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Article *in* Journal of Film and Video · August 2014

DOI: 10.5406/jfilmvideo.66.3.0031

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Contests and Simulations: *Tron: Legacy*'s Connections with Technologies

AYLISH WOOD

THE TRAILER CAMPAIGN FOR *TRON: LEGACY* (2010) reintroduces the story-world of Kevin Flynn and the Grid first encountered in *Tron* (1982), while also showing off the latest incarnation of light cycles, disc battles, and recognizers. Though the film received mixed reviews for its story, the special effects—or F/X—sequences of *Tron: Legacy* were widely applauded on its release in late 2010. The F/X are central to the ways in which the film imagines the interiority of a computer game, with much of it depicting technological entities (Alter; Bradshaw; Ebert). Stories of technology also reside, however, in the connections between the story-world of *Tron: Legacy* and a range of contextual materials. In paying attention to these connections, *Tron: Legacy* offers an opportunity to expand ways of exploring technology in contemporary popular cinema.

The contextual materials relevant to a discussion of technology in *Tron: Legacy* are primarily the mythology of Tron and also production culture disclosures. Contextual materials include stories that intersect with those of Tron-world and that have the capacity to prop up the fiction's story-world, extending or undermining it. The mythology of Tron starts with the original *Tron* film, released in 1982, and is added to by a range of transmedia texts, including comics and computer games. Production culture disclosures include "making of" featurettes, interviews released online, and articles about how various aspects of the film were achieved. These two sets of materials form part of a network with which *Tron: Legacy* coexists. The idea of transmedia storytelling is more usually associated with a fiction created across more than one media platform (Kinder; Jenkins). But contextual materials too are transmedia texts, each making a contribution to a story about technology. This perspective takes its lead from John T. Caldwell's position that production disclosures are trade narratives. Instead of seeking out the trade narratives of production culture disclosures, this discussion explores them as sources for stories about technology.

Tron: Legacy is more than a spectacular revisioning of light cycles and disc battles. Instead, when placed in a network of contextual materials, *Tron: Legacy* can be explored as working through an active contestation of our understandings of technologies. This involves something more than a stand-alone recuperation of a film often critically reviewed on its release. What is distinctive about *Tron: Legacy* is its connectedness with transmedia iterations of Tron-world. A connecting thread running through this network links computers in actuality with computer games and also with films about computer games. Across this thread questions are raised about both familiar and new technologies. The following discussion focuses on three areas. The first concerns *Tron:*

AYLISH WOOD has written articles on visual effects in cinema, animation, and games. Her work has been published in *Screen*, *Quarterly Review of Film and Video*, *New Review of Film and Video*, *Film Criticism*, *Games and Culture*, and *Animation: an Interdisciplinary Journal*. Her books include *Technoscience in Contemporary American Cinema* (2002) and *Digital Encounters* (2007).

Legacy and its transmedia texts. These place the imagined and futuristic technologies as familiar, our understanding mediated through connections with objects in the world. A consequence of placing technologies in the world is that they become knowable as technology, rather than only standing in for constructions of humanness. This idea is followed through in relation to two elements of *Tron: Legacy*: data bodies and the evolving technologies depicted in the entities Clu 2.0 and Quorra.

Back to the Grid: 1982 Revisited

The marketing strategy of *Tron: Legacy* drew on the legacy of *Tron*. Steve Lisberger, director of *Tron* and producer of *Tron: Legacy*, comments that as the Tron story has "continued to evolve and grow the simulation has got more perfect and more realistic" (qtd. in "Tron Legacy Shoots in 3D"). Lisberger's suggestion that the simulation has become more perfect picks up the connecting thread running through Tron-world. Via this thread, the imagining of futuristic technologies in Tron-world is mediated by a series of connections linking both reality and fiction.

