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SPACE TO INSPIRE  
**Why Almost Being an Astronaut  
Was the Best Thing That Ever  
Happened to Me**

YOUR INNER CHILD:  
**The Dormant Seed of  
Your Success**

TAMING THE DRAGON:  
**Creating The F1, NASA's  
Innovative Moon Rocket Engine**

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# FEATURES

## A7 | **SPACE TO INSPIRE**

*Why Almost Being an Astronaut Was the Best Thing That Ever Happened to Me*

BY DR. SIAN PROCTOR

## A15 | **YOUR INNER CHILD:**

*The Dormant Seed of Your Success*

WITH GABOR GEORGE BURT

## A23 | **TAMING THE DRAGON:**

*Creating the F1, NASA's Innovative Moon Rocket Engine*

BY ROD PYLE

# PROGRAM

## B2 | **FULL SCHEDULE**

## B4 | **KEYNOTE SPEAKERS**

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FOR ADVERTISING/CONTENT INQUIRIES, CONTACT:  
DR. ANTHONY PAUSTIAN  
PROVOST, DMACC WEST CAMPUS  
5959 GRAND AVE.,  
WEST DES MOINES, IOWA 50266  
515-633-2439 | ADPAUSTIAN@DMACC.EDU

#### **CONTRIBUTORS:**

PUBLISHER: ANTHONY D. PAUSTIAN, PH.D.  
CO-EDITOR: BETH BAKER-BRODERSEN  
CO-EDITOR: JASON BRANDT SCHAEFER  
DESIGNER/PRODUCTION: AMINA MIRAJ ALI

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A4 | ciLive! Magazine



# EDITOR'S NOTE

*Throughout 2020 and now in early 2021, sometimes it seems as if the Earth's gravity has grown a bit stronger, or as if the demons of our worst intentions may have finally overthrown our better angels.*

We're ready to move on—as individuals, as a society, and as new armchair experts on the fragility of democracy and the science of virology. Perhaps, most of all, we're ready to move on as families—loved ones we may sometimes fundamentally, vehemently disagree with—who have all suffered together. Maybe the United States is one big dysfunctional family, some of us angry, others at peace, every last one of us with an opinion, and the only way to make it through dinner is to choke down your pride and listen, to demand that you're heard when necessary, and sometimes to stand up and leave the room.

As a nation and a people, we have suffered so much in a matter of mere months, and from my standpoint, in both senses of the word. "To suffer" captures the way we navigate illness and loss, but in a more archaic sense, it signifies that we are allowing something unpleasant or even horrific to happen. That is perhaps the greatest irony of this past year—we have been forced to tolerate the intolerable, to suffer grief while also suffering fools. But this, too, as they say, shall pass.

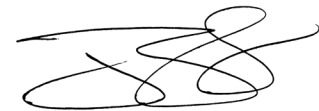
In this edition of *Celebrate! Innovation Magazine*, you'll discover some of the rewards of perseverance through stories of suffering. Dr. Sian Proctor shares the disappointment she felt as an African-American woman tokenized by NASA in her bid for the Educator Astronaut Program, who eventually moved on to become an analog astronaut for the 2013 HI-SEAS mission and an advocate for greater diversity in the sciences. Gabor George Burt, originator of The Slingshot Framework, advises us that when markets crash and businesses are up against the wall, one of the best traits a leader can have to survive is the willingness to play games and engage creativity. And in a historical piece by Rod Pyle, he reveals the countless number of times engineers failed in their quest to develop the Saturn V rocket, its experimental engine exploding over and over again, and the final innovation that successfully propelled the first humans to the Moon.

I hope these stories bring you peace and demonstrate that suffering always ends. Though the only escape is through, on the other side are greener pastures, newfound

strength, important discoveries, and maybe even a little beauty.

You can hear more inspirational stories by accomplished people (and interact with those storytellers) during our Celebrate! Innovation Live virtual event, March 10-11. Visit [www.ci.live](http://www.ci.live) for more details.

Yours in the struggle,



**JASON BRANDT SCHAEFER, CO-EDITOR**  
**JASON@EMPATHICEDITORS.COM**

# DMACC Urban Campus Student Center

## **AMPLIFYING EDUCATION**



“ Saying we are thrilled would be an understatement. We know what this long awaited addition means to DMACC, who has been involved in the design process since day one. The new DMACC Urban Campus Student Life & Services building and exterior improvements were born out of a collective staff and student vision. An inviting place for students to thrive, big and small opportunities for social interaction, an enhanced student-focused experience, an asset that celebrates the local community – and the future of education.

Summer 2021 will be the start of the next chapter at DMACC. The updated campus will offer more programs and workforce training opportunities than ever before. A recent partnership with UNI will provide a 2 + 2 year degree program with the luxury of a convenient Des Moines location – elevating DMACC Urban as an attractive student destination for years to come. ”

- Holly Reid | Landscape Architect,  
Shive-Hattery







DR. SIAN PROCTOR SERVED AS AN ANALOG ASTRONAUT FOR THE 2013 HI-SEAS MISSION. (PHOTO CREDIT HI-SEAS)



BY DR. SIAN PROCTOR

## SPACE TO INSPIRE

*Why Almost Being an Astronaut  
Was the Best Thing That Ever  
Happened to Me*

*Moon or Mars?*

*I am 100 percent a Moon girl; it's in my DNA. But I certainly wouldn't turn down a trip to Mars.*



DR. SIAN PROCTOR WAS AN ANALOG ASTRONAUT FOR THE 2020 SENSORIA HI-SEAS MISSION. (PHOTO CREDIT SIAN PROCTOR)

In 1966, my mom and dad moved with my two older siblings to Guam for what would be an adventure of a lifetime. My father was working for the Bendix Corporation, which was one of many contractors helping NASA put the first human on the Moon. At the NASA tracking station there for Apollo 8 through Apollo 13, my father's job was to make sure we didn't lose communication with the Apollo capsules. He was there when Neil Armstrong took those famous first steps on the Moon, and 8½ months later, after Neil Armstrong's giant leap for mankind, I was born. So I am literally a celebration of humans on the Moon.

My father eventually left Bendix and his work with NASA soon after I was born. Our family packed up and moved from Guam but my father's NASA legacy remained a prominent part of my upbringing. After

Neil Armstrong returned from the Apollo 11 Moon landing, he traveled to Guam to thank the engineers and technicians who helped contribute to his historic mission. I grew up marveling at Neil Armstrong's autograph to my father along with all the other cool NASA memorabilia hanging on the wall in our house. When I was old enough to really appreciate what my father had done, he was already gone, taken away by lung cancer before his time.

I always wondered why I never saw people of color when I watched NASA documentaries about the Mercury, Gemini, and Apollo missions when there, on our wall, was Neil's Armstrong autograph to my dad, thanking him for his contributions. It wasn't until the movie *Hidden Figures* came out that I realized my dad, too, along with so many others who helped put white

men on the Moon, was a hidden figure—unacknowledged in history except for the NASA artifacts in our home.

I grew up sheltered from that reality. My parents fueled me with the notion that a good education would lead to unimaginable opportunities. I grew up looking up, not at the stars, but at the airplanes that transported people across the sky. I didn't want to go to space; I wanted to fly jet airplanes. I dreamt of being a military aviator, not knowing that my gender, skin color, and failing eyes were all barriers to that dream. I built model airplanes, served as a cadet in the Civil Air Patrol, and dreamed of flying fast enough to leave Earth's gravity, but those dreams never manifested. I was always good at math and science and, filled with my father's dream of education as the





## TO BE OR NOT TO BE A NASA ASTRONAUT

It wasn't until 2008 that my father's legacy of human spaceflight fully manifested again within me. A friend sent an email saying NASA was looking for astronauts and that I should apply. Up until that moment, I didn't even know how NASA selected astronauts. The thought of learning what it took to be a NASA astronaut had never entered my mind. I had always seen astronauts in two categories—either as military aviator, or as super-smart people who graduated from MIT, Harvard, or Cal Tech. I fit neither of those categories. But there was the Teacher in Space program, and I remember vividly watching from our living room couch the day the Challenger Space Shuttle exploded on live TV.

