The Fulldome Action Flip Slide: Retelling Romeo and Juliet in Immersive Cinema

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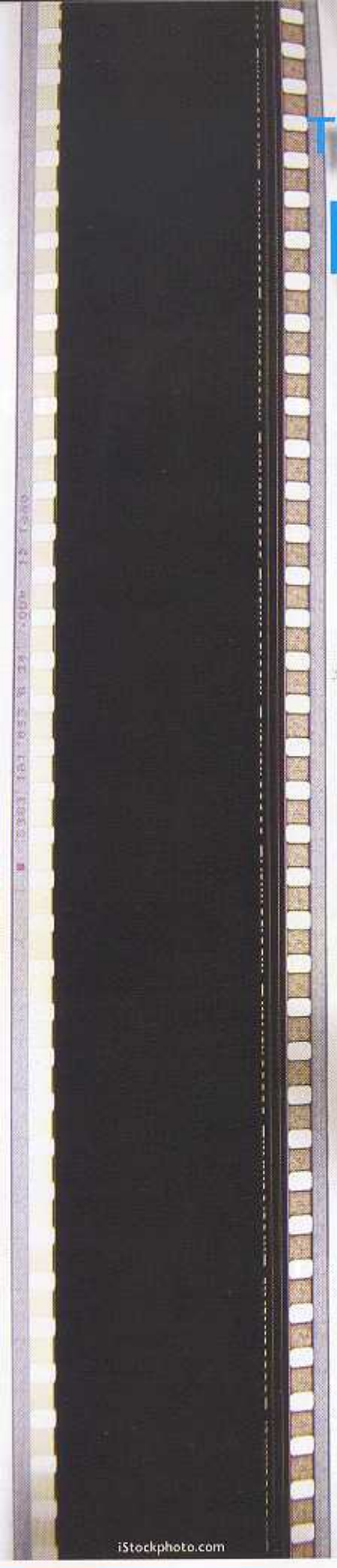


Abstract: In this article Director Harald Singer and Creative Producer Bettina Pfaendner of LivinGlobe describe their experience with the production of *R+J*, the first immersive cinema movie worldwide. They delineate the insights they received from this project for the production of planetarium shows. In addition to the article in the March 2007 *Planetarian* by Ka Chun Yu, Matthew Brownell, Joslyn Shoemer, Daniel Neafus, Thomas Lucas and Zachary Zager, this text shall initiate a discussion on how real life footage can be used in the dome.

R+J is the first immersive cinema fulldome film worldwide, produced for ADLIP and Sky-Vision. This modern adaptation of the famous drama *Romeo and Juliet* by William Shakespeare was produced by LivinGlobe in cooperation with Carl Zeiss and Sky-Skan Europe. *R+J* demonstrates various solutions of the use of live action and computer generated images (CGI) in fulldome programs and it proves that today it is possible to project real film images into a dome to tell narrative stories.

Initiated as a test film by a collaboration of bold, innovative filmmakers, *R+J* now is shown as a special interest film in planetariums. It is not the usual planetarium program, nor was it ever produced and marketed as such. The goal was completely different: to find an answer to the question "What does and does not work in the dome?"

The film was shot in 2003 in the Canary Islands. Postproduction took place in 2004 in Munich, Germany and in the US at Wispir Studios in Peterborough, New Hampshire. It was produced like a normal feature film and shot with an Arriflex 535 on 35 mm. In order to achieve the best image quality, the complete negative was used and exposed open-gate. A 6 mm fisheye lens was used. After shooting and rough cut, 29,500 frames of the 35 mm negative were scanned in 4k. As a final product we got a dome master with a 3.2k resolution. That's the best result to be achieved in a production on film.

Some 80% consists of live action footage that includes 7 actors, 20 dancers, and a crew of 50 people.

R+J premiered during IPS 2004 in Valencia, Spain. Steven Savage of Sky-Skan gave a very moving introductory speech with the legendary sentence, "You will see the very first kiss in the dome." *R+J* was first shown to the public as a Valentine's Day program at Exploration Place in Witchita, Kansas.

The Planetarium and Immersive Cinema

The planetarium has always been an imaginative and virtual space for projection. Visitors go on a trip to distant worlds and one can move freely in space and time. These abilities were improved by the new possibilities of fulldome video projection. So far projection in the dome has been limited to CGI. Expanded by the possibilities of digital art work, great imaginative live action cinema can be created with fantastic images and emotional stories. The goal is not "unity of space and time," as in the presentation of the story in as realistic a manner as possible on a seemingly real location (as in a classical feature film), but the dramatic expansion into imaginative spaces and into fantastic realms of images and associations. The action is spread out over the whole space. The audience becomes the director, by deciding where to look and which aspect of the film to contemplate. The audience has the freedom of view.