In *Simulation and Its Discontents*, Sherry Turkle asks, "What does simulation want?" (6). Her answer is that simulations want immersion, the full imaginative engagement of architects, scientists, artists, and also viewers:

> Immersed in simulation, we feel exhilarated by possibility. We speak of Bilbao, of emerging cancer therapies, of the simulations that may help us address global climate change. But immersed in simulation, we are also vulnerable. Sometimes it can be hard to remember all that lies beyond it, or even acknowledge that everything is not captured in it. (7)

Turkle's project is to interrogate what happens to engagements with reality when simulations are used to aid design and visualizations. If users of packages that generate simulations remain unaware of the ways in which they edge out reality, what might happen to engagements with that reality? Although the fictional worlds of *Tron* and *Tron: Legacy* do not matter in the same way as architectural design, molecular modeling, and research into gene therapies, the kinds of questions Turkle asks can inform an engagement with Tron. However, unlike the examples Turkle considers, in the world of Tron, simulations edge *in* reality. Far from creating a credulous audience, by edging in reality, the marketing strategy places *Tron: Legacy* within a network that facilitates connections to contemporary concerns about technologies.

Before more fully considering *Tron: Legacy*, it is useful to quickly revisit the context for *Tron*, which was based in both the reality of household computers and an existing arcade game culture. When *Tron* was made in the early 1980s, home computers were relatively new. The first home computers appeared in 1977, with the market taking off from 1982 onward. Through the 1970s, computer-based arcade games were also emerging, with games such as *Pong* (1972), *Space Invaders* (1978), *Pac-Man* (1980), and *Donkey Kong* (1981) established as central to the history of arcade video games (Kent). At the point of *Tron*'s release, computers and games were already part of popular culture, though not embedded in the way that they are some thirty years later. Given this context, *Tron* not only imagines the inside of a video game but also stands as a simulation of a version of an early electronic environment.

The developing electronic environment of the film industry is also part of Tron-world. Though it was not a commercial success, certainly in comparison with its box office competitor *ET: The Extra-Terrestrial* (1982), *Tron* has achieved longevity as both a cult classic and a key moment in the development of computer-generated imagery. For figures within the F/X industry, *Tron* has a special status because it opened up a range of possibilities for computer-generated F/X (Gagne; Wolff; "Original Tron"). In the twentieth-anniversary DVD edition of *Tron*, John Lasseter, the director of *Toy Story* and many other computer animations, comments, "I think it will always stand as one of the milestones of computer animation. I mean, without *Tron* there would be no *Toy Story*." Establishing *Tron* as a

milestone in computer animation gives the film its place within history and locates the then-new technology in actuality.

Tron: Legacy exists within a wider digital terrain than *Tron* did in the 1980s. The multiple texts that coexist as the legacy of *Tron* connect in ways that more explicitly edge reality into the fiction. This is active in the shifting between Tron-world as a simulation of something in actuality and as a simulation of a fiction, that of the earlier film. For instance, when writing about the release of *Tron: Legacy*, commentator Ime Atakpa remarked of *Tron*, "The movie effectively gave an image to how processes might work in a real computer . . . Because of this sense of authenticity inspired by the special effects, one could definitely imagine that the fictitious world of *Tron* was something entirely real." In the slippage between fiction and reality seen in Atakpa's comments, the fictional entities of Tron are placed as technologies known and used. Though relatively few people in 1982 had access to a household computer, by 2010 personal computers in homes and offices had become commonplace. The knowability of Tron-world is evident through other connections too. For fans of the original, the fantasy world of *Tron* is already a very familiar one. Not only is it simulated in *Tron: Legacy*, but it is propagated in other transmedia texts. Occurring across media platforms, each of these texts makes a distinctive contribution to an understanding of the story-world (Kinder; Jenkins). The platforms both make a contribution and provide different access points through which to connect to the story-world. As soon as *Tron* was made, its reality rippled outward with the release of the arcade games *Tron* and *Discs of Tron* in 1982 and 1983 (Kent). In conjunction with the release of *Tron: Legacy*, games are again part of the wider world of Tron. These include *Tron: Evolution*, games based on Tron trivia available as Tron apps on iTunes, and the Web site *Flynn Lives* (www.flynnlives.com). The latter Web site playfully edges the fictional character of Kevin Flynn toward a possible existence in reality by providing stories about traces of Flynn on the Web and links to books he has published. In addition, in 2010 a gamer could link to another Web site and play *Space Paranoids*, a video game created by Kevin Flynn in *Tron*. In a further iteration of Tron-world, the comic book *Tron: Betrayal*, filling in the years between the two films, was published in 2010 prior to the release of *Tron: Legacy*. This comic book tells the story of what happened to Kevin Flynn after his first encounter with the Grid and leads up to Clu 2.0's betrayal and the annihilation of the ISOs (isomorphs). For fans of Tron, these iterations of the story offer a transmedia engagement with the world of the Grid.