Almost 20 years later, NASA had revamped the Teacher in Space program and had designated three educator astronauts in the 2004 selection. Maybe there was a way for me to join a mission through that category as a community college teacher. But for the 2009 selection, I learned that NASA was no longer looking for educator astronauts. Educators were still encouraged to apply, but they would have to compete with medical doctors, MIT astrophysicists, and everyone else who was not a pilot. I'm not sure what gave me the courage to apply, as I honestly didn't think NASA would even consider me. But I could hear my father's voice encouraging me, prodding me to ignore my ever-present imposter syndrome and to put myself into the game.

"Let them decide if you are qualified or not," is what I could hear my father saying in my mind. So I applied and soon found myself on my way to Johnson Space Center for a meet-and-greet. Out of thousands of applicants, I had made it to the top 110 semi-finalists. I spent three days with a cohort of ten amazing individuals learning about the astronaut corps and being interviewed and tested.

After meeting Jessica Meir, selected to be an astronaut in 2013, I remember saying to myself, she is what NASA is looking for. I could never compete with that caliber of applicant.

From the 110 semi finalists, NASA would choose 40 finalists to be invited back to JSC for a full week of medical tests and more interviews. I went home and told myself that I just had an amazing experience, but there was no way they were calling me back, even though, deep inside, I was secretly hoping they would. My thoughts were confirmed when word got out that NASA had selected their top 40 finalists. I was both sad and relieved. I'd gotten further than I'd thought, and I was still holding onto the stigma of just being a community college professor. Why would they ever pick me? I celebrated my thirty-ninth birthday knowing that my father would have been proud of me for at least applying and making the top 110.

The shock came early in the morning. My phone rang, and I thought it was my mom. (She is the only person who ever calls early that early.) When I answered, and the lady on the other end said this is so-and-so from JSC, all I could say was, "Oh, my God!" again and again. She laughed. Yes, she said, we would like to invite you back to JSC to be a finalist for the NASA Astronaut selection. Are you available to come in two weeks? Yes, I quickly replied. I was going back to JSC as a finalist for the astronaut program! How the hell was that possible? Didn't they already have their final 40? Maybe they had a lot of people who were medically disqualified. It didn't matter, I told myself, because I was going back to JSC.

When I returned there again in April 2009, I wasn't alone; six other finalists were joining me. We quickly began to speculate why the seven of us were chosen. It was immediately apparent that we weren't the typical crew: A black military aviator, a high school science teacher, an older-than-typical scientist, a Jewish medical doctor, a

best road map to opportunity, I pursued degrees in environmental science, geology, and science education.

I came to realize that with every level of educational advancement came new opportunities I had never imagined. While teaching and traveling around the world, I geo-explored places like Australia's rugged interior, China's Tiger Leaping Gorge, and Easter Island's monolithic statues. I became scuba certified in the warm waters of the Mexican Yucatán and learned to fly across the Phoenix desert. I was living the life of an explorer, chasing new frontiers. But not for the advancement of humankind—instead, to inspire myself and those within my reach.



ASTRONAUT NEIL ARMSTRONG'S AUTOGRAPH TO MY FATHER EDWARD LANGLEY PROCTOR, JR. (PHOTO CREDIT SIAN PROCTOR)



FROM MY FATHER'S COLLECTION (PHOTO CREDIT SIAN PROCTOR)



ELEVEN SEMIFINALISTS FOR THE 2009 NASA ASTRONAUT SELECTION. (PHOTO CREDIT NASA)



ELEVEN SEMIFINALISTS FOR THE 2009 NASA ASTRONAUT SELECTION. (PHOTO CREDIT NASA)

black Nigerian-American scientist, a civilian aviator, and me, a black female community college professor. We jokingly labelled ourselves “the Unoriginal Seven” as a play on the original Mercury Seven. (NASA soon advised us to drop the reference.)

The rumors were that NASA had chosen their top 40 finalists and had selected who they wanted, but the team was rejected for lacking diversity. We were the solution to that problem. At the time, we didn't care because we were all now finalists. NASA wouldn't spend all that money to bring us

together and complete all those medical checks without selecting at least one of us, right? Our chances just went from 40 finalists to one in seven. Not bad odds.

I will never forget the July 2009 day the call went out for the final selection. I was a visiting educator at the Goddard Spaceflight Center for the summer. I got texts one-by-one from my “unoriginal” crew members saying they hadn't been selected. So I braced myself, hoping that if I were the last one to be called, and everyone else was a no, then I must be the lucky one. The phone rang, and the call was from Astronaut Sunita Williams. She said, “I am sorry to inform you that we did not select you for the astronaut program. We hope you will try again in the future.” I could barely breathe; the words resonated to my core. I think I said, “Okay, thank you.” I'm pretty sure my voice quivered as I held back the tears just long enough for me to hang up. It was over. I was not selected, and neither were any of the seven from this round.

It took me years to come to the realization that we had only been a group of figures—numbers on a piece of paper to satisfy an apparent lack of diversity. Some would say NASA was careless to waste all that money on medical tests for seven people because they were called out for a lack of diversity. But I honestly don't care. The experience I got from that year of “almost being an astronaut” was priceless. It rekindled my love of aerospace. It brought me closer to my father and his legacy. I learned to acknowledge my imposter syndrome and not let it rule my world. But most important, I met amazing people who have inspired me to think outside the box and redefine what it means to be both an astronaut and an explorer.

### BIRTH OF AN ANALOG ASTRONAUT

In 2009, I had no idea that people lived in Moon and Mars simulations for the purpose of contributing to human spaceflight research and training. Analogs



are places that can be used to simulate conditions somewhere else like the Moon, Mars, or the International Space Station. For example, places like the Mars Desert Research Station have been around since the early 2000s. In 2013, NASA funded two research professors to start a new Mars analog, the Hawaii Space Exploration Analog and Simulation (HI-SEAS), on the Island of Hawaii. The goal was to bring six highly qualified scientists and engineers together with funding from NASA to investigate food strategies for long-duration spaceflight to Mars. A friend sent me the announcement, stating, “You love food and space, so you should apply.” So of course, I did.

Out of approximately 750 candidates, I was selected to be the education outreach officer who would live in the HI-SEAS habitat for four months, acting as an analog astronaut living on Mars, along with three men and three other women. We were diverse in so many ways. Crew members were from Belgium, Canada, Puerto Rico, and Russia. One crew member was lesbian, and I, a black female, was the oldest at 43.

We participated in research studies dealing with food, sleep, crew cohesion, microbes on clothing, and much more. I created education outreach videos, and I ran a cooking show called *Meals for Mars*. I took photos for *Discover Magazine* and tromped across lava fields wearing a space suit. We were determined to have a successful mission and contribute what we could to NASA’s research to help advance human spaceflight to Mars.

## **BRINGING CULTURAL NORMS TO THE MOON AND MARS**

What I learned from living in HI-SEAS and investigating food for space exploration is that diversity matters. Being able to share your culture through a delicious meal or stories while celebrating a milestone matters. The select few who will get to go to the Moon and Mars will be determined by another select few with the power to

decide. Whoever decides access to space, the Moon, and Mars matters because they bring with them culture, language, and tradition and establish the story (whether that’s *history*, *herstory*, or *our* story). If we truly believe that space is for everyone, then we need to think about access to space for everyone. Our vision of a Just, Equitable, Diverse, and Inclusive space, what I call a “JEDI space,” can only be achieved when we use our voice and speak up when we see injustice, inequity, lack of diversity, and exclusion.

