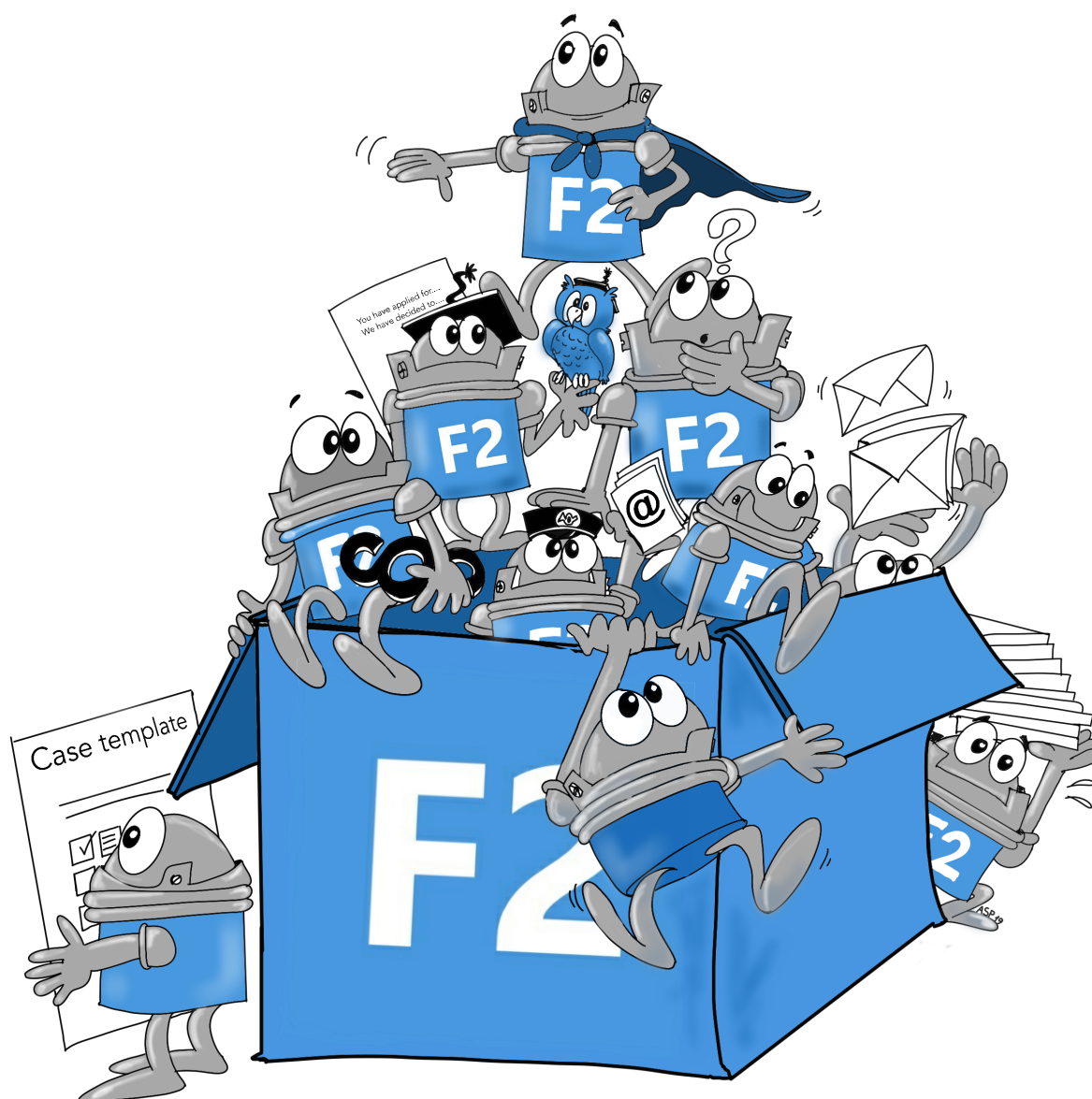


cView



Artificial Intelligence in Case Management F2 Version 6.2

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CBRAIN

Artificial intelligence in case management

Though the public sector is investing heavily in artificial intelligence, many projects are still in their research phase. Many solutions are characterised by supporting simple, stand-alone work routines. The enthusiasm is present, but so far results have been modest.

