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Executive Summary

Aim of the Deliverable. *This deliverable was set up to define the functional requirements in the application area "film production" for the first.stage software.*

Brief Description of the Sections of the Document. *Section 1 contains the interviews with leading Austrian film makers to give a view on current use and perception of previs. Section 2 describes scenarios in which the future use of Previs with the first.stage software is outlines for the specific application area. These scenarios are mainly inferred from the outcome of the interviews and special application knowledge by the authors. Section 3 describes individual use cases of the first.stage software specific to the application area. Finally, section 4 derives the functional requirements for the first.stage software from the previously described scenarios and use cases.*

Mayor Achievements. *Definition of the function requirements for the application area "film production".*

Summary of the Conclusions Obtained. *The functional requirements for application area "film production" have been documented. These requirements will be needed to define the core functionalities in the deliverable D1.5.*

Content

1 Capturing of Requirements

The basis for these requirements were interviews conducted during film productions on one hands side and personal experience from Mr. Vogel and his team on the other. Vogel also did some field research about the application of previs technology and made inquire inquiries about if and how previs methods and tools are being taught at film schools in Europe.

1.1 Methodology

The process of defining the requirements for the film production application area consists of four consecutive steps, including interviews, scenarios, use cases and deriving the functional requirements. This is an informed process based on relevant literature [1, 2, 3].

First, semi-structured interviews with professionals from the application context were conducted. The objective of the interviews was to obtain information on procedures adopted by users and on their expectations of the system and gather information based on the user's experience.

The interviews targeted current and envisioned previs practises, experience with previs and workflow, areas of improvement, current disadvantages of previs and limitations in everyday work, as well as preferences in the application area, ideas for the integration of previs in the future using 3D tools, and possible impact on the production. Individual questions based on the person being interviewed as well as follow up questions were allowed in order to spark idea generation and the exploration of alternatives.

1.2 Interviews

Interviews were conducted with the following persons:

- **Jakob und Dieter Pochlatko**
  Producers working in the field of feature film and documentary film in Austria with co-productions in German-speaking countries (e.g., Tatort, Cop Stories, Klimt, Jack)
- **Stefan Ruzowitzky**
  Director and author. Winner of the Academy Award (´Oscar') for Best Foreign Language Film of the Year ('The Counterfeiters'). Works in numerous projects in Austria and the US.
- **Christoph Kanter**
  Set designer. Works in in German-speaking countries and internationally among others together with Austrian director Michael Haneke (Oscar and Palm d'Or winner).
- **Erich Pröll**
  Cinematographer, director and producer working in the field of nature documentary film for public broadcasters worldwide (ORF, ARTE, National Geographic, BBC).
- **Robert Dornhelm**
  Director for feature film and theatre, Academy Award nominee, projects in Europe and the US such as 'Echo Park', 'Anne Frank' (Emmy Award), 'Die Kinder der Theaterstraße'.

The interviews were conducted in different sections structured. The deepening in the individual sections was carried out according to the respective field of activity of the interviewed persons.

The following key statements were collected from the interviews:

In all interviews it consistently became apparent, that using previs is no standard in the environment of film production.

An exception are the fields, where computer generated elements have to be pasted into real pictures. Here, previs is frequently used to facilitate a seamless integration of artificial and real elements – the quality of the outcome in respect of resolution is not the key objective.

Set designer already now apply previs in their standard workflow, using ‘classic’ CAD programs to virtually construct their sets beforehand. The results are used to better coordinate with director and producer and for cost planning.

In the interviews it was frequently mentioned that they rather use drawings instead of renderings (although these drawings are frequently based on renderings). The reason is, that a too realistic representation of a scene might restrict the creative ‘free space’ for the artistic team (director, director of photography).

In one session it was mentioned, that Academy Award winner Michael Haneke asks his set designers to previsualize the positioning of actors to experiment with proportions and different camera angles and objective lenses.

On one hands side, there is the before mentioned fear to lose the artistic freedom to decide things spontaneously and creatively on the set. There, people like to work with scribbles with different degrees of detail – from rough sketches to detailed depictions.

On the other hand, there are reservations against the use of computers. Predominant is the fear of an inadequately high effort to learn and operate these tools and having to re-learn them after long production pauses.

They unanimously refuse to wear VR headsets, stating they are not comfortable enough.