Finding your voice isn’t easy. I grew up learning not to step out of line, and to silence my voice for fear of not fitting in, not advancing, or even facing potential harm. We all have examples of when we’ve seen something that wasn’t fair or inclusive and didn’t speak up for whatever reason. When we think about humanity’s future in space, I see this amazing, unique opportunity for us, for the first time in human history. We get to decide our future, and that future is in space. The old way of doing things, of providing access to space, was all about exclusion. Human spaceflight has a history of looking for ways to eliminate people through age, gender, sexual orientation, and medical issues, among others. Essentially, through discrimination. We need to be active participants, fully engaged in designing our space for a better tomorrow. You can do that by unleashing the JEDI within you and speaking up the next time you see, hear, or are called to participate in unjust, non-equitable, non-diverse, exclusive activity. You can do it by using your unique voice to create JEDI space and inspire others to do the same—those within your reach and beyond, and perhaps in the not-too-distant future, that space will extend all the way to the stars. ■

*“Finding your voice  
isn’t easy.”*

Dr. Sian Proctor is a geoscientist, analog astronaut, space artist, speaker and solar system ambassador. Her motto—Space2inspire—is designed to encourage people to use their unique, one-of-a-kind strengths and passion to inspire those within their reach and beyond. Dr. Proctor has completed four analog astronaut missions, including the all-female SENSORIA Mars 2020 mission at the Hawai’i Space Exploration Analog and Simulation (HI-SEAS) Habitat, the NASA funded, four-month Mars mission at HI-SEAS, a two-week Mars mission at the Mars Desert Research Station (MDRS), and a two-week Moon mission in the LunAres Habitat. She believes that when we solve for space, we also solve issues on Earth, and she promotes sustainable food practices used in space exploration as a way to reduce food waste on Earth. Dr. Proctor has a TEDx Talk called “Eat Like a Martian” and has published a *Meals for Mars* cookbook. In 2021, she was selected as an Explorers Club 50: fifty people changing the world.

Dr. Sian Proctor will present Virtually via e360tv Wednesday, March 10, at 10:30am.



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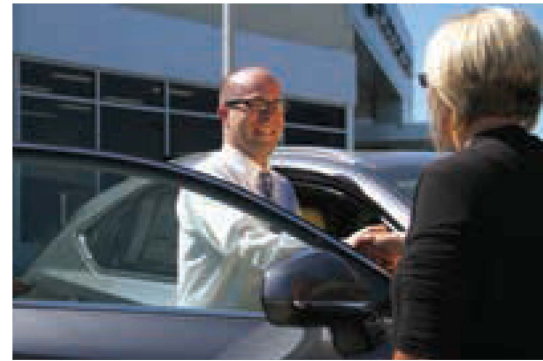
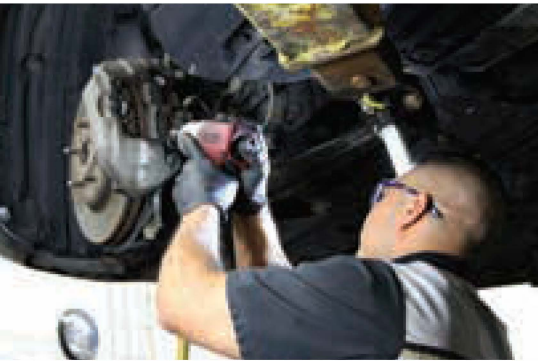
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BY GABOR GEORGE BURT

USED WITH PERMISSION

# YOUR INNER CHILD:

*The Dormant Seed of Your Success*

*I like nonsense; it wakes up the brain cells. Fantasy is a necessary ingredient in living—it's a way of looking at life through the wrong end of a telescope. Which is what I do, and that enables you to laugh at life's realities.*

*—Dr. Seuss, American author and illustrator (1904–1991)*

It may seem hard to believe, but we were all children once. As children, we experienced a sense of elation and accomplishment from inventing our own games and making use of random objects in any environment to bring to life a customized activity that was a blast to do, with virtually no limit to what we could play and where. What if we could reignite our childhood creativity and deconstruct our realm of acquired assumptions in the process? It would not only be disarmingly fun, but also deeply meaningful in guiding our strategic thinking, particularly in this world-turned-upside-down by the COVID-19 crisis.

**The connection: the basis of the most successful strategies is not outcompeting rivals, but rather creating your own game, your own market space.** This approach is especially important during highly turbulent times, when existing market norms vanish, and the status quo disappears.

Indeed, there has been a growing recognition that creativity is a vital component for navigating our unpredictable and rapidly changing surroundings. For example, according to a 2010 global survey of 1,500 chief executives conducted by the IBM Institute for Business Value, CEOs identified creativity as the most important leadership competency for the successful enterprise of the future. In other words, among all personal qualities, business leaders cited creativity as the key foundation for success, ahead of such traditional pillars as operational expertise, industry know-how, interpersonal skills, or even innovation. How fascinating. There is clearly a major mindset shift in motion, which leads to the question, if creativity is thrust to the forefront of vital leadership qualities, how can one fully embrace it and tap into a reservoir of resourceful thinking?

I spent my childhood in the heart of Budapest, Hungary, which at the time was part of the Eastern bloc of Communist countries. One time, when I was eight



MY PERSONAL SHRINE TO CHILDHOOD INGENUITY: THE VERY PLACE IN THE CENTER OF BUDAPEST WHERE MY STORY TOOK PLACE. AMAZINGLY, ITS AMBIANCE HAS CHANGED LITTLE SINCE THEN.

or nine years old, I was visiting my best friend at his family's apartment. It was early winter, and we were both itching to do something new, fun, and slightly mischievous. But how could we? We had nothing at our disposal except bland, everyday things. However, we also had our imaginations. So we improvised a pastime out of the ordinary objects that surrounded us. Armed only with a few random household items—a matchbox, sugar cubes, some sticky tape, and a bit of string—we invented a game in a matter of minutes.

It went like this: my friend's family lived in an apartment above a popular home furnishings store on a busy street. The apartment had a balcony perched over the prominent front store window where pedestrians would stop and eye the displays. So we took the empty matchbox, stuffed it with a few sugar cubes for added weight, and wrapped it in outward-facing sticky tape. We lowered the sticky contraption from the balcony using some

string, carefully maneuvering it to land unnoticeably on top of the winter hat of a window shopper below. Then came the pinnacle moment. We briskly yanked on the string, which caused the hat to momentarily lift off the person's head. We did this urban catch-and-release routine over and over as new people shuffled by the store window. We thought the startled reaction and colorful cursing of our victims was the funniest thing in the world.

It was pure, untainted fun. And we knew this game was completely our own. We invented it, and we perfected it. It was empowering and exhilarating. To this day, decades later, my friend and I still reminisce about it, the game etched into our memories as a highlight of our youth and an ongoing symbol of our inner flame of resourcefulness.

What does this story remind you of from your childhood? What game did you invent that brings back fond memories? All of us have stories, buried but recoverable, that bubble to the surface when properly



triggered. And their recovery provides the foundation for navigating unpredictable environments and turning crisis into opportunity. As we grow older, we tend to put aside childish things, including our sense of continuous exploration and invention. Our imagination gives way to conformity, and fun cedes to seriousness. So the first step in uncovering one's buried inner child is to evoke a sufficient catalyst.

Here's my challenge to you: No matter where you happen to be right now, take a quick look around. Absorb the various ordinary things you see. Now try to fabricate a game or a sport using all things you see every day in the same way and don't give much thought to as props. Let your imagination take over and see them as objects for entertainment. Look to my story above as your guide. Go ahead, give it a go!