We see a great opportunity, especially in the production of planetarium shows. Only by shooting live action is the "human factor" established in the show. Computer generated characters always look artificial and rather stiff, and voice overs, even spoken by the most famous voices, cannot replace the real actor. Computer animation, SFX, and creative postproduction offer the possibility to show invisible things, like far away galaxies, planets, scientific correlation or imaginative spaces, but only the actor can touch the audience and turn a film into an intense emotional experience.

The Story

For this first film we deliberately chose one of the most famous and best dramas of world literature in order to demonstrate the connection between classical story telling and modern visualization. The everlasting "boy meets girl" story seemed to us to be the perfect choice. A science fiction story, a sheer montage film, an action story, or a typical "who done it" were ruled out because we did not want attraction to be derived from the story, but to be created by a virtuosic composition of new visual effects in the dome.

The famous story of Romeo and Juliet is shown in key scenes. Each scene was visually staged in a different way.

The "play in a play" starts in a desert. A group of young people pull a truck with building materials through an empty landscape until they discover the right spot. They stop the truck and start building a stage from wood and fabric as a party space. A huge party gradually escalates into a kaleidoscopically sensual orgy. Juliet moves around. She is totally lost, pushed forward by the wild party crowd, until she suddenly ends up in the embrace of a young man-Romeo. Their eyes lock, but Juliet is pulled away and has to continue to dance. Romeo is exhausted. He backs out into a quiet corner. He leans against a large wooden ladder. Suddenly he discovers the beautiful Juliet up on the balcony. They are overwhelmed by tender love, which leads to a first kiss.

But Romeo and Juliet are only powerless pawns in a game between two hostile families, the Capulets and the Montagues. Juliet's cousin Tybalt challenges Romeo to a fight. Tybalt loses. In a wild ecstatic fist fight Romeo kills Tybalt. Romeo escapes to Juliet. She is torn between their love and his bloody deed. But once more they are able to forget reality and, as if wrapped in a cocoon, they live out their love. They enjoy their first night together. When the new day dawns, Romeo has to flee because the prince has sentenced him to exile for his crime. Tragedy takes its course. The priest resorts to a trick: he gives Juliet a potion, which will seem to kill her. Unaware of this subterfuge, Romeo secretly returns from exile and finds the allegedly dead Juliet in her crypt. In his desperation, he takes true poison to be united with her in eternal love. While he is dying, Juliet wakes up from unconsciousness. She kisses him in joy, anger, and finally in the desperate attempt to get some of the poison from his lips and die with him. She succeeds. Romeo and Juliet are united in death. But that's only a play in a warm desert night. After the tragic ending, the party goes on with dancing and celebrating.

The Visual Language

In *R+J* we have tried to use the complete potential of visualization in a dome. Each scene is an experiment. Some have succeeded and others have demonstrated limits. The following short review reflects our approaches and experiences.

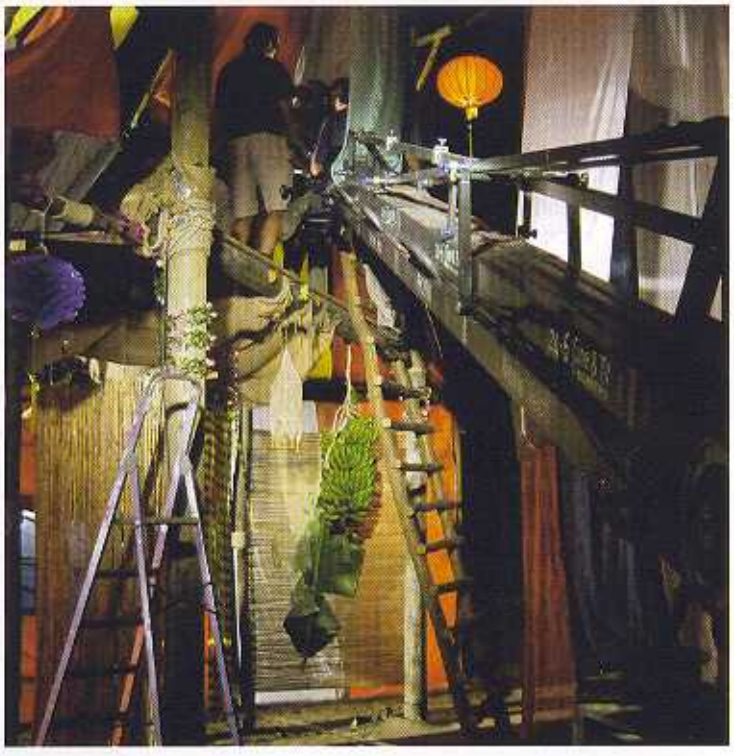
Cross-Reflection: The greatest challenge of visualization in domes is cross-reflection, i.e. the fact that light is reflected from one side of the dome to the opposite side. The brighter the image, the more light is reflected, which inevitably leads to low contrast and visually