When computer generated elements need to be integrated into films respectively when filming with Chroma key compositing ('Green Screen') the advantages of previsualisation are quite obvious for all interviewees. Budget permitting, they all use corresponding tools when using this technology.

In general, reservations against previs as an unfamiliar and not consistently used tool were expressed in many of those interviews – mainly by the artists. At the beginning of the interview, they all refused to ever actively ‘play’ with previs.

However, when potential benefits are outlined in more detail and when they are specifically asked about the usefulness of various features, some interest awakens. So, it can be assumed, that acceptance for using previs technologies will rise, when the tools are easy to use. More and more creative people in the film industry might review their positions, if they can – with little training – personally and efficiently operate these tools.

They basically accept the various fields of application, such as communication with director of photography (DOP) and set designer, placing of actors, simulation of camera movement and light – especially when shooting complex scenes. Still though, everybody is perfectly ok with handling these issues just by talking.

In the field of documentary films (especially nature) no application for previs is seen at the moment. Feature documentaries might be an exception.

Talking to producers it becomes apparent, that there absolutely is interest to make more use of previsualisation. Previs presentations would certainly be helpful for finding financing of film project or when looking for co-producers. It would be much easier to convince people deciding over these budgets, who are sometimes no experts and have limited imagination.

Another field of application not mentioned before is the use of previs during the production of commercials. Here, previsualisation could support the internal development of the spot in the agencies'' creative departments. People could play with different versions and produce a photorealistic version for the client presentation, who in most cases have little knowledge about film production. There are cases, where clients could not imagine the final result based on the information provided by the traditional storyboard they approved. This resulted in non-acceptance of the final spot and costly alterations.

Concerning the optical quality of the results generated by previsualisation tools, the interviewees had different opinions related to the respective field of application.

Photorealistic results are not necessary in a majority of cases.

A common requirement however is that previsualisations can be presented and altered on laptops and mobile devices.

Based on the interviews different scenarios for the use of previsualisation for film production were developed. They are listed in section 2.

1.3 Assessment of output quality

In order to assess the quality of the requirements gathered in this document and to ensure that these are valid requirements, two steps were performed based on common user experience guidelines and practises [1].

First, after gathering all requirements for all four application areas of the first.stage project, the requirements were reviewed and prioritized by each application partner. Prioritisation included all requirements, sorting them in either of the three categories low, medium, and high priority. Thus, less important requirements could be identified in order to focus on core and the most important functions of the future system while at the same time incorporating a control loop that allows for dismissal of certain requirements, which however was not the case. All requirements were kept.

However, the order of implementation is highly dependent on the priority of the requirements. The prioritized requirements can be found in Deliverable 1.5. This step ensures that only valid and important requirements result from the requirement analysis.

As a second step, the requirements are subject to constant validation, change and rework in the process of testing the prototypes developed based on these requirements. These efforts are rooted in Work Package 6. Based on the iterative approach of software development practices [1], on the basis of the initial requirements and their priorities, first prototypes are developed. These prototypes are tested iteratively in the application context with professionals.

Based on the results of these tests, the requirements are adapted and new ones are added if necessary. In addition, non-functional requirements regarding the interaction with the system are gathered based on first user tests of prototypes, as interaction requirements are often hard to obtain from users without much technical knowledge. The results of the new and reworked requirements can also be found in Deliverable 1.5.

2 Scenarios

Based on the interviews we derived use case scenarios which generalize the answers from the interviews.

For this, key statements were extracted from the interviews concerning tasks, workflow, benefits and drawbacks of used software, input /output hardware, natural interaction techniques as well as preferences for new software.

From these statements, scenarios were derived that summarize all statements from the different interviews and generalize from the concrete answers given in the interviews. Further, we developed individual use cases describing each of the tasks from the scenarios in more detail. Pre- and postconditions as well as a detailed description of the tasks are made.

From the scenarios and detailed use cases the final functional requirements for the film production application area were extracted. The requirements for each use case were derived first based on the content as well as the pre- and postconditions of the specific use case.

As different use cases can derive the same substantial requirements, the requirements were grouped and combined if possible. Driving actors and roles for the requirement were also considered in the process of grouping the requirements.

2.1 Set Design

The final version of a screenplay/script has just been finished. Director and set designer have several meetings to plan the construction of set and soundstage for the production. Using the first.stage tool, the director has roughly visualized his ideas in 3D.

