

X – The Moonshot Factory

The Gimbal

V2.0 / JULY 2018





X – The Moonshot Factory

The Gimbal

V2.0

- ✓ Finalizing a late day equipment inspection of the balloon autolauncher at Project Loon's Puerto Rico launch site





The Gimbal is a guide to X's moonshot factory culture.

We are X, The Moonshot Factory on Facebook and LinkedIn, and we are @theteamatx on Twitter, Instagram, and Medium.

Visit us at www.x.company.

No part of this publication may be reproduced, distributed, or transmitted in any form by any means without the permission of the editors. For any permission requests, please email thexgimbal@x.team.

The X logo, Moonshot Factory, and any related marks are trademarks of Google LLC or X Development LLC.

The Gimbal
Version 2.0
Published June 2018

Copyright © 2018
X Development LLC.
All Rights Reserved.



Conducting a pre-flight inspection of a Project Wing delivery drone in rural California





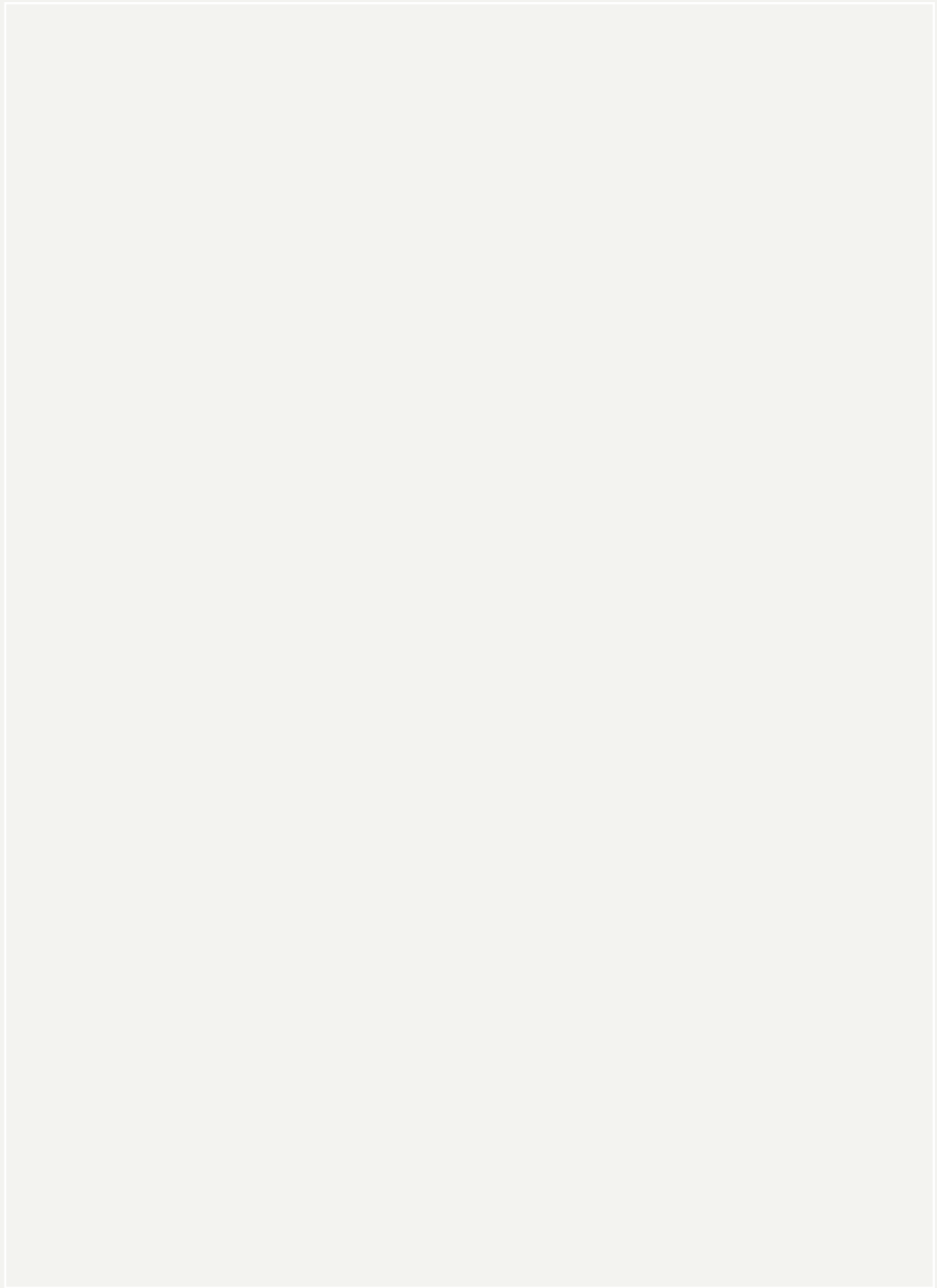


Table of contents

S1	INTRODUCTION
12	Welcome to X
S2	BASICS OF X
22	Who & What We Are
26	Our Creative Tensions
S3	TRUE NORTH
36	Our Values
38	Audacity
44	Initiative
52	Learning
58	Teamwork
64	Creativity
S4	THE BUSINESS OF MOONSHOTS
72	Purpose & Profit
S5	LEARN MORE
84	Reading List

01



Introduction

12 Welcome to X

Welcome to X

We created this guide to help you understand what kind of organization you've landed in and what we've learned about taking moonshots. The Gimbal will also help you figure out what to try when you're not sure what to do – because that will happen a lot, maybe more than it's ever happened anywhere else in your career. That's what it takes to bring the future here as fast as possible and get traction on huge world problems that most people have already deemed to be intractable.



Before we get started, we need to be honest: life here isn't easy.

We're trying to build things most people can't even imagine, and we're deliberately choosing long, difficult roads in the hopes of having a huge, positive impact on the world – but we can't see where the road is going to lead us (not yet, anyway). That makes this a high-ambiguity, high-change environment, with huge internal and external expectations of us as individuals and as project teams. You'll be pushed professionally and emotionally in a way you may never have experienced.

The good news is that you're joining an incredibly supportive team. From the generations of Xers who've passed through here since 2010, we've learned some of the mindsets and behaviors that help us get to the moon faster and weather the inevitable tough spots. We lean on good judgment, flexibility, and open communication more than hard and fast rules. And most importantly, we know that no one gets to the moon alone; we go together.



Monitoring the progress of an internet balloon being prepared for takeoff from a launch site in Nevada





1: The team observes an early Makani prototype at a test site in Hawaii

2: Early Loon test balloons sometimes landed in unexpected locations, so we were sure to provide contact info.

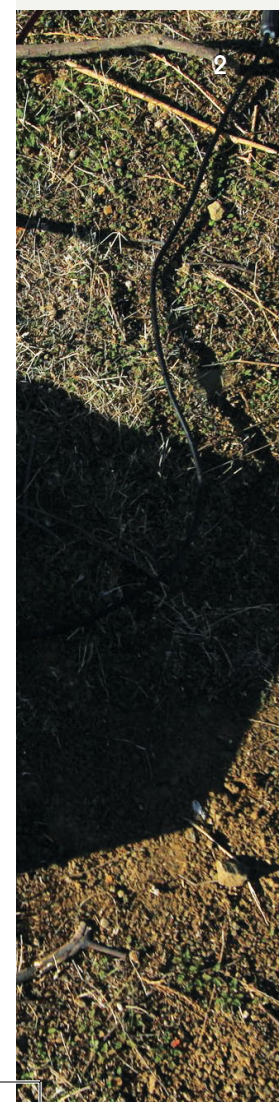
3: The operations team recovers a Loon balloon after its descent into a dune field in Peru

4: A low-fidelity lab test of an early iteration of the Wing drone





3



2



4



What is a gimbal?

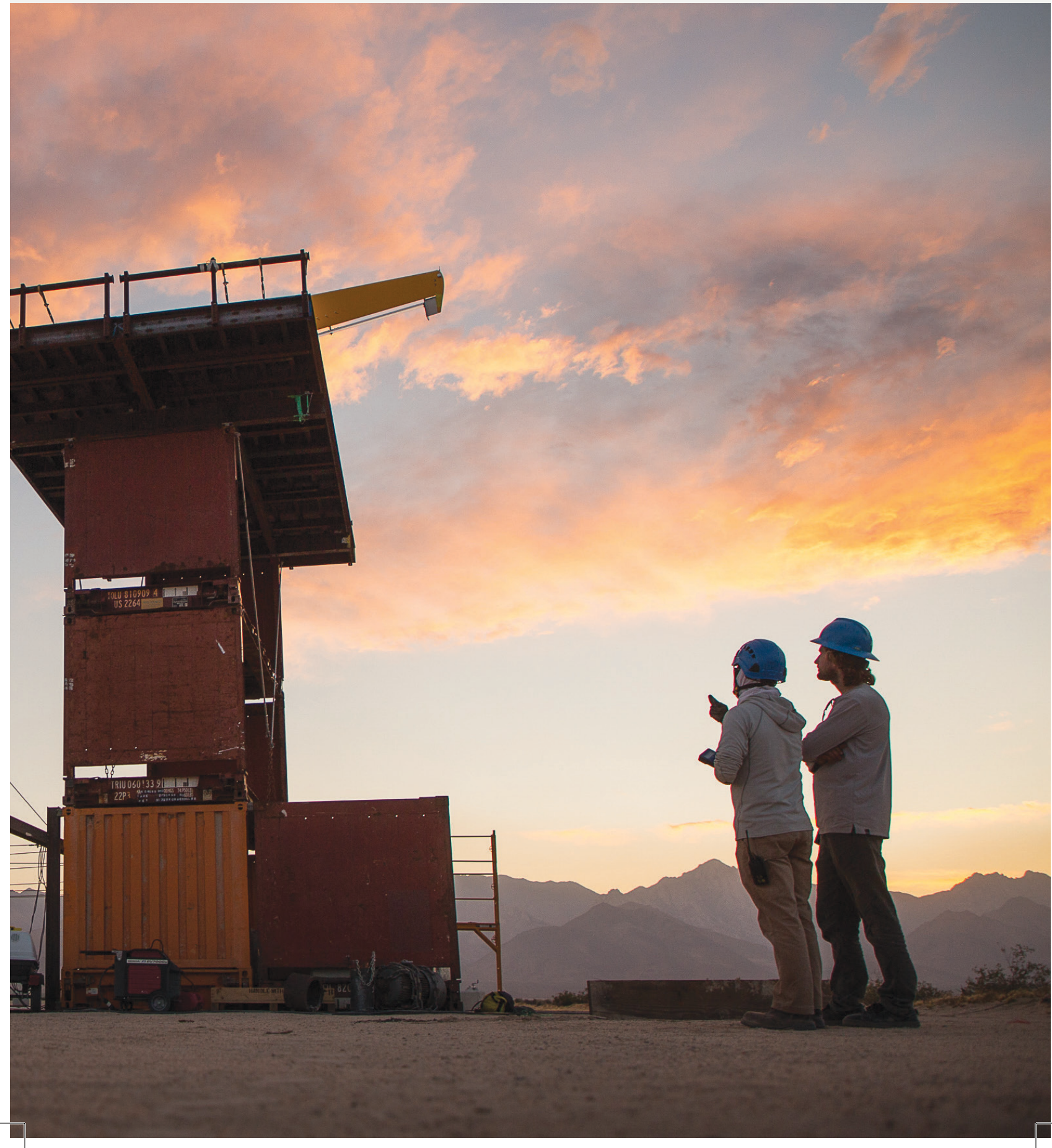
It's a mechanism, typically consisting of rings pivoted at right angles, for keeping an instrument such as a compass or chronometer horizontal in a moving vessel or aircraft. As X pitches and rolls with the inevitable chaos of moonshot-taking, we hope our gimbal can keep us relatively stable, upright, and making forward progress.



