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Evaluating Groupware for Creative Group Processes – The Case Study of CreativeFlow

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ABSTRACT

The creative potential of teams plays a crucial role in generating the competitive advantage of organizations. We introduce an architecture supporting creative group processes in the context of business processes. Based on the theoretical concept of Pockets of Creativity (Seidel et al. 2010), the architecture aims to balance freedom for creative group work and constraints set by the processes in its environment. The architecture is implemented in the prototype CreativeFlow, integrating a groupware component and a workflow component. The prototype is evaluated in a case study in a TV production company. Free participation in group tasks and support for the structuring of ideas were deemed appropriate for the support of creative group processes. Process structure is mainly imposed by project deadlines that require user notification, also outside the workflow component. Process orientation is a promising approach to increase the efficiency of the creative value creation.

Keywords

Groupware, Creative Group Processes, Case Study, Artifact Evaluation

INTRODUCTION

Nowadays business processes are the core unit of analysis when it comes to questions of how to organize business. Before designing the organizational structure and the information technology (IT) architecture, business processes are created defining the framework of all subsequent design decisions (van der Aalst 2004). Workflow-Management Systems (WfMS) serve as the central component of an information systems (IS) landscape. They implement the logic of the business processes and integrate all other human and non-human components of the IS into the control flow of a process. This way, information is transmitted literally at light speed throughout the company and certain administrative activities can be performed without human participation. Consequently, WfMS provide improved information transparency, faster process execution and reduced workload for employees, thus reducing personnel expenses. However, these advantages come along with the initial effort of analyzing and implementing workflows as well as a certain reduction in the organizations flexibility.

While companies from numerous industries realized long time ago that the benefits outweigh the cost (Grinter 2000), the media industry never adopted these thoughts. Having a core business that is creative in nature, being forced to create new, innovative and unique products on the assembly line, one hardly embraces the idea of structuring and standardizing processes. Nevertheless, not all of the work done in companies from the media industry is entirely creative. As any other company, several administrative tasks are performed as well. While the potential benefits of WfMS systems are clearly lower than in other industries they may still be beneficial to some extent.

Inspired by the theory of Pockets of Creativity (PoC) (Seidel et al. 2010), a theory describing how creativity-intense business processes look like, we developed a software prototype integrating workflow management and groupware functionality into one holistic IT system designed to support business processes in media industries. Workflow functionality is used to structure administrative tasks while the groupware component serves as a source of inspiration to the creative worker. Integration ensures a seamless flow of control. The aim of our work is to explore the utility of our approach. To this end, we conducted a case study in a German company from the TV industry.

The remainder of this paper proceeds as follows. Chapter two discusses the research design. Related work is presented in chapter three. In chapter four, the theory of PoC is presented. Chapter five then discusses architectural guidelines we propose as well as our prototypical implementation. Results from our case study are reported in chapter six. Finally, chapter seven concludes.

RESEARCH DESIGN

The aim of our contribution is the evaluation of a design artifact that solves the described real world problem of designing process embedded creative group work. Accordingly, it follows the research approach of design science (March & Smith 1995; Hevner et al. 2004). Our evaluation is guided by the research process of Peffers et al. (2007) (see Figure 1): we indicate theory (1) that forms the design of our artifact. We then present the basic architecture (2), i.e. a group creativity support tool. In order to ease the evaluation of the artifact we built the research prototype CreativeFlow (3), an expository instantiation of the system architecture (Gregor & Jones 2007).

After this introductory part we focus on the qualitative evaluation (4) of the prototype. We therefore present the analysis results of a case study conducted in the German TV industry (Yin 1994). A group interview of approximately three and a half hours was held with four domain experts of a TV production company. Its core business process is the production of TV formats for TV broadcasters. The company has an international background. With about 20 employees and approximately 150 project bound, freelancer personnel it is a mid-sized player in the TV production market. As part of the creative industries, the business processes of our case company are intensively coined by creative group processes. Hence we considered the expert feedback being of high relevance for the evaluation of appropriateness of our design artifact. CreativeFlow was presented to the interviewees in a live demo. We then discussed the single parts of the system following an open questioned set of questions. The structure of the questions refers to properties of the architecture implemented in CreativeFlow. The answers were synchronously documented by three researchers which later cooperatively conducted the analysis of the gathered data. We present the results of our analysis which are related to the design decisions of the system architecture. We then formulate improvement propositions for our architecture. The indicated four phases of our research process also provides the structure of the following sections of this paper.