The visual axes can be altered and the different effects of light (esp. of the one coming from outside through the windows) can now be seen.

The set designer can transfer these data to his first.stage device (or has access to the same data stored in a cloud) and elaborate on them, bringing in his ideas in form of 3D-constructions he produces with his usual CAD programs.

He now works out the details of the basic set design they have developed in the meeting, integrating decoration and textures. Light moods based on the intentions of the scripts are being created and coordinated with the help of the light crew and can be also previsualized.

The director accesses/imports the data and has the opportunity to position actors on the set and to simulate their movements. He can change picture sections/views and objectives/lenses and test different camera movements. The results also help the producer to get a better feeling for the final impression of the scene.

2.2 Cinematography

There are many different ways how directors see the role of a DOP during a production, depending on the persons involved and their working methods. Some directors completely delegate the shooting and concentrate on leading the actors. Other also want to closely control the composition of the images. In both cases the following scenario is applicable:

Director and DOP plan within the previsualized set design the shots scheduled for the next day. The target is to save time on the set by not having to experiment with different options on site.

The actors are being placed, the DOP shows his ideas of views and the lenses to be used (which have a great impact on the how the final image is perceived - wide angle views give a completely different impression from what is achieved by using lenses with larger focal lengths) and possible camera movements.

The director plans the movements of the actors according to the concepts of the DOP. Optionally, also the head of the light crew is integrated in this process to contribute with ideas and restrictions from his domain.

The result is a clear plan which ensures, that expensive hours on the sound stage are used efficiently and the production can proceed significantly quicker.

2.3 Lighting

Preparing a complex shooting on a sound stage the director (probably together with the DOP) coordinates his concepts with the head of the lighting crew.

Again, the basis for this discussion is the virtual set layout created by the set designer. Various options for different lighting moods can be shown and experimented with. This includes both the lighting of the interior, as well as the light coming from 'outside' through the windows.

The director once more harmonizes these findings with the planned positions of the actors and the different shooting angles of the camera.

2.4 Complex Scenes

The director is planning complicated scene, where the relative positions and of the actors and the resulting effects are crucial. Director and DOP analyse different options using the first.stage tool. The shot shall be a view into a flat, moving through several rooms. Four actors need to be positioned, their interactions and movements must be dynamically planned. The questioned to be answered are:

- What is the impression of the relative size of the actors - how tall do they appear depending on the camera movement?
- On which 'paths' are they moving in relation to each other and the camera?
- Which lenses must be used to obtain the desired effects?
- What effects does the depth of field have in different situations?
- Which kind of camera movement is to foresee?
- What would be the ideal lighting mood?

The result of these considerations would for instance be two variants, which can be applied at the shooting without much delay. Such clear pre-settings for **light**, **sound** and other parts of the **crew** would keep trial-and-error type of **experimenting** to a minimum and would save much time.

2.5 Computer Generated Images (CGI)

The implementation of computer generated elements in real pictures has become a standard at many productions. Here it is important that such 'artificial' content is integrated seamlessly and can be perceived as completely natural.

Director and DOP elaborate together with the CGI expert the respective settings, using the set design in the first.stage tool. They precisely plan the movements of the actors, their reactions to the computer generated elements and their exact positioning.

Based on this, director and DOP can plan camera movements accordingly, which again need to be coordinated with the CGI expert. The previsualisation of the scene also helps the actors to interact with objects and persons, which do not exist in reality. By showing them the desired result, the director can help them to play the scene more convincingly.

2.6 Green Box

Shooting in a Green Box is a special challenge. On one hand the imagination of the director must anticipate the final result, on the other hand the actors must cope with fact of working in a 'non-room'. All movements and the interaction with real images or CGI added later must function perfectly, because the human perception has 'stored' certain views and experiences and detects even small discrepancies as being un-natural.

Director, DOP and CGI-Expert coordinate the different elements of the shot:

Background/set in which the scene will take place, actors and their movements and reactions as well as the movements of the camera. The lighting situation in the acting scenes and in the virtual background are precisely synchronized, to give a consistent natural impression.

After the approach has been determined by the Leading Team, the director elaborates the actor's movements and gestures together with them, using the previsualisation.