How did you do? How long did it take you to come up with something? Do you think your game would be fun to try? Moreover, did you find such mental exploration difficult? Meaningful? In essence, this simple exercise represents exactly the thinking process that we need to reclaim, that came so naturally as children. I can reposition the challenge this way: take a look at the familiar resources of your business or the characteristics of your personal environment that surround you. Now think of new applications, new combinations, new angles that would allow you to overstep perceived limitations of your business or your environment in a way that unlocks new levels of value for your target audience or enrichment for yourself.

**In doing so, nothing has changed except your perspective and the boundaries of your imagination, which in turn serves to open unlimited new possibilities.**

Here are a few of my favorite invented games that make use of ordinary objects and surroundings:

**Balloon-Couch Volleyball:** A variation of volleyball, this sport can be played in almost any family home. It combines two

everyday objects—a standard balloon and a couch—in an unexpected way. Rules: two teams face each other on opposite sides of a couch (front and back) and hit the balloon back and forth, trying to make it touch the floor on the opposing team's side before they can get to it. Any body part can be used to hit the balloon or to save it from falling to the floor. Each team may pass the balloon to teammates twice before having to hit it over the couch.

The couch itself is neutral; the balloon is allowed to bounce off it. The balloon's lightness makes the game both harmless to surroundings and a blast to play.

**Saltshaker Curling:** This sport is a variation of the Winter Olympic sport of curling, where players from two teams slide round objects across the ice, trying to get them to stop within a circular target area. Saltshaker curling brings together two ordinary objects in an unconventional way—a kitchen table and a tabletop saltshaker. Rules: two players, seated at opposite sides, take turns sliding the saltshaker toward the other side of the table, trying to make it stop as close to the edge as possible without falling off. The game goes on for 20 attempts each. Once players get good, the winner often gets the shaker to stop with a part of it hanging over the edge of the table without falling.

**Speed Leaf-Catching:** Very simple but exhilarating, this outdoor game requires only one common object: an autumn tree with falling leaves, and preferably a bit of wind. Rules: players position themselves around the tree, where they try to catch as many falling leaves as possible before they hit the ground. The game is played for five minutes. The winner is the person who grabs the most leaves.

How about it? Are you motivated to try one of these games or perhaps create your own variation? If you need a bit more inspiration, try this: whenever you have the opportunity, give children some random objects, ask them to make up a game, and watch them play. Observe how they think,

*“To be successful we must live from our imaginations, not from our memories.”*

—Stephen Covey, author and leadership expert

how they relate to the objects and to each other. Take note, and be inspired.

Another thing I encourage you to do is to honor the one publicly recognized annual celebration of child-like frolic: April Fools' Day. What a great concept. The first of April is the one day every year when adults have full license to be impish and playful. The act of planning and executing a ruse reconnects you with your inner child, so take advantage of it. The best April Fools' pranks are not unkind or nasty, nor are they designed to mock, but rather to challenge the perception of reality and the limits of conventionality. What is absurd? What is sensible? How can artificial boundaries be overstepped or even reversed through a hoax? You should partake in reality-bending April Fools' activities and get those you work with to do the same. It is liberating and opens up channels of unconventional thinking. Encouragingly, more and more companies around the world engage in fabricating humorous April Fools' campaigns that express their sense of fun, laughter, and creative thinking. In fact, Stand-Up Strategist ([www.standupstrategist.com](http://www.standupstrategist.com)) is a new platform that annually ranks and recognizes the best corporate April Fools' campaigns from around the world.

The process of coming up with the appropriate setting and choreography for a prank that tests the frontiers of people's reality is in itself therapeutic. For example, I find scuba diving a great backdrop for a practical joke. When submerged, divers are completely cut off from the world, and their sense of reality can be viably challenged. A possible scheme could go like this. Divers are ferried by boat to an



A CHILD'S DRAWING OF SCUBA DIVERS IN ROMAN BOAT.



A CHILD'S DRAWING OF ROAD TO NOWHERE.

offshore dive site and proceed to take the plunge as planned. While they are below, the dive boat races out of view and is replaced with a replica of an ancient Roman vessel, with a crew in period costumes. When the divers ascend to the surface, the Romans, speaking only Latin, act very astonished and quite scared of them. Reluctantly they allow the divers to climb onto the craft, but being from many centuries ago, the misunderstandings continue to mount. Just as the divers are beginning to question their own perception of reality, a crewman whips out a cell phone and a Wave Runner is prompted to race by, exposing the joke.

Here is another farcical scenario. Take a stretch of an imposing five-lane highway and make it innocuously merge into four lanes. Repeat the lane reduction at short intervals, until only a single lane remains. Then gradually shift the road surface from asphalt to dirt, and finally phase out the road incrementally altogether, leaving drivers in the middle of nowhere. Such an experiment would test the rigidity of people's adherence to the assumption that all roads must lead to somewhere.

These kinds of comic situations that unexpectedly nudge people out of their comfort zone were elevated to an art form by the legendary Allen Funt through his seminal reality television show *Candid Camera*, which started way in 1948. More recently and in a more extreme fashion, many new shows and reality series, including Ashton Kutcher's MTV show *Punk'd*, continued in Funt's footsteps. Although these shows tend to go too far, their pranks nevertheless expose how quickly our sense of normalcy can be challenged and how seriously we take ourselves. What's more, watching such situational musings encourages you to confront how you might react if you were suddenly thrust into a circumstance that seems downright absurd and illogical. Kind



of like the one that Nokia executives faced in 1991, when overnight, the company's biggest market (the Soviet Union) ceased to exist. Or the situation Kodak executives were confronted with in 2003 when their long-standing core business of film photography suddenly became irrelevant with the advent of digital photography. Or the situation we find ourselves in right now, in the wake of COVID-19.

Let's turn to a real-life illustration of injecting some humor into the workplace. A European bank recently held a company-wide weekend event at a countryside hotel as a token of appreciation to its employees. Unbeknownst to the bank's top executives, but with their tacit consent, the organizers orchestrated a practical joke. On the highway leading to the hotel, phony policemen flagged down each senior manager one-by-one, scolded them for reckless driving, and issued them traffic violations. Because the charges were bogus, the incidents were filmed by a hidden camera to capture the

indignant reactions of the executives. The resulting humorous footage was played on a large screen in front of the bank's entire staff at the hotel. What do you think is the effect of something like this? It sends a message that fun is allowed in the organization, and even top executives are not immune to laughing at themselves and allowing others to do the same. A company-wide emotional alignment builds around a foundation of open, creative expression, enriching the work experience of employees. In turn, it supports more creative, more engaged, and more satisfied employees who serve to make the bank itself more successful, more adaptable, and more innovative.

So how can you begin to harness the power of unconventional thinking to help you master disruption? It starts by looking at the world through an inquisitive, humorous lens, like you did as a child. And this perspective should not be limited just to your work, but permeate your general outlook on life. After all, some of the

Gabor George Burt is the originator of The Slingshot Framework, a leading expert of Blue Ocean Strategy, and the global authority on creative business transformation and re-imagining market boundaries. Gabor is uniquely positioned to guide leadership teams to be among the shapers of the future. Since the beginning of the COVID-19 pandemic, he has been enabling organizations around the world to turn crisis into opportunity, identify new growth opportunities, expand their market presence, and harness creativity as a key organizational asset.

Gabor George Burt will present Virtually via e360tv Wednesday, March 10, at 9:30am.

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A CHILD'S DRAWING OF WATER SKIING.

