Management Cockpits: Concept, Benefits and Challenges

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Abstract—Management cockpits for businesses allow to cumulate all available data in real-time for the strategically important information. They pre-process information and thus reduce the complexity of managing a business. Employing principles of cybernetics, the managers are immediately getting feedback to the decisions they have taken and can manage the business accordingly. Despite of the obvious potential of this approach, only few companies have introduced a management cockpit. This paper identifies the main benefits of such a concept as well as its general requirements in order to successfully introduce and use the management cockpit approach in a company. The inhibiting factors why management cockpits are not used more widely are researched and discussed. A solution approach of how to integrate management cockpits in businesses and companies is presented.

Keywords—management cockpit, information management, decision-making, data analytics, strategic decisions.

I. INTRODUCTION

Information overload, complexity and unpredictability negatively affect the ability to see the bigger picture of the state of a company and to make strategic and effective decisions. Transparency and the intelligent management of information across an organization are nowadays critical success factors of an efficient and sustainable business. All aggregated aspects build the foundation of how the decision-making process is realized within organizations. Today’s decision-making process in companies is basically information intensive, and managers face many challenges and difficulties when trying to manage the information overload efficiently. Over the past decade there has been a dramatic increase in data volume, diversity and complexity leading to poor decision-making at different levels and negative impact on a company’s performance. Managers may lack sufficient time or are reluctant to invest the time needed to collect, process and analyze the data and interpret the information in order to gain new and faster insights. According to Gartner Research [1], it has become clear that it is not a lack of available data and technologies that will block progress and growth in modern businesses but the challenge to identify and visualize the usefulness, importance and relevance of the gathered data to improve efficiency and decisions. Companies and in particular managers need to think systematically about their information assets before making decisions.

The need for a concept that presents and organizes information in a way that amplifies managers’ intelligence to foster better and more effective decision-making in companies was investigated by P. M. Georges in 1989 [2]. He claimed that the gap between the constant input of ad-hoc and individual information and the ability to keep the bigger picture is getting larger. In today’s dynamic environment it is an increasing challenge to manage businesses. A decision maker needs the ability to answer critical questions at any given moment. It was conclusively shown that creation of information transparency into the current business performance in order to briefly get an understanding and overview of a company’s essential variables is the key for success.

The idea of a management cockpit is based on the historical concept of war rooms where all relevant the knowledge required to make a decision is stored in a central location. It ensures that the right key decision-makers are engaged with the right information at the right time based on an end to end information flow to support the collaboration through the decision making processes. Data visualization with a deep understanding of the business is at the core of a management cockpit to generate new insight for decision makers. Overall, it is intended to make management more productive by improving communication and by focusing on strategic issues based on the company’s information assets. One advantage of a management cockpit is the ability to enable managers to rapidly access the required information in a comprehensible and business-friendly way (cockpit) in order to make better and smarter decisions. Furthermore, it helps to understand the status of all related decisions associated to the individual projects, strategic goals, and agreed actions.

However, the current concept of such a corporate war room contains some limitations. Besides the obvious benefits and advantages, this paper focuses on identifying why the concept is still not best practice and state of the art in companies. This study illustrates potential limitations around the concept affecting its popularity and acceptance as a management instrument to improve collaborative and informed decision-making in business. An overview of critical success factors for the implementation and usage
II. LITERATURE REVIEW

A. Benefits of a Management Cockpit Concept

1) Holistic View on the Company

The holistic view on the company is one of the key points in Georges’ initial concept [2]. He describes a meeting room which is dedicated to decision making by a company’s top management with the help of the wall display system. The latter are display clusters displaying important KPIs (key performance indicators) for the business using appropriate visual devices, e.g. displays or screens. The walls of the room are covered by these displays where each wall is dedicated to a specific topic (e.g. financials, HR, etc.) and assigned a color of a predefined set of colors. The displays are furthermore grouped into logical views, each of them answering one specific business question. Using multiple levels of aggregation, Georges stated that when using this concept, the managers get an overall view of the entire company and not uniquely of particular business areas, which makes the impact of each business area on the overall objectives visible. The case study by arcpian Information Services [3] about the implementation of a management cockpit at Thai Airways has shown, that this concept is a great help in monitoring business activities and is hugely supporting the decision making process on top-management level. Similar benefits were achieved at Siemens Belux, as described by Daum [4], were this concept has led to a broader, much more holistic approach to taking decisions.