2.7 Stunts

Stunts often are the most expensive elements of a feature film. Even if the exact results can not be predicted, it is a great benefit to previsualize these sequences. The reasons are not only of economic nature - also potential risks, which are always connected with stunts, can be reduced as much as possible. This means that the routines integrated in the first.stage tool showing the physical behaviour of persons and objects under certain circumstances are especially important here.

For planning a car chase with several crashes and the overturning of vehicles, director, DOP and stunt coordinator use the first.stage tool. Different variations of the car movements are being played with. They simulate the different camera angles and decide on the location and kind of the cameras and the lenses to be used. They decide in which sequences original actors must be seen and where stuntmen and women will perform. Explosions and additional FX need to be timed and scaled and their feasibility is agreed upon with the respective experts.

When the planned sequence is fixed, they discuss in detail it with the stunt team, also agreeing on the optimal placement of safety – equipment. This ensures that these provisions are as low-key as possible, avoiding post-editing time.

2.8 Public Funding Juries

Financing feature film projects is a lengthy process, often taking years and great efforts to convince potential investors. Only about a third of planned projects can be realized.

Especially in Europe a high percentage of film projects depends on public funding (especially Non-Blockbusters or films with regional topics). There is general funding or support for filming on certain locations. In almost every European country such instruments are available.

Good previsualisation can be very helpful to increase the odds when presenting film projects to juries for public funding. These panels frequently consist of people with little affinity to movie-making, who have a limited ability to imagine the proposals described with words and scribbles. To a lesser extent this also applies to the search of potential co-producers.

The producer – together with the chosen director and the scriptwriter – has prepared some key scenes using the first.stage tool, showing a quite realistic picture of the final result. Potential donors and partners get a high-quality impression about the the film, which considerably improves the chances for getting funded.

2.9 Advertising (internal)

Commercials are all about telling stories in 30 seconds. The impression of the advertised product, the CG elements and the 'style' of the film (cut-speed, lighting, camera movements) are decisive factors for the success of a spot.

Agency employees elaborate different concepts for the realization of a spot for a certain client/product. Using the first.stage tool they have prepared three different versions to be discussed with an internal team. They discuss the alternatives, adapt and optimize them in real-time until the result is ready for presentation.

While the first (internal) previsualisation was not too detailed, the clip now is being optimized to be as photorealistic as possible.

Large and high-volume advertising campaigns frequently are tested before launch. For this, the agency shows the spot to a statistically selected panel of persons and surveys the reaction. Formerly this could only be achieved be shooting costly pre-versions of the spot – now they can use the results of the previs tools.

2.10 Advertising (external)

The customers of advertising agencies frequently are not too accustomed to the world of moving images. By only being focused on their own products they often have quite preconceived ideas. These decision-makers are rarely capable of imagining a final result by just using storyboards and scribbles.

The agency has internally optimized their ideas for the realization of the spot. With the first.stage tool a sequence has been created that represents the result as photorealistic as possible. This considerably facilitates the evaluation of the result for the customer.

During discussions and reacting to rightfully proposed modifications, theses can be made in real time (probably with reduced resolution) changing the complete commercial on spot.

The final version (approved by the client) is also the basis for further talks with the producer of the commercial, the director, the DOP and the CGI expert. Using the data already generated in the first.stage tool, they can plan shooting and post-production more detailed and work as efficiently as possible.

3 Use Cases

In this section use cases are developed that describe typical tasks performed with the first.stage previs software.

The abbreviations used in this table and in the following text are as follows:
D Director
A Actor
DOP Director of Photography
SD Set Designer
LC Lighting Crew
CGI Computer Generated Image (expert)
P Producer
SC Stunt coordinator
SW Script writer

UC #	UC Name	UC description	Actors	Flow	Scenario
UC1	Initial Set Design	Generation of an initial set design	SD, D	Based on a script, an initial 3D set is created	3.1
UC2	Detailed Set Design	Refinement of set design based on design knowledge and ideas	SD	Imported set design is refined based on previous experience	3.1, 3.9, 3.10
UC3	Animation of Content	Placement of actors, cameras and movement of actors and objects	D, P, DOP	Set design is augmented using assets to generate more detailed insights	3.1, 3.2, 3.4, 3.5, 3.6, 3.7
UC4	Planning of Shots	Different alternatives of shots are being discussed	D, DOP	Set design is imported and discussed	3.2, 3.1, 3.6, 3.7
UC5	Selection of Lenses	Different lens options are evaluated and agreed upon	D, DOP	Import of 3D scene, generation of a plan	3.2, 3.4, 3.7
UC6	Discussion and Planning for Coordination	Several people work together to share and discuss ideas, restrictions and options	All	Loading of a 3D scene, discussion and output of a common plan	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10