The young people arrive with the construction materials. All images provided by and © LivinGlobe

bad images. Therefore, the goal has to be to create images which have as few bright spots as possible. The starry sky with only pinpoints of light is ideal. To get as close as possible to this ideal, we decided to keep the film as dark as possible and therefore shoot the major part of the film at night.

Sceneries: The film's "establishing shot" defined the site of the story: empty desert scenery shot on a plateau at over 2.2 m (7200 ft; it is above the clouds) around the volcano Teide on Tenerife, Canary Islands. It is extremely difficult to depict sceneries in the dome because it is situated over one's head, while the view on scenery is usually directed into the distance and downwards. In a 180° dome one would not see the scenery when shot with a horizontal direction of the camera. Therefore, we slightly tilted the camera and moved the scenery's horizon about 45° up. This can only be done with films for unidirectional domes. In theaters with concentric seating, it would be a disadvantage for the audience. In *R+J* we tried to find a compromise and took great care in all scenes so that they can be shown in both types of theaters.

A further problem in shooting sceneries with daylight is the Sun. We adjusted the exposure to the sunlight on the scenery and accepted the outshining of the Sun. Interesting clouds were visibly enhanced during postproduction. These help to fill the image.



Top: The contrast between the dark background at night and the colorful set; Bottom: A crane allowed action to be filmed from above and emphasize the vertical composition.

We wanted to test as many different challenges as possible, so we deliberately shot the introductory scene during daylight. The Sun in the sky is the worst source of light for the composition of image because it results in a low-contrast, uniformly bright lighting. The richer in contrast images are, the better is their visual impression and the sharper they appear.

We were surprised to find out that cross-reflection does not downgrade the images as much as we thought. We therefore concluded that it is possible to shoot during daylight.

The Set: The design of the set is especially important. Sets for conventional films will not work in the dome. The set has to be designed in a way that the action can develop not only horizontally (as in conventional film), but also vertically. Only that way can the dome be filled with action. We believe that it is the biggest mistake of most dome films to set all the action with characters in the lower third of the film. The impressive screen is reduced to a postcard and the audience will ask why the film is projected into a dome.

For *R+J* we opted for a high round construction which tapers off the zenith for the stage. The party people construct a stage in the desert, where they want to stage the play *Romeo and Juliet*. This stage, shaped as an open pavilion, consists of three levels: the ground, where most of the action takes place; a second level for supporting action and the balcony scene; and the side walls ,which surge upwards.

The walls were created by set designer Ralph Michels with colourful and high-contrast hanging panels of cloths that moved with the wind. Behind the panels one only sees the black night sky. This trick results in a very light, lively image extremely rich in contrast. The most important goal for the set design was to be able to create real images which were as rich in contrast and as colorful as possible.

By constructing the stage in different levels we gained the possibility of filling the entire dome with action. For example, in the party scene the disc jockey dances on the balcony. The scene with Romeo and Juliet's first kiss does not take place horizontally, but vertically. Romeo climbs up the ladder to Juliet, who sits dreaming on the balcony. Film makers have to use their imagination to create different, new, and unexpected levels of action to fill the hemisphere. In the dome the audience has a permanent 360° view, which is one of the major differences with conventional film. It is important to carefully design not only the location of the main action, but also all the other parts of the set. In the dome nothing is outside of the view. The audience can let their eyes float; one will always detect something new, like a small altar in one corner or fruits hanging from the ceiling.

The Actors

The shooting of a dome film was a completely new experience, especially for the protagonists. We decided to maintain the nature of the stage play *Romeo and Juliet*. The dome offers the possibility to perform as if on a stage, but with a bonus. In classical film, cuts are necessary to show the dialogue partner or other parts of the set, whereas in a dome film one always sees both dialogue partners at the same time. The audience decides whom to watch and thus becomes the director of the scene. This procedure naturally leads to rather unhurried staging of the story. If the director wants to achieve a faster pace, conscious cuts will be necessary.

