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Knowledge Management and Decision Support in Adaptive Case Management Platforms

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***Abstract*— The paper sets out from a central proposition that the concept of adaptive case management (ACM) bears on the evolution of business decision support and knowledge management in modern businesses. While presenting the state of the art in efforts to blend enterprise resources planning/business process management (ERP/BPM) systems with knowledge management systems (KMS) and decision support systems (DSS), the authors observe that the classical platform combining ERP/BPM with KMS and DSS was based on the interaction of three separate layers/subsystems and that, throughout the past decade, that approach proved satisfactory. However, in the last few years it has been increasingly felt that the approach to business process management and enterprise resource planning, as well as to their integration with knowledge management and decision support, needs to be modified. The dynamic and adaptive nature of some business processes poses challenges that the classical BPM approach cannot adequately address. Adaptive case management has been developed to better cope with such challenges. It makes it, on the one hand, easier to align a business to rapidly changing requirements and conditions, and, on the other, it allows organizations to more effectively exploit the potential inherent in organizational knowledge and information resources. The paper discusses the evolution of KMS and DSS from the perspective of their application in ACM environments.**

I. The Origins of, and Rationale for, Adaptive Case Management

WHAT has long been demanded of information systems is that they move away from the prevalent control flow perspective, commonly adopted in the BPM area, toward the data perspective[1]. Attempts to meet these expectations have led to the emergence of a new class of information systems built around the approach known as adaptive case management.

This work was not supported by any organization

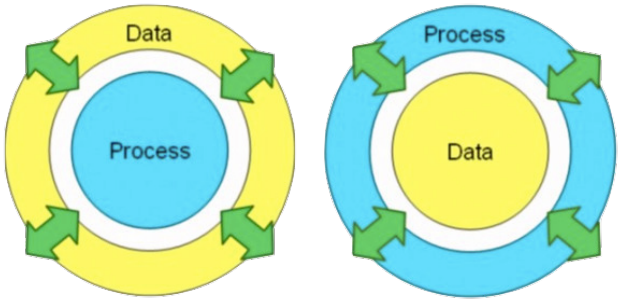

Fig. 1 The classical BPM approach vs. modern ACM.

The term "case" represents a generalization of any activity by so called "knowledge workers", whose efficiency Peter Drucker sees as a principal challenge of the 21st century [2].

Unlike in classical BPM, under adaptive case management processes are of dynamic character, since they are not defined until at runtime. To master the unpredictability of processes and hence facilitate process management in contexts where processes are mostly complex and where relevant decisions are affected by a large number of factors, more and more organizations choose to switch to adaptive process management systems [3].

ACM allows perfect visibility and full control of each specific case, whether it is handled by a predefined or an ad hoc process, or by a combination of the two.

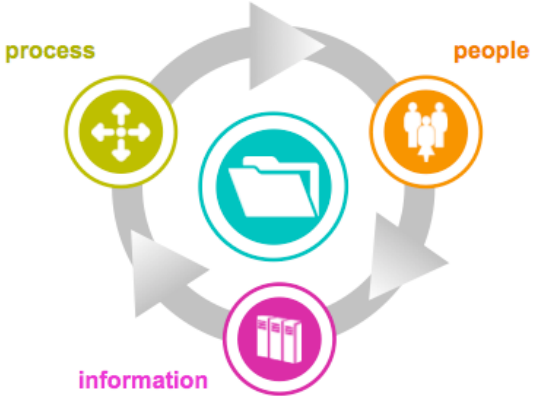

Fig. 2 A typical ACM implementation environment.

In a dynamic process management environment, operators/managers, i.e. knowledge workers, can be creative and innovative in performing their work, in that way contributing to organizational knowledge management and creation.

To distinguish the role of process operator from that of temporary process participant, under ACM the former has been redefined and termed as the knowledge worker.
Van der Aalst uses the "blind surgeon" metaphor to illustrate the differences between the two [4]. Under the traditional approach to processes, a participant has a partial view of the whole process, usually limited to the step in the process at which the participant is supposed to make a business decision.

The knowledge worker, on the contrary, has a complete insight into information on the case or process. Knowledge workers constitute a new category of specialized staff whose job is, in the first place, to utilize and exchange knowledge in a productive manner. They are responsible for the generation and implementation of new ideas that enable organizations to align their strategies with the increasingly rapid changes taking place in the business environment; they do so, primarily, through searching, exchanging, combining and utilizing knowledge inside as well as outside the organization.

An enterprise that is run in compliance with the ACM concept will be able to seamlessly combine its core activities with an ability to generate and verify innovations daily [5]. Allowing operators to dynamically modify their processes (and business rules, too), the enterprise management system as a whole opens up to creative initiatives from staff at large, while at the same time preventing chaos that could arise as an outcome of unharnessed changes made to the operating properties. In addition, since it possible to examine the outcomes of changes as they emerge, information on which practices and solutions produce the best results and which yield the worst can be appended to organizational collective knowledge. This stands for actual day-to-day improvement and adaptation of business processes, relying on the best knowledge of a large portion of personnel and getting validated through feedback from customers.