UC7	Lighting Arrangement	Lighting options are tried out and different positions of light are evaluated	LC, D	3D scene is loaded and lighting is evaluated	3.2, 3.3, 3.6
UC8	CG Content Creation and Integration	Coordination and integration of CG content in real scenes	D, DOP, CGI	Load 3D scene and plan integration, output plan and instructions for actors	3.5
UC9	Green Box Integration and Coordination	A virtual green box is integrated in the 3D scene and different shots are evaluated	D, DOP, CGI	3D scene is loaded and green box content is added to the scene, plan is generated	3.6
UC10	Stunt Generation in 3D	Placement of safety equipment	D, DOP, SC	Load 3D scene, add content to generate a plan	3.7
UC11	Preparation of Key Scenes for Internal and External Presentation	Export of realistic pictures of 3D scenes for internal and external presentation for clients and funding bodies	P, D, SW, DOP	Load 3D scene, select viewing angle and export high res rendering	3.8, 3.9, 3.10

3.1 UC1: Import of an Initial Set Design

Short Description: The set designer and director are able to create a set design in the first.stage software based on an existing script and assets in a library. First viewing angles can be explored and the scene is created under constant collaboration with other personnel.

Precondition: Running first.stage software and a new, empty project.

Postcondition: A rough set design including assets from a library which later can be extended and saved.

3.2 UC2: Detailed Set Design

Short description: An initial set design is imported and refined with further content. Decoration is added to the scene, textures are applied to objects and different light sources are integrated.

Precondition: Initial 3D scene is loaded.

Postcondition: A detailed scene is created, saved and can be edited further.

3.3 UC3: Animation of Content

Short description: A given set design is augmented with characters, cameras, and objects. The respective movements can be edited to generate dynamic visualisations of the content in order to transport more detailed ideas. Movements and sizes of persons and cameras can be edited and combined with different lighting scenarios.

Precondition: A 3D set is loaded into the first.stage software.

Postcondition: Objects and animations are created with the software and can be saved for further editing

3.4 UC4: Planning of Shots

Short description: Camera angles can be tested and different movement patterns of cameras based on character movement and scene actions can be experimented with, planned and previsualized for idea generation and the instruction of the real camera crew.

Precondition: An existing 3D scene and different camera models.

Postcondition: A plan for the camera team on where to position cameras, select equipment and how to coordinate.

3.5 UC5: Selection of Lenses

Short description: Different lens options are evaluated and agreed upon.

Precondition: An existing 3D scene, different camera models and lenses.

Postcondition: A previsualisation of the camera views and optical effects generated by different lenses.

3.6 UC6: Discussion and Planning for Coordination

Short description: Several people work together to share and discuss ideas, restrictions and options.

Precondition: All key elements (scene, actors, cameras, lighting) of the scene are available in the first.stage software and can be experimented with.

Postcondition: Detailed plan of the both the artistic aspects of the shot and the organisational work-flow.

3.7 UC7: Lighting Arrangement

Short description: Lighting options are tried out and different positions of light are evaluated.

Precondition: An existing 3D scene and the complete light system.

Postcondition: Precise parameters for the setup of lighting.

3.8 UC8: CG Content Creation and Integration

Short description: Coordination and integration of CG content in real scenes.

Precondition: An existing 3D scene including actors, camera movements and lighting parameters. A compatible CG system with data exchange of all relevant parameters with the first.stage software.

Postcondition: Seamless integration of CG content into real film.

3.9 UC9: Green Box Integration and Coordination

Short description: A virtual green box is integrated in the 3D scene and different shots are evaluated.

Precondition: An existing 3D scene and a compatible green box system with data exchange of all relevant parameters with the first.stage software.

Postcondition: Seamless integration of green box content into real film.

3.10 UC10: Stunt Generation in 3D

Short description: Movements of objects/actors and special effects are integrated in the 3D scene and timed. The placement of safety equipment can be optimized.