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—Sir Richard Branson, founder and chairman of Virgin Group



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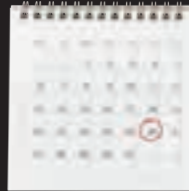
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VIEW OF THE F-1 FUEL INJECTOR PLATE, THE CAUSE OF SO MUCH DISTRESS. CREDIT: NASA.



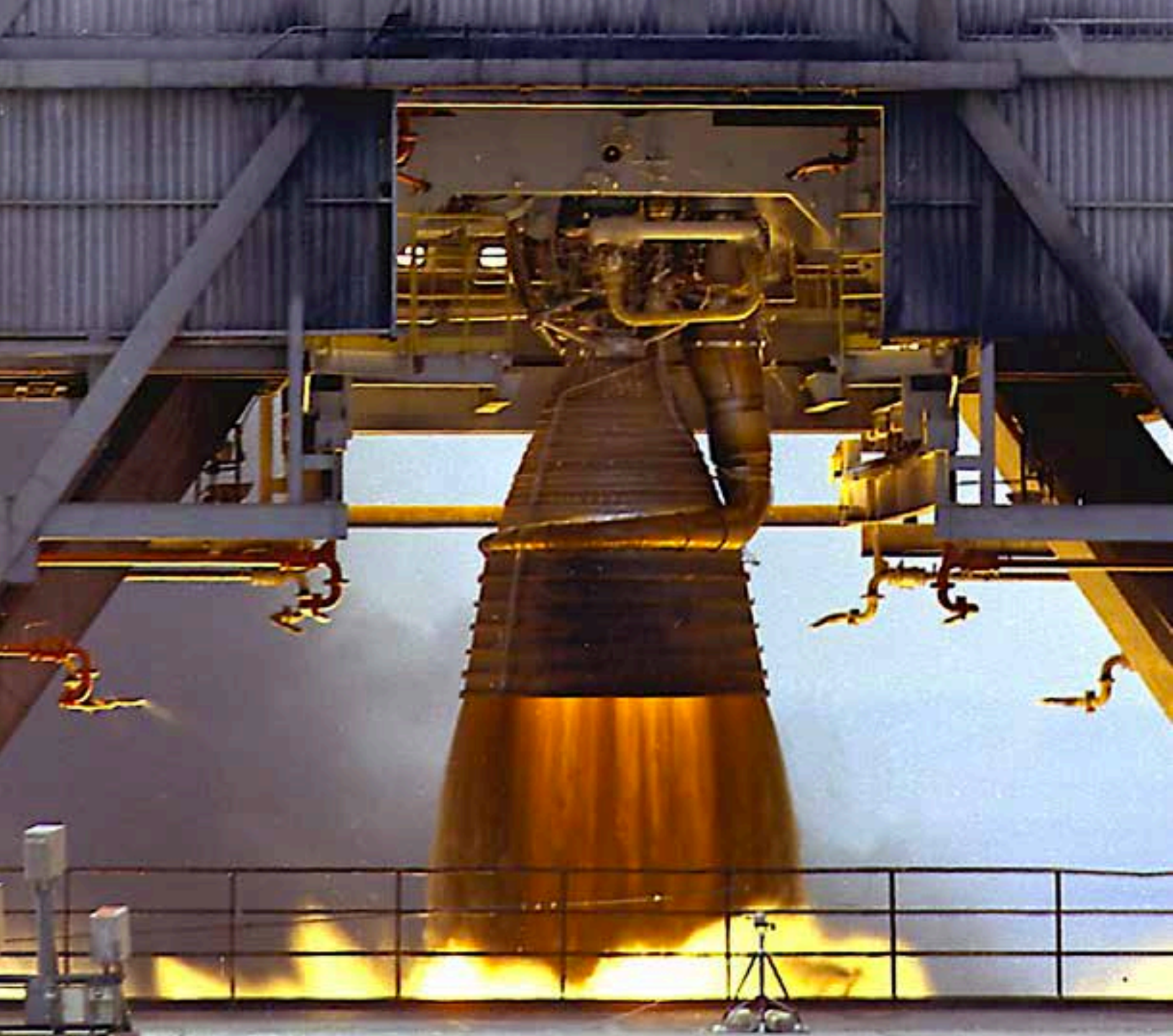
BY ROD PYLE

## TAMING THE DRAGON:

*Creating the F1, NASA's Innovative Moon Rocket Engine*

*When I was a young boy growing up in Southern California, my family made our first outing to Disneyland. We rode the trolleys on Main Street, survived Mister Toad's Wild Ride in Fantasyland, and laughed at all the obligatory spots on Adventureland's Jungle Cruise. But the most magical moment was yet to come.*





THE F-1 ENGINE BEING FIRED ON A TEST STAND IN THE 1960S. CREDIT: NASA

Nearing twilight, after passing through the deep shadow of the imposing Matterhorn Bobsleds, we entered Tomorrowland. I stopped dead in my tracks, jerking my father to a halt with a clutched hand. Ahead of me was the most magnificent thing I had ever seen. Gleaming white against an indigo sky, bathed in spotlights, loomed a 76-foot-tall rocket. It was shaped like a World War II V-2 missile, stood on

three streamlined legs, and sported a pilot cockpit near the top. Gaping, I breathlessly looked up to my father, who at six feet seemed almost as tall as the rocket, and asked, "Is . . . is it real?" His answer was somewhat deflating to an enraptured eight-year-old—"Nope"—but the image of that beautiful spaceship remains burned in my memory.

The TWA Moonliner was 76 feet of streamlined grace, and, at eight feet taller than Sleeping Beauty's castle, towered as the tallest feature in the park. It remained the centerpiece of Tomorrowland from the day of the park's opening in 1955 through 1967 (shortly after Walt Disney died), when it was removed to create room for the much less entrancing Carousel of Progress.

At that moment, however, this fantastic sight whetted the appetite of an already space-crazed kid, for whom the American space program would become a lifelong obsession. What I did not realize then, however, was that as realistic as the Moonliner seemed, we were a long way from placing humans on the lunar surface. Just three years earlier in 1961, with the primitive Mercury spacecraft under its belt, President Kennedy had announced America's intention to "land a man on the Moon." From then on, via presidential decree, the aerospace industry had been working in overdrive.

*"Nearing twilight, after passing through the deep shadow of the imposing Matterhorn Bobsleds, we entered Tomorrowland."*

There were many machines to be invented and perfected, astronauts to select and trained, and trajectories to be calculated and checked. Safety was paramount, but the program was on a timeline—Kennedy had set the end of the 1960s as the goal—and these innovations had to be developed in parallel to meet that deadline. One of the greatest challenges was the Saturn V rocket that would hurl the tiny Apollo capsule and its lunar lander to the Moon. And as if designing the 363-foot-tall behemoth was not a sufficient challenge, it would require a revolutionary new rocket engine to power it through deep space.

At the time of Kennedy's speech, the most powerful rocket in the US arsenal was the Atlas, America's first successful nuclear missile. The Atlas stood 75 feet tall (almost exactly the same height as Disneyland's Moonliner), and developed 360,000 pounds of thrust with three rocket engines.



A SMALL SCALE MODEL OF THE ORIGINAL TWA MOONLINER, WHICH WAS INSTALLED IN TOMORROWLAND AFTER THE ORIGINAL WAS REMOVED. CREDIT: WIKIPEDIA/HARSHLIGHT.

The rocket was troublesome and failure-prone, and the structure was so thin that it would collapse under its own weight without fuel in it. Yet this was the starting point, the state of the art in 1961.

In contrast, to reach the Moon with the Apollo capsule and lunar module that were just beginning to take shape, a rocket would need to develop about 7.5 million pounds of thrust—equivalent to roughly





CLOSE VIEW OF THE F-1 FUEL INJECTOR PLATE. NOTE THE NUMEROUS ABORTED DRILL MARKS, WHERE INJECTOR HOLES WERE STARTED, THEN ABORTED. IT WAS ENGINEERING BY TRIAL-AND-ERROR. CREDIT: NASA.