The greatest benefit in deploying dynamic ACM-based business process management is that large enterprises can regain agility and responsiveness that makes them capable of operating and competing in a rapidly changing marketplace. Making it possible to actually delegate work and responsibility to process operators without the risk of losing control of the currently running processes, ACM permits large enterprises to manage their knowledge on an everyday basis through:

- creative, proactive experimenting based on continuous, even if modest, changes, introduced by a number of process operators and leading to gradual accumulation and dissemination of knowledge,
- validation of existing knowledge and elimination of outdated information that no longer meets customers' requirements or competitive challenges.

As a precondition, organizations must be able and ready to adjust their policies and operating properties on an everyday basis as well as to continually update their knowledge on the actual and likely needs of their customers. Adaptive management of business cases is an extension of classical process-based management and an attempt to bring it together with the concept of a learning organization.

One of the cornerstones of ACM is the overarching belief that any organization should continuously expand and process its knowledge on the mechanisms governing its business environment and that this management model is not only more effective but indeed a prerequisite for its ability to keep pace with the unprecedented dynamics of changes in present-day markets and customer expectations. It is often alleged that ACM aims to create a learning organization. Clearly, it streamlines the processes inside an enterprise at several levels, affecting managers as well as personnel.

In course of its business activity, a company creates, accumulates and validates knowledge, which is then used to evaluate and support business decisions. By this token, an ACM system can use business processes in the following ways:

1. As knowledge sources;
2. As a space for organization-wide, innovation-driven knowledge creation and limited experimentation;
3. For knowledge preservation and in database building to bypass the need to set up and operate another system.

II. THE LEGACY REFERENCE ARCHITECTURE

In business practice, the most common enterprise-level system architecture consists in mounting decision support and knowledge management subsystems on top of business process management and enterprise resource planning platforms.

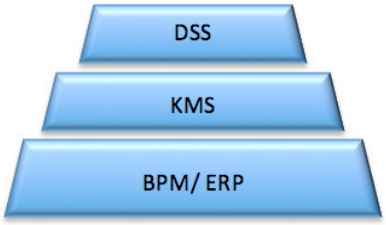

Fig. 3 The classical corporate work platform

Platforms designed in this way would make it possible to use information resources (business rules, workflow mappings, standardized management procedures, etc.) in order to build explicit knowledge and, consequently, develop knowledge management systems and address better support to decision making processes.

This approach involved several problems, the information flow being the fundamental one. Each layer had to be integrated with the others, which required months of analytical and design work focusing on a metadata model enabling the exchange of information between the component layers. For each layer, constituting a subsystem on its own, a specific conception had to be developed for its integration with the other components.

Another feature that users emphasized fairly often was the static mode in which knowledge and decision support were built. Where BPM processes had been defined and designed in advance, the values added by the DSS that the users mentioned the most often were decision process automation (the addition of another layer in the workflow) and instant updates to process flows to keep pace with external regulatory changes. Just like the DSS, beyond the stabilization phase of the underlying BPM/ERP system the knowledge management subsystem did not further contribute to increasing the corporate intellectual potential by expanding its knowledge base.

What users most complained about was that systems so designed were not adaptable enough. Decision support systems perform best in dynamic environments where decisions are complex and the response path cannot be defined in advance. However, in the architectures described above, most decisions are known at a very early stage (the BPM process map pre-defines all options to choose from, leaving no room for dynamic processing and decision making).

The same was, to a large extent, true about organizational knowledge building. In an architecture raised on a static foundation, a knowledge base is built most effectively at initial stages of the system's functioning, i.e. right after it has been put in place, while its subsequent use does not contribute much value to the knowledge base as no new, unique business cases come up.

The paper aims to demonstrate that that the ACM concept can successfully replace the classical approach involving a separate DSS and KMS mounted on top of a static BPM/ERP platform

A. Figure 3 shows architecture composed of three separate layers, which can be considered as the most mature and most tested solution to date.

III. ACM FROM THE DECISION SUPPORT PERSPECTIVE

Just like the decision making process itself, the decision context and the process context will change dynamically in the course of decision making as the cases are being handled.

From a business perspective, DSS is often regarded as part of ACM. Fischer et al.[6] define the key DSS features as follows:

- developing socio-technical environments that support and empower users to engage in the process of system development not only at design time but also at use time,
- supporting social creativity by providing the technical and social conditions for the exchange of ideas during discussions, debates, brainstorming, co-creation sessions, and other forms of vivid collaboration,
- combining art and design in the processes of self-realization,
- use of meta-analysis for comparing, combining, synthesizing, summarizing, specifying, and generalizing of previous studies.