2) Visible Strategy

A benefit of the management cockpit concept is the possibility to visualize the company’s strategy. The introduction of a management cockpit greatly improved the strategic orientation of all management decisions. Its use allows the managers to get a deep insight into several aspects of the company and align it with its overall strategy. Also, if some actions are not conformed to the strategy, the results will be immediately visible in the management cockpit. Georges [5] divides the information displayed in the cockpit into four different layers. In this case the top layer is relevant, which represents the strategic questions with all subsequent layers representing the information necessary to answer the strategic question on a more granular level. Haulet [6] also identified that, when using a management cockpit, the strategy can more easily be broken down into operational terms and therefore better executed.

3) Accurate and Clear Information

According to Daum [7], Georges, a former neurosurgeon, found out, that a person is only able to process about 800 characters per minute. Today’s managers, however, are confronted with an information density of around 4000 characters per minute. In order to cope with such an enormous amount of information, it is inevitable to aggregate and reduce the information to a level, which still allows them to be able to control the business, but not to lose the overview. To achieve such a situation, it is necessary to present this information in an ergonomic and standardized way. He states, that having display clusters of six screens ideally fits the cognitive capability of a person. To visualize the effective information, he believes that the use of charts and graphs are ideal. The choice of the chart or graph corresponds to the information level; the more detailed the information is, the more complex is the chart (starting with a simple “traffic light” on the strategy level).

Fig. 1 The management cockpit [5]

B. Requirements for a Management Cockpit

1) Clearly Defined Strategy

According to Daum [4], a company benefits the most from a management cockpit, when this whole approach is tightly integrated in the company’s strategy management process. Dealing with the strategy should not only be done once a year but all operational decisions or decisions made in the company’s management must be aligned with the strategy. Also Eckerson [9] identified the need for a clearly defined corporate strategy as a vital factor for the success of a management project. This factor was also mentioned as one of the key success factors for the implementation of a management cockpit at Siemens Belux. According to SAP [10], it is, however, not enough to just have a clearly defined strategy, because it is also vital that everyone in the company understands it and that it complies with the overall corporate goals and objectives.

2) Strong Management Commitment
The second important factor for the successful implementation of a management cockpit is the full commitment of the management. Georges [2] stated that the decision makers must be trained accordingly, since using a management cockpit enables a whole new way of how decisions in a company are made. Daum mentioned furthermore [2] that, already during the implementation phase, the affected managers must be closely involved in the project since, in the future, they will be using this tool for all important decisions. Therefore, they must be aware of the importance of the project since it is their responsibility to define a management cockpit, which will support them in taking well considered decisions in the future. This factor was also leveraged by Weber [11] stating that the alignment of the management culture and the management cockpit approach must be done beforehand.

Daum [4] also stated this point as one of the key success factors in their project. In the first place, this new decision-making approach was discussed within the whole management team and the processes were adapted accordingly. The management cockpit itself can be seen as the peak of the iceberg. The final success of the project, accordingly. The management cockpit itself can be seen as the primary tool for decision-making among the decision makers. Procter&Gamble took this even a step further by using management cockpits as the primary tool for decision making among all their employees. More than 50'000 people have access to their own management cockpit (although not a room but a website in the intranet) adapted to their everyday needs. Furthermore, P&G implemented so-called “Business Spheres” in more than 50 locations displaying management information for reviewing and decision making by groups [12].

3) Reliable and Real-time Information

The third important factor, which has been identified, is the reliability of data. Jacob, Weiss and Schweig [13] described in their working paper the process of implementing a management cockpit from a technical point of view. They defined the identification of necessary data as a vital point when building a management cockpit. According to them, it is necessary to analyze the existing data and model it accordingly in order to be able to extract KPIs, thresholds, alerts, etc. and display them in the management cockpit.