< Using a high pressure water jet to simulate how rain affects drone performance

- ✓ Finalizing a late-day inspection of the M600 kite at a remote test site in California





02



Basics of X

- 22 Who & What We Are
- 26 Our Creative Tensions

Who & What We Are

This is what we do

Our mission is to invent and launch moonshot technologies that make the world a radically better place. We live in the sweet spot between high-risk/idealistic (where most research lives) and safe-bet/pragmatic (where most companies live). We push forward projects people think are crazy to the point of feasible prototype, so people no longer ask “if” but “when”. The primary “product” of the moonshot factory is startups that have the potential to become large, sustainable businesses for Alphabet.

This is who we are

We’re a team of people trying to solve some of the world’s largest and most difficult problems. We work through complex challenges every day, navigating ambiguity, wrestling with uncertainty and pushing the boundaries of what’s possible – all while caring deeply about one another and the people we seek to help.

Catching the package “hook” as it descends from a hovering Wing delivery drone



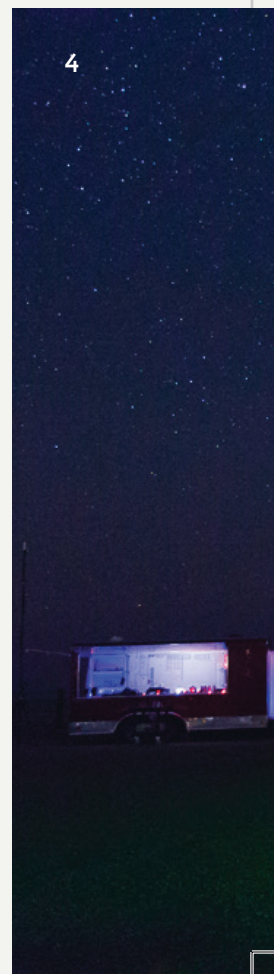




1



2



4



3



┌ 1: Early Loon balloons had a lot in common with giant trash bags

└ 2: The Loon team inflates an early prototype at an airfield in Winnemucca

┐ 3: A friendly drone awaits flight instructions at a Wing test site in California

◁ 4: A Wing drone painting the night sky with colored light

Our Creative Tensions

We've built these tensions into the factory. If you don't realize they're deliberate, you might feel like we keep changing the rules on you.

Build the future, but know we can't predict the future

There are many different ways to get to the moon, and none of them are clear from the start. Embracing this is a source of strength, not a sign that we don't know "the right way to do it." Moonshots are inherently unpredictable and need serendipity and on-the-fly judgment. And we need to be careful we don't constrain them unnecessarily by leaning on "the way we usually do things"; our ability to find a fresh perspective is one of our greatest strengths.

Be passionately dispassionate

We're intellectually honest. We pursue our ideas with the conviction that we're right and are going to change the world, but once we start learning where we're wrong, we take a step back and calmly assess the risks we face, what's not going well, and what we could do differently. That includes sometimes choosing to kill our project so we can move our time and resources to a more promising idea.

Be responsibly irresponsible

We want audacity and initiative...but we can't light everything on fire. We want to encourage learning and deep understanding of a problem...but we also need to just get on with things. We navigate this fine balance by leaning on good judgment and open communication. We want Xers to seek out each others' perspective and expertise and work together to find flexible, fast ways forward.

Embrace dynamic stability

Frequent change is our normal, so X is like riding a bicycle; just keep pedaling forward and keep your momentum up and you'll be fine. The mix of projects in the factory and the challenges they need to tackle change regularly. At any time, our projects are likely to vary dramatically in size and maturity and be in radically different industries, geographies, and technology fields. At any time, any of them could encounter a challenge no one's ever seen before, learn they have to go back to the drawing board, or unlock a problem that's defied the world for generations. This can make for an unsettling ride, but we've learned to stay flexible and adaptable and lean on each other.

Seek both profit and purpose

We want to work on things that are good for the world and, where we can, build a business with good margins and growth potential so it can sustain itself over time. Sometimes, as we learn more about a particular problem or approach, we find ourselves with a project that's good for the world, but we're unable to make the economics work. We need to shelve these things, disappointed as we might be, until we can see a path to a bigger, less risky market opportunity. We have to provide a return to Alphabet on money invested here, and that means we shouldn't commit to projects that we know will struggle to become large profitable businesses.



Xers collaborating on an early-stage prototype in X's Design Kitchen ^

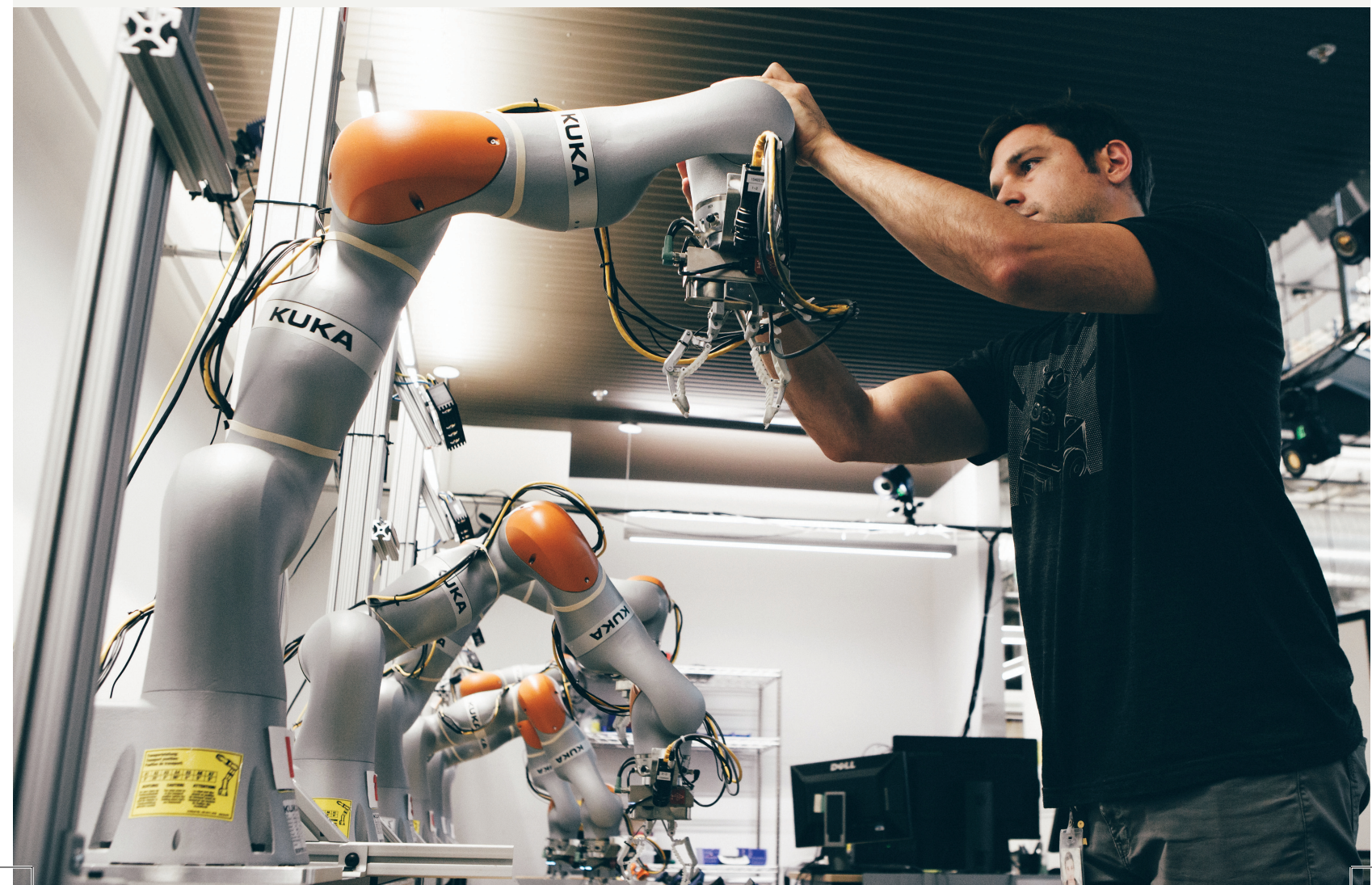


^ Inspecting the underside of the wing of the Makani M600 kite

BUILD AUDACIOUS NEW BUSINESSES, NOT JUST AUDACIOUS NEW TECHNOLOGY

We believe deeply that small, focused teams with the ability to run themselves independently is a good recipe for making a big impact on the world — quickly. We also want teams to share in the upside of their hard work (and give them “skin in the game”), so we have various compensation structures to address this. We graduate our projects once they’re ready to bring products to market. This creates

opportunities for Xers to be founding team members in their own startup, with a new company’s freedom to define their own culture and ways of doing things. It’s also an opportunity to reward people who stick it out through the early risky, bumpy, uncertain years. If you’re joining an X project, you’re joining a team that’s building and launching its own hardy little rocket — and we hope you’re excited!





┌ 1: The Loon team completes equipment inspections before a sunrise launch in Brazil

└ 2: Verifying port connections on a robot arm being used for a machine learning experiment

└ 3: The Makani M600 kite in crosswind flight



Members of the Loon team work on launch preparations at sunrise in New Zealand



03



True North

36	Our Values
38	Audacity
44	Initiative
52	Learning
58	Teamwork
64	Creativity

Our Values

We believe these approaches to solving problems and working with each other give us a better-than-average chance of success in the face of long odds.



Audacity

We believe in moonshots! We aim for 10x not 10%. We try things no one else has tried before. We're brave. We possess a sense of adventure and are resilient in the face of challenge.

Initiative

Xers don't wait for instructions; we get it done. When we see a problem, we roll up our sleeves and fix it. We look for ways to reduce complexity. We move fast and sweat the details.

Learning

We proactively seek out data and face it with honesty. We run at the hardest parts of the problem first. We make contact with the real world as fast as possible. We're curious students for life. We don't hold ideas sacred; we ask hard questions and say the difficult things so we can learn and make things better.