A popular definition of ACM asserts that it is "a collaborative process of assessment, planning, facilitation and advocacy for options and services to meet an individual's holistic needs through communication and available resources to promote quality cost-effective outcomes" [7]. Under this definition, ACM can be perceived as a platform comprising a decision support system.

Clyde Holsapple, one of the fathers of the DSS concept, commented that "… DSS architecture does not define what DSS is; rather, it functions as an ontology that gives a common language for design, discussion, and evaluation of DSS."[8] This perception of DSS corresponds with Lambert's opinion that "… the architectural design should set a common level of understanding among technical, non-technical and management participants." [9] Suresh Basandra, on other hand, believes that "… system architecture is the process of partitioning a software system into smaller parts." [10] These insights bring us to Holsapple's 2008 definition of the DSS architecture: "DSS architecture is a general framework that identifies essential elements of a DSS and their interrelationships." [11]

Substantial research conducted by the authors at the request of several business enterprises employing ACM

systems indicates that most such systems have similar business goals concerning decision support:

- to support the knowledge worker in making optimal decisions in each and every case,
- to deliver faster and more accurate case resolution,
- to improve agility by following business rules in deploying decision support.

Within existing decision support systems, the control function is performed via meta-knowledge subsystems (like norms, axioms, ontologies, etc.). The development of a meta-knowledge subsystem is driven by the double loop pattern of knowledge development. The primary feedback loop, which is characteristic of adaptive learning, involves detection and rectification of deviations from operational norms. The secondary loop, found in the so-called generative learning, is responsible for creative modifications to operational norms.

Likewise, ACM system users will build up corporate knowledge using IT tools and social mechanisms to bring tacit knowledge (i.e. the staff's expertise and individual experience) to broader use in case processing.

It is essential in any DSS project to thoroughly analyze interactions among business owners. As Frederic Adam has it, "… [M]anagers are not seen as atoms but as active, purposeful agents. It is possible to visualize the Decision Making Network (DMN) and to investigate what happens within the networks as the organization tackles a Decision Situation." [12]

ACM could be viewed as an IT platform including an integrated decision support system. The DMN can be then identified with a process map that visualizes all possible case states and provides process managers/leaders with a profound insight into the business.

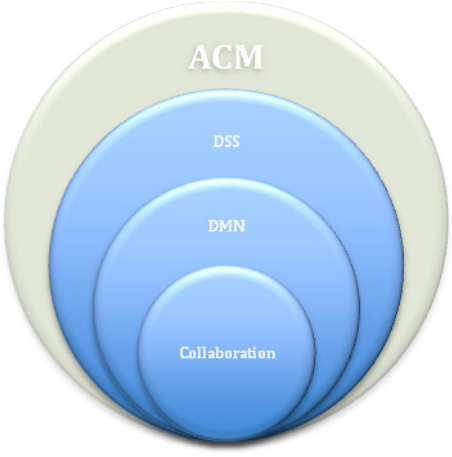

Fig. 4 A model of relationships between ACM and DSS

Those having to cope with less structured decision problems will normally need to have a good understanding of the problem solving process and to be familiar with the applicable techniques. Without this know-how, users situated beyond the operational level might not be able to use the system resources efficiently: even if an expert system is activated to provide them with support in choosing the most suitable tools (models) for their problem, the choice has to be ultimately made by the user. Observation reveals that the most common reason why some systems are not used in tactical or strategic problem solving is not the technology itself but the relatively high demand they put on users' competence (knowledge base).

ACM helps manage the unpredictable by enabling knowledge workers to effectively cooperate and share their knowledge, thus improving the functionality of a decision support system.

Users engaged in solving tactical and strategic problems will rather expect the system to become a "partner in problem solving." Interestingly enough, we have found that the lowest skill levels are associated with the highest expectations from the system, including a proactive attitude in assisting the user. Conversely, the expectations of most advanced and creative problem solvers are limited to being offered an efficient technology and a rich collection of presentation tools.

What is expected from the system in such circumstances is, in the first place, adaptability and expandability through appending new decision models. Not only does the DSS have to offer the requisite decision modeling tools but it also needs to be able to instantly integrate (owing to bidirectional data interchange) with dedicated external systems tackling specific business problems.

The ACM model typically includes a special resource containing knowledge on the business processes utilized in decision making (decision workflows). Identifying the key business processes and analyzing the decision making processes intrinsic to them makes it possible to accumulate knowledge needed to discover and assess relationships between decisions and their outcomes. This appears critical, in the light of our research, for decision analysis at all levels.

Our survey indicates that the most frequently used creative problem solving tools include:

- context-sensitive help along with access to historical data and similar cases,
- group work support tools, such as discussion forums or (widely popular) instant messengers.

