



Nothing Is Real

by Andy Nicholson, Production Designer

"You know, in the end, the technology thing...I mean it worries me a little bit when people are talking about which are the real sets, which are not...This is a movie, nothing is real... everything is fake. And everything is created by the same group of people, just with different tools."

—Alfonso Cuarón



Previous pages: A Photoshop® keyframe image by Concept Artist Julian Caldwell of Ryan (Sandra Bullock) in the Soyuz, tangled in the deployed parachute. This page, above: A screen capture of Ryan and Kowalski (George Clooney) held by a thread and slipping away from the ISS. With the exception of Ms. Bullock, this is an entirely CG environment. Opposite page, top: Two screen captures of (left) Kowalski's POV of Ryan and the ISS as he drifts away, and (right) Ryan servicing the Hubble. Supervising Modeler Pierre Bohanna's team manufactured a complete physical version of the computer card array and replicas of real teathers so that their physical properties could be taken into account by the animators and coders at Framestore. Ryan's diagnostic's computer (page 48) is visible top left. With the exception of Ms. Bullock's face these are entirely CG environments. Center: Concept Artist Andrew Williamson's Photoshop keyframe sketch of Ryan and Kowalski's POV as they approach Shariff's body, still tethered to a section of the Shuttle.

I first met Alfonso Cuarón in a café on a Monday morning near his home in London. I'd received a script midday Saturday. *Gravity* was to be set almost entirely in low-Earth orbit and in zero G. It was unlike any scenario I had read before. From a conversation with producer David Heyman I knew that many of the sets were out of necessity to be virtual. It was an immense challenge to re-create all of this and would involve huge logistical, technical and creative innovations.

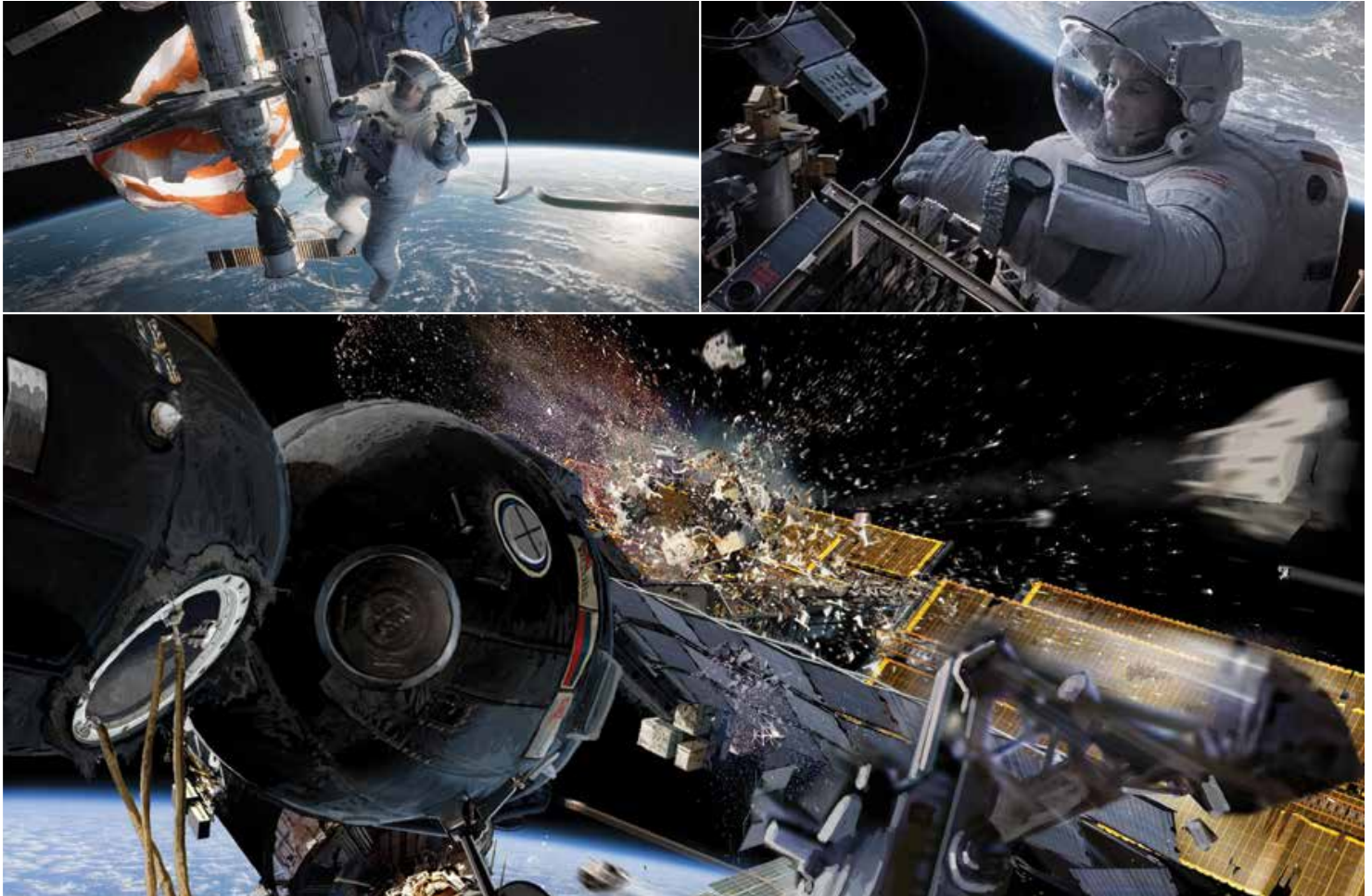
Before the meeting, I had gathered a selection of stills from various NASA websites and what excited me were the details, the economy of the engineering and crucially, the clarity of the images. The thirty-minute meeting turned into two hours and Alfonso asked me one very important question: "Do you think it can be done?"