Teamwork

We believe that innovation is a team sport. We share knowledge with each other and seek out diverse perspectives. We follow through and earn trust. We stay humble and are good to each other.

Creativity

We draw inspiration from unexpected places and apply insights from disparate fields. We look for ways to cut Gordian knots in our projects. We find opportunities for play and keep a sense of humor.

Audacity

AIM FOR 10X, NOT 10%.

We believe in moonshots! We aim for 10x not 10%. We try things no one else has tried before. We're brave. We possess a sense of adventure and are resilient in the face of challenge.

Aim for 10x better, not 10%

Trying to make something 10x better forces us to free ourselves from existing tools and assumptions and start over, to imagine an answer that's practically unrecognizable compared with today's status quo.

Don't look for a playbook. We don't have one – and we like it that way

No one really knew how to build an airplane when they decided to build the first airplane – and the same goes for self-driving cars, Internet balloons, and most of our other moonshots. This makes life inherently unpredictable and risky, and things zig-zag more often than they roll in a straight line, but we surf this chaos and accept that uncertainty is the price we pay for the opportunity to shape the future.

Take moonshots, not roofshots

We start by aiming for a huge impact on millions of people's lives, and for the possibility of large, sustainable businesses. We get there by taking smaller steps, and we're not afraid to take the path that's longer and harder than others are willing to risk – as long as we feel the rewards are worth it.

- ✓ The self-driving car team's Firefly prototype completes a round through our specially designed test track in California



Navigational tips

Change your perspective, ask a different question, start over

Often, if you step back and apply enough audacity and creativity, the new perspective you get makes doing the impossible, possible. Be willing to go into places that other people haven't looked or have decided are too hard. Throw out old assumptions. Train yourself to take off the blinders and shake off the tendency to just spend more time or effort on existing methods.

No idea is too crazy to suggest and no effort is too sacred to change or end

Unchecked optimism fuels our imaginations. It can lead us to places both amazing and awful – and that's the point. A terrible idea is often the cousin of a good idea, and a great one is the neighbor of that. But, as we build and make progress, we apply enthusiastic skepticism, and, at all times, we remain emotionally ready to walk away so we can move on to the next promising idea.

It's okay to be afraid

Being more audacious isn't about having zero fear. It's about being able to work through and challenge our fear. It's also worth noting that audacity doesn't mean recklessness. We're not audacious for its own sake; we're audacious because we want to make the biggest impact we can.

Audacity is for everyone

Engineers aren't the only ones who can be audacious. We want to see creativity and innovation from every team, and we don't want to do things the way every company does them. We also want to celebrate audacity whether there's a happy ending or not; bravery and creativity need emotional support.

Don't hesitate to ask for help if you find yourself:

- Delivering work that feels ordinary, incremental, or overly complicated
- Frequently referencing old ways of doing things or how Google/other companies do things
- Shying away from things that feel unconventional or uncomfortable
- Undermining audacious goals, calling them "unrealistic" or "ridiculous"
- Criticizing others who take thoughtful risks
- Shutting down others' ideas
- Falling victim to analysis paralysis

✓ Flight preparations of a Makani M600 prototype kite







WE CUT THE GORDIAN KNOT

In 333 B.C. Alexander the Great arrived in Gordium (what is today's northwestern Turkey). In order to claim the chariot of the city's ancient founder, he had to undo a knot where the end was hidden inside. Others had tried—and failed—to untangle it. His solution? Chop the knot. Well, that's at least how the story goes anyway. We take the same approach to problems at X. We're always looking for ways to achieve more audacity with less complexity. Rather than spend thousands on a piece of equipment, we might hack it together using cheaper parts to achieve the same results. Rather than build huge, complex systems, we might work really hard to find a simple, elegant solution.

< Checking the interior assembly of the Firefly self-driving car prototype

Initiative

BE A FIRESTARTER

We don't wait for instructions; we get it done. When we see a problem, we roll up our sleeves and fix it. We look for ways to reduce complexity. We move fast and sweat the details.

Just get going

There's no instruction manual for moonshots; we roll up our sleeves and take the initiative to figure out a way. We write the playbook ourselves day by day and enjoy doing it. Grab a shovel and start digging.

Don't wait for someone to give you permission, hold your hand, or show you the way

We respect the laws of physics and the laws of the land we're operating in — but beyond that, we try to impose as few additional rules and processes as possible. Be a pioneer, an agent of change, a fire-starter. Not sure what to do? Reach out to any of hundreds of Xers who are happy to brainstorm, give advice, or point you in the right direction.



^ A free space optical communications [FSOC] unit is installed for a broadband connectivity test in the Indian state of Andhra Pradesh

Navigational tips

Learn to love “version 0.crap”

Don't let perfect be the enemy of good. It's more important to get going than sit around thinking about the perfect outcome. It's okay to share early drafts and fragments of thoughts. If you communicate what stage the work is at and that you're just looking for feedback, your fellow Xers aren't going to judge it harshly. They're going to be happy you're getting started and will likely jump in with great suggestions.

If there's a rule you disagree with, poke at it

We always operate with the physical and emotional safety of Xers and our surroundings top of mind. We also have to remember we're part of a high-profile public company, and there are obligations that come with that. Other than that, we actively work to resist bureaucracy creep, and we don't accept the notion of “this is how we've always done it” — though we don't want to reinvent the wheel. So, if you're told about a rule and you don't agree with it, test it and try to understand its intent. We're open to updating our thinking as we learn and as conditions change.

Don't hesitate to ask for help if you find yourself:

- Finding long lists of reasons that something couldn't get done
- Blaming other people or parts of the organization when you feel roadblocked
- Escalating before taking a crack at solving problems independently
- Taking rules you've heard of in the past and holding them up as immutable
- Letting your ideas languish if other people don't immediately support them
- Frequently asking for permission

✓ The Rapid Evaluation team explores the capability of a new prototype in the Design Kitchen



GETTING ADVICE FROM EXPERTS WILL SPEED YOU UP, NOT SLOW YOU DOWN

We all feel a strong sense of urgency and entrepreneurial “can do” spirit, but sometimes it’s a good idea to get some advice before you jump in with both feet. We’re working on some fairly radical things, which means that we need to be mindful of how we go about it, particularly once we reach outside the walls of X. We want to move fast, but we don’t want to accidentally create headwinds for ourselves. As various Xer experts advise you through these potentially tricky moments, it can sometimes be easy to hear “no” or feel like you’re getting slowed down unnecessarily. Their advice is important and can be nuanced, so here’s how to interpret their advice so it sounds less like “no” and more like “here’s how”. We also suggest you show them how you’re thinking through a problem so they can blend their expertise with your own and partner with you to find a good path forward.

Advice Type #1:

“You decide. I’m giving you my opinion and I think there are risks here, but you are the expert, and I trust you to consider all the risks (including those to X and Alphabet) and get appropriate mitigations in place. I have your back if you need me.”

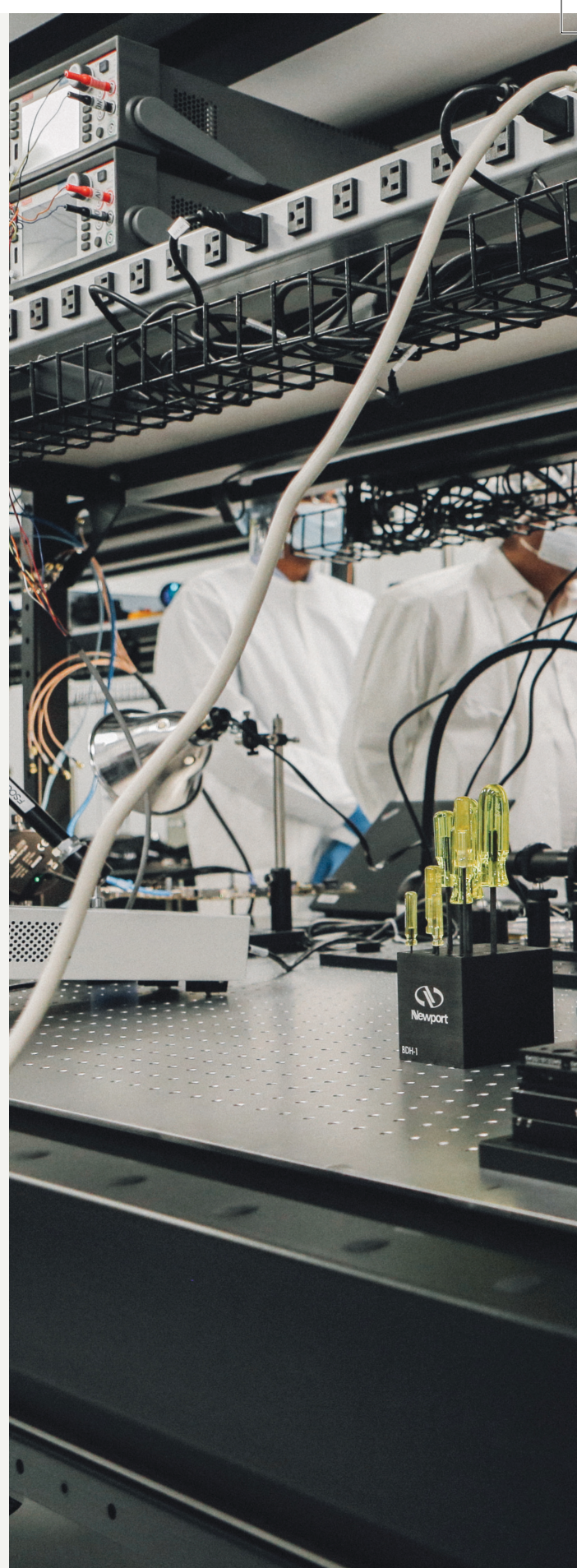
Advice Type #2:

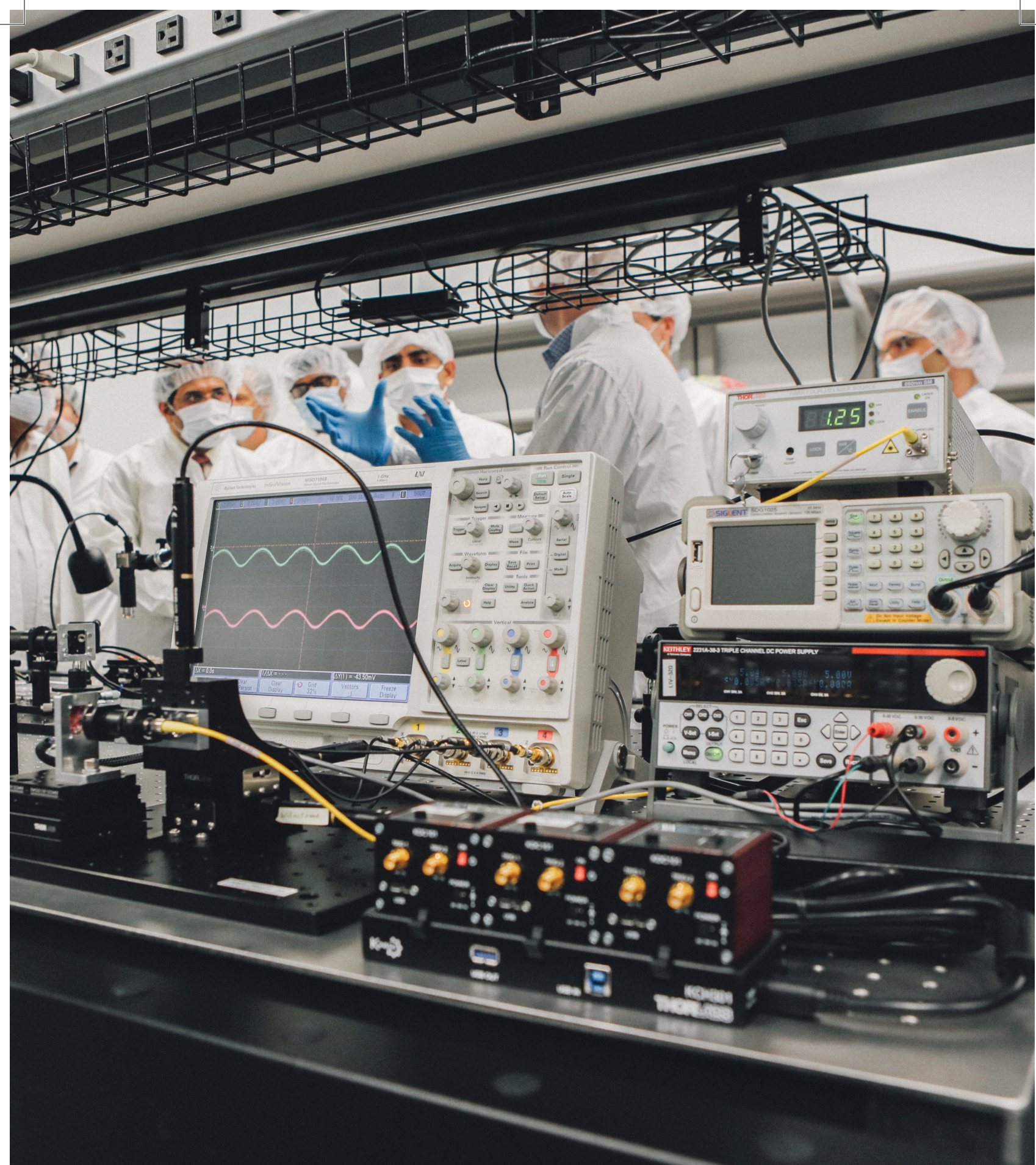
“The jury’s out. There are legitimate risks to X and the project, but we should all work together on a plan to proceed. Your manager or project lead should feel comfortable with the plan and be ready to help fix things if something goes wrong.”

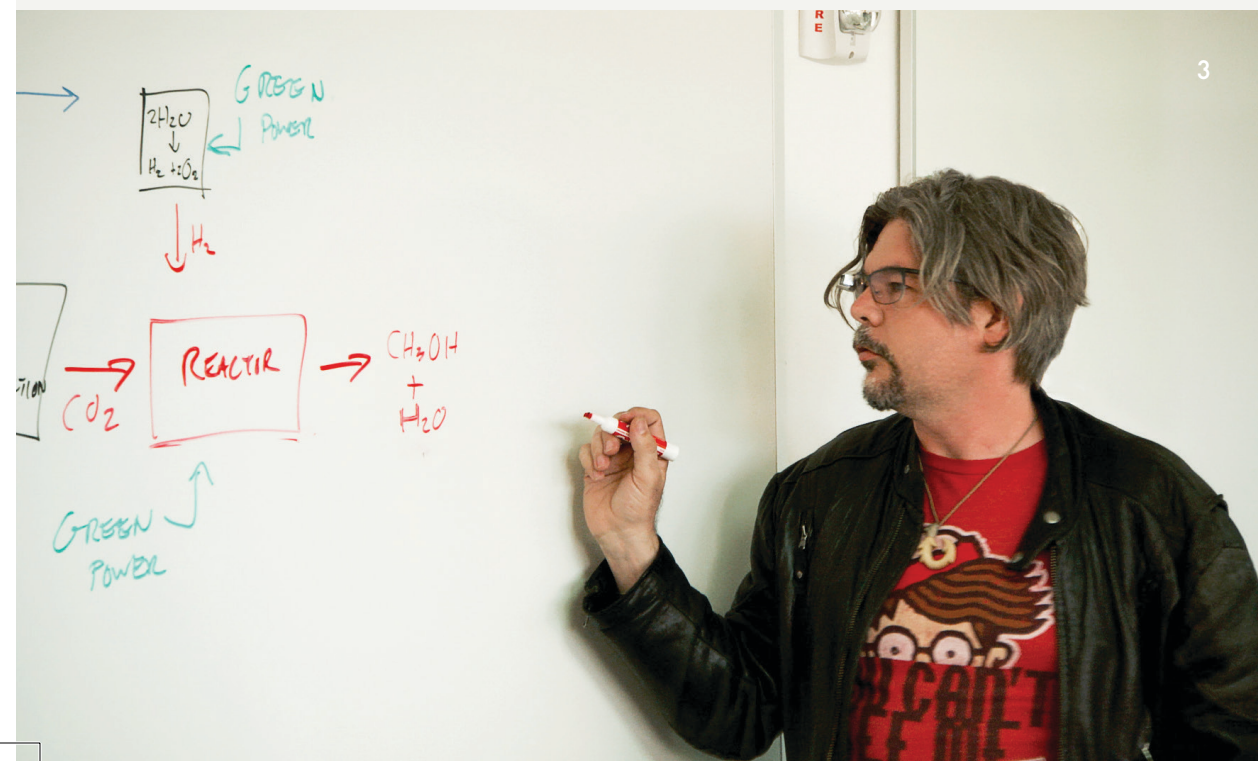
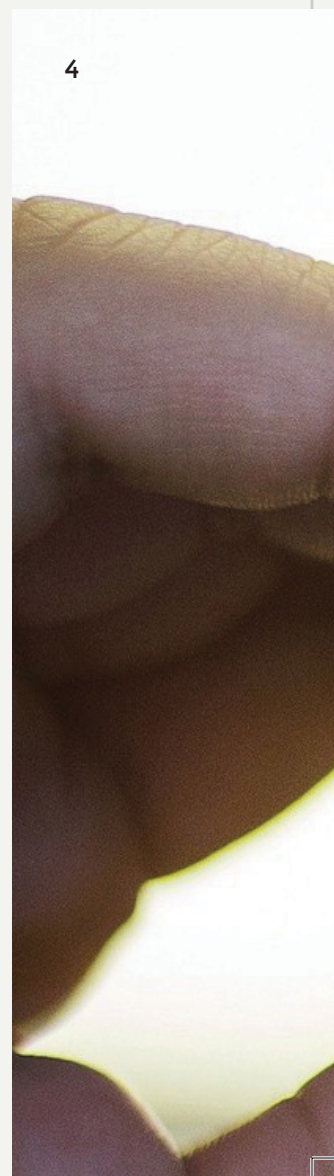
Advice Type #3:

“NO. Don’t do this, for realz, it’s stupid and/or unsafe, and you could get fired or end up in jail.”

Completing a demonstration of free space optical communications [FSOC] technology in a clean lab at X

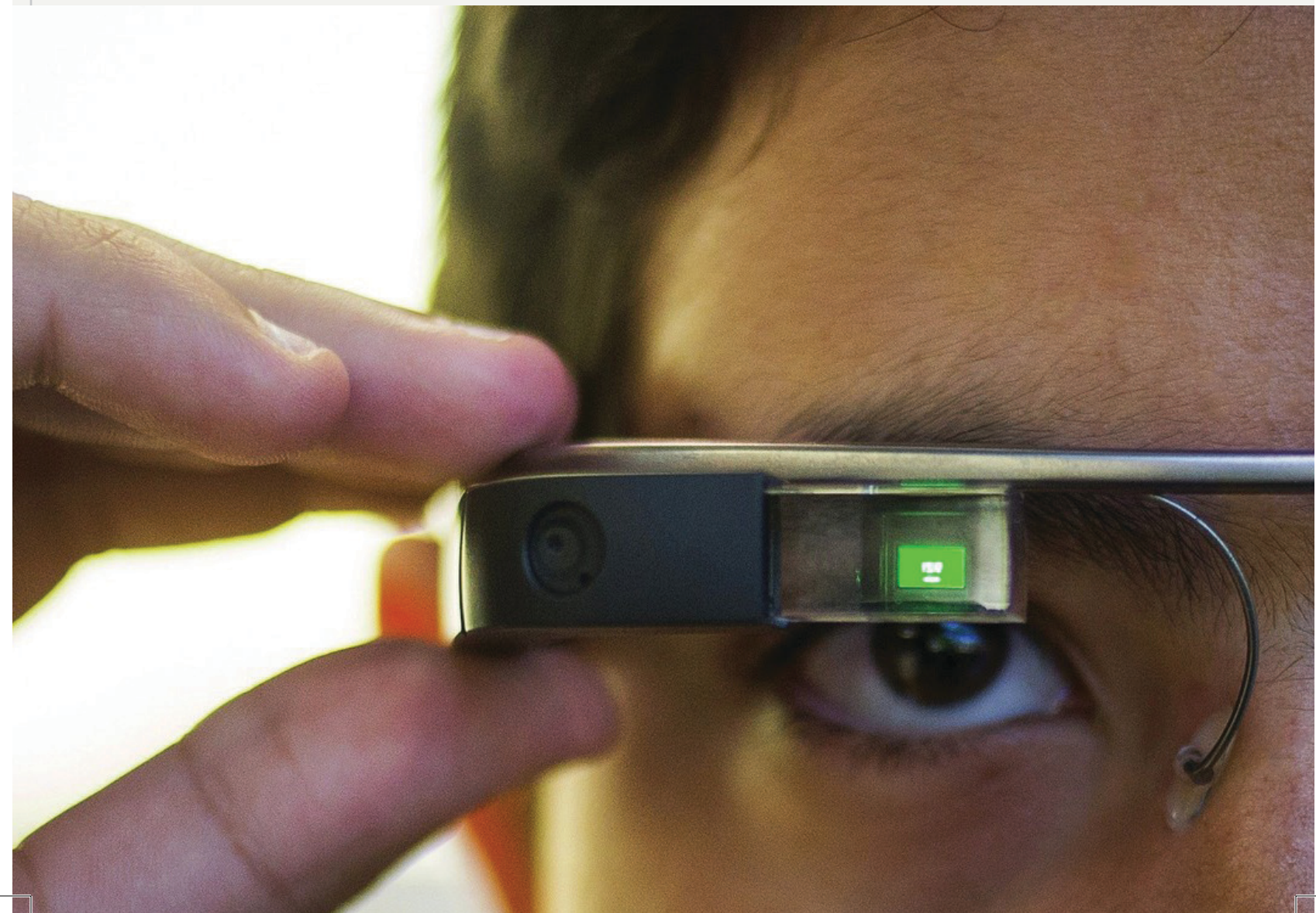








- ┌ 1: A fully inflated Loon balloon sailing through the stratosphere
- < 2: An operator prepares a Wing tailsitter drone for a flight test in rural Australia
- └ 3: Working through a concept with the Rapid Evaluation team
- └ 4: Usability testing of the Project Glass display



Learning

BUILD TO LEARN

We proactively seek out data and face it with honesty. We run at the hardest parts of the problem first. We make contact with the real world as fast as possible. We're curious students for life. We don't hold ideas sacred; rather we ask hard questions and say the difficult things so we can learn and make things better.