Close-ups are more difficult. Due to the use of the fisheye lens, during close-ups the camera has to get extremely close to the faces of the actors. Sometimes there will be only a few inches of distance. Therefore the acting is more difficult and the range of action and movement limited. Lighting can also become a problem, because the camera will easily cast shadows on the scene. For the dialogue scenes between Romeo and Juliet we selected the image segment in a way that the zenith is never crossed, otherwise the character would be upside down in the dome. Our experience has shown that within these limits, the compo-

sition of the image segment is at will. We do not regard the low camera position which we used primarily in *R+J* as necessary anymore.

Camera Work

Our camera team met the biggest challenge in *R+J*: how to light a 360° set at night, without having the spotlights on-screen. Director of Photography Peter Mathes and his assistant, Mathias Schmettau, mastered that difficult task in a creative way, even though they only had very limited time for their complex preparations. During the day the set was built for the evening. In the afternoon, 11 gaffers and grips set up the lights at the planned locations, laid tracks and prepared the crane. At dusk, lighting could start in detail, which usually took until midnight. Meanwhile the director rehearsed the scenes and movements with the actors. After a meal at midnight, the shooting could start in the early hours of the morning and had to finish, sometimes painfully soon, at dawn.

Does the camera always have to point up, because the dome reaches over the audience's heads, or can it be tilted? In *R+J* we tested several camera positions. For the party scene we buried the camera in the ground in order to achieve the lowest possible position. Several lights were put into the same trench to light the scene from the camera axis. These trenches were secured with glass so the dancers could get very close to the camera.

We knew that we essentially wanted to avoid erratic camera movements because these feel very uncomfortable to the audience in a dome. To get smooth and fluent camera movement it was mounted on a dolly or a crane. We hold that the use of handheld cameras is impossible for dome films. The big Movie Tech crane with 10 m height proved especially useful. With this crane we were able to move freely around the entire high stage space, allowing us to emphasize the vertical in our film composition.

At the end of the film we staged the scene which was visually the biggest challenge: the final scene of Romeo's and Juliet's deaths. Their dreams end in that tragedy; in effect, the world literally stands on its head. We staged this without paying attention to the zenith and filled the whole hemisphere with images. The camera on the crane moves from a height of 10 m down to the two lovers and as a natural result, Romeo hangs "head over" in the dome while he is drinking the last drop of poison—as if he hangs on the gallows, the very image of pain and imminent death.

This scene was a great risk: would the audience accept that in the dome? The reaction was surprising. Although the first comments were negative ("one cannot do it that way"), an increasing number of people have come to support the method and understand it as something really innovative. That's exactly our position: the overstepping of limits of composition for dramatic reasons emphasizes the drama and meaning of the direction.

To film the dancing from the lowest level possible, cameras were buried in the ground. Lights in the trench lit the scene from the camera axis.

Cuts in a Dome Film

Another major question was how many cuts and at what pace would they be acceptable in a dome. In conventional film, montage sequences are an important element of composition. Would these also work in the dome? To answer that question, we edited the first scene (entrance of party people, construction of the stage) in a conventional slow pace. The actors arrive, unload the truck, and start building the stage.

Our experience shows that cuts work. The audience is so used to this way of composition that they accept the change of scenes in the dome. Our experience has thus refuted the doctrine that in the dome one can use only invisible changes of scene. This result offers a much wider range of composition for future projects.

Special Effects

We believe that the composition of immersive cinema allows much more innovation and experimental work than in conventional feature and documentary films. The dome is an imaginative space and as such, demands the use of special effects. In the party scene, where Romeo and Juliet meet for the first time, we used these types of visible effects to demonstrate the atmosphere and ecstasy of a night of dancing.

The scene starts in a conventional way. The party people dance, shot from a low position. Gradually, these movements develop into a kaleidoscopic picture. As if in a trance, the single actors merge into a suggestive impression of movement and color. The club music, which is very much dominated by bass, emphasizes the impressive effect of the scene. At the end of the dance Romeo and Juliet meet for the first time—they seem electrified. The trance disappears and the view focuses on those two characters.

In this scene an important part of the image composition was done in postproduction. All "unimportant" elements of the image were made unfocussed and darkened. Only the two protagonists are clearly visible, until the dancing crowd tears Juliet from her contemplation and the scene continues in its kaleidoscopic intensity.

Real Shooting and Computer

Animation: Computer animation for the dome is produced easily and at relatively economic costs. Many possibilities for composition arise especially from the combination of scenes with live action.