The CG imagery had to be photorealistic and merge with the physical sets seamlessly.

The design aesthetic, so obvious in the detailing, was crucial for the film. To bring everything together, continuous communication between all departments would be critical.

The collaborative and collective genius of visual effects supervisor Tim Webber and his team at Framestore and cinematographer Emmanuel "Chivo" Lubezki cannot be overstated and are well documented elsewhere. I will focus here on the Art Department's design process and production pipeline.

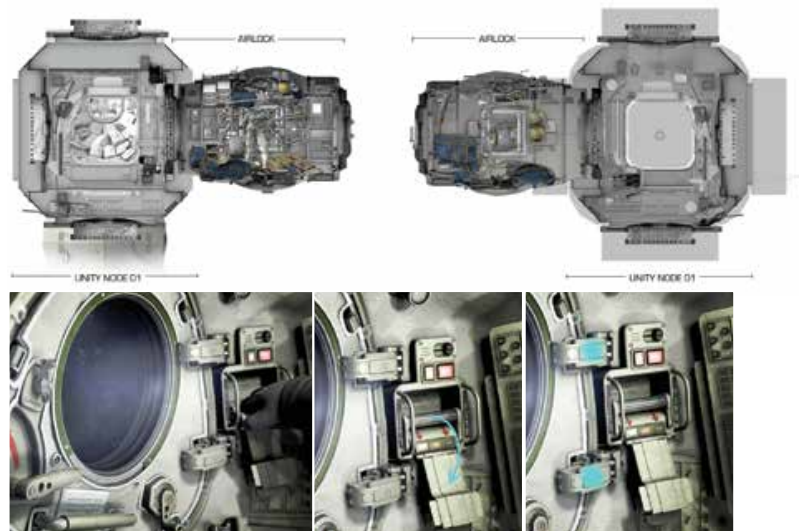
Alfonso's vision, the world the story was set in and the physics of that world, would drive the need for creative innovation throughout. We are all used to interfacing with visual effects artists when extending physical sets, generating background plates or working with action sequences. *Gravity* was to be completely different because entire sets, complete with dressing, were to be fabricated only in the computer. In addition, the camera would often be less than three feet from everything



so we would need to pay exact attention to detail throughout. Consequently, the production processes and workflows used on *Gravity* were unique and involved every department.

My job as *Gravity*'s Production Designer was similar to that involving most period movies set in a specific environment. However, everything about this Art Department's structure, pipeline and output would need to be tailor-made for the different forms of information that would be disseminated, as so much Art Department output would be relayed exclusively to visual effects artists. Everything (including the props) was either designed from scratch or based on exhaustive research and adapted to suit the mise-en-scène.

Pictorial and physical research was sourced from technical libraries, the space industry and NASA's own myriad public domain data. Websites like **Space.com** and **nasaspaceflight.com** were an important source of technical manuals and videos that helped inform zero G animation, etc. When it was appropriate to purchase physical items and



Above: Concept Designer Ivan Weightman drew these cross-section renderings through the ISS airlock using Cinema 4D and Photoshop. 3D Concept Designer Jamie Martin used Cinema 4D, Photoshop, and Illustrator® to create procedural explanations of the hatch emergency release lever in the Soyuz as reference for previs animators, model makers and Ms. Bullock's welcome package.



space memorabilia, even eBay became a resource. From research, and then in conversation with Alfonso, rough, spatially accurate interiors and exteriors were designed and modeled in the Art Department in Cinema 4D. FBX files were then sent to Framestore who were working predominantly in Maya® so that Alfonso could then work on them with animators. Framestore would then send back notes and models complete with camera paths which I used to update and augment as required. This process would repeat until the sets were refined to a point that we could begin to build detailed concepts in the Art Department. Once these were complete and approved by Alfonso, they could be handed off to set decorator Rosie Goodwin; then Chivo could tackle the somewhat abstract task of prelighting the scenes for the physical shoot. One huge advantage of receiving camera path data from Framestore was that Alfonso could sit with any of the set design and set dressing modelers, adjusting parameters and even details on the fly, then work with Framestore's previs animators on the same set as soon as the model had updated on their server.