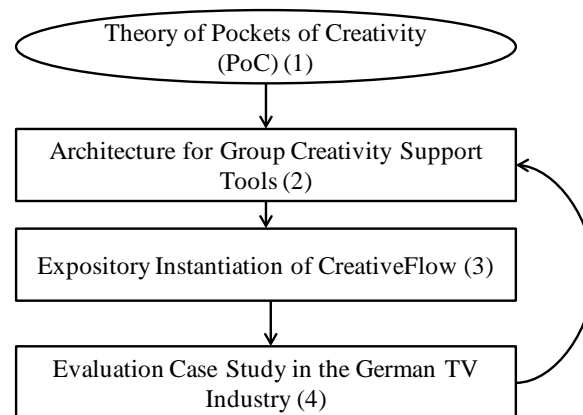


Figure 1: Research Process (adapted from Peffers et al. (2007))

In the next section related work on creative-group processes, groupware for their support and current approaches for the flexibilization of workflows are presented.

RELATED WORK

A business process is considered to be a completely closed, timely and logical sequence of activities which are required to work on a process-oriented business object (Becker & Schütte 1996). In contrast to this group processes relate to interactions taking place between group members, whether following a certain structure or not. The focus of interest is on communication in collaboration scenarios. Briggs et al. (2003) identified five general pattern of collaboration in groups: (1) *Diverge* is the process of generating concepts. (2) *Converge* aims at focusing most promising concepts while ignoring others. The pattern (3) *organize* is the establishment of relationships between concepts. (4) *Evaluate* has the purpose to foster the understanding of the consequences of the concepts. (5) *Build consensus* is the process of having an agreement in courses of action. We interpret these patterns in the context of creative work, replacing concepts with ideas. Hence, creative group processes are

interactions in groups that aim at generating ideas that may be transformed in business value. On promising approach to support these group processes is through Computer Supported Cooperative Work (CSCW). “CSCW is a generic term which combines the understanding of the way people work in groups with the enabling technologies of computer networking and associated hardware, software, services and techniques.” (Wilson 1991) Groupware are information systems that implement the principles of CSCW. Our special focus is on groupware for the support of creative group processes. We refer to this special type of groupware as Group Creativity Support Tools (GCST) (Forster 2009). In contrast to WfMS that automatically control business processes, groupware opposes no process structure. However, competitive advantage is generated by efficient business processes. Hence, as a counterpart to groupware, flexible workflow approaches are an attempt to broaden workflow applicability. Late Modeling (Sadiq et al. 2001; Weber et al. 2008) or Case Handling (van der Aalst et al. 2005; Swenson 2010) are well known approaches to defer process design to process execution or to replace the control flow paradigm of sequential executions of activities to a data centered perspective. Especially the latter has gained much awareness and has found its way into practice. However, the concept of cases which are managed with case handling systems is again mainly applied in quite formalized contexts, such as insurance case handling. More complex problem solving processes requiring flexible, creative solutions are rarely supported. The flexibility provided by flexible workflow approaches is either not sufficiently developed or incapable to respond to the requirements of knowledge workers. We thus deem a combination of GCST and WfMS to adequately support creative group processes in the one hand and assure process efficiency on the other hand.

In the next section we will present the theoretical basis that was at the outset of the development of the architecture for GCST.

THEORY OF POCKETS OF CREATIVITY

It was found that business processes involving creative tasks are not either completely creative or noncreative (see Figure 2) (Seidel et al. 2010). With a thorough analysis of these processes, parts can be identified that expose a high degree of structure, whereas other parts involve creative tasks (see level 1). They are coined by a high intensity of informal communication of the personnel involved in it and spontaneous activities hardly to predict before the actual execution of the process. When focusing on those process parts that involve creative tasks, further analysis reveals that again some structured parts can be identified (see level 2). Examples are reviewing activities or support processes that are issued from within the creative process parts. Consequently, business processes that involve creativity have levels of varying structure. They are conceptualized as creativity-intensive processes (Seidel et al. 2010).