IV. ACM FROM THE KNOWLEDGE MANAGEMENT PERSPECTIVE

A company's body of knowledge is partitioned and distributed among staff and across worker groups; before it can be brought to productive use, it has to be properly

organized. Any modern enterprise needs to have a knowledge management system, which can be described as a complex blend of understanding and experience, explicit and tacit knowledge, material and social technology [13]

The following are the principal goals of knowledge management in organizations:

- To make the most of the knowledge that is already available within the organization,
- To create new knowledge, and
- To increase the understanding of knowledge.

It has taken some time for companies and researchers to realize that, besides data as such and besides information that can be interpreted by humans, there exists another vital resource that becomes increasingly crucial to a company's performance but cannot be captured and managed via standard information management methods – and that is knowledge. It can be either explicit knowledge, readily accessible e.g. from an internet portal, or tacit knowledge that resides in the staff's minds and originates in their individual experience, training and talent.

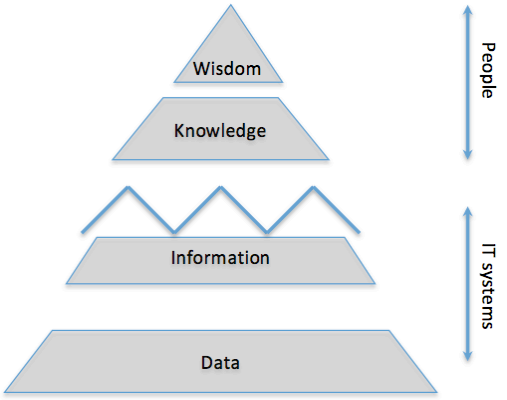

Fig. 5 A model of interrelationships between organizational resources.

Nonetheless, efficient knowledge management alone does not ensure success in business. David Pollard argues that businesses survive and achieve success not because they give a lot of attention to managing their knowledge but because they manage their operations better than their competitors do [14]. The ACM concept, and the instruments it offers, can help organizations optimally utilize their knowledge repositories as a resource and to run their business adaptively, thus increasing their competitive edge.

ACM tools, such as the IBM Case Manager or Pega SBPM, offer knowledge workers a wealth of opportunities to communicate their ideas, observations and suggestions, and to establish best practices, at the same time increasing their autonomy in the workplace.

A survey of industry leaders such as Ford Motor Company, PWC, LLP, Hewlett-Packard or Arthur Andersen, conducted by the American Productivity & Quality Center (APQC), has revealed the presence of processes and features typical of learning organizations [15]. Of these, the following five elements seem to be of critical importance:

Knowledge sharing that occurs in solving problems or with a view to delivering better business results. Different approaches are pursued; in some companies, executive management is involved, while in others preference is given to the use of internet-based knowledge bases or to knowledge sharing among staff during problem resolution.

This aspect of knowledge management has become a central element of the ACM concept. Information on each business case is stored in the system and retrieved by staff engaged in handling cases as they collaborate in case processing and closing. Modern information technologies can provide support for group work through communicators, messengers, social networks, and corporate portals, helping exchange insights, comments, and case processing information – thus facilitating knowledge creation and knowledge sharing.

There is a high degree of awareness of the relationships between knowledge acquisition, knowledge sharing, and achieving business objectives; the staff appreciate the importance of knowledge sharing and understand its contribution to the accomplishment of their company's strategic goals.

It should be noted that, from the ACM perspective, information (e.g. process-related data) is construed as a tool for knowledge creation rather than part of knowledge itself [16]. This is a fundamental difference that has practical consequences for the approach adopted toward knowledge management. Gilbert Probst, Steffen Raub and Kai Romhardt assert that knowledge is a collection of information and capabilities employed by individuals in problem solving [17].

Under ACM, the conception of knowledge management conforms to the definition adopted by the NASA: "Knowledge management is getting the right information to the right people at the right time, and helping people create knowledge and share and act upon information in ways that will measurably improve the performance of an organization and its partners." [18]

The company's principal values are closely related to self-development, cooperation and knowledge sharing; knowledge management is well deliberated and embedded in the organization's business strategy.

At a time of economic downturn, new challenges will arise for business enterprises, forcing them to seek improvements to flexibility, innovation, and responsiveness;

it is also necessary to take a new outlook on human capital – each company's prime asset – with its competencies, autonomy, and responsibility. Adaptive case management systems respond to companies' real needs by offering them dynamic handling of business processes on the one hand, and effective communication and knowledge management mechanisms on the other. In the world of today, success is founded not so much on a careful orchestration of corporate processes, but rather on an organization's ability to instantly adapt, make quick decisions, and use intuition and knowledge management in adjusting its process flows to changing business conditions.