The degree to which every set would be physically or virtually built was assessed. The extent of either was determined by the complexity of the shot (camera movement, performance capture, lighting

and level of detail) and relative cost. Every scene in the movie had some sort of CG shot list, even if just background subtleties or a couple of floating objects. All CG sections of the movie needed to be prelighted before the shoot and performance capture. The Previs/Animation/Art Department loop was key to achieving all of that.

A unique byproduct of this design process was the ability to engage in an often frame-by-frame study of everything that would be on screen in the final assembly. The interiors in the International Space Station (ISS) and Tiangong, the Chinese space station, are restricted spaces. Surfaces would often be close to a slow-moving camera, so each material and item of dressing was carefully considered before being used. Even in space, there is wear and tear; the ISS has been continually occupied for almost thirteen years and is a continual work in progress. There are sections both inside and out that show their age so I incorporated that degree of texture in the design and passed that information on to the texture artists at Framestore. In 3D, the tremendous amount of layered detail has an essential cumulative effect on the viewing experience.

Each of the hundreds of props, from large hand tools to the manuals and cutlery, were painstakingly researched or designed and then computer-modeled, generating a library of props that could then be used to digitally dress the sets using the previsualized shots. It was important to show that the ISS is occupied by people of different nationalities and tell their stories, so care was spent deciding who they could have been and adding suitable layers of dressing.

"I worked so hard with Rosie Goodwin because we knew the elements that we placed in the set would talk about the people in space, would reveal something about them. And I'm referring to the stuff that is floating, as well as everything that is in or on the walls of the space station.?? All of that had to be perfectly set decorated and art directed- because we wanted to convey their history or their personality."

—Alfonso Cuarón

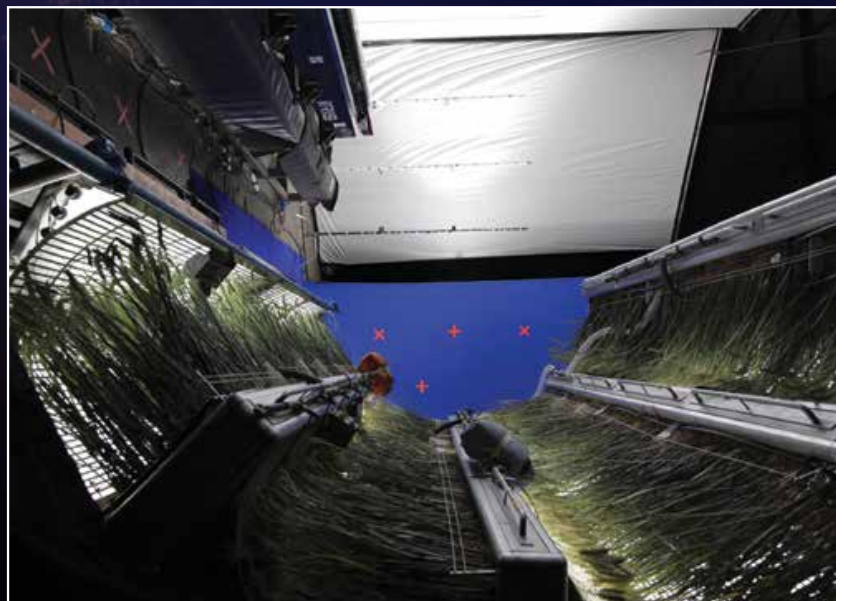
Rosie had a very particular challenge. Her job began traditionally with detailed dressing studies made for each interior that were presented as a combination of physical props and photographs. These involved character, nationality and backstory. However fleetingly, we knew everything would be seen. Once a prop list had been designed for



each sequence, the physical props were hired/purchased/manufactured as required and handed to Framestore for turntable photogrammetry. Working with her own modelers, Rosie dressed the same 3D set models that were used in the existing previs animations, complete with camera paths with low-poly 3D props. We were even able to add basic placeholder animation to some floating props if required. Alfonso could then study the dressing in a shot-related context and make refinements. As with the set design pipeline, this process would repeat until signed off by Alfonso.

The physical sets fell into two areas: standard photorealistic and proxy. Supervising Art Director Mark Scruton had his work cut out. Complete physical sets were built for the Soyuz and Chinese Shenzhou capsules by supervising modeler Pierre Bohanna

Opposite page, top: A set design and dressing concept illustration of the ISS airlock drawn by Ivan Weightman in Cinema 4D and Photoshop. It was made for approvals before 3D dressing could commence. Center: A set still of the Soyuz capsule showing two of the four articulated panels open and one of the three seats dropped out to facilitate a shot. Bottom: A screen capture as Ryan exits the airlock and heads towards the Zarya and Zvezda capsules. This is an entirely CG environment: the interior ISS sets and all its props were designed, chosen, dressed and incorporated into the previs before they could be handed to Chivo for prelight. This page, above: A set concept for the interior of the Tiangong tunnel of wheat, by Props Conceptual Artist Ryhs Pugh, done in Maya and Photoshop. Below: A set still photograph of the tunnel of wheat, built as a physical set. Half of the tunnel was mounted on a shaking gimbal and the two halves were matched with motion control cinematography.





PERSPECTIVE | MARCH/APRIL 2014 27