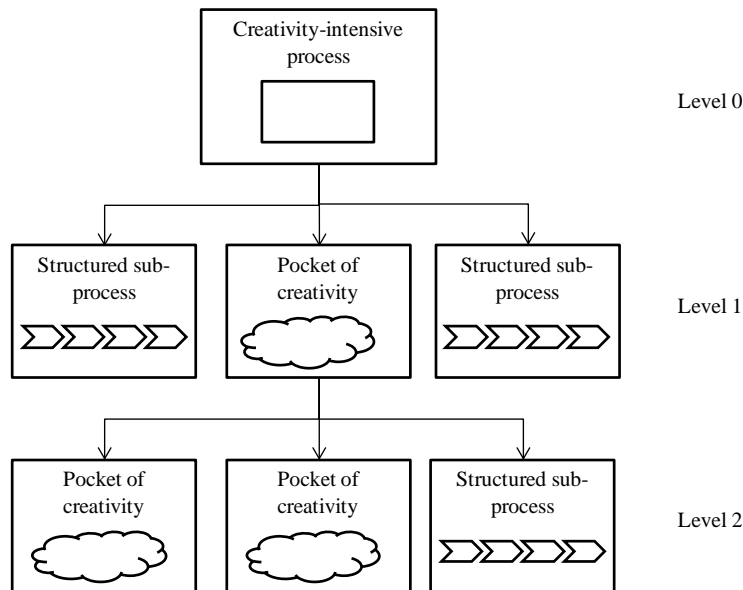


Figure 2: Levels of varying structure (Seidel et al. 2010)

PoCs are characterized by three different kinds of uncertainties: (1) the output creative work is hard to specify, due to the infinite variety of the form the creative product might take (Caves 2003). This uncertainty is referred to as product uncertainty. Product uncertainty is the source of process uncertainty. It is equally cumbersome to define the structure of PoC

prior to its execution. Components of structure are the required process steps, the number of iterations in which these process steps have to be executed and the flow of control. The last uncertainty in PoCs is that on the required resources, such as time, budget or staff. Summarizing, uncertainties in PoC express what is not known about processes that are particularly characterized by the involvement of creativity. As a counterpart, three types of constraints put some boundaries to the inherent uncertainties. Hence, they express what is known about the PoCs. The constraints correspond to the uncertainties. They also refer to product, process and resources.

The product characteristics are restricted by product requirements. Albeit they might not be as specific as requirements for other products, such as software or technical machine parts, basic requirements will always be set to creative products. Creativity-intensive processes as value-creating core business processes are restricted by some basic process constraints. These can take the form of project milestones and process phases. Accordingly, some project phases have to be completed so that other can start. This process dependency often is bound to a product dependency. The abilities of personnel determine the creative quality of a product. The same accounts for some working equipment allowing the creative personnel realize its ideas. Consequently the PoCs depend on a set of resources in order to be executed in accordance with the requirements of the client. On the other hand, efficiency in business processes has to be guaranteed by meeting some resource restrictions on budget, time and personnel. Information systems that aim to support creativity-intensive business processes have to consider the stated insights on the process as a whole and on its parts that are particularly characterized by the involvement of creativity. In the next section we will portray the architecture of group creativity support tools following this directive.

GROUP CREATIVITY SUPPORT TOOLS

Architecture of an integrated system for the support of creativity-intensive processes

In the following chapter we propose an architecture of a system supporting business processes exhibiting characteristics as discussed in the introduction of this paper. The design principles are guided by the theory of PoCs which forms the basis of our approach.

Due to the fundamental dichotomy between structured and unstructured work that has been discussed before, different functionality is needed to support these types of work. On the one hand, standard workflow management techniques appear to be suitable for well-structured processes while usage of a GCST is proposed for all activities being conceptualized as PoCs. Hence, to support the entire organization, a combination of two software systems having a very different set of functionality is required. Nevertheless, the big picture shall not be forgotten which immediately results in the need to closely integrate both parts of the system. Both the control flow of the entire process (consisting of both structured and unstructured parts) and the data flow must be sustained. Regarding the control flow, this means that participants of a PoC must be informed once the control flow arrives at the PoC. In turn, these users must provide the system with a signal indicating that the unstructured part of the process is completed so that the system can proceed with the structured one. Input data may be required to perform activities within a PoC that must be provided to it by the system. Similarly, the result of a PoC should be attached to the overall process in form of output data. Such data is passed on to the next structured part and possibly to the next PoC.