Artificial intelligence offers a set of IT tools that provides great opportunities, especially in relation to the public sector. Already today there are great improvements to be made, because a large part of administrative case management is rule-based. Coincidentally, the rule-based type of artificial intelligence is the most advanced.

Artificial intelligence means “mimicking human cognition”. There are several kinds of human thinking, however. Today we are working on mimicking two basic ways of thinking:

- Rule-based thinking, e.g. used for computer chess
- Recognition-based thinking, e.g. speech or image recognition

The public sector’s limited success with artificial intelligence so far may be due

to its missing emphasis on the rule-based type, which is exactly what is needed for the automating of case management. Instead, recognition-based techniques are tested and implemented, and while they may be appropriate, they are mostly used for point solutions or in relation to estimation and counselling.

Integrated artificial intelligence
Based on a model of digital bureaucracy, F2 offers a new and effective approach to artificial intelligence. The model ensures an effective integration and supports both types of artificial intelligence as well as agile implementation.

The model helps describe an authority’s work flow in detail, down to case types, tasks and roles. With a basis in this description case processes and tasks can be automated by implementing artificial intelligence directly in the flow and on each individual step. F2 ensures an effective integration and supports and utilises both types of artificial intelligence as a fully integrated part of the standard system and in both the authority’s processes and case management.

The many case areas which are exclusively rule-based can then be fully automated, and estimations during the case

management can be supported when relevant. The model also facilitates the implementation of artificial intelligence, so it happens as part of a controlled and agile transformation.

F2 as a platform allows for great improvements, as the model ensures that the administrative tasks are the starting point. F2 also facilitates an ongoing optimisation of the authority while experience is accumulated and new techniques are implemented. Artificial intelligence, then, becomes not only an independent science project, but a natural part of the authority’s digital transformation and evolution in both the short and the long run.

In this issue of cView, we present F2 version 6.2 with a special emphasis on artificial intelligence. We will tell you about the new functions in F2 version 6.2, including a number of fully integrated robots, and we will tell you about the theory, model and techniques which make F2 a unique platform for artificial intelligence in relation to case management.

F2 version 6.2 emphasises Automatisation

In F2 version 6.2 cBrain has added several new functions and options to the standard product, not least when it comes to artificial intelligence and automatisation. Support for both rule-based and recognition-based artificial intelligence is fully integrated in F2 version 6.2, making it an especially effective platform for automating work tasks and case management.

- Robot case creation
- Automated tasks for case steps
- Robot for producing documents governed by a rule- and context-based phrase archive
- Support for rulings
- Robot for case guide and variance processing
- Robot for rule-based self-service

- Robot for hearings involving external participants
- Mass processing of cases
- Robot for case monitoring

In addition, new functions and improvements have been implemented across the product, several of which are inspired by user suggestions and feedback including - The ability to delete a case, e.g. to meet data protection regulations.

Robot for case creation

Central to every case process is the case creation. But creating a case can be laborious and quality assurance difficult. F2 solves this using automated case creation, a context-sensitive robot that supports fast and secure case creation.

The robot is based on a library of case templates. When the user creates a case, a template can be attached based on which the robot performs a number of tasks in relation to e.g. attachment of security groups, participants, keywords or a given case guide.

With case templates, case creation is faster and many errors are eliminated. The robot may be activated by a user or by F2. For example, in relation to self-service the robot may be activated on a given case step after case creation, fully automating the process.

Automated tasks for case steps

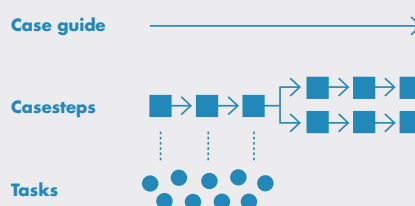
Based on the "digital bureaucracy" model, F2 enables the creation of case guides which determine the steps and tasks that a given case type must go through. When a case is created, it is possible to attach a case guide from the case guide library.

Each step comprises a number of tasks. Automation of these tasks is possible since rules can be attached to a step, and each step may call on external functions. An entire task or parts thereof may be completed by calling on external services. A recognition routine which offers counselling on estimations based on available data may also be activated. This enables F2 to perform many of the work tasks which the case manager before performed manually.

As an example F2 may automatically offer information on parts of the case or verify reported case information through the use of rules and lookup functions.