20 Atlas rockets. Many solutions were considered, including using lots of smaller rocket engines (the solution the Soviet Union attempted on their own Moon rocket, with catastrophic results), or the development of a much, much larger one.

This was a problem. While NASA had the brilliant engineer Wernher von Braun leading the effort to develop the Moon rocket—he had been brought to the US from Germany after leading the V-2 project for the Nazis in World War II—nothing of this scale had ever been

attempted. Even with five large engines clustered on the first stage of the Saturn V, each would have to develop about 1.5 million pounds of thrust to deliver the necessary hardware to the Moon, a mind-boggling challenge. In just a handful of years, engineers would have to increase the output of their most powerful engine (which in 1961 was generating about 100,000 pounds of thrust) by a factor of 15, and it would be required to run for at least ten minutes without exploding. (As it turned out, in flight this particular engine

would never run for more than 2.5 minutes, but the designers wanted a wide safety margin.) Finally, it would have to be safe and reliable enough for three astronauts to ride atop it—human-rating such hardware was a much tougher assignment.

It is natural to assume one might just make the existing engines bigger and bigger until reaching a magic number, but von Braun and his engineers knew this was not a simple matter of scaling up. This was a time when computers were little more than oversized four-function calculators, and

engineering was performed largely with slide rules, graph paper, and sharp pencils. A mixture of science, art, and intuition, and the devil was in the details, large and small. To top it all off, it was hoped that the Saturn V would be flying tests no later than 1965—just four years away. Von Braun’s NASA team spent a lot of late nights wrestling over how to proceed.

Fortunately for the young space agency, the US Air Force had been pondering a similar problem. In the mid 1950s, with larger and larger hydrogen bombs being developed to address the perceived threat from the Soviet Union, the Air Force wanted a big, powerful single-rocket engine that could hurl nuclear warheads into Soviet territory. They turned to North American Aviation (who would later build the Apollo spacecraft and the Saturn V’s second stage), and the project was assigned to their then-new rocket engine subsidiary, Rocketdyne, based in Canoga Park, California. Two massive single-chamber rocket engines, the E-1 and the F-1, were designed and tested. Test firings of the F-1 had been under way since 1957, but it was not yet something considered reliable. Adding complication, the Air Force had recently cancelled the project, as the bombs they needed to fly had gotten smaller and lighter. NASA eagerly inherited the program, and the Rocketdyne engineers got back to work.

For some at NASA, the situation seemed a godsend—a nascent massive rocket engine, which had already undergone some testing, had fallen into their laps. Still unclear was how much still remained to be done, and all in a few years. And everything needed to be nearly 100 percent reliable—something no machine, even a doorknob, could claim. There were many devils in the details, all conspiring to release the fiery hell of thousands of gallons of highly explosive rocket fuel.

The project had already had its share of growing pains, and these did not stop simply because it had a new sponsor. In

the early 1960s, rocket engines of any size were still relatively new territory, and much of the design was based on intelligent, and intuitive, guesswork. Think a problem over, meet with peers, hash out design ideas, then return to the drafting table to make more drawings. Now that NASA was in charge, the Rocketdyne team had to submit those plans to the engineers at NASA’s Manned Space Flight Center in Huntsville, Alabama, for scrutiny. The Huntsville team, comprised primarily of von Braun’s German compatriots who had relocated to the US after the war, had their own way of doing things, which often drove the Rocketdyne personnel to distraction. As expected, the culture clashes were intense. (Just open the hood on a Mercedes and a Cadillac sometime, and those differences become clear. The former is built like a precision timepiece, and the latter like a driving tool.)

But they muddled through. Once everything was approved, the Rocketdyne team would return to the shop with the revised plans and start making parts, then assemble those parts into the monster that was the prototype F-1 engine, inspect it, pivot to the test stand, and fire it up.

Quite often, “fire it up” resulted in an engine fail and explosion. After the smoke cleared, the engineers would then wander the test range picking up parts. Later, with all the bits and pieces taken back to Rocketdyne, engineers spread them out on the floor to discern what had failed. Alongside those parts were the charts and recordings of readouts from analog measuring devices such as pressure gauges and industrial thermometers. Comparing notes, the team would attempt to determine the point of failure—this was engineering forensics at its finest—before it was quite literally back to the drawing board to try again.

Schlepping an F-1 engine around was not a trivial task, nor were the tests. The massive rocket engine stood almost 20 feet tall, with 12 feet across at its widest. Each part

*“There were many devils in the details, all conspiring to release the fiery hell of thousands of gallons of highly explosive rocket fuel.”*

was hand-made, and no two were exactly alike. The F-1 weighed 18,000 pounds and burned a mixture of high-grade kerosene and ultra-cold liquid oxygen. Its engine was bigger, hotter, thirstier, and vastly more powerful than anything that had gone before. Its enormity was hard to grasp. In an era when a standing person could look down at most rocket engines, a committee of engineers could hold a cramped meeting inside the exhaust nozzle of the F-1.

While expensive, time-consuming, and sometimes maddening, that was the methodology. With most aerospace ventures, this approach worked. Eventually. But the Apollo program was on a tight schedule, and the F-1 program was rapidly becoming a “pacing item,” threatening to be the foot dragging behind the speeding toboggan of the lunar landing program, slowing it down by increments.

Then it got worse. They hit a brick wall.

During tests, after firing up, the massive engine would run for a short time. Then the readings would start to peg, and before long, the engine would fail or explode. Those “devils in the details” were combining into one large demon banging around inside their monster engine and causing it to shake itself into fiery oblivion. The engineers realized they were missing something, but they knew only the symptoms. Eventually their deductions led them to one massive, inescapable conclusion: the fuel was not burning properly.

When they started the engine, two turbopumps would spin, forcing the fuels into the combustion chamber. There they would mix, and an igniter—a glorified spark





TECHNICIANS INSTALLING ONE OF FIVE F-1 ENGINES AT THE BASE OF THE SATURN V'S FIRST STAGE. CREDIT: NASA.

plug—would light the fire. The engine would run fine for a bit before starting to hiccup, prompting the chamber pressures and temperatures to run wild. The fuel burned unevenly, often with catastrophic results. The culprit? Combustion instability. The scaling-up of engine design changed the physics of how it should have behaved, and acoustic waves would begin slamming around inside the burning gases in the combustion chamber. As it turned out, this had always been the case inside

smaller rocket engines, but with the lower pressures involved, they worked anyway. Now, with the cave-like size of the F-1 combustion chamber, the instability was fatal—the milliseconds it took the fuel to ignite from startup to full power set up an inescapable pattern of compression waves, shaking the machine to bits.

Although innovative, yet not innovative enough, the engineers needed a solution, and they needed it quickly. The normal procedure would have been to keep

refining, keep testing, keep mulling over the results (often just those bits of alloy shrapnel), and try again. But as time and money pressures mounted, they needed to do something more drastic. It was truly time to think well outside the box . . . something they had thought they were already doing. Their next innovation would have to be radical.

Eventually, the Rocketdyne team realized that a big part of the problem was incomplete mixing of the fuels prior to

ignition. When the deluge of kerosene and liquid oxygen came gushing into the combustion chamber—about three tons of fluids per second—it was pushed through a three-foot-wide, four-inch-thick injector plate, which looked like a glorified shower head. Fuel jetted through more than 6,000 holes drilled through the massive plate, transforming it from a liquid into a fine mist before ignition. As near as the engineers could tell, the number and orientation of the holes were not working, and they had to figure out how to fix this issue before moving on.