Also Daum [14] identified this as a success factor. He states that the creation of an integrated information system architecture is a basic requirement for every management cockpit and even assigns a dedicated person to maintain this data foundation. By having a well-performing business intelligence solution, P&G was able to reduce manual correction or aggregation of data which greatly improved their management cockpit project. Atos Origin [15] identified during their past project experience the underlying data as a vital point of the management cockpit. According to them, it is not very easy to get the necessary data and usually 50% of the “critical indicators” were not immediately available.

C. Requirements for the Decision-making Process

The process of decision-making depends on many factors. Four of these decision-making factors linked to the management cockpit concept turned out to be outstanding through the literature review. The type of decisions was targeted at a strategic level because of the high business impact and decision complexity.

1) Clear & Shared Vision

Strategic decisions serve the overall corporate culture and vision. Therefore, it is crucial that a clear vision was established within the company. Effective decision-making starts with knowing and understanding the company’s goals and should be aligned with the strategy and values. Above that, successful companies were able to establish a positive decision-making environment aligned with the company’s culture that encourages employees to share and discuss their concerns about any decision [8].

The research found out that a clear and shared vision for the future of the business significantly helps managers to make effective decisions and better execute the strategy [16].

2) Easy Access to Information

Decision making is certainly the most important ability of managers but it usually takes only a small fraction of the process [17] [18]. Managers spend more time on determining and processing the information needed to make this decision. Information must be available, real-time and if necessary controllable to analyze future scenarios and perform a what-if analysis prior to making the decision. As Herbig and Kramer [19] as well as Wilson [20] stated, finding and analyzing the right information will not only reduce the complexity of decision-making but also solve the problem to overcome the information overload. Georges called it the intelligent reduction of information overload [21].

In addition, Eppler and Mengis [22] found out as the amount of information increases to a critical point, managers will consequently make poor decisions, because people have obtained more information than they can process. Any further information received beyond that point will not be processed, may lead to confusion and could have a serious and negative impact on the decision-maker’s ability to set priorities as well as see the greater context [23] [24]. Therefore, the need of accessing value-added information is the key. As Badenoch et al. highlights, information by itself is not necessarily useful for managers to make good decisions; it needs an aggregating and filtering mechanism while being clear about what the decision is and how it relates to the strategic goals. This is one of the most important parts in decision-making. It is about asking the right questions and what information is needed to answer these, followed by analyzing and connecting information to gain new insights. Often reliable and accurate information exists within the company, but managers struggle to access and locate it [25].

3) Understand Business Impact

Another very important aspect in decision-making is to understand its impact and, in the case of strategic decisions, whether the organization is ready to adapt. It is about taking informed and calculated risks whilst considering the risk of inactivity versus action [26] [27]. Of course, managers will not have direct control over the occurrence of most risks, but they do have control over pre-work for and mitigation to any developments. Managers must therefore assess the business impact at different levels before making decisions. It is crucial for effective and smart decisions to understand the uncertainty which affects the desired outcome and the opportunities that decisions will create [28].
4) Listening to Stakeholders

Above all, decision-making involves bringing the right people together, especially people involved and to listen to what they have to say and get multiple perspectives. It is elementary to form a group of people who have diverse backgrounds but a definite interest in the decision. The commitment of the people involved is a critical success factor and, therefore, it is important to make strategic decisions in a more collaborative process. The idea of collaborative decision-making provides many benefits and yields better results as can be seen [29] [30]. Because of the high business complexity, decision-making must be a combination of fact-based, data-driven and gut feeling and human judgment [31].

III. RESULTS

The findings in the literature review were summarized in three distinctive categories named benefits and value of the management cockpit concept, requirements for a management cockpit and factors of decision making. We tried to visualize these categories with the blue circles depicted in Fig. 2. We found that most of the arguments (grey text) in literature can be attached to one of the blue summarizing circles in the upper part of the diagram. The bold statements have been explained in the previous part of the paper.