Thus, architectural principle AP1 is defined to be:

AP1: The system must provide different functionality for unstructured and for structured parts of the activities of an organization. Both parts must be properly integrated such that a seamless flow of control and data throughout the entire organization is ensured.

This principle is sketched in Figure 3 in which a PoC (the unstructured subprocess) is located between two structured subprocesses of an organization. The integration of both types of activities is stressed by the arrows connecting them.

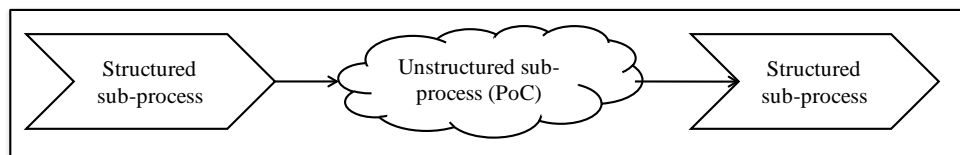


Figure 3: Interfaces between the two parts of the system

When further examining an unstructured part of a process then usually, nothing specific can be said about how that work is performed. Nevertheless, we argue that a certain basic structure in terms of work packages and responsibility allocations (Globerson 1994) will be beneficial to accomplish the work within a PoC. This allows the PoC-manager to plan his

resources, define milestones and deadlines and to keep track of progress towards these deadlines. All PoC-participants on the other hand can see all work packages of the PoC and can thus easily locate their own work within the bigger context.

AP2: The part of the system supporting the creative work must provide some basic functionality to define tasks that have to be accomplished within the PoC, to define deadline for these tasks and to assign tasks to participating users of that PoC. The tasks shall be visible to all users.

This design principle is sketched in Figure 4 in which the unstructured PoC is filled with certain group tasks representing some smaller work packages within the PoC.

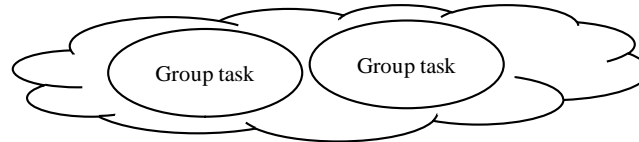


Figure 4: Group tasks within a PoC

When working on a creative group task, users will typically perform heterogeneous activities, which either cannot be supported by software tools or, if they can, are supported by specialized expert tools. Consequently, no direct support for this work can be offered by our system. There are however accompanying measures that can help while performing a creative task. (Seidel et al. 2008) for instance propose to use an ontologically structured database with multimedia content for user inspiration. By means of the ontology, the user is subsequently presented with related content that might lead him towards new ideas of how to combine content in a novel way. The authors call this “information retrieval” in a creative context which is a term we will adopt in this paper:

AP3: Creative work within a group task should not be supported directly, but rather by means of indirectly supporting software such as tools enhancing creativity of creative workers.

The implementation CreativeFlow

Given the previously discussed architecture of our system, we now present our instantiated prototype called *CreativeFlow*. According to AP1, we need to separate the structured from the unstructured environment and provide appropriate functionality for each part. The structured environment is supported by a WfMS as such systems are well matured and have proven their usefulness in numerous situations. We will call this part of the system the *workflow component*. Regarding the support for creative work and inspiration in particular, software systems are much less standardized. For this reason we have chosen to implement this system by ourselves. This part, implemented as a java prototype, will be called the *groupware component*. We intentionally chose two entirely different systems as the functionalities of these systems address two entirely different user groups. Users of the one system will almost never be users of the other at the same time. Furthermore, requirements of both user groups are heterogeneous due to the different focus.

To account for AP1, the groupware and workflow components are connected via web services with each other. This allows a workflow to trigger a new project within the groupware component and to provide any kind of data as an input. Similarly, the groupware can send output data to the workflow component and can trigger the workflow to proceed once creative work is completed. The groupware component basically consists of three parts. First, it allows creative workers the ad-hoc creation of group tasks to organize their work. They creator can define a name and a deadline and can assign others to the task. All tasks are visible to all users and each user can both decide to work or not to work on a task freely. He can do that regardless of any assignments that have been made during the creation of a group task. With this functionality, we account for AP2. Another part of the groupware component is the repository. It stores multimedia content from past projects and structures this data within an ontology. A so called watch-list is assigned to each group task in which content from the repository can be bookmarked. This allows sharing certain content and ideas with other participants working on a group task. Hence, we also account for AP3.