The ability to play *Space Paranoids* is a tangible example of the ways in which a fictional reality is edged into Tron-world. In *Tron*, *Space Paranoids* was an arcade game seen in Flynn's Arcade, but it never existed as an actual game. It has since come into existence as a Web-based simulation of the fictional game (www.spaceparanoidsonline.com). The viral campaign accompanying the release of *Tron: Legacy* deliberately played at bringing the fiction of the film into actuality—for example, an Encom press conference was held with actor Bruce Boxleitner playing his character Alan Bradley. Commenting on the possibility that *Space Paranoids* might be marketed as a game, Josh Tyler remarked, "That's part of the fun though, the movie's viral campaign has done a good job of muddying the waters between fantasy and reality . . . So the question is . . . is this trailer fantasy or reality?" *Tron: Legacy* is not simply a sequel that simulates the world of the original story but rather moves it on and relies on other texts to fill in gaps for viewers interested enough to want them filled. As these transmedia texts fill the gaps, blurring the boundaries between reality and fiction, the technologies of *Tron* and *Tron: Legacy* become connected to technologies in the world. The transmedia texts provide a context for *Tron: Legacy*, one that accentuates the embedding of the fiction in contemporary experiences of computers and games. Embedding the fiction in this way expands the range of connections through which images of technology within the film can be thought about. Often, interpretations of

technology have been weighted toward thinking about constructions of humanness. The transmedia context for *Tron: Legacy* redistributes attention toward connections that include technologies *as* technologies.

Entering the Grid: Bodies of Data

The story-world of *Tron: Legacy* provides further dimensions to the story of technology of Tron-world. Just as the transmedia texts of films, comics, and computer games offer different points of entry into the story of technology, so too do the connections between the story-world of *Tron: Legacy* and production culture disclosures. Imagining the processes of the machine is explicit in the film's opening sequence. A voice-over from Jeff Bridges speaking as Kevin Flynn, the programmer behind the Grid, accompanies an image of a line that is then joined by others, which gradually build into more complex shapes and organizations. Flynn intones, "The Grid, a digital frontier. I tried to picture clusters of information as they moved through the computer—what did they look like? Ships? Motorcycles? Were the circuits like freeways? I kept dreaming of a world I thought I'd never see. And then, one day, I got in." Once he is inside, everything, of course, looks as Flynn has pictured, and information does seem to travel like vehicles. Alongside these vehicles are various kinds of bodies through which our understandings of technology also cohere.

The Grid consists of an environment, architecture, and other objects within that environment, as well as programs. The latter, played by actors, have the form of human beings. A reasonable starting point might be to say that data or information is embodied by these actors and given a human-like form. The problem with taking this view is that data *as* data is replaced, becoming instead a human form readable in terms of humanness. It is a familiar step to then begin reading these figures as characters. However, in the world of the Grid, the programs are not characters but constellations of data. They are data bodies that coexist with other kinds of data organizations. Because human figures stand in for technology in *Tron: Legacy*, there is a temptation to say they embody technology. More usually when questions of technology and embodiment are considered, the debates circle around how human bodies are reconfigured by technologies (Jones; Hansen; Clarke) or how technologies are embodied in human-like ways. In the latter case, critical analyses seek to open up images of technology, exposing how they challenge or enshrine existing constructions of humanness through an engagement with questions of gender, race, or sexuality (Redmond; Short; Roberts; Geraghty). Even though these two perspectives have fascinating things to say, they offer relatively little insight into how our understandings of technologies are generated, other than to say that they reconfigure humanness.

Talking of human bodies configured by technologies, N. Katherine Hayles suggests that "seeing entities emerging from specific kinds of interaction allows them to come into view not as static objects precoded and prevalued but rather as the visible results of the dynamic on-goingness of the flux" (229–30). Hayles is too ultimately concerned with questions about human and technological entanglements and experiences of embodiment. Nevertheless, her description of entities emerging from interactions resonates with the approach taken here. Rather than only being seen as a pre-given entity understood through how it functions, technology exists at the intersection of social, political, and cultural codes. The meanings associated with technology emerge from connections that develop across stories of technology in both fiction and reality. Donna Haraway's use of the term *figuration* also gives insight into how connections have the potential to reconfigure existing narratives about technology. For Haraway, technologies are a particular instance of materialized figurations, which she describes as "condensed maps of contestable worlds" (8). Approaching Tron-world as a body of films, games, and paratexts involves drawing out the contrary figurations of technologies, some of which might be anticipated, whereas others run counter to the conventional order

of things. From this perspective, multiple and contested figurations of technologies emerge.