Automating tasks saves time and helps increase quality. Additionally, and crucially, it ensures compliance with administrative requirements. Basing the automatisation on a case guide ensures that even an entirely automated case process is fully documented as if the case were handled manually. The documentation covers both the overall process as well as each step and its tasks, decisions and rulings.

Case guide model



A case guide consists of a number of steps, each with a number of tasks to be performed.

Many tasks can be automated through rules which are applied to a given step. The tasks may be performed by the authority or by a citizen or another external participant.

Robot for producing documents governed by a rule- and context-based phrase archive

A central element of case management is the production of notes, emails, letters and other documents. F2 offers a robot which allows for large parts of document production to be automated through an advanced rule-based phrase archive. When the robot is activated, it reviews the relevant case information and relevant templates and phrases. The phrase archive is comprised of rules with full access to case information and is able to utilise templates for e.g. Word documents or emails.

This means that F2 can generate even complex documents automatically. It also allows for automatisati- on of even the complex steps of the case process.

Example: When a new case is received from a self-service site, the case creation robot ensures that the case is created correctly and attaches a case guide. As a first step of the case guide, the document producing robot generates a document or an email based on the information which the citizen has entered through the self-service site. The robot retrieves a template which merges relevant phrases and information. Then the robot generates and sends an individual confirmation email, including relevant attachments, to the citizen.

The robot can also generate a pertinent document with a ruling based on the case information, such as an individual complaint guide that matches the given ruling and context.

Robot for case guide and variance processing

The F2 standard product allows for the definition and storage of case guides. In this context variance is central. It is possible to define variance in relation to the case guide itself, e.g. which steps to follow, and in relation to automating tasks performed on the individual steps of the case process.

This means that rules may be attached which govern a concrete case guide, and the case guide itself may be redefined with additional case steps if changes are made to the case's information.

A case that progresses through the steps of a case guide will often be represented by lists that are presented to the user in F2's main window. The user will experience the robot for case guide and variance through the case's progress from list to list, which can be thought of as a relocation from one bookcase to another.

In this relation, the robot also supports a so-called "navigation function". If navigation is present on a given step of a case or record, the robot determines what is presented to the user. For the user, this means that clicking on a record in a given list in F2 opens those tasks that must be performed in order to progress to the next step. It is a means of guiding the user's work using lists, or bookcases, made possible by the F2 robot that governs the overall execution of the case.

Variance may also be governed by checklists. If the case is missing information, for example, the F2 robot can add an additional step to ensure that the case is fully examined before proceeding. Through rules and variance, the robot can also determine which further case steps are relevant in relation to a concrete ruling.

Robot for rule-based self-service

Case guides in F2 can support the entire case process from self-service to case management, ruling, finalising and registration.

Many self-service sites are often just advanced forms. In contrast, F2 offers a robot which enables a fully integrated and automated self-service solution based on rules and case context.

This eliminates many of the case processing tasks, because the case itself is created by the citizen, and a number of checks are made already at case creation. In addition, the quality is markedly increased since relevant information is verified and made consistent already from the beginning.

The rule-based self-service is governed by a robot with full access to the self-service solution, the case information, internal and external services as well as other data from F2. The robot facilitates an interactive and intelligent self-service, guiding the user and customising the interface to fit a given case.

Utilising artificial intelligence, F2 becomes an efficient platform for automating work tasks and case handling

Robot for case monitoring

F2 offers a robot for advanced case monitoring, which includes the setting up of alarms.

F2 offers an effective list control to monitor the case progress, which also makes automated, online case monitoring possible. By utilising information from each case type, including each individual case step, metadata and variance, the standard system is able to display progress and status in the form of lists, dashboards, etc.

Utilising information from case steps, metadata, including progress codes, and variance for each case type, it is also possible to attach alarms to and initiate messages for each case process.

Thus, overview and intelligent monitoring are fully integrated parts of F2.

Support for rulings

For case steps that demand an estimation, the case manager can be supported by both rules and recognition, which includes utilising external services. This is possible since each case step in F2 is open and able to call on external services through web services. On a given step, F2 can call on an external AI service with select information after which an answer is presented to assist the case manager.

Mass processing of cases

F2 allows for the configuration of rules for automatically processing multiple cases. Such a rule set is typically configured as an autonomous case guide in order to document the mass processing itself.