EVALUATION

Potentials of CreativeFlow to support structured and unstructured processes

CreativeFlow automatically connects structured processes with creative group processes. We aimed to enhance goal-oriented discussions by providing four advantages of the application of CreativeFlow:

- (1) Deadlines for group tasks are automatically controlled
- (2) Digital work results are automatically routed to the next task
- (3) No tasks are forgotten in the overall process
- (4) Personnel responsibility for tasks are controlled automatically

We then asked our four domain experts (an executive producer, the head of post-production, the creative director and a script editor): “What is the importance of these potentials for your business context?”

Result of evaluation

The executive producer generates creative impulses and asks his creative staff to follow-up and to concretize the idea. Due to high workloads and unmanaged innovation processes, the advancement of the ideas often is neglected. Hence, the advantage of explicit definition and control of task sequences for follow-up on idea was deemed among the most important potential of workflows (3). “Forgetting important things” in general, was considered one of the most important challenges in the overall production process. This also accounts for deadline control of group tasks (1). The interviewees emphasized that the control of deadlines has not only to be supported when actually using CreativeFlow. Reminders have also to be send to the personnel on other channels, amongst which E-Mail was deemed the most favorite one. The head of post-production evaluated routing of digital work content only to be of restricted applicability (2). The major part of visual material used in post-production, i.e. the rough cut, often is in analogue and not digital format. Hence many activities in the post-production are manual. Moreover, the general absence of process structure, also within the post production process, was perceived as the major obstacle for the introduction of workflows. CreativeFlow is an integrated tool, consisting of a workflow component and a groupware component. The integration has, by purpose, only been implemented on the level of the application logic and application data. The user interfaces, however, have not been integrated. This led to confusion with our interviewees, expecting both systems to one also from the perspective of the user interface. Unexpectedly, both parts of the application were deemed of use for both the creative teams and the administrative staff.

We conclude that the process integration potential of CreativeFlow was acknowledged with some restrictions: task reminding functionality beyond the system border of CreativeFlow has to be integrated. Accordingly, upcoming deadlines could be announced by automatically generated E-Mails. Moreover, automatic control of personal responsibilities of tasks was not echoed by our interviewees (4). Our interpretation is that task assignment by an automated system is of minor relevance. Hence, this workflow functionality is inappropriate for the use in creative contexts. To ease the system adoption of CreativeFlow, the user-interfaces of the workflow component and groupware component have to be integrated.

Features of creative group work in CreativeFlow

In the following the groupware component of CreativeFlow was discussed. Its functionality was presented following our evaluation example with the process of script writing. To assure goal-oriented discussions, we structured our questions according to the system components of project organization and watch-list.

Result of evaluation

CreativeFlow follows a liberal concept regarding restrictions and rights management for group tasks. All participants are free in the choice of participation. The aim is to foster creativity through liberal involvement. The participation rights and duties of group members in *group tasks* were vividly discussed. Inter-personal relations and communication in creative group processes played a crucial role in the discussion. In general, the free participation in group tasks, whether invited to the task or not, was deemed to be appropriate for group work at the case company. However, decline of participation in group tasks was considered to be potentially subject to conflicts. From the perspective of the group member that creates the group task and asks other members to participate, the decline could be interpreted as affront. As a solution, the interviewees proposed to modify CreativeFlow in a way that reasons for the decline in group task participation could be formulated. As another proposition, more hierarchic and exclusive scenarios of group tasks shall be supported by the tool. One example could be project budget discussions. The person responsible for the tasks should be able to exclusively create the group task. Participation should be obligatory for invited group members, whereas not invited personnel should not be able to freely join the task. Concerning the project level of the tool, interviewees deemed an exclusive access for the executive producer to all projects appropriate. Accordingly, role based modifications of CreativeFlow would be necessary.