With this being a very early period in computer modeling, the answer remained elusive. The engineers tried many variations of hole patterns, hole diameters, and placements. They welded in “baffles,” metal rails that reached from the center of the injector plate out to the sides in different configurations. They designed every combination they could think of, and of course each ultimately had to be tried in the unforgiving environment of a full test.

The endeavor was exasperating and exhausting. At one point, a NASA inspector is said to have come upon a group of metalworkers at the North American Aviation plant, who were scratching their heads over placement of the baffles they were about to weld. When he asked them what they were doing, they said that the Rocketdyne engineers had just minutes earlier walked away in disgust and said, basically, “Try whatever you want.”

The testing continued, sometimes two or three prototypes per day. Some tests ended with a fireball engulfing the test stand (which had been intelligently placed well outside of Los Angeles) in a failure of man against physics. Others ended better, with an incremental improvement made, a small change proven useful. But overall, the method was test, try something else, test, and test again. It was driving them crazy.

Eventually the engineers began to realize that this combustion instability issue was so hit-and-miss that it could take thirty

*“Think a problem over, meet with peers, hash out design ideas, then return to the drafting table to make more drawings.”*

years past the landing deadline of 1969 to hit upon the right solution. It was a seemingly chance occurrence, but a potentially disastrous one. How could they test new designs for something that seemed to occur randomly?

Then the engineers got a wonderful, bizarre, and slightly malevolent idea: Bombs.

Being able to trigger the combustion instability shockwaves at a time of their choosing allowed them to take control of the process. They designed an explosive device that could be inserted into the engine prior to test firing. Then, rather than waiting for the instability to build up in unpredictable ways, their little bomb (which was of a known power and yield) went off when the pressure built to a pre-determined point and sent a shockwave into the inferno of burning fuel. This would increase the chamber pressure from 1,100 pounds per square inch to more than 4,000 PSI in a fraction of a second. The engineers could then watch as the instability built, but with increasingly predictable results. Their goal was to get their monster to settle down in about 400 milliseconds. By 1967, after hundreds of tests and a few too many blazing light shows in the desert test range, they got it down to 100 milliseconds.

The challenges were not eliminated by resolving the combustion instability, however. They had issues with rocket nozzle heating, which they addressed by somewhat incongruously cooling the nozzles with rocket fuel, which also served to pre-heat the propellant. They also used rocket fuel, rather than heavy masses of hydraulic fluid, to steer the engines with massive hydraulic rams.

Rod Pyle is an author, journalist, historian, and futurist, and filmmaker. He has written 17 books on space history, exploration and development, including *Innovation the NASA Way* and *Destination Mars*. Pyle has also produced, directed and written several episodes for History Channel's *Modern Marvels* as well as a documentary for History Channel entitled, *Beyond the War of the Worlds*.

North American made their revised deadline by a hair. The fully stacked Saturn V rocket, with five of the adolescent F-1 engines powering its first stage, flew just two test flights before it was used to send three men to orbit the Moon in the flight of Apollo 8. A few issues occurred during those test flights, including an engine that quit due to vibration, but both the Rocketdyne and NASA teams were confident in their rapid fixes, and Apollo 8 headed to the Moon with a crew of three in December 1968. Nine more Saturn Vs would send crews to the Moon, and the final flight of the mammoth rocket would launch America's first space station, Skylab, into orbit. Despite the challenges, the F-1 engine proved its mettle again and again, without a single failure that jeopardized mission success or imperiled the crew.

It took seven years, countless late nights, triple shifts, and many strained marriages, but in the end, radical innovation—not just thinking outside of the box, but so far beyond it as to seem unimaginable—won the day: July 20, 1969, when a 38-year-old American named Neil Armstrong set foot on the Moon. Walt Disney would have been proud.

Eventually, between tests such as the above and many redesigns of the injector plate among other components, most of the problems were resolved and the F1 engine was tested in flight and declared flightworthy and man-safe. ■





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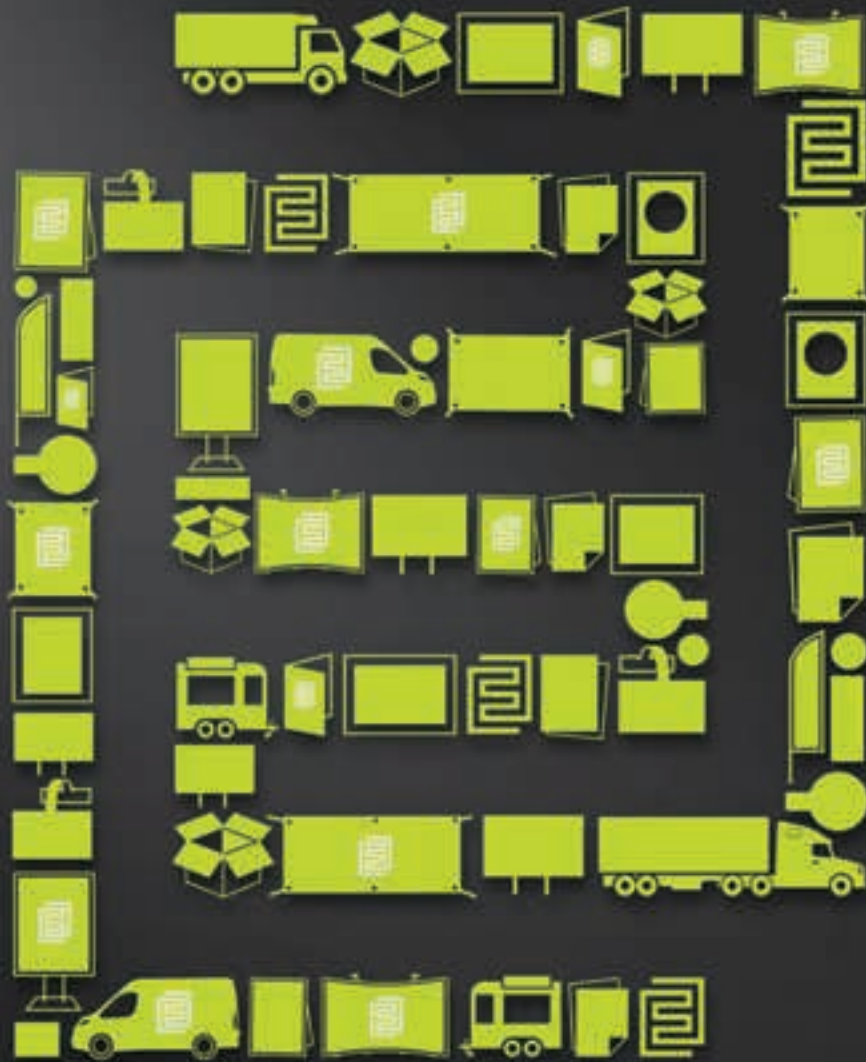
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## NIELSEN TRUST CONCERT

**BAND FEATURING RICK NIELSEN  
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THURSDAY, MARCH 11 | 1:30PM

Nielsen Trust is a band featuring famed guitarist and songwriter Rick Nielsen from the Rock & Roll Hall of Fame band, Cheap Trick, and members of his talented family. This includes his son, Daxx Nielsen, who plays drums for Cheap Trick, and another son, Miles Nielsen, who has his own successful project, Miles Nielsen and The Rusted Hearts. Kelly Steward, married to Miles, is a singer and songwriter. While they have all jammed together at various

times in the past, the performers became a group in 2019, debuting at the Castle Theatre in Bloomington, Ill. The band now performs all over the country, and Cheap Tricks songs are a large part of the band's repertoire.

The scholarship support provided by the DMACC Foundation enabled Kendra Fulton to immerse herself in her studies in pursuit of a Nursing degree on Ankeny Campus.