In his 1999 typology, Skyrme proposes a distinction into six types of knowledge:

- Know-**how** – i.e. individual skills and familiarity with procedures,
- Know-**who** – the kind of knowledge that triggers access to required resources; acquaintance with people who can help find the answer or perform a task,
- Know-**what** – or structural knowledge, e.g. acquaintance with pertinent patterns,
- Know-**why** – or "deeper knowing" that enables one to interpret the information one already has and understand the broad context of whatever one does,
- Know-**when** – a sense of the right timing and rhythm for an action,
- Know-**where** – an awareness of the place and context in which an action would be best performed [19].

The latest ACM systems make use of all the above-mentioned types of knowledge. Within such systems, the knowledge of how, what, where and when is readily available and easy to access and modify.

The business owners of respective processes define instructions and types of documents required in process handling, as well as tasks and roles to be performed in solving business cases. Depending on the type of case being processed, relevant properties are displayed to the case manager. The know-how of every assignment (i.e. how it can be best completed within a specified time) is available throughout the system, easy and intuitive to find for each ACM user.

It is different with knowing **who** and **why**. ACM supplies knowledge workers with ample functionalities supporting e.g. task delegation or, notably, the creation of a hierarchy of experts whose assistance is instrumental to resolving a given case. Owing to social networking services (e.g. setting up a team room for experts designated by the system to sort out a specific problem), the knowledge of who can help process a case and why a particular decision should be taken is broadly utilized and dynamically expanded.

The knowledge management style, as well as its structure and language and the extent to which it has been formalized, are aligned with the organization's culture and work environment.

ACM software packages contain rich collections of personalizable tools providing whatever organizational and technical means it takes to raise organizational competence, improve the staff's education and learning capability, and boost up collective intelligence. It supports the development and use of state-of-the-art mechanisms for semantic content analysis and industry-specific glossaries aiding communication among knowledge workers within an organization. Owing to enhanced text analysis techniques, it makes it possible to discover trends, patterns and relationships in unstructured data as well as in related structured data. The resulting observations become part of organizational knowledge and can be used in decision making, forecasting, and setting business targets. In ACM environments such as the IBM Case Manager, the user interface and the system vocabulary are customizable and can be adapted to the language specific to a given professional/business area (e.g. medical or other discipline-specific terminology).

Managers engage in promoting attitudes and behaviors involving cooperation and knowledge sharing.

In organizations that are managed in line with the ACM concept, core activities go hand in hand with a drive for daily innovation. Given the process operators' ability to dynamically adjust and fine-tune their processes, the enterprise management system as a whole becomes open to creative initiatives from most staff while at the same time avoiding the risk of disorder that might result from spontaneous changes to operating norms. In addition, being able to observe the outcomes of changes, the organization can incorporate findings on best and worst practices into its body of collective knowledge. This stands for actual, day-to-day improvements and adjustments to business processes based on knowledge contributed by a large number of staff and on feedback from customers. Instead of hierarchical relations and work division, ACM offers autonomy that enables staff at lower levels to create knowledge and transfer it to higher levels, where new solutions are assessed and approved by senior executives in recognition of their staff's initiative and enthusiasm.

From the perspective of knowledge management, most ACM systems are characterized by several fundamental properties. Depending on specific organizational conditions and requirements, the system's design should embrace socially or technically oriented knowledge management

tools. An ACM system framework must aim to integrate all of the company's functional areas as well as all of the existing management subsystems.

Fig. 6 A model of relationships between ACM and KM.

Benefits that can be expected in relation to the introduction of a support system for knowledge management (e.g. an ACM-compliant one) include improvements to organizational knowledge distribution, innovation management, and knowledge transfer (sale). Deloitte & Touche point out another two rewards:

- enhanced internal efficiency – dissemination of best practices, innovative concepts and valuable experiences,
- increased loyalty – establishing and strengthening ties between staff, customers, shareholders, and suppliers [20].

One can easily endorse Ernst & Young's definition of ACM as "a framework or system designed to help companies capture, analyze, apply, and re-use knowledge to make faster, smarter, and better decisions and achieve competitive advantage." [21]

V. The New Order.

The application of an ACM framework substantially increases the capabilities of platforms conforming to the classical architecture delineated in Chapter 2. Adaptive case management effectively combines BPM/ERP components with a dynamic approach to business case management.

In a world where business processes are unpredictable due to their complexity and the number of factors affecting decisions, more and more organizations choose to shift to adaptive process management systems such as adaptive/advanced case management [22] or dynamic case management [23].

The above can be illustrated by a business process involved e.g. in construction projects or loan application processing. Each must be tackled differently, in a manner specific to the type of project or suited to a customer's unique requirements. Since it is impossible to predict and model all types of projects and all customers' likely needs, there has to be a way to dynamically adjust a business process to specific contexts and individual requirements. Process management cannot be therefore reduced to merely reiterating a process according to an established routine, even if the process has been perfectly optimized. Attention to customers' individual tastes and requirements means that processes in an organization must be individualized, too. The advantages exercised by small, innovative and fast-adapting businesses over large international corporations demonstrates that the key to success is no longer in process optimization alone but that it should be sought in an ability to dynamically adjust a process to customers' requirements and address effective support to organizational decision making and knowledge management. Large companies spending enormous amounts of money on introducing new management methods and complex information systems cannot dream of the flexibility that comes as natural to small family businesses.