The idea behind the diagram is that the three blue categories feed into the research question, which is to find limitations and inhibiting factors why the management cockpit is not used more widely today. (Depicted by the big blue circle to which the arrows are pointing.)

In the next chapters we will pick out tree topics, which we consider to be very important inhibiting factors. These are shown as grey text in Fig. 2 around the blue “limitation” bubble. As inhibiting factors we see the question of business readiness, the effort of data gathering combined with analytical effort and the interpretation of the concept as such.

A. Business Readiness

As a basis, strategic decisions need a clear and shared vision of where the business needs to go and why. The decision should be aligned with the corporate strategy and goals. A management cockpit can visualize the company’s strategy for a group of managers and will help provide the necessary input for their decision to ensure its success. Without doubt it would be an advantage to conclude important decisions always in a central location where participants can directly relate their actions to the company’s goals and to any dependencies within and among decisions. Logically, in order to create such a display, the business strategy has to be well defined before it can be visualized in such a location. Well defined does not only mean documented in papers, but clearly measured with key performance indicators and captured in a continuative optimization process in order to define and select opportunities. According to SAP [10], it is, however, not enough to just have a clearly defined strategy but it is also vital that everyone in the company understands it and that they comply to the overall corporate goals and objectives.

According to Daum [4], the implementation project of the management cockpit at Siemens Belux had to include a strategy definition part, because not all the mentioned requirements were given. In a project charter it was discovered that for a management cockpit to work, the strategy had to be defined in more detail and standardized across multiple divisions. Every member on the
management level had to be included so that they would understand on what basis future decisions were made and with what strategic goals they were measured.

To implement a management cockpit a company first has to overhaul their strategy and goals, make them compliant to internal standards and communicate them well across the board. The goals and strategy must not be a secret, because in the end they will be used for the layout and design of the management cockpit. It is vital that every management member can relate to them. This gap is one of the key factors, why companies did not implement a management cockpit despite its benefits.

B. Data Gathering & Analytics

Maybe the biggest advantage of the management cockpit is the form in which the complex business data is presented. The majority of the described concepts follows a question and answer approach in order to ease the human mind into picking up and understanding the data. This approach uses simple graphical tools to give short and concise answers to possible questions on topics across the whole company. Of course, the data is always required to be as up-to-date as possible in order to base decisions on the most recent facts and events. That is why the information displayed in a modern management cockpit must be based on a well-integrated BI-solution. If not, the cockpit generates additional effort for preparation and data gathering before a meeting. If we consider a manual input of the data, we also have to consider its accessibility in a timely manner and a concise format. This means that the management cockpit, automated or not, is essentially an interface to the company’s stored data and IT-landscape and cannot be a replacement of a business intelligence tool. On the contrary, a management cockpit requires an established information base and for best effectiveness also requires automated data gathering processes.

The case study from Atos Origin [15] shows that the basic data which is needed for a management cockpit can be available in the company’s information systems, but it is likely that the data is not yet in the correct form for direct usage. Data has to be aggregated and matched from multiple sources to result in usable information. At first it was identified which KPIs will be needed in the management cockpit and it was discovered, that about 50% of them were not yet available in their current BI (business intelligence) solution. So, a big effort of the project went into gathering additional data and adding those KPIs to the mentioned BI-solution.

This discrepancy between the need to base the management cockpit on an existing BI-solution and what range and quality of data concepts this BI-solution offers symbolizes another important factor. Not only must the connection to the BI-solution be automated, but there is an additional effort involved in building and gathering all the needed information. Because these are critical tasks that have to be addressed in a management cockpit implementation project, this paper concludes the information base and data gathering another major inhibiting factor for the popularity of management cockpits.

C. Interpretation of the Concept (Tool vs Methodology)

A management cockpit ideally provides managers with all the information necessary to run their business unit and, as mentioned before, how they conform to the business strategy. In order to achieve this, the management cockpit presents a holistic view on the company and includes information levels of different granularity. Managers from varying divisions can come together in such a war room and discuss comprehensive projects or decisions that affect multiple parts of the company, because the available information covers all aspects of the business. At least this is the case in the theory.