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## DR. DAVID GALLO

OCEANOGRAPHER

WEDNESDAY MARCH 10 | 2:00PM

Dr. David Gallo, who will be making his third appearance at ciLive!, is one of the world's leading experts on exploration, and an unabashed ambassador between the sea and those of us on dry land. A premier oceanographer and explorer, he was one of the first scientists to use robots and submarines to explore the deep sea floor. Most recently he co-led an expedition to create the first detailed and comprehensive map of the RMS Titanic, and he co-led the successful international effort to locate the remains of Air France Flight 447. He has given more than 10 TED and TEDx presentations, and has appeared in numerous documentaries and as a featured guest on a variety of national news programs. Dr. Gallo's presentation will illustrate how lessons we can learn from the ocean can help our efforts in space exploration and settlement.



## DR. MIREYA MAYOR

PRIMATOLOGIST FOR NATIONAL GEOGRAPHIC

THURSDAY, MARCH 11 | 9:30AM

Dr. Mireya Mayor is a world-renowned primatologist, explorer and Emmy Award-nominated wildlife correspondent for the National Geographic Channel. Dr. Mayor's adventures have taken her—armed with little more than a backpack, notebooks and hiking boots—to some of the wildest and most remote places on earth. Hailed as a “female Indiana Jones” and as an inspiration to young women who are interested in science and exploration, she has survived poisonous insect bites, been charged by gorillas and chased by elephants, and keeps going back for more. Her latest project is Travel Channel's hit series *Expedition Bigfoot*, and her signature book, *Pink Boots and a Machete*, continues to thrill readers around the world.



## THE GHOST BROTHERS

TELEVISION'S PREMIER GHOST-HUNTING TEAM

THURSDAY, MARCH 11 | 10:30AM

The Ghost Brothers, which include best friends Dalen Spratt, Juwan Mass and Marcus Harvey, are considered Atlanta's premier ghost-hunting team. The trio's first show, *Ghost Brothers*, ran on Destination America/TLC for two seasons. Their current show, *Ghost Brothers: Haunted Houseguests*, appears on the Travel Channel, and blends comedy with a straightforward approach to the paranormal. They will discuss their tagline, "It's time to pop the trunk on these ghosts," in more detail at ciLive! 12.



## NIKKI Van SCHYNDEL

SURVIVALIST AND BEST-SELLING AUTHOR

THURSDAY, MARCH 11 | 12:30PM

Nikki van Schyndel is one of North America's top wilderness survivalists, as well as a best-selling author and star of the self-filming survival show *Alone* on the History Channel. She also tested her skills by spending a year and a half surviving in the wilderness, using primitive ways of the past such as trapping and spearing bears, fishing with bone hooks and hunting with stone-tipped arrows. She recounts the adventure in her best-selling memoir, *Becoming Wild*. Today, she lives off-the-grid on an island in the middle of nowhere, in a log cabin she built herself from a how-to book, with her "how hard can it be" motto leading the way.





## GABOR GEORGE BURT

**INNOVATION, CREATIVITY AND STRATEGY  
DEVELOPMENT EXPERT**

WEDNESDAY, MARCH 10 | 9:30AM

Gabor George Burt is an internationally recognized expert in innovation, creativity and strategy development, and the author of the book *Slingshot: Re-Imagine Your Business, Re-Imagine Your Life*. Burt was a leading expert of Blue Ocean Strategy, the new millennium's most influential business strategy approach. He contributed case study material to the worldwide, best-selling book of the same name and also originated the most popular blog on the topic. Burt is actively involved in shaping strategy for a diverse group of international clients, ranging from top multinationals and governments to start-ups and NGOs. He has given the opening presentation at the World Marketing Forum and was the architect and host of the Forum for Partnership in the Americas, a gathering of business and government leaders.



## DR. SIAN PROCTOR

**GEOLOGIST AND ANALOG ASTRONAUT**

WEDNESDAY, MARCH 10 | 10:30AM

Dr. Sian Proctor is a geoscientist, analog astronaut, space artist, speaker and solar system ambassador. Her motto—Space2inspire—is designed to encourage people to use their unique, one-of-a-kind strengths and passion to inspire those within their reach and beyond. Dr. Proctor has completed four analog astronaut missions, including the all-female SENSORIA Mars 2020 mission at the Hawai'i Space Exploration Analog and Simulation (HI-SEAS) Habitat, the NASA-funded, four-month Mars mission at HI-SEAS, a two-week Mars mission at the Mars Desert Research Station (MDRS), and two-week Moon mission in the LunAres Habitat. She believes that when we solve for space, we also solve issues on Earth, and she also promotes sustainable

food practices used in space exploration as a way to reduce food waste on Earth. Dr. Proctor has a TEDx talk called "Eat Like a Martian" and has published a *Meals for Mars* cookbook. In 2021, she was selected as an Explorers Club 50: fifty people changing the world.



## KYLE HILL

SCIENCE CELEBRITY AND EDUCATOR

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WEDNESDAY, MARCH 10 | 11:30AM

Kyle Hill is a science educator and communicator who says no question is too nerdy. His work has been published in *WIRED*, *Popular Science*, *Slate* and *The Boston Globe*. He has also appeared as an expert on Fox News, Al Jazeera America, BBC World Service, Huffington Post Live and the Science Channel, and has held writing positions at *Scientific American* and *Discover Magazine*. In 2016, Hill hosted *MythBusters: The Search* on the Science Channel, which was the highest-rated show on the network that year. Hill also created the popular online science show *Because Science*, which garnered more than 300 million views over its lifetime and gained 1,000,000 subscribers in just 15 months. His latest venture is *The Facility*, a new channel that garnered 100,000 subscribers in just five days.



## KAI KIGHT

CLASSIC VIOLINIST AND COMPOSER

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WEDNESDAY, MARCH 10 | 1:00PM

Kai Kight is a classical violinist turned innovative composer who uses music as a metaphor to inspire individuals and organizations across the world to compose paths of imagination and fulfillment. In his emotionally powerful presentations, Kight performs mesmerizing original music and shares stories from his own transformation as an artist. Kight translates these insights into takeaways that audiences can easily infuse into their own lives and work environments. As a musician, Kight has performed his original music for thousands in venues across the world, from the White House to the Great Wall of China. As a speaker, he has created impactful experiences for audiences at conferences, companies and universities internationally. His clients include The Walt Disney Company, PricewaterhouseCoopers, and the NFL's Seattle Seahawks.



# ciLIVE! 2021 AT A GLANCE

All events held at DMACC West Des Moines Campus | 5959 Grand Avenue, West Des Moines, Iowa.

## WEDNESDAY, MARCH 10, 2021

**9:30AM GABOR GEORGE BURT**  
Innovation, Creativity and Strategy  
Development Expert

**10:30AM DR. SIAN PROCTOR**  
Geologist and Analog Astronaut

**11:30AM KYLE HILL**  
Science Celebrity and Educator

### INTERMISSION

**1:00PM KAI KIGHT**  
Classic Violinist and Composer

**2:00PM DR. DAVID GALLO**  
Oceanographer

## THURSDAY, MARCH 11, 2021

**9:30AM DR. MIREYA MAYOR**  
Primatologist for National Geographic

**10:30AM THE GHOST BROTHERS**  
Television's Premier Ghost-Hunting Team

**11:30AM SPECIAL AL WORDEN EVENT**

### INTERMISSION

**12:30PM NIKKI VAN SCHYNDEL**  
Survivalist and Best-Selling Author

**1:30PM NIELSEN TRUST CONCERT**  
Band Featuring Rick Nielsen and Daxx  
Nielsen from Cheap Trick

# Thank you

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CiLIVE!12

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