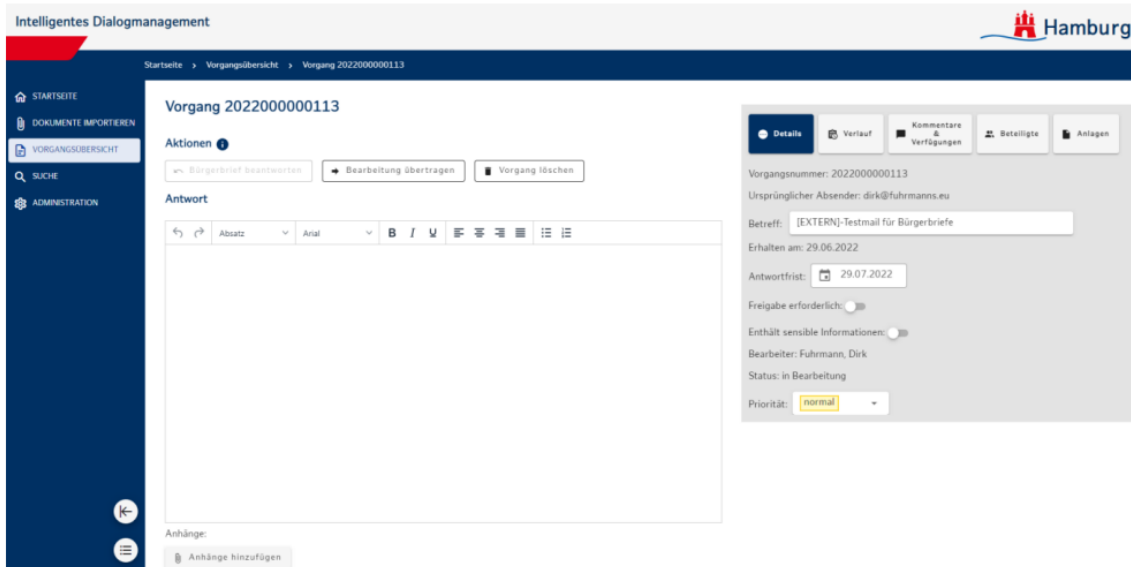
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 32: IDM tool: edit view - participants & appendices



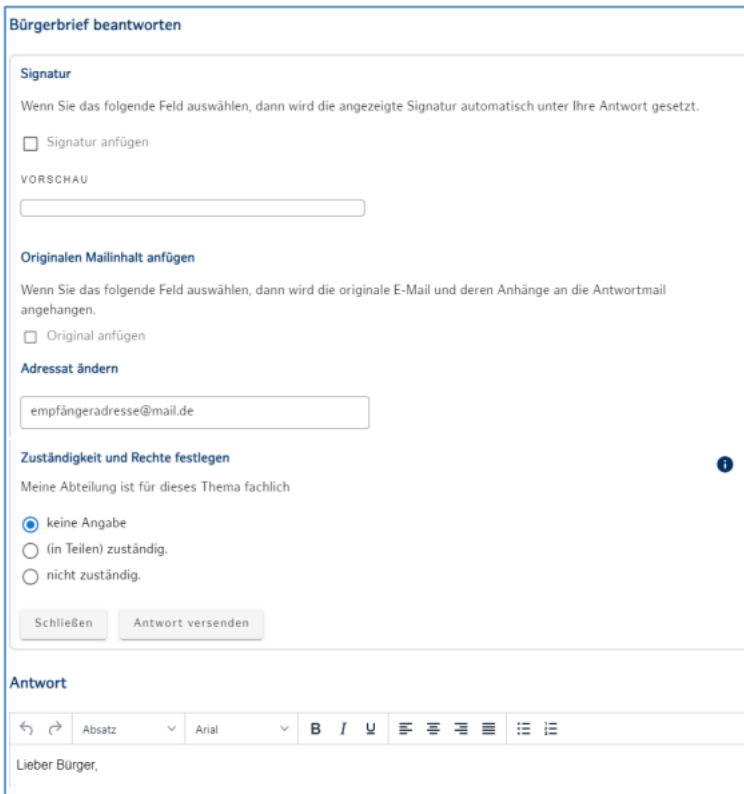
Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 33: IDM tool: Create new process - edit view (2/2)

























Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 34: IDM tool: edit view - actions



Source: Screenshots IDM, provided by the City of Hamburg (2022)

Figure 35: IDM tool: Monitoring/Deadline Tracking

| Bürgerbriefe Hamburg | | | | | | | | | | |
|----------------------|------|--------------------------|-----------------|---------------|--------------|----------------|------------|-------------|---------------|---|
| Laufende Vorgänge | | | | | | | | | | |
| Id | Hash | Ursprünglicher Empfänger | Absender | Empfangsdatum | Upload Datum | 4-Wochen-Frist | P-Frist | Status | Zuständigkeit | Betreff |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |
| 1 | 1 | Herr Mustermann | Herr Mustermann | 18.06.2020 | 19.06.2020 | 16.07.2020 | 10.07.2020 | Freigegeben | Amt XYZ | Problem   |

[Bürgerbrief hinzufügen](#)

Source: Screenshots IDM, provided by the City of Hamburg (2022)



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