Make contact with the real world as fast as possible so we can learn as fast as possible

Learn by doing

Impact, not intellectual wandering

No one knows the best way to solve any big, meaningful problem. The most productive and least expensive way to do this is to tackle the hardest part of the problem first and break out of the lab as soon as we can. The world, be it public opinion or the realities of physics or nature, will tell us quickly and bluntly why we're wrong or what's broken in our ideas.

It's tempting to say, "I know the right thing to build: give me 2 years and a bunch of money, and I'll prove it to you." That's not how X works. We feel our way to "the right thing" by prototyping, testing, and iterating based on what we've learned. When we show progress for the money we've spent, we're able to unlock more resources. We know this runs counter to what's taught in many engineering disciplines and many industries, but we also know from years of experience that this is the more useful approach when you're building something that's never existed in the world before.

While we want to come up with audacious new technology approaches, we want to move as fast as we can from "idea" to "impact". We're not doing research or publishing papers. As we figure out how our technology will work in the real world, we might end up with breakthrough research along the way, and that's great, but it's not the primary goal.

< The Foghorn team worked with PARC to develop an end-to-end prototype and determine if it was possible to make "seawater fuel"

Navigational tips

It's okay to not know the answer

In what we do, there's rarely a single "right answer". We have to feel our way and learn the best path from taking lots of steps that are "wrong" in some way. When you feel stalled in your work, give it your best guess and then test it. You'll learn something useful, we promise!

Invest in gathering good metrics – but be ok when metrics can't tell the whole story

Every team should have dashboards where they can track critical metrics over time, and given the new fields we work in, you may even have to invent the tools and metrics to evaluate yourself. That said, with brand new technology, sometimes success (or failure) is more of a "holy s**t" moment – where you know it when you see it.

Get someone to give you a dollar as soon as you can

It's not about the revenue, or cutting your burn rate. It's the fact that taking someone's money meaningfully changes how you think about your product or service, how you're treating that customer, and how you're going to get the next dollars.

Be realistic about what you can learn from a particular situation

A single test or pilot program is unlikely to answer all the questions you have about your technology or business. Be clear and deliberate up front about what you most want to learn or measure, and be sure you and your team can realistically achieve that. You can also lean on experts around X who know how to design user research and other types of experiments to get the learning you want.

Don't hesitate to ask for help if you find yourself:

- Wanting to make it a bit better and never being ready to get it out there
- Pushing for longer development cycles – just give me more time
- Refusing to share ideas with others until you are sure they're right
- Shying away from assignments because you feel you might fail
- Being reluctant to test assumptions
- Dismissing audacious goals as impossible

✓ A sample of methanol created as part of the process of proving it's possible to turn seawater into carbon-neutral fuel



BE THE TIGER BEETLE

The tiger beetle hunts its prey by sprinting really, really fast and then pausing to reorient itself. It has to reorient because, when it's sprinting, it's moving too fast to process the world around it. At X, we move fast too, but instead of chasing prey, we're chasing moonshots. But going too fast for too long can make it nearly impossible to process everything going on in a way that lets you reach deep insights, find inspiration, and most importantly, recharge your batteries – all of which are necessary to reach audacious goals. So, remember to channel the tiger beetle. Going fast is great, but only if you balance it with taking a break to reflect and recharge.

Working inside Loon's altitude control chamber



WHAT'S YOUR MONKEY?

If you were asked to train a monkey to stand on a pedestal and recite Shakespeare, where would you start? Most people would start building the pedestal, because it's easier than training the monkey – even though training the monkey would be the truly groundbreaking achievement. When taking moonshots at X, we always say “tackle the monkey first.” We always want to take on the hardest, most audacious part of the problem first, rather than waste time on relatively simple tasks we know we can do later.





Teamwork

SUPPORT EACH OTHER

We believe that innovation is a team sport.
We share knowledge with each other and seek out
diverse perspectives. We follow through and earn
trust. We stay humble and are good to each other.



The lonely genius inventor with a single Eureka moment is largely a myth

We believe there's greater power in teams working closely together over time. We trust and rely on each other to make our ideas bigger, ask hard questions, say difficult things, and draw inspiration from unexpected places. We know that if you want to go fast, you go alone, but if you want to go far, you go together.

10x can light a fire in people's hearts in a way that 10% can never do

Counter-intuitively, it can be easier to get people to join you to work on really hard things than on ordinary things. This was the genius of the iconic 1960s moonshot to put a man on the moon. The sheer size and audacity of the challenge ignites motivation and passion and invites creativity and bravery.

Value diverse perspectives

Everything we do at X is multi-disciplinary by nature and depends on our ability to include diverse perspectives. We think about the mix of voices in any conversation, encouraging the quiet ones, welcoming the contrary ones, and remembering that the outside world is going to teach us some hard lessons so we should try to get some understanding in advance of what that might be like.

Navigational tips

Connect your team with others across X

Be a great networker internally. Spread knowledge and pitch in across teams. Share widely what's working well for you or what you might have learned out at conferences, in the field, or in the lab. We may all be working on different projects, but we have many technical and business challenges in common.

Draw strength and inspiration from both your project and X

As project teams get larger, they tend to develop their own cultures and team habits – and that's ok. Think of your project as your nuclear family, where your primary relationships and experiences are formed. X is like a hometown, where you can borrow knowledge and resources from neighbors and you're all rooting for each other.

Find strength in vulnerability

The road to the moon is long, and some days it'll feel like you're never going to get there because there are more ways you're wrong than ways you're right. The trick is to remain emotionally open to this hard learning, while also leaning on people around X to cheer you through the tough spots.

Practice radical candor

We hold one another accountable, and give each other open and honest feedback, while caring for each other deeply. Many people shy away from giving feedback because it feels mean – and when we care about each other, we don't want to be mean. But far more often than not people will say, "I wish you had just told me!"

Teams change, people change

Every project moves through different stages of need and maturity while it's at X...and individuals do too. This is a hard thing to talk about, but we don't want it to be. Teams may need different types of people and capabilities at different times. The best thing to do is to talk about it with compassion and intellectual honesty.

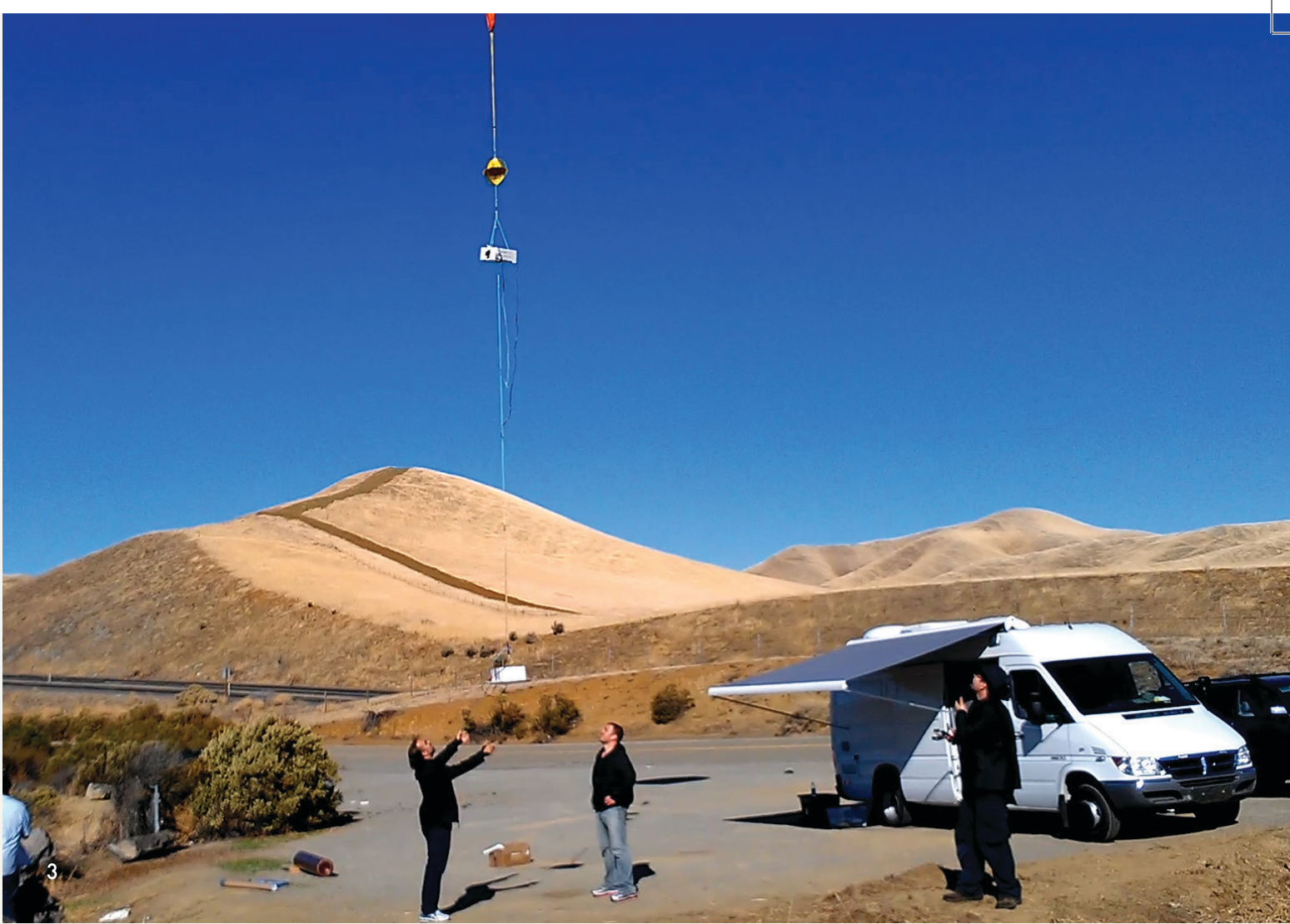
Don't hesitate to ask for help if you find yourself:

- Staying too attached to your own ideas and resisting feedback
- Getting hung up on or confused by hierarchy or job titles
- Not doing what you say you will; not carrying your load
- Prioritizing individual success over team success
- Expressing reluctance or fear of working with others
- Checking out from conversations or being removed from conversations

∨ Installing a free space optical communications unit in India







- ┌ 1: Lining up early Wing prototypes
- └ 2: Working on project Wing at X's main offices
- ┐ 3: Testing an early version of the Loon payload
- ◁ 4: Testing an early iteration of a mylar Loon balloon

Creativity

KEEP X WEIRD

We draw inspiration from unexpected places and apply insights from disparate fields. We look for ways to cut the Gordian knot. We find opportunities for play and keep a sense of humor.