In *R+J* we have tested different variations.

Match-cuts: Based on the design plans and photographs of the real set, our lead visual artist Kevin Beaulieu reconstructed the complete stage in 3D in order to create the opportunity to transition from reality to computer animation. The single poles and elements of the stage come flying through the air and build the final stage, and then we return with a match-cut to the real stage.

The Enemy Groups: Romeo and Juliet come from families who hate each other. We show this in the scene when Romeo and Juliet wake up and take each other's hands. The people in the background belong to the enemy



From left: The kaleidoscope effect of the dance scene, the "love bubble," and the "fight of the colours," all blends of live action and CGI.

groups. Like boxers, they start wrapping ribbons around their hands. Each group is symbolized by a different color. Then, in postproduction, the people were removed and only red and green were left. In a computer animated "fight of the colours," the fight between the groups is shown.

Image montage: The visual collage of live actors and CGI background is another possibility of image montage. The actors step out of their role, to tell their view on the story. Thus we could tell the essential story despite the film's short duration of 20 minutes.

Love Bubble: For the love scene between Romeo and Juliet, a "love bubble," we used blue-box technology. Romeo and Juliet are lying on their love bed, which is shot in front of a green wall and easily cut out and inserted into the computer generated set of the love bubble. In the computer animation, the complete montage is then moved around the dome. Warning: blue-box shooting sounds much easier than it really is. The director of photography has to have a lot of experience in order to guarantee that fine structures such as hair are maintained in keyed scenes. A lack of experience often results in ugly visible edges around the cut-out character.

These examples show that with a creative combination of images of live action and computer animated elements, impressive and comparatively economic results can be achieved for planetarium shows and immersive cinema movies.

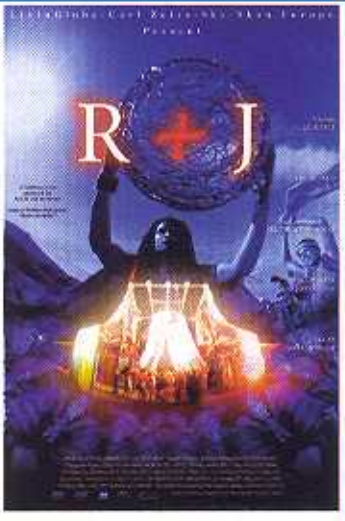
The Partners

LivinGlobe was founded in 2003 by Bettina Pfändner and Harald Singer with company offices in Berlin and Munich. LivinGlobe focuses on the production of fulldome films for planetariums, science centers, exhibitions, and events with the goal to establish immersive cinema as a new film genre on the market. After the production of *R+J* we developed an ultra high resolution fulldome production technique (fulldome UHR), which allows the digital production of fulldome video up to a resolution of 6k. LivinGlobe is currently developing its first immersive planetarium show about the life and work of Galileo Galilei.

Harald Singer is a director, writer and producer with 20 years of experience in the production of over 400 commercials and feature films. Bettina Pfändner has produced 500 hours of TV films as creative producer and has written several feature film scripts. ☆

Harald Singer and Bettina Pfändner at IPS 2004 in Valencia, Spain

Credits
Title: *R+J (Romeo and Juliet)*
Duration: 20 min.
Production: LivinGlobe
Coproduction: Carl Zeiss, Sky-Skan Europe
Producer: Bettina Pfändner
Director: Harald Singer
Visual Design: Kevin Beaulieu
Cast: Juliet Dietze, Florian Jahr
Produced for ADLIP and SkyVision



Apart from the two protagonists, there were five supporting roles and 20 male and female dancers. Romeo and Juliet are played by Florian Jahr and Juliet Dietze from Germany. They are very talented young actors chosen during a casting session with Uwe Buenker casting in Berlin. The actors for the characters Tybalt (Medy Soul), Friar Laurence (Ruediger Reschke) and Mercutio (David Toeroek) are also from Germany. The Prince (Biama) and the Nurse (Tania Dinnery) were cast in Spain, where we also found the 20 dancers who were chosen from more than 100 candidates in a "you can dance contest."

For economic reasons some people have performed double-duty. Beside Pascal Mokrosch and Guido Hieronymus, Medy (Tybalt) was also responsible for the music. Ruediger Reschke is a professional dancer and choreographer. He created the choreography for the party scene. David Toeroek is a renowned martial artist who has participated in numerous action films. He developed the fighting scene between Romeo and Tybalt. Florian and Medy travelled to Berlin weeks before shooting to be trained by David. The scene that looks so natural in the film is the result of hard training and long preparation.