Figures on the Grid embody a range of meanings that have the potential to inscribe both gendered and cultural encodings. For instance, the Sirens, the four figures who dress Sam Flynn in the Armory when he arrives on the Grid, couple images of technology with women's bodies. Already sitting at an intersection encoded by a history of representations of women's bodies, the Sirens are further entangled, production culture disclosures reveal, with blurred distinctions around their status as humans or technologies:

> "In every great film you have to have the sexy girl," says costume designer Christine Bieselin Clark. "We didn't want that to be Olivia Wilde [who plays Quorra]. The one place in *Tron* we had these sexy women was with the Sirens. We wanted the Sirens' costumes to make you wonder, "Are these Sirens real? Are they fake? Are they human? Are they robots? What the hell is going on here?" (Hart)

It is not only the costumes that suggest the Sirens may be robotic; the way in which they enact re-dressing Sam Flynn also has mechanistic elements, including the Sirens' movements, their same hairstyle, their synchronized forward and backward walk cycles, the (almost) absence of blinking, and voices that resonate with the soundscape of the sequence. That soundscape is layered with machinic noises, from the hum of the lasers at the tip of the Sirens' fingers to the dampened clatter of the tiling that covers up Sam's body and the muted whoosh and whirr of cabinets revealed and opened. The snapped attachment of body plates onto Sam's body is a sound that suggests the Armory is embedded in a machine. At the end of the sequence, the color grading, which bleeds out the color of the Sirens' lips and eyes, makes the Sirens appear as though they too are component parts of the dull gray environment. The disembodied voice that accompanies the scene has the verbal register of a prerecorded announcement, and when two of the Sirens speak, their voices have a flangey or twangy distortion. Such voice distortion is a part of the design strategy of *Tron: Legacy*.

> "Everyone in the game world is a computer program," explains Whittle. "Joe, the director, wanted to have it so, depending on how high up in the computer program you were, you'd be less processed. The 'programs' at the bottom rung were more processed and had more digital distortion on them—they sounded less human." (qtd. in Mac)

The encoding of the Sirens, then, pulls in two directions, a site of contestation in which a viewer has two points of access. One direction is the "sexy girl," in which the curves of the women's bodies are accentuated, drawing attention to their physicality. The absence of individual personality is open to the interpretation that the Sirens are simply figures on which to lay a fantasy. The second direction in which this site of contestation pulls presents a different figuration, one through which technology enters aural and visible registers. When one Siren moves toward the glowing white identity disc holder, the symmetry of the circles within circles is echoed in her almost white irises. Her figuration as human is further deferred by her unblinking look and the robotic quality of her movements.

The contested connections of this figuration are explicit in further comments on the costume design for the Sirens:

> "We designed these sleek costumes that play on feminine shapes and then made them look like cars," says costume designer Christine Bieselin Clark. "We wanted an auto-body kind of finish so the characters' curves feel like metal. We used metallic paint and pigment and things you would use on motor vehicles and created a fabric that we invented for this process. When you put those little touches of light in there, it just becomes a whole other being, almost." (Hart)

This kind of statement again couples together the shape of women's bodies and technology as an auto-body. Although this coupling of women's bodies and technology equates

Figure 1: A Siren approaches the disc for Sam Flynn. The circular symmetry of the disc is echoed in her eyes.

with a perspective in which women's bodies are simply the vehicles for a fantasy, as figurations of data bodies, the Sirens also allow us to ask questions about how technology is depicted as technology. The Sirens lack individuality, their identity residing in the functionality of the program. Each program has an identity disc, which exists as a repository of experiences. The identity disc is a mirror drive through which the experiences of an individual are made collectively available to the Grid, or will be available once the disc is linked to the network. When Sam Flynn is re-dressed by the Sirens, he is connected via his identity disc, a process visualized in the passing glitch of his eyes. Programs, then, are collective beings, part of a network. Data bodies are described by Maurya Wickstrom as "collections of a multitude of electronic information" (96) that circulate as entities in data space. The light on the suits is a reminder that these characters are only constellations of data and not fully embodied entities. The Grid is an example of a decentralized organization in which the most important unifying element in the Grid is light. Visible on the suits of the figures, on the edges of the buildings, and running out toward the boundaries of the technological world, light lines signal the flow of information around the network that makes up the data space of *Tron: Legacy*.