Keep X weird

A quirky, weird and unexpected vibe is part of our DNA and essential to our ability to take moonshots. We couldn't be normal if we tried. Who else jumps out of blimps wearing face-computers? Who else builds a bunch of weird-looking balloons and causes UFO sightings across the US? Yep, that was us.

Find inspiration in unexpected places

We bring together a diverse set of dreamers from a wide range of backgrounds and paths across the world. We combine expertise and insights from disparate fields, and we look far outside the obvious areas that have already been picked over by lots of other people.



^ The Glass team rapidly prototyped many head mounted displays; pictured here is a version built from a disassembled Nexus One in 2011

Navigational tips

Prototype it

Before you dive into a slide deck or a doc, ask yourself if you can skip it and make a prototype instead. You're likely to get a lot more and better feedback when you walk into a meeting with a prototype instead of a slide deck.

Play

Start an epic game of tag (seriously, adult tag is totally a thing) or ask facilities if you can hook up a game console to the Matrix screen (you haven't played a video game until you've played it on a jumbotron). X is a factory, but it's also a playground for curious, audacious minds like yours.

Try a 'bad idea' brainstorm

This is when you come up with as many bad ideas as you possibly can. Because, remember: a terrible idea is often the cousin of a good idea, and a great one is the neighbor of that. So, start with the bad idea and let it take you to unexpected places.

Don't be afraid of sounding stupid

We don't hold back on sharing our ideas, and we don't care if we sound like the dumbest person in the room. We're confident that the fastest way to move forward is to get as many ideas as possible on the table.

Make time for your creative work

Unstructured time plays an important role in creative problem solving and generating new ideas. If you see others who look like they're not up to much, it's likely they're working hard to make room for their next, great idea.

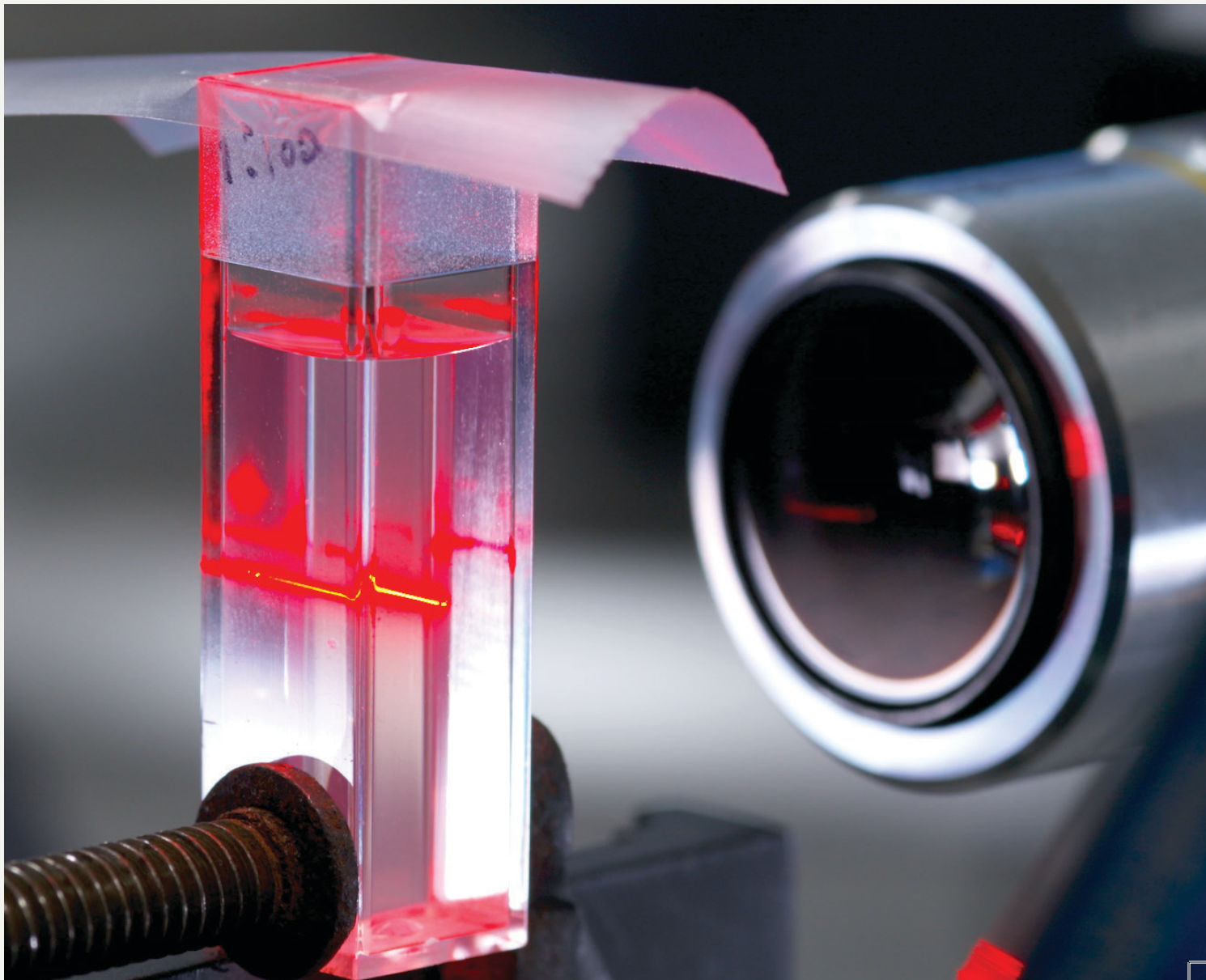
Invite people in to solve problems with you

Years of schooling taught us to keep our eyes on our own paper and handle problems on our own. Creative work requires the opposite approach, so don't hesitate to invite your fellow Xers in to help you solve a problem.

Don't hesitate to ask for help if you find yourself:

- Constantly saying "we tried that before"
- Being unwilling to surface new ideas for fear your idea might be bad
- Pushing back against new ideas, saying "that's not the way it's done"
- Resisting being sent back to try something less conventional
- Being reluctant to bring in ideas from the outside world
- Not accepting or making changes based on feedback

✓ Testing the prism from the Glass headset





^ Testing a prototype of the Wing drone at sunset



04



The Business of Moonshots

72 Purpose & Profit

Purpose & Profit

We build technologies that are good for the world, and we build large, sustainable businesses around them.



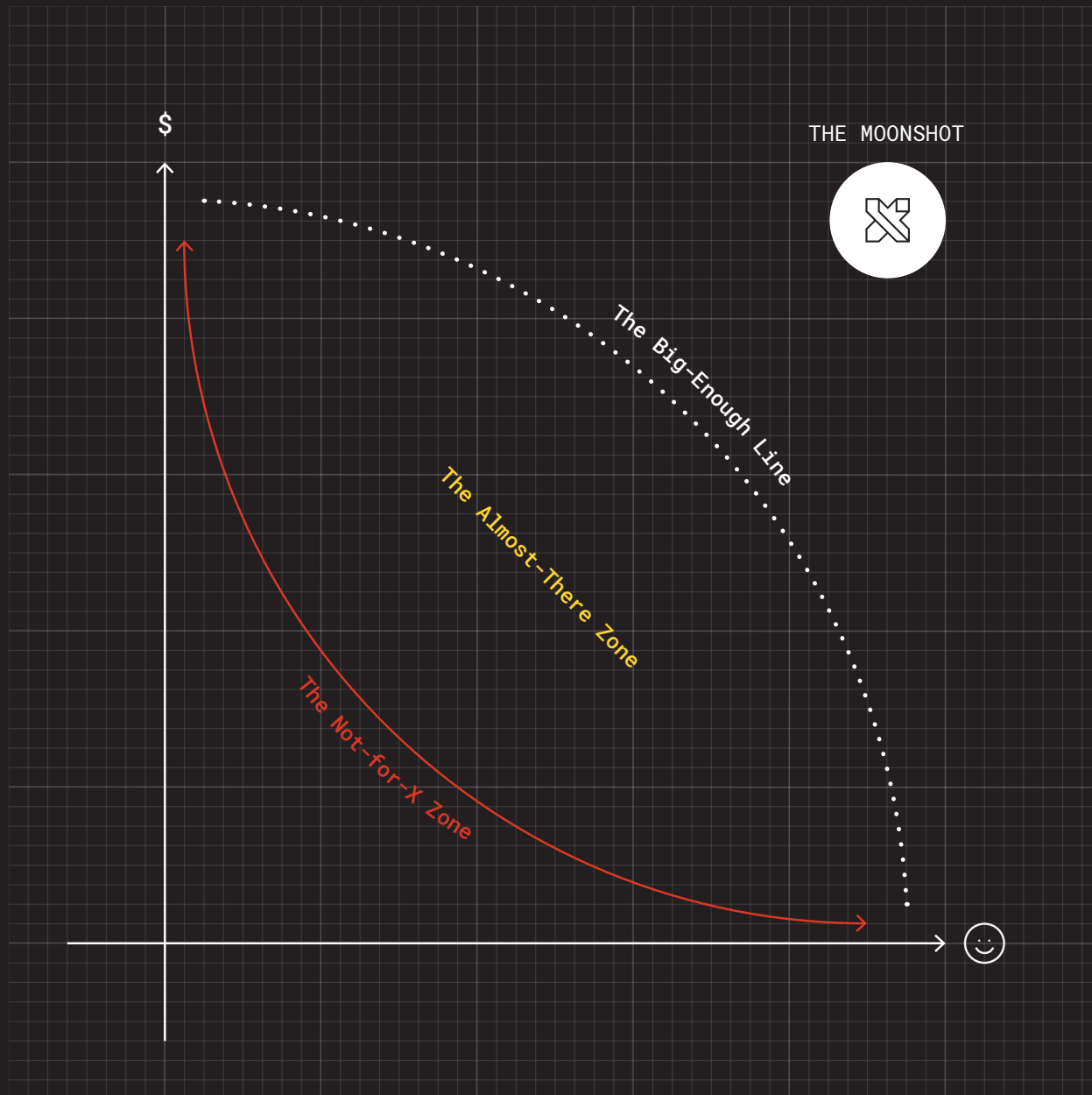
“Great companies aren't great because they make lots of money. They make lots of money precisely because they're great.” - Julie Hanna, X Advisor & Executive Chair, Kiva

Conventional corporate wisdom often suggests that profits have to come first, and impact on the world is an afterthought (and hopefully positive). We heartily disagree. In fact, we believe that large, profitable businesses can have an enormously positive impact on the world – and unlike non-profit organizations, they are self-sustaining. (Google's a great example of this; it has made information more accessible and useful for billions of people around the globe by using the revenue from advertising.) That's why X's moonshots are shaped from the start to have a huge positive impact on the world and have the potential to be a large, profitable business.