Precondition: Physical behaviour of objects and bodies can be planned/simulated very precisely.

Postcondition: The stunt is planned so well, that the number of trials can be minimized and the security for all participants is improved.

3.11 UC11: Preparation of Key Scenes for Presentations

Short description: Export of realistic pictures of 3D scenes for internal and external presentation for clients and funding bodies.

Precondition: The complete project is mapped within first.stage with the option of producing high-definition renderings for some scenes.

Postcondition: Potential clients and sponsors can be provided with photorealistic scenes of the film to bring about decisions more quickly (and more favourable).

4 Functional Requirements

4.1 Hardware

Related Use Case (UC): all

Description:

Tool must run on standard hardware (PC, Laptop, Tablet).

4.2 Simplicity

Related UC: all

Description:

- Ease of use is most important.
- Simple construction of virtual sets directly in first.stage tool.
- ‘Variable’ quality from raw draft to photorealistic representation.

4.3 Drawing, Making Scribbles

Related UC: all

Description:

Drawing of raw scribbles for basic storyboards and communication.

4.4 Import

Related UC: all

Description:

Import of existing data from different sources (CAD, Maya, Cinema4D…) from previous projects.

4.5 Libraries

Related UC: UC2, UC10

Description:

- Furnishing of sets with architectural details, props or textures out of well-structured libraries which are easy to navigate.
- Easy integration of existing libraries and own designs.

4.6 Lighting

Related UC: UC7

Description:

Easy previsualisation of different variations of the light on the sets e.g. colour temperature, kind of light (led, hmi etc.), using of shades.

4.7 Camera

Related UC: UC4, UC5

Description:

Camera movements and use of different lenses and angles (preferably in real time).

4.8 CGI

Related UC: UC8, UC9

Description:

- Seamless integration of CGI elements into real film.
- Insertion of actors in CG environments.

4.9 Previs of Physical Behaviour of Objects

Related UC: UC4, UC6, UC10

Description:

- Physical behaviour of objects and persons under certain situations (stunts).
- Typical movements of avatars e.g. walking from A to B, grasping, sitting down.

4.10 Real Time Output

Related UC: all (with moving elements camera, lights actors)

Description:

Real time output of the scenes at least in medium rendering quality.

5 References

[1] Rex Hartson and Pardha S. Pyla. The UX Book: Process and Guidelines for Ensuring a Quality User Experience. Elsevier, 2012.

[2] John M. Carroll. Making Use: Scenario-based Design of Human-Computer Interactions. MIT Press, 2000.

[3] Klaus Pohl. Requirements Engineering: Fundamentals, Principles, and Techniques. Springer Publishing, 2010.

6 Document History

Ver.	Date	Changes	Author
V0.1		Structure	
V1.0	08.11.2016	First content added	Vogel
V2.0	16.11.2016	Content refined	Vogel
V2.1	28.11.2016	Uses cases added	Friedrichs / Vogel
V2.2	30.11.2016	Use cases and general content refined	Vogel
V2.3	30.04.2018	Methodology added, public version	Vogel / Wenig

Appendix

Interview-Ablauf zur Anforderungserhebung bei Filmproduktionen

- Wie visualisieren Sie aktuell Ihre Ideen bei der Vorbereitung von Filmproduktionen?
- Haben Sie bereits Erfahrungen mit Previs Programmen?
- Wenn ja, in welchem Kontext?
- Wenn nein, haben Sie schon überlegt, Previs einzusetzen?
- Planen Sie, diese Technik einzusetzen?
- Haben Sie Vorbehalte gegen diese Technologie?
- Wenn ja, welche?
- Welche Voraussetzungen müssen erfüllt sein, damit Sie Previs verwenden würden?
- Was wären Hinderungsgründe, derentwegen Sie Previs nicht verwenden würden?
- Wie müssten die Werkzeuge funktionieren / zu bedienen sein, damit Sie sie verwenden würden?
- In welchen Ihrer Arbeitsbereiche können Sie sich vorstellen, Previs zu verwenden?
- Beschreiben Sie bitte Szenarios, in denen Ihnen Previs bei der Arbeit helfen könnte. (Vorschläge machen, wenn der Befragte von sich aus keine Anwendungsmöglichkeiten erkennt)