The flow runs through all of the objects on the Grid, decentering the data bodies as a primary site of identity. Instead, light draws our eye to patterns of data, to data bodies, to architecture, and to vehicles and other objects on the Grid. Where the contested figuration of the Sirens provides familiar points of access through which to generate an understanding of technology, the data space is patterned by what we know as well as what we do not know. The light signals the edges of what is and is not. The modeling of the environment is as full as it is empty, and it too is a contested figuration. From a distance, the Grid looks like a circuit board: a network of lines connecting various column-shaped and rectangular components. Closer up, the Grid begins to resemble a stylized city, with game arenas, bars, and streets. The figuration of data as architecture and vehicles presents places we can go into, created using 3-D software and projected in 3-D. The change into full 3-D at the moment when Sam Flynn enters the Grid encourages us to imagine we might follow. According to commentators, "[u]sing the next generation of 3-D technology developed after *Avatar*, *Tron: Legacy* will allow the audience to experience the digital grid and be part of the action in the highly stylized landscape" ("The Making of Tron: Legacy"). This is certainly true of Sam's disc battles and the light cycle sequences. Both are created using a sense of gravity and dimensionality that is modeled on the actual world. In the disc battle sequences, a mobile camera moves viewers in to and out of the action sequences. When Sam fights Rinzler, the shots reframe according to both the movements of the figures and the changing orientations of the platform. Through-

out, the sound effects and pacing of the Daft Punk score combine to embed the viewer further. Here this is explained more fully:

> So we try to use cues from modern cinematography with lens flares and camera moves, and the "physicalness" that we keep our camera to, but we're still in the computer and trying to fight those same things. So the camera work, and the live action where we have human actors and sets, and the camera work we use in the CG world, is exactly the same. The language stays the same throughout. (Lowensohn)

The Grid, then, has a familiarity to it, one that comes into view at an intersection of known cinematic language, a soundscape partly grounded in reality (the sound effects of the light cycles are manipulations of Ducati engines), and data bodies with recognizable patterns. Such familiarity, however, only catches at the edges of the possibilities of a data space. What might yet happen to the space undelineated by lines of light remains open to contestation.

Data Evolution: The Contested Futures of Simulation versus Emergence

Data bodies are constellations of a multitude of electronic information, but these bodies can be different assemblages of code. All the entities on the Grid, aside from Flynn father and son, are programs, but two in particular give insights into ways data bodies are assembled, both within the parameters of the story-world and at the intersections with associated texts. They are also evolving technologies on the Grid. Clu 2.0 is an AI (artificial intelligence) program, visibly a simulation of Kevin Flynn and programmed by the latter to keep the Grid in order. Quorra is an ISO, the last remaining instance of programs that were emergent on the Grid. The explicit story of *Tron: Legacy* is that Sam Flynn seeks and finds his long-lost father in the Grid. This coexists with another story, a contest over data space and what might evolve from the undelineated spaces of the Grid. As characters, neither Clu 2.0 nor Quorra is especially insightful; they are action-focused rather than dramatically interesting. As bodies of data, they stand as two potential routes of evolution in the organization of the Grid: simulation and emergence. Simulations are a copy or a construct of something that already exists in the world, whereas emergent entities arise out of decentralized self-organizing systems (Corning; de Landa). Within the terms of Tron-world, the conflict between simulation and emergence is based on a contest between a hierarchical process involving elements that cooperate to drive a predictable system and a process generating unanticipated possibilities. *Tron: Legacy* plays out the contest between these potential routes of evolution through its storyline of the Flynns and Quorra versus Clu 2.0. Access to figurations of these data bodies, to the two evolving systems of programming, is also mediated through connections with production culture disclosures.