To overcome this increasingly evident paradox, it is necessary to extend the classical architectural model of a corporate platform described in Chapter 2. Given the need to deliver swift performance demanded by customers and the number of processes running parallel, process owners should not bear the sole responsibility and powers for analyzing and adjusting their processes. With ACM, that responsibility is shifted toward knowledge workers. Within their delegated powers, knowledge workers are allowed to make changes to the processes they are engaged in, just like process leaders would. This functionality, coupled with the integration of decision support and knowledge management subsystems into the ACM architecture, provides a vantage point over companies whose operations are based on the classical BPM/ERP+ DSS + KMS model.

Under the traditional approach, the staff tackling a process are forced to execute an algorithm developed on the basis of a standard process map, i.e. designed in accord with the knowledge workflow that was in place at the time the map was made. As the conditions for process execution will vary in practice (e.g. there do not exist two identical consulting or development projects) and no two processes are in fact performed in the same way, it is advisable that standard processes be adjustable to implementational requirements by their direct executors[24]. The classical process improvement cycle administered by process leaders, involving such subsequent steps as process modeling, performance monitoring, formulating conclusions and, eventually, utilizing the findings to improve the process, is far too slow and therefore inadequate. What is more, in the event that certain clients have conflicting expectations, it might be impossible to design a "universal" process that could be accepted by all the stakeholders.

The ACM approach, incorporating a DSS and a KMS working parallel, is particularly useful in designing

processes that are not known in advance, which is what occurs e.g. in court proceedings or in medical treatment. In such processes users have to be given the capability of dynamically modifying and creating tasks within each process. These users are therefore referred to as knowledge workers. Owing to ACM, not only organizational knowledge is built in the KMS, but also the DSS becomes a much more valuable tool, helping make even the most difficult decisions concerning a wide variety of business cases.

A dynamic management strategy allows concentration and intensification of efforts directed at supporting decision processes and organizational knowledge building, while catering to the most unique expectations of clientele.

Under the classical three-layered architecture (BPM/ERP, DSS, KMS), platforms typically suffer from delays arising from the necessity to involve process leaders in making process-related decisions and from the very limited possibility to establish systemic, institutional links between the company's core activity and knowledge management via a process based system. Given the current pace of changes, top executives or process leaders are increasingly unlikely to be able to react timely.

At the heart of ACM is the belief that an organization must never stop expanding and refining the knowledge it already has on the mechanisms governing its business environment, and that management methods founded on this belief are not only more effective but simply constitute a precondition of an organization's responsiveness to the incredibly robust changes in present-day markets and in customers' expectations. Another distinctive feature of ACM, perhaps just as important, is that it can effectively and efficiently support knowledge workers in making business decisions. It is frequently stated that ACM enhances organizational learning to the extent that it represents a step toward the building of a learning organization, since internal process improvement takes place at several levels, affecting both personnel and managers. It should be also underscored that ACM comprises fully-fledged and fully integrated, tailor-made decision support and knowledge management subsystems that do not need to be integrated through individual system integration projects.

The benefits of ACM and the development potential of this methodology have already been recognized by software vendors (e.g. IBM Advanced Case Manager). A major emergent trend in software development is to remove inflexibilities attributable to the posture whereby processes, once identified, are treated as a binding blueprint for action. ACM is different in that it allows users of corporate software applications to take initiative in performing actions that have not been envisaged at identification and design stages. As a result, dynamic ad hoc processes are simpler and easier to model.

ACM systems account for better results in knowledge management and decision support owing to:

- reducing the process description stage to preliminary modeling or to the modeling of known, invariable elements, subject to subsequent supplementation and expansion via the learning mechanism built into the knowledge management system;
- significant acceleration of process improvement by allowing both process operators and process leaders to modify processes, whether in steps or leaps;
- enabling instant dissemination of the knowledge inherent in process innovations through the integrated knowledge management system.

When fully exploiting the potential of ACM-class systems, companies can extract process-related knowledge that has so far been tacit or hidden and in that way find out about processes that cannot be structured by defining straightforward, clear-cut algorithms (process maps). This makes it possible to substantially accelerate the acquisition of knowledge about processes, thereby reducing or eliminating the time required for their formal identification. In effect, organizations should be better prepared to seize emerging opportunities and make optimal decisions, which will affect not only their current performance, but their ability to survive in the market as well. Therefore, it seems that the classical approach is likely to be soon abandoned or modified, and business optimizations will be chiefly conducted using ACM.