< A Loon balloon floats over the Alps

All X Moonshots should have both purpose & profit

We always start out aiming for the moon, but circumstances often change on the way there. We don't aim for The Almost-There Zone to start, but we might end up there as conditions in the outside world change. Projects in the Not-for-X zone are ones we wouldn't work on. They either fail to do enough good for the world or they fail to make a profit worthy of Alphabet's investment.



Navigating the Almost-There Zone

It's easy to identify the two extremes — moonshots and the projects that we won't pursue. Projects that are likely to end up in the "Almost-There Zone" are a bit more difficult to spot, largely because the path to the moon is always foggy. Here's how we tend to think about it:

We don't want projects to start or end too close to either axis

It's not uncommon for an addressable market to end up smaller than we thought when we first wrote the business plan, or for unintended consequences of a new technology to cut into its positive impact. So when we start, we have to be confident that we're likely to stay well out beyond the "big-enough" line.

Beware our bias toward goodness-for-the-world

We have a strong cultural bent toward the "good for the world" axis, and sometimes that makes us feel like steps to build a business aren't consistent with our values. Or we get a little nervous and judgy if we hear a team's pitch for their moonshot and it doesn't meet our own personal bar for "enough goodness." We need to listen for this bias and remember that we need success on both axes.

We sometimes have to walk away when we can't see a path to profitability

It's heartbreaking to walk away from an inspiring new breakthrough, but without profitability, we can't have the real impact we want. We have to make the hard decision dispassionately and move the resources to other more promising ideas.





1



2



3

┌ 1: Prototyping a propeller for the Wing drone

└ 2: Monitoring a Wing drone as it delivers a package

└ 3: Installing a free space optical communications unit

GETTING TO THE MOON ONE BURRITO DELIVERY AT A TIME

When Project Wing started developing their delivery drones, they set a goal of being able to deliver defibrillators to people who were having a heart attack. It's hard to get much better-for-the-world than saving lives. Unfortunately, getting their technology reliable enough to depend on during a medical emergency was going to take a long time, so they needed to re-organize their plans around some nearer-term goals. They decided to deliver food – specifically burritos – in an early test at Virginia Tech. Xers were disappointed; they felt Wing had given up on their moonshot and should be doing more inspiring tests such as delivering medical supplies in needy parts of the world. We had to explain that delivering food was a necessary step to getting to the moon. Delivering food is really challenging: it has to arrive fast and at the expected temperature and condition. If the Wing team can master the high volume, high speed operations necessary for food delivery in fairly densely populated neighborhoods, it'll be relatively easy to expand their capability to other types of goods and environments. This will actually help them unlock both their business and their impact on the world faster than if they started with humanitarian missions.

A Project Wing prototype delivers an aerodynamically-designed package at Virginia Tech, a designated FAA drone test site, in 2016







^ Finalizing pre-launch inspections of the Project Loon autolauncher in Puerto Rico



05



Learn More

84 Reading List

Reading List

A few resources to learn more about the underlying cultural insights that drive us at X. Explore these resources online at [go/xgimbal](https://go.xgimbal).



Internal Resources

[go/xhome](#)

This is the home for critical information to know about X – everything from who is on our central and project teams to resources for new Xers.

[go/grow](#)

This is a great resource for personal development resources. You can sign up for classes and workshops, and set goals for developing new skills.

[go/managers](#)

If you're a new manager or a seasoned manager who needs to learn how management works inside of Alphabet, visit **go/managers** to get the latest management tools and resources.

[go/xadvisors](#)

Here you'll find a list of seasoned leaders at X who are available to offer 1:1 coaching sessions.

[go/myhrbp](#)

Every Xer has a human resources business partner, or HRBP. If you have an HR-related issue, and you don't know who your HRBP is, you can find them at **go/myhrbp**.

< Loading the M600 kite onto the ground station in Alameda, CA

External Resources

[Radical Candor](#)

Kim Scott

A former Googler, Kim Scott is the author of “Radical Candor”, in which she outlines the practice of caring deeply while challenging directly.

[Vulnerability](#)

Brene Brown

Vulnerability has long been seen as a weakness. University of Houston professor and master social worker Brene Brown points out, the ability to be vulnerable is, in fact, one of our greatest strengths.

[Growth v. Fixed Mindset](#)

Carol Dweck

In her groundbreaking research, Stanford professor Carol Dweck discovered that people’s ability to learn didn’t depend on innate intelligence but instead on their mindset. Those with a fixed mindset believe they are either naturally able to do something or they are not. Those with a growth mindset believe that they are capable of learning whatever they put their mind to.

[Inside the Factory Operating Manual](#)

Astro Teller

We’ve been working on the moonshot factory for some time now. Here’s an early look at how we got to where we are.

[The Unexpected Benefit of Celebrating Failure](#)

Astro Teller

In this TED talk, X’s Captain of Moonshots offers a peek inside the moonshot factory and explains how and why we celebrate failure at X.

[The Science of Mad Science](#)

Rich DeVaul

The secret to building a better future is the ability to imagine it.

[How to Kill Good Things to Make Room For Truly Great Ones](#)

Obi Felten

Learn how to kill good things — a good idea, a good job, or a good project — to get to great.

Find us online

We are **X, The Moonshot Factory** on Facebook and LinkedIn, and we are **@theteamatx** on Twitter, Instagram, and Medium. Learn more about us at **www.x.company**.

Do you have feedback or questions about The Gimbal?

We hope this helps you get grounded in our way of approaching our work and each other. This document is just like X – it's constantly being refined and updated. If you have questions or feedback, reach out to **thexgimbal@x.team**.

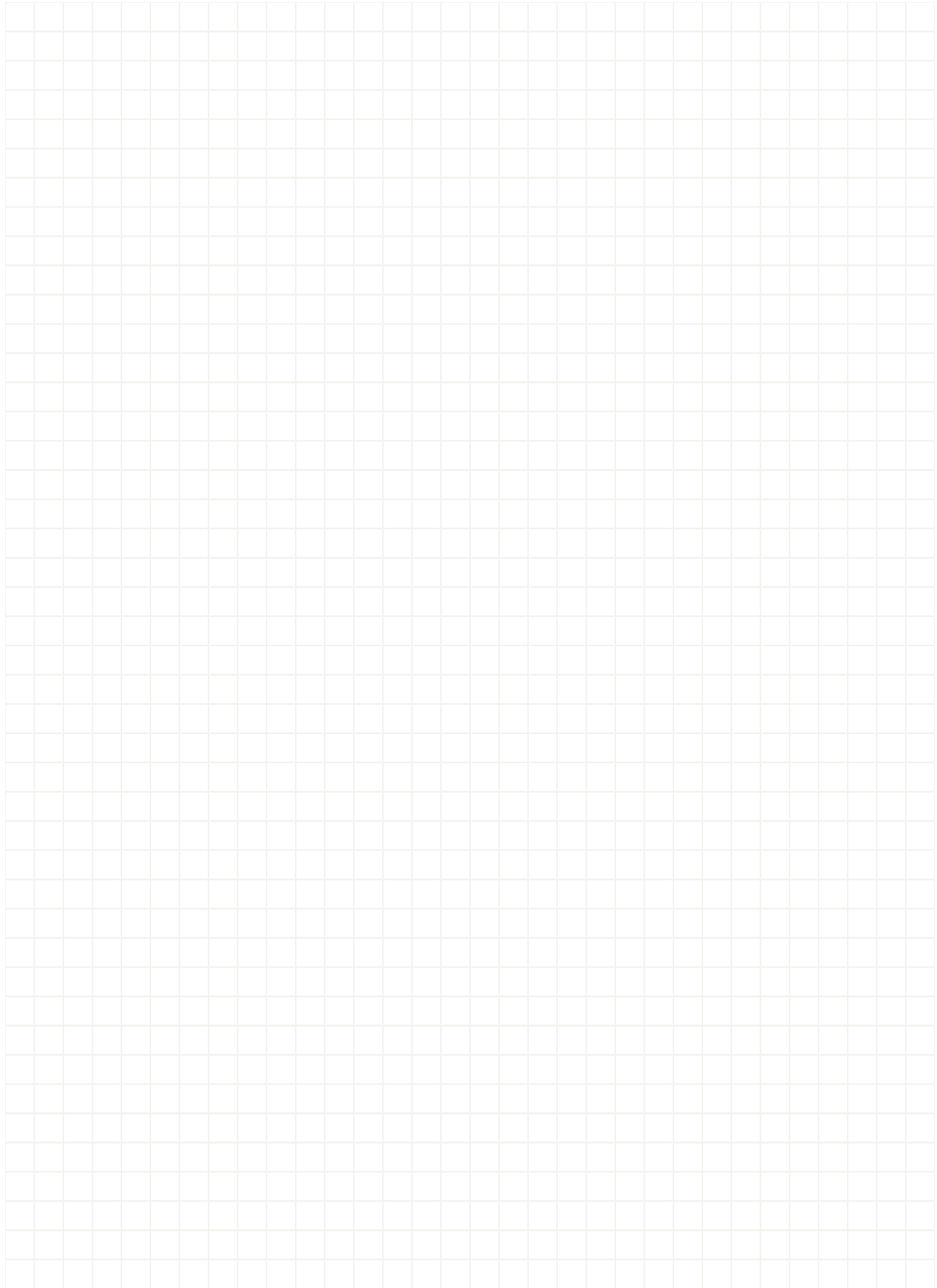
∨ Testing a Loon balloon in sub-zero temperatures