For an audience watching *Tron: Legacy*, connections associated with the figurations of Clu 2.0 and Quorra accumulate when Sam Flynn introduces the possibilities of the Grid and also the contest over its organization. Despite Kevin Flynn's excited description of the Grid as a digital frontier, Sam's entry signals constriction rather than openness. The gray tonal palette and the overhead rumble and drumbeat accentuating an accelerating tempo create a location within which Sam seems perplexed, tempering the visual extravaganza of the transition into full 3-D projection that occurs when watching the film on a 3-D format. Also quickly apparent is disorder as an element to be controlled and eradicated. Picked up by a recognizer, Sam watches as malfunctioning programs are designated for rectification or as fodder to be almost certainly de-rezzed in the games, the spectacular fights that take place on the Grid. The rigidity of the system is evident in the enforcement imagery of capture, the performance of faceless guards marching in unison, and the angular iconography of the recognizers and that of the miscreant programs standing strapped to a series of pillars. Accordin the backstory of

Tron-world, when Kevin Flynn first programmed the Grid, he thought that predictability defined the perfect system, and Clu 2.0 was designed by Flynn to be the enforcer of this system. "Any simulation is actually an encoding of a set of choices" (Wardrip-Fruin 304), and within the story-world the choices encoding the simulation of Clu 2.0 are clear. The perfect system is a hierarchy in which the parts cooperate into a smoothly running whole. This smoothly running whole is also a closed system, with any bugs or intrusive users to be removed. By the time of *Tron: Legacy*, Clu 2.0 has developed a system that simplifies by generating sameness rather than complexity.

The perfect organization operated by Clu 2.0 is contested by the figure of Quorra, an ISO. ISO stands for "isomorphic algorithm," which means a sequence of code that looks the same as others but has different origins. In the comic *Tron: Betrayal*, which preceded *Tron: Legacy*, the ISOs arise at the edge of the city from an undifferentiated pool of data. Within *Tron: Legacy* there is a flashback to groups of ISOs emerging from the edges of the defined city, from outside the light-lined flow of perfect data. Clu 2.0 demonstrates centralized thinking, a top-down process of command and control delineated by the light lines of data, whereas the ISOs are examples of a decentralized process, the spaces between the light lines generating something unexpected. Kevin Flynn describes them as shattering existing knowledge—"every idea that man has ever had about the universe is up for grabs, bio-digital jazz, man." The term *emergence* describes the process through which complex decentralized systems self-organize into stable entities: "Agents residing on one scale start producing behavior that lies one scale above them: ants create colonies; urbanites create neighborhoods; simple pattern-recognition software learns how to recommend new books. The movement from low-level rules to higher-level sophistication is what we call emergence" (Johnson 18).

According to the transmedia story-world of Tron, Clu 2.0 has sought to exterminate all the ISOs. Clu 2.0's figuration is that of an inflexible technological system whose programming is unable to respond to an evolutionary step that has not been imagined. By contrast, Quorra has the more positive figuration. She protects Kevin Flynn, saves Sam Flynn at the games, and is willing to sacrifice herself to ensure the survival of both of the Flynns by resisting the relentless pursuits for perfection by Clu 2.0. *Tron: Legacy* celebrates a system of technological organization that resists inflexible hierarchical structures that overdetermine possibilities, valuing technological systems of such complexity that they enable emergence.

Other dimensions to these figurations of evolving technology appear when the layers of connections are peeled back to their gendered constructions and production culture disclosures. In a way that is similar to the bodies of the Sirens, these data bodies too exist at an intersection of performance, gendered constructions, and connections running through production culture disclosures. Clu 2.0 is a construct of performances played by two actors, Jeff Bridges and John Reardon. Bridges's facial movements were motion-captured, and the data used to generate a digital simulation of the younger Bridges's head, which was digitally matched to Reardon's body (Seymour). Clu 2.0 is a simulation in two senses: within the story-world of *Tron: Legacy*, he is the look-alike AI created by Flynn; in the production culture of *Tron: Legacy*, Clu 2.0 is a computer-generated simulation of the young Jeff Bridges. Following Wardrip-Fruin's comment that simulations are encodings, one of the encodings is masculinity. Clu 2.0, clad in the spandex uniform of all programs, leads an army of programs. Like Clu 2.0, the light lines of these programs are orange. The militarism of Clu 2.0's closed system becomes overt when he speaks to the massed ranks of programs, telling them that in the human world, "our system will grow; our system will blossom." As Clu 2.0 speaks these words, a digital sphere of planet Earth is shown in the process of being covered in orange-hued outline hexagons, matching the light lines of Clu 2.0's programs. Writing about *Starship Troopers* (1997), Brian Baker