It is possible to create a case guide which selects a number of cases and processes them according to a given rule set and then document the results in the form of a new case. Examples of this could be sending letters to a group of citizens, collecting fees or managing grants.

Robot for hearings involving external participants

F2 offers a robot which supports automated hearings of external participants on a given case step.

This happens through the so-called clarification request sites generated by the robot and sent to the citizen. The citizen receives a link to a website

requesting clarification of the reported information. When the citizen submits an answer, the case is automatically updated, and the case guide registers that a response has been received.

Case deletion

With F2 version 6.2 comes the ability to delete cases, for example to support the "right to be forgotten" and in relevant documentation is produced to comply with data protection regulations.

The basic principles of artificial intelligence

Artificial intelligence (AI) is not something new.
What is new is the processing power.

In 1950, the mathematician Alan Turing developed an ability test for artificial intelligence, and in 1957 Nobel prize winner Herbert Simon predicted that some day computers would solve greater tasks than humans were able to. But it is within the last 5-10 years that serious progress has been made.

The reason is not new logic nor algorithms. The mathematics and methods that are used in relation to artificial intelligence today have not changed much. What did change, however, is the processing power and data capacity that make it possible

to better utilise the mathematics and implement an even more advanced artificial intelligence.

The two basic types of artificial intelligence

Artificial intelligence revolves around mimicking human cognition and is divided into two fundamental paradigms: symbolic and subsymbolic. In connection with F2, we designate the symbolic as rule-based and the subsymbolic approach as recognition-based. Both approaches may be of use in case processing, but in different areas.

The symbolic paradigm has its roots in the 1950s. Its basic idea is to mimic the reasoning of the conscious human mind, e.g. planning of tasks, searching for data and defining rules for decisions. This paradigm is characterised by its robust and explicable methods. In principle, its results are “faultless”, since they are 100% predictable, exactly based on the rules used by the given method. The symbolic paradigm is used e.g. in computer chess; the computer calculates its next move based on algorithms.

In contrast, the subsymbolic paradigm is based on simulating basic physical processes of the human brain, e.g. through simulated neural networks.

Case management is mainly rule-based. Case management work is often divided into rules and estimations. It is also characterised by zero tolerance of errors.

This makes the symbolic, i.e. rule-based, methods particularly effective in the parts of case management performed accor-

ding to rules. In principle, these parts of the case management could be fully automated. Naturally, a premise for fully automated case management is that legislation allows it for each case type.

The subsymbolic methods will often be more effective in relation to counselling and supporting the case manager’s estimations, e.g. pointing out irregularities or fraudulent behaviour that calls for a closer examination of a given case.

The greater part of the administrative case management is based on rules. It is also the rule-based artificial intelligence based on the symbolic paradigm that has been developed the most. This means there is a great potential for artificial intelligence in case management already today.

Based on the model for digital bureaucracy

We consider F2 a unique platform for both types of artificial intelligence and automation because it is fully integrated with cBrain’s model for administrative work, the “digital bureaucracy” model.

The integrated, model-based approach enables the utilisation of artificial intelligence in the context of the authority’s work, from its process and data down to the tasks of the individual case manager. This allows for the significant advantages of well-defined solutions and for ongoing impact measurement and learning.

The agile approach means that artificial intelligence can be implemented through easy-to-control, smaller projects in which the basic (bureaucratic) principles of the

Authority

Service

Business

Proces

Casetype

Modeling services

F2 is based on a model for the digital bureaucracy, which is based directly on the administration’s work.

The authority has legitimate responsibility for managing and providing a range of services (the authority’s resort area). The authority delegates this responsibility to a number of specialist offices, each responsible for given processes, where each process consists of one or more case types.

Context	Examples of rule-based AI	Examples of recognition-based AI
Services Proces & Data	Rule-based AI makes it possible to define rules for monitoring on a general level of the production from a process or data perspective	Recognition-based AI makes it possible to recognise patterns and developments related to production and the authority's data
Case type Case guide and case steps	Rule-based AI makes it possible to define rules for automating an entire case process or parts thereof (governed by case type)	Recognition-based AI makes it possible to reveal patterns related to an entire case process or parts thereof and to inform the case manager
Function Complex and simple	Rule-based AI makes automation of concrete system functions possible, thus minimising the user's work tasks	Recognition-based AI makes it possible to reveal patterns related to an entire case process or parts thereof and to counsel the case manager

administration, such as requirements of compliance and transparency, are kept. In addition, the impact on production is minimal, as artificial intelligence can be implemented using a gradual transition in which an increasing part of the authority's work tasks and processes are automated.