The following decision requirements were identified in the literature review: It is important for every decision, that the key stakeholders or people affected by the decision are listened to or included in the process. The decision makers need to understand and consider any risk or uncertainty as well as the implications. Further, a decision benefits if personal bias and emotions are reduced to a minimum. Therefore, it is vital that the right people are taking part in a decision and base their decision making process on a fact base, that they can deliver or present to the deciding group of people.

According to Shah, Horne, and Capellà [25], managers can have different personalities, meaning some base their thinking almost exclusively on data (unquestioning empirics) and some build their opinion solely based on intuition (visceral decision makers). To accept and use the management cockpit optimally the managers should have a personality in between and base their opinion on a mix of data and intuition (informed skeptics).

Implementing and using the described holistic view of the company, while fulfilling the mentioned requirements of the decision making process, demands that all the top-management members and the company itself must fully commit to the concept of the management cockpit room and generally to the use of management cockpits. The case studies at Procter&Gamble [12] and at Siemens Belux [4] both showed that at first they perceived the management cockpit as a tool to support the top-level decision making process. But during their projects they recognized, that they had to implement management cockpits not just as a tool, but as a wide methodology or even as a culture. In the case of P&G this means that a digital management cockpit was available for every employee and a focus on working with the views of the cockpit throughout the company was pursued. Only then they were able to fully benefit from the appraised values.

The realization that the implementation of a management cockpit is just a new tool for managers, and that there is only limited benefit compared to the big amounts of efforts and requirements is probably the strongest inhibiting factor. It is possible that companies considered adding a war room as a tool and recognized that it would not work as a standalone product and that it had to be integrated not only in the companies IT-landscape, but also in the culture of managers and employees.

IV. CONCLUSIONS AND OUTLOOK

Management cockpits have multiple ways of supporting strategic decision making. Generally, they provide a holistic view of the company, present the company's strategy and goals in an intelligent and easily understandable visual format, and use both, current and historic operational data to improve decision-making. Managers are provided with all the relevant information and can make their decisions related to strategic targets, considering possible outcomes.

Various case studies show, that such a state can be achieved and benefits are realized. But, significant
financial and time investments are required. Thus, a qualitative analysis of multiple case studies showed that there are certain limitations of the management cockpit as well as organizational implications.

Firstly, it is required, that the company's strategy is well defined and the corporate goals are standardized. Strategy and goals need to be communicated in order that every decision stakeholder can relate to it. There is a gap between having a strategy and being able to visualize it in a graphical form. This gap has to be addressed before a cockpit can be implemented. Further, the management cockpit is only as accurate as its data. The fulfillment of KPIs and the state of major projects across different divisions are only two examples of information that needs to be digitally available. The data gathering processes of a management cockpit should be automated. The data that is available is not necessarily that which needs to be presented. In most analyzed cases, additional KPIs had to be defined and data sources identified and implemented before the management cockpit could go operative.

Lastly, there is a misconception when it comes to the interpretation of management cockpit. Managers think of the concept as a tool that can be used in a somewhat isolated way, as a standalone instrument. The analyzed successful implementations have all shown the opposite. The management cockpit approach is much better described as a methodology applied to the company as a whole and fully integrated within the corporate culture. Strategy, data and personalities have to adapt to reap the full benefits the management cockpit approach can provide. Managers and employees need to be committed and base their decisions on the visualized data, to discover where the cockpits can be further improved and gaps can be filled.

Collaborative decision-making automatically requires visualized information and a relation to the company's strategy and goals. In general, this paper concludes that organizations focus too much on providing information and not enough on improving the way in which decisions are made overall, not just on a manager level. Future research must focus on the applicability of the study outcome and the validation of the identified key requirements in a live environment. An area of particular importance in this context is the monitoring of a business project aiming to introduce a management cockpit to transform the decision-making process and enable the organization to be agile in the market and uncover new opportunities for value creation.

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