comments that the film makes explicit that "the price of 'colonialism' and 'expansion' is often death and destruction on a horribly vast scale" (28). Though the scenes of massed ranks of digital bodies are not similarly self-reflective, the imagery of *Tron: Legacy* makes visible both the scale of the invasive force and the area to be dominated. As the lone surviving entity of her kind, Quorra contrasts with this relentless and all-consuming massification of a technological system. Her gendered construction also differs. Quorra is performed solely by Olivia Wilde, rather than being a technologically mediated construction. She belongs in the tradition of action women, other recent examples of which include Trinity in the *Matrix* trilogy (1999–2003), Bride in *Kill Bill: Vol. 1* and *Vol. 2* (2003; 2004) and the young Hit Girl in *Kick-Ass* (2010), all agile, strong, capable in fights, and highly competent with all the available technologies. In terms of physicality, then, both offer a different perspective on technology: Clu 2.0 is associated with massed force and sameness, whereas Quorra is associated with flexibility and power.

The bodies of Clu 2.0 and Quorra reveal more about technology when accessed through connections with production culture disclosures. Clu 2.0 is a simulation of the image of Kevin Flynn circa 1989, as well as a simulation of Jeff Bridges in the 1980s.[1] Many of the disclosures surrounding the creation of Clu 2.0 outline how "he" is a real performance with a digital face (Ditzian; Seymour; Hart). When writing about data bodies, Maurya Wickstrom comments on audiences' fascination with "how they did it." She remarks that "still the internal structuring, the driving forces of technology remain hidden from our vision" (101). With production culture disclosures increasingly available, this is becoming less so. Although we may not be able to fully grasp the detail of the technological processes involved, we can see the logics of control over the image that is mediated by moving image technologies. Descriptions of the construction of Clu 2.0 lay out the encoding decisions made in designing how Clu looks, edging in reality by exposing technologies of simulation.

The F/X for Clu 2.0 build on techniques used in *The Curious Case of Benjamin Button* (2008). In the latter case, Brad Pitt was aged, whereas for *Tron: Legacy*, the visual reference was to a face familiar through its existence in the public domain:

> Digital Domain used old photographs and movie footage to construct Jeff Bridges' clone Clu at age 30. "We figured out what makes Jeff look like young Jeff right down to the hair," says *Tron: Legacy* animation supervisor Steve Preeg. "Clu was conceived as having a very short military crewcut, but early on we realized, "That's not Jeff in any movie, so we gave him that '80s coif and the 11 o'clock shadow." (Hart)

Further disclosures reveal the process through which Clu 2.0 was generated, a simulation

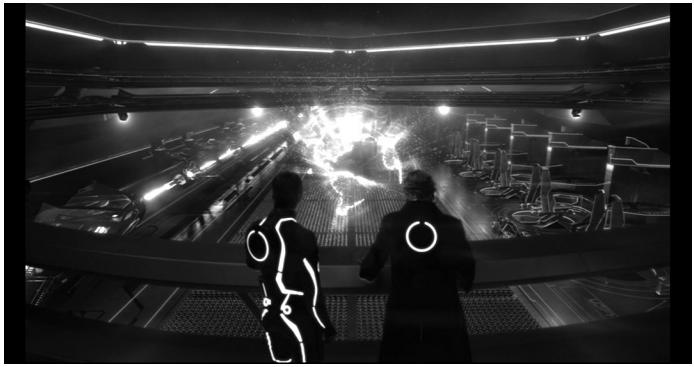

Figure 2: The massed forces of Clu 2.0 stand beneath a holographic image of Earth.

created from a fusion of human bodies, digital technologies, and human voices:
When playing Clu, Bridges had the fifty-two markers drawn on his face and wore the Helmet Mounted Camera (HMC); his facial movements were fed into the computer and were used to control the expressions and movements of the digital head. Thus, the digital performance of a younger Bridges was controlled by the real Bridges's performance, as if the younger Bridges were actually on screen. The information sent to the computer made it possible to instruct the digital head to speak and emote in the exact same way Jeff Bridges would on set ("*Tron: Legacy*").