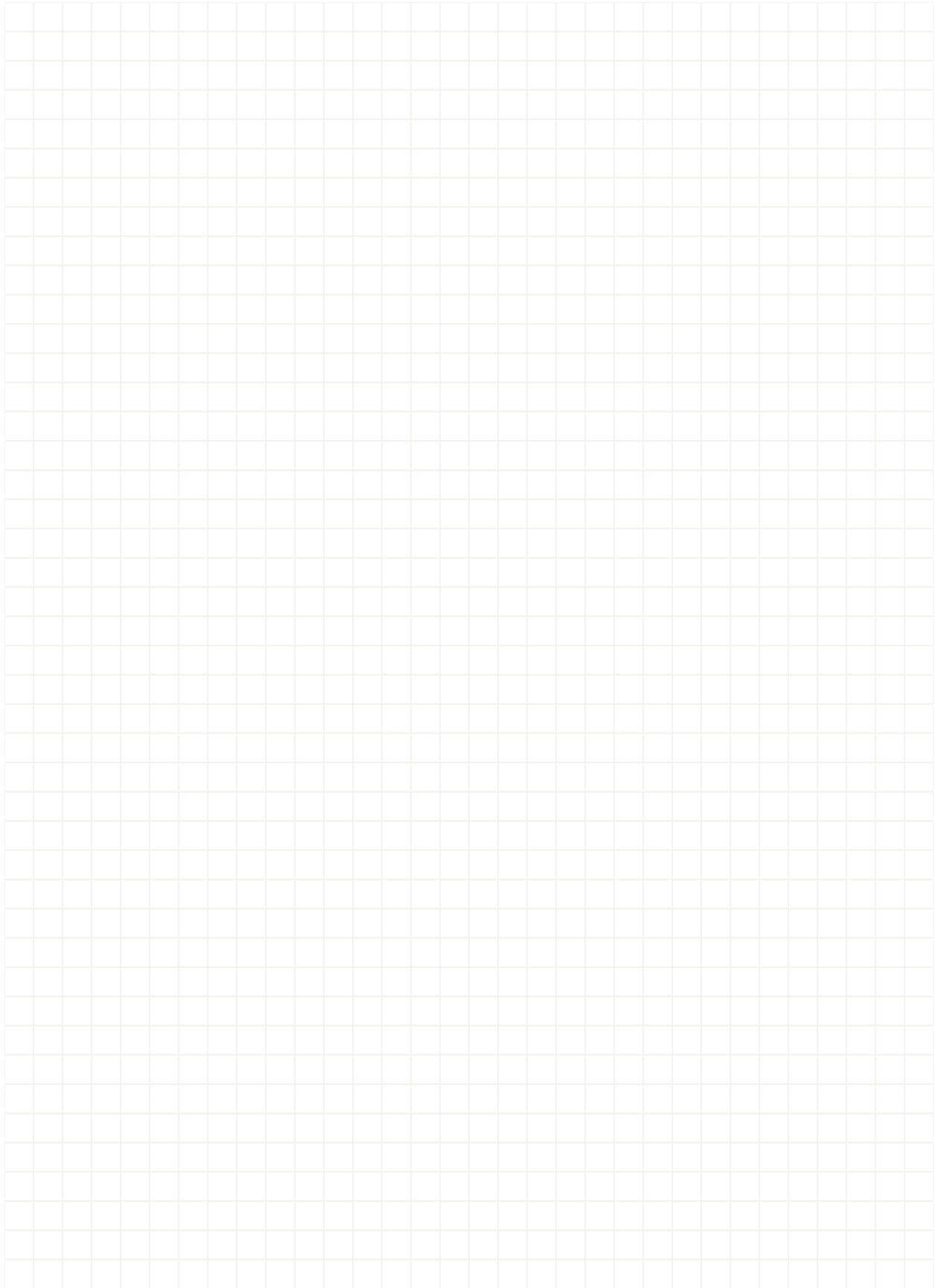




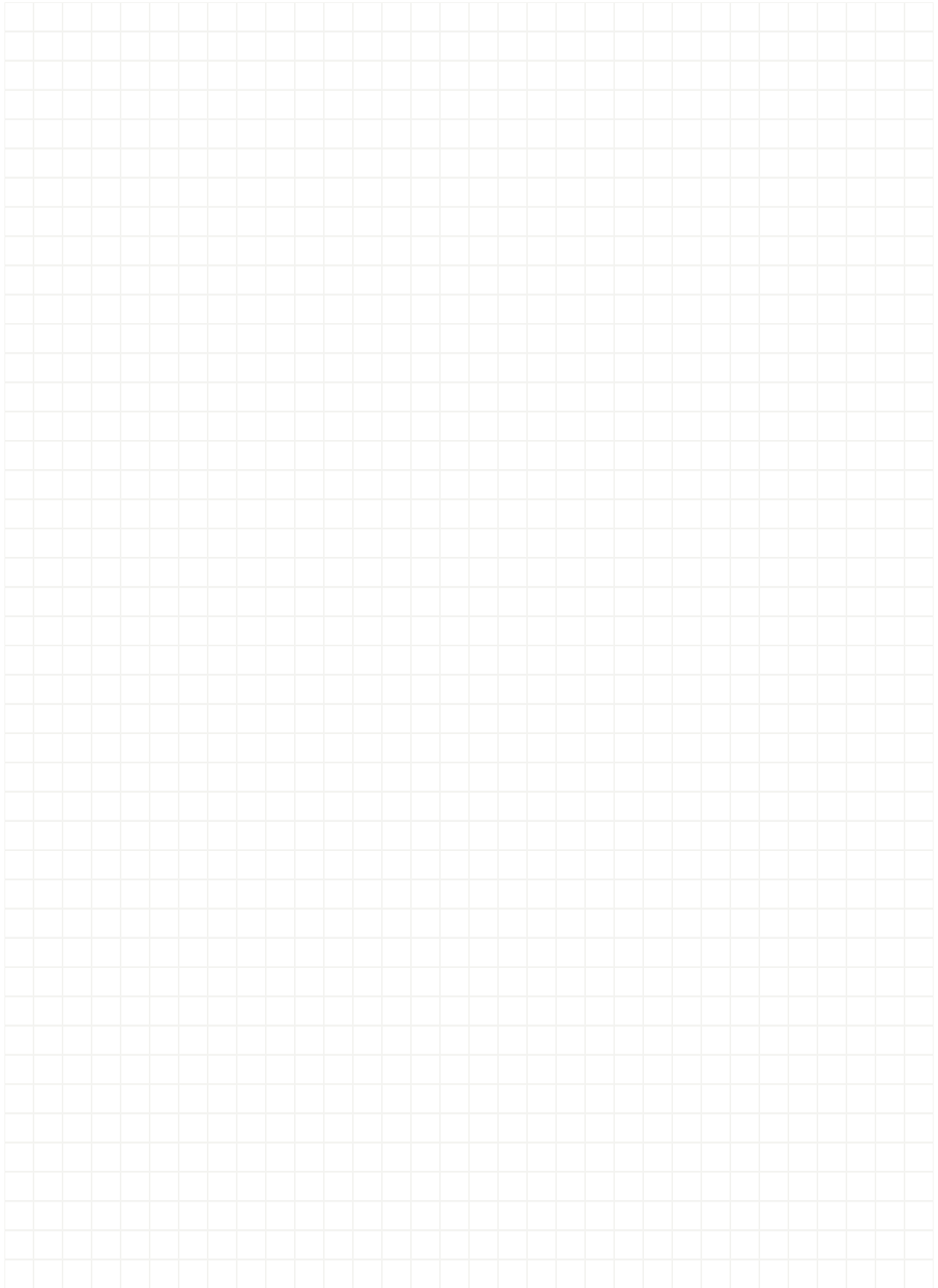
A Loon balloon is launched from a site in Nevada to deliver emergency internet service in Puerto Rico

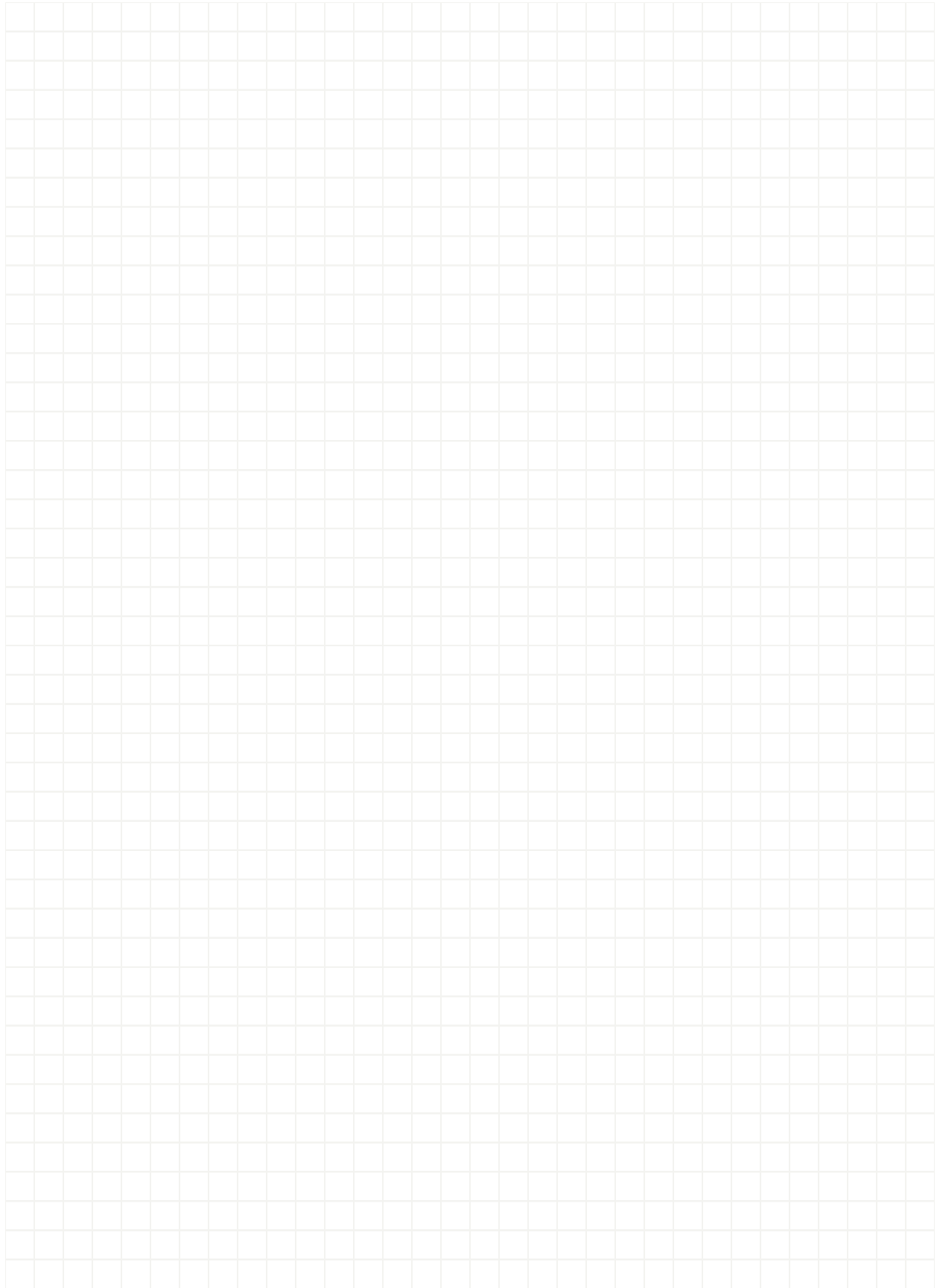