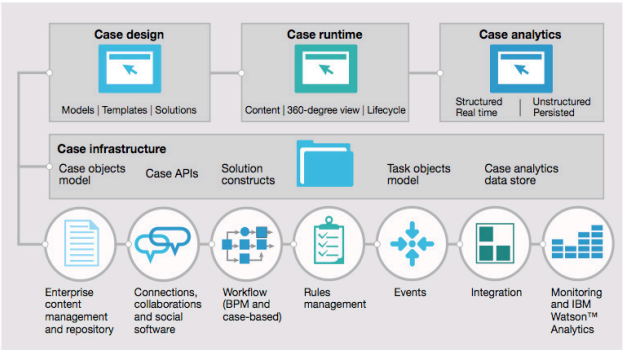

Fig. 7 The architecture of the IBM Case Manager.

As shown in Figure 7, elements accounting for group work, knowledge sharing and knowledge discovery (Connections) as well as those responsible for the definition and optimization of decision making rules/procedures (Rules Management) form an integral part of an ACM solution.

VI. A CASE STUDY

JM Family Enterprises, Inc., founded in 1968, is a diversified automotive company ranked by Forbes as the 27th-largest privately held company in the U.S. The introduction of an advanced case management platform has

affected a number of its core businesses, including World Omni Financial Corp. – a major US car finance company.

At World Omni ACM has, in the first place, improved customer service by enabling service associates to access all relevant information concerning a customer's case and hence provide a quicker and more reliable response regardless of where the loan/lease servicing request is initiated. ACM helps the company manage information and knowledge as the customer requests arriving from multiple sources, such as phone, fax, mail or e-mail. When a loan/lease request is received, an associate initiates the process by completing appropriate electronic forms or templates and electronically attaching any associated documents. Such approach structures the case data and improves decision process. Inputting information into electronic forms removes the need to re-key data and, owing to integration, makes it possible to share data with mainframe and client-server systems that are part of the loan/lease servicing process.

At the same time, the elimination of paper-based documents has further streamlined the loan/lease process and resulted in a corresponding "green benefit" meaning that approximately 168,000 pages of paper are no longer printed annually. Moreover, it translates directly into the optimization of knowledge workers' daily duties. 360 degree view for the case information and data is used for decision support in key process steps.

Following is an overview of the key benefits obtained by JM Family in particular business areas through the deployment of an advanced case management system:

- **Customer service**. At its locations in Mobile, Alabama and St. Louis, Missouri, the World Omni call center employs more than 700 customer service associates and processes tens of thousands of automobile loans and leases annually. Originally, the customer service process was complex and involved sizeable volumes of paper documents, frequent interaction with customers, and multiple information sources and systems. Each loan/lease servicing transaction had to pass through a specified sequence of steps engaging many associates and including a number of approval and audit levels. Now all the necessary customer data, along with the requisite knowledge (information regarding a customer's case, transaction history, staff's comments and shared expertise), are available in each single case, providing for an ability to deliver a quick and reliable response/decision regardless of where the loan/lease servicing request is initiated. This is example for using ACM system for better knowledge utilization and making more accurate business decisions.

- **Better punctuality and efficiency** corresponding to shorter response times in handling customer inquiries. The implementation of case management has resulted in improved access to information and knowledge pertaining to a customer case. As a result, knowledge workers can make better-informed and timelier business decisions. Electronic document management and distribution enhances productivity by removing the delays arising from the need to wait for information required to complete a task.

- **Enhancing business outcomes**, which translates into increased customer satisfaction. Working with IBM, JM Family has achieved its primary goals of improving customer service and raising productivity. Customer service associates can now quickly determine the status of a loan or lease service transaction – a task that previously required significant manual effort. A comprehensive view of each customer's case allows associates to update account data and have changes applied consistently across all systems involved in the process. In addition, the ACM system lets knowledge workers collaborate and exchange their knowledge about optimal processing (automatically contributes to organization's knowledge base). As a result of business process automation, loan/lease transactions are now finalized more quickly. JM Family has also achieved its secondary goals relating to: improvements in data quality, paper reduction, better compliance with corporate reporting requirements, and the ability to monitor process performance metrics. JM Family estimates savings at approximately $202,000 annually and anticipates further savings as additional business processes become automated.

- **A better organizational culture**, underpinned by the characteristics of **lean manufacturing**. All of the customer content has been organized into dedicated information silos. This move has been applied consistently across the entire organization, and the idea of a single central backbone for information has led to the emergence of a better, more mature organizational culture. The benefits are reflected in reduced operating costs and increased efficiency that have been accomplished by improving the management and distribution of relevant information and knowledge. Not only has JM Family improved the loan and lease processes, but the company's progressive IT culture has motivated it to strive for continual process improvement with ACM.