In addition, a body double was used in the simulation, with John Reardon mimicking Bridges's original on-set gestures and postures when the scenes were reshot, and it is over Reardon's body recreating Bridges's actions that the digital head is placed (Hart).

These descriptions of Clu 2.0 reveal rather than efface the technologies of simulation. They make explicit that the element edged into the fictions is again a link to reality: the familiar face of Jeff Bridges, something existing in the world. Commentaries and reviews of *Tron: Legacy* remain focused, and divided, on the question of whether Clu 2.0 "works"[2]—that is, whether or not the digital Clu 2.0 is realistic enough to perform in a way that was both convincing and engaging. But the familiarity of Bridges's face in this simulation also intersects with Clu 2.0's figuration as inflexible, hierarchical technology. Through this added connection, Clu 2.0, a technology that is threatening the potential for the future, rather literally also becomes a familiar face of technology. This contrasts with the new emergent technology of Quorra. Following her injury during the fight at the End of the Line Club, her difference is revealed when Kevin Flynn accesses Quorra's code as a holographic projection from her identity disc. As the projection zooms closer in on the detail of her programming, the data configures into a multi-strand helix of code, its intertwined backbones turning on a rotating axis. Even though this axis seems a familiar image, similar to representations of the double helix of DNA, Quorra has a distinct configuration of code consisting of three helical strands. Revealed is the code of a hybrid entity; both Flynn's Grid programming code and the digital DNA of an ISO define Quorra's data body. Quorra is not simply the figuration of technology as a gendered body, but the partly unknown future of technology depicted as a hybrid code, whose figuration includes flexibility and power as well as a decentralized organization. Whereas the simulation of Clu 2.0 is a copy of something that already exists, the emergence of Quorra remains open to possibilities. Evolution of data, though depicted in bodies, is finally bounded not by the imagination of humans but by the self-organizing possibilities of complex code.

Figure 3: Quorra's biodigital data is depicted as a triple helix.

Conclusion

Tron: Legacy has more to say about technology than the display of light cycles and disc fights, impressive though these are as audiovisual spectacle. In the critical appraisals of *Tron: Legacy*, one of its flaws is considered to be a reliance on such spectacular moments to hold the audience's attention (Alter; Bradshaw). And it is probably reasonable to describe the dramatic impetus of the narrative arcs of the reconciled son and father, the battle between Clu 2.0 and the older Flynn, or the growing attachment between Sam Flynn and Quorra as somewhat lackluster. Given this, it is tempting to see the depictions of technology in *Tron: Legacy* as spectacle in search of a narrative. But that is to tie our understandings of technology only to elements inside the story-world of the film. The purpose of this discussion has been to argue that the perspective offered by *Tron: Legacy* on technologies emerges from both the fictional world of Tron and its contextual texts, including production culture disclosures, comics, and computer games. Looking only at images of technology within the film itself gives a limited access to *Tron: Legacy*'s story of technology. Increasingly, whether or not they make extensive use of F/X technologies, films are released in conjunction with production culture disclosures. Often taken as fact-based descriptions of the filmmaking process, such disclosures offer further narrative insights as they expose perceptions of technology or other aspects of a film that may extend the narrative of the story-world. When one draws on connections between production culture disclosures, the numerous Tron texts, and *Tron: Legacy*, a multifaceted view of the story of technology emerges. By taking into account a range of access points, *Tron: Legacy*'s story about technology is revealed as a series of contestations. As a film making extensive use of F/X and 3-D to depict a technological environment, *Tron: Legacy* seeks to show that environment as an immersive spectacle. At the same time, the story-world explores ideas about competing technological organizations. The contests not only lie in the battles between characters and data bodies but also are active in the alignments and misalignments in the frames of meaning that percolate through different figurations of technology available to viewers when *Tron: Legacy* is located in a network of associated texts.

NOTES

1. "CLU" stands for codified likeness utility, which is also a reference to a computer language created at MIT between 1974 and 1975 by Barbara Liskov.

2. A discussion list about *Tron: Legacy* debates this point. The contributors consider whether or not the model of Clu 2.0 becomes less animated as the film progresses, a gesture (inadvertent or otherwise) toward Clu's lack of flexibility. See ginger_maya. Interestingly, the actor Jeff Bridges makes a similar point—that Clu is only a digital version of Flynn, and so the difference between him and the CGI model is appropriate. See Boucher.

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