Using F2 as a platform, then, great improvements can be made to quality, cost reduction, citizen service and transparency, as it is based directly on the work of the administration.

Based on the model it is possible to define case guides in F2 directly and store them in libraries. When a new case is created, a case guide can be attached to define case steps, rules, ruling, responsibility, documentation, etc.

F2 offers an agile user experience in which digitisation and automatisisation of the authority's work are facilitated through the support and automatisisation of each case type. Each case type can be further digitised and automated through ongoing revision of the case type library and through the utilisation of new types of artificial intelligence.

With F2, then, the authority is able to keep optimising and improving while gaining experience and implementing new techniques.

The fully integrated, agile approach means that artificial intelligence becomes not just a peculiar science project, but a natural part of the authority's digital transformation and evolution in both the short and the long run.

The table above offers context and examples for the applications of rule-based and recognition-based artificial intelligence in F2.

Evidently, artificial intelligence can be applied to several levels, and support thereof may be implemented in the form of well-defined projects. This ensures that artificial intelligence becomes neither disruptive or too complex, but instead a natural, controlled and agile tool included as a fundamental part of the authority's digital strategy and projects. cBrain's ongoing product development as well as the development of new services are grounded in the three levels shown in the AI context table: services, case type and function.

Could artificial intelligence replace the case manager?

It is natural to ask the question, "to what extent will artificial intelligence replace jobs?"

There is no doubt that we today have the technology to replace large parts of rule-based case management. However, this process would require several legal clarifications and decisions on both a national and international level. Conversely, it is evident that machines possess neither verbal nor social intelligence.

In principle, artificial intelligence could replace the rule-based parts of the case management, while parts that demand estimations and intelligent interaction with citizens are likely to be carried out by humans for the foreseeable future.

The potential of supporting the rule-based case management with artificial intelligence is great and the support and development of case management through pattern recognition will only increase.



Ministries

The Ministry of Employment
Ministry of Social Affairs and the Interior
The Ministry of Ecclesiastical Affairs
Ministry of Industry, Business and Financial Affairs
The Ministry of Climate, Energy and Utilities
Ministry of Finance
The Ministry of Environment and Food
Ministry of Taxation

The Prime Minister's Office
Ministry of Transport and Housing
Ministry of Higher Education and Science
The Ministry of Foreign Affairs
The Ministry of Immigration and Integration
Ministry of Children, Education and Gender Equality
State of Greenland

Authorities, municipalities and other institutions

Agency for Digitisation
Rail Denmark
Danish Meteorological Institute
Danish Energy Agency
Danish Business Agency
The Evangelical Lutheran Church - The Deaneries
Active Patient Support - Across Four Regions
Danish Economy Agency
Environmental Protection Agency
The Ombudsman Faroe Islands
The National Board of Social Services
Agency for Governmental Administration
Agency for Governmental IT Services
Agency of Family Law
Danish Agency for International Recruitment and Integration
Danish Maritime Authority

Danish Labour Court
Vestforsyning, Water and Heating
The Ombudsman Greenland
Agency for Development and Simplification
Agency of Employee and Competency
Gentofte Municipality
Odsherred Municipality
Copenhagen Municipality - International House, Copenhagen
Rudersdal Municipality
Vordingborg Municipality
Liverpool City Council
Aabenraa Municipality
IT University of Copenhagen
Roskilde University
University of Bristol

Unions, unemployment funds and organisations

Danish Union of Teachers
Danish Unemployment Funds
Danish Psychological Association
Danish Union of Social Counsellors
DJØF - Union for Graduates in Social Sciences, Business and Law
Danish Association of Occupational Therapist

Danish Association of Pharmaconomists
The Danish National Union of Upper Secondary School Teachers
Danish Diet and Nutrition Association
Danish Medical Association
The Social Democratic Party of Denmark

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cView published by cBrain A/S

Responsible publisher: Ejvind Jørgensen, CSO & CFO

Editor: Inger Vinther Veber, ivv@cbrain.dk

www.cbrain.com · cBrain A/S · Dampfærgevej 30 · Copenhagen · Denmark

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