- **Market forecasting, costs of decision prediction, business optimization**. Case managers need an insight into workloads and processes to optimize case handling and to be able to find out whether service associates are achieving key performance metrics. To support these objectives, JM Family utilizes the IBM FileNet Process Analyzer to record loan/lease servicing performance metrics. These data are then used by IBM BI software to generate daily performance reports, allowing continual monitoring of the automated loan/lease servicing process as well as of individual customer service associates participating in the process. Such approach is an example of directly contribution to DSS and to business performance overall.

- **Smart, rich data/content analysis**. The ability to dynamically analyze customer content means that it becomes possible to catalog and organize content from multiple sources by exploring and aggregating JM Family information. Content exploration leads to new knowledge and understanding for making instant decisions about business value, relevance, disposition and category schemes in order to take action. "Decommission what's unnecessary" means to cut down on costs and reduce risk by eliminating obsolete, over-retained, duplicate, and irrelevant content, along with the infrastructure that supports it.

Employee productivity has been improved by enabling service associates to access all relevant information and enterprise knowledge regarding a customer's case, which accounts for quick and reliable decision regardless of where the loan/lease servicing request is initiated.

Annual projected savings of approximately $202,000; faster and more accurate response to customer inquiries; much less paper used to print out documents, which results in significant environmental benefits; improved compliance with corporate records requirements. ROI: 64%, payback: 1.6 years.

Improved data quality and reduced audit costs. By eliminating many processes that involved re-keying of data across systems, JM Family has reduced data errors to help ensure consistency and accuracy of data that are transferred between systems. New business processes have been designed to automate World Omni approval procedures and implement firm controls, thereby reducing the amount of auditing required. JM Family estimates annual savings attributable to cost cuts in audit steps at $68,000.

Savings in case progression and resolution. JM Family's reputation for technical innovation implied that advanced case management could be a key enabler and driver in improving the quality of customer service as well as the productivity of customer service associates. Additionally, it was recognized that ACM could help the staff improve knowledge management, decision support and other business processes throughout the organization. JM Family has chosen to use IBM software to gain the advanced case management insights that it needed to make the customer experience seamless. The software contributes an integrated process approach that combines electronic forms, business process integration and systems integration to optimize process automation. A flexible framework provides customer service staff with access to all relevant content for each case at every step regardless of source.

Improved business visibility and transparency to further enhance compliance. JM Family has designed a process to automatically record the status of key processes as well as of the participants involved in reviews and approvals. JM Family employs the IBM Enterprise Records software to automatically capture and retain loan/lease documents in accordance with corporate compliance policies.

Continuous improvement with case analytics. The ACM system implemented at JM Family offers high performance analysis of customer content, hence better monitoring of the automated loan/lease servicing process as well as of individual customer service associates engaged in the process. The continuous improvement policy, coupled with process knowledge retrieved from case analytics, has led to better business decisions resulting in significant savings.

VII. Conclusions

The paper has tried to highlight the reasons why adaptive case management could be considered as a valuable tool in both decision support and knowledge management. Admittedly, ACM is currently shaping trends in the evolution of both KMS and DSS – by adding vital dynamics to knowledge acquisition and management as well as to decision support.

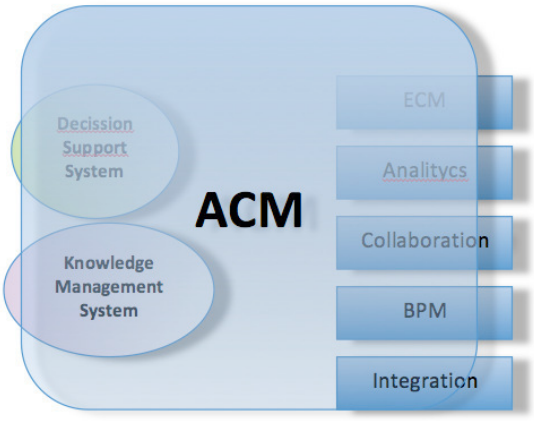

Fig. 8 ACM vis-à-vis organizational resources.

The new business model associated with ACM proves more effective and capable of satisfying most of the requirements of modern businesses.

A dynamic management strategy permits concentration and intensification of efforts aimed at supporting decision processes and organizational knowledge building, standing for an ability to respond to even the most extraordinary customer expectations.

The classical platform, whose architecture is divided into three layers (BPM/ERP, DSS, KMS), is clearly inferior to ACM in terms of efficiency. Furthermore, it offers limited possibilities of establishing systemic, institutional ties between a company's core business activity and knowledge management via the system's process-orientedness. Its adaptability is, on the other hand, increasingly compromised by executive and line managers', as well as process leaders', inability to deliver a timely response to rapid changes in the business environment.

ACM represents the most recent model that comprises integrated subsystems responsible for knowledge management and decisions support. Its very design accounts for superior performance over the traditional approach based on a combination of distinct ERP/BPM, KM and DS systems. Its primacy has been demonstrated by a number of business case studies.

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