We conclude that free group tasks participation is appropriate in most cases of creative group processes. However, CreativeFlow has to support the possibility to communicate reasons for the decline of participation in group tasks. As special

case, an option of more hierarchic design of group tasks shall be supported. Project overview shall be provided to special users.

The *watch-list* was considered as a handy tool to support the process of idea generation in groups. It works as a whiteboard for annotating arbitrary ideas. However, structuring of ideas and associated resources is not supported sufficiently. A suggested way of implementation in CreativeFlow is collaborative mind maps. Moreover, direct commenting on ideas and resources was deemed to be necessary for idea discussion. Further, the group ambience with respect to appraisal of single ideas shall be supported. When presenting our example of idea generation for a new script, the interviewees identified the necessity to build new group tasks from a bundle of existent ideas and associated resources in the watch-list. This could be the case if ideas within a group task are emerging and gain increased attention mirrored in an increased amount of associated ideas and resources. Consequently, bottom-up creation of group task shall be supported in CreativeFlow.

We conclude that the support of collective idea generation is appreciated in the creative group processes of our case company. However, system improvements have to be made to allow for structuring and evaluating ideas.

Interviewees concluding statement on CreativeFlow

At the end of our evaluation, we asked all interviewees for a concluding statement on CreativeFlow. This was intended as a wrap-up of our evaluation and provided the possibility to our interviewees to feedback on potentials and threats we so far did not cover in our questions.

Result of evaluation

The script editor deemed the idea of CreativeFlow as an “exciting approach”. He stated that the challenge will be to apply the idea of workflows to the production company. The production manager was convinced that CreativeFlow could foster necessary communication within the company. He saw the potential to bridge virtual project borders and foster inter-project communication. An important role in realizing this idea is mutual access on projects within the groupware component of CreativeFlow. The head of post-production was in favor of the idea of workflows. However, user acceptance of the system could be a major barrier for the success of CreativeFlow. Software adoption is even more complex given the many freelancers involved in TV production projects. In the TV production industry, the personnel working on the basis of freelancer contracts by far exceed the permanently employed personnel. The ratio in our given case company was ten to one. Since there is restricted managerial authority on the working processes of the freelancers, the introduction of new tools is hampered. Consequently, the use of CreativeFlow has first to be fostered within the permanently employed personnel of the production company.

We conclude that there is potential for workflow management in the case company. However, there is a high potential for missing user acceptance. Personnel working in creative groups do not want to be fitted to processes by software, but want to keep their freedom in doing things the way they are used to.

CONCLUSION, LIMITATIONS, OUTLOOK

We are convinced that creativity-intensive processes can profit from the support of information systems. They help to solve the dichotomy of necessary process efficiency versus freedom for creative processes in groups. Based on the theoretical concept of Pockets of Creativity we developed a system architecture integrating concepts of workflow and groupware. The architecture was implemented in CreativeFlow. Main subject of this paper was the evaluation of CreativeFlow in a case study in the German TV production industry. The interviewees neglected existence of structured processes in their daily operations. However, some information provided by our interviewees gave some evidence for the existence of control flow. The support of creative group processes with the groupware component was deemed appropriate whilst some modifications of the tool have been proposed.

The lack of awareness for process structure in the processes of our case company hampered the discussion of workflow approaches and integration of the workflow component and groupware component. The interviewees were much more familiar with questions regarding the group process, leading to more differentiated results in the evaluation of the groupware component. On the one hand this may allow the conclusion that groupware is more suited to support creativity-intensive processes. On the basis of our industry expertise and nuances in the feedback of our interviewees, we assume the paradigm of structured process to be more at present that it was deemed to be. Despite all reluctance of TV productions to process structure, the interviewees deemed the introduction of workflows to be a reasonable effort. “Actually, the situation is as unstructured as my description of it. However, this does not mean that there’s an alternative way of doing it.” Further

evaluation of CreativeFlow, possibly applying it in action to support the operative processes of the company, may show whether this “alternative way” will be beneficial.

Our findings are based on the feedback of experts from a single organization. To broaden the empirical validity of our findings, more studies have to be conducted. Site selection should be chosen differently from ours, so that companies with a higher number of employees on the one hand and very small companies of even single freelancers are asked to evaluate. The importance of communication and unforeseeable iteration in group processes might be the acid test workflow management. However, the optimization potential are remarkable and worth further intensive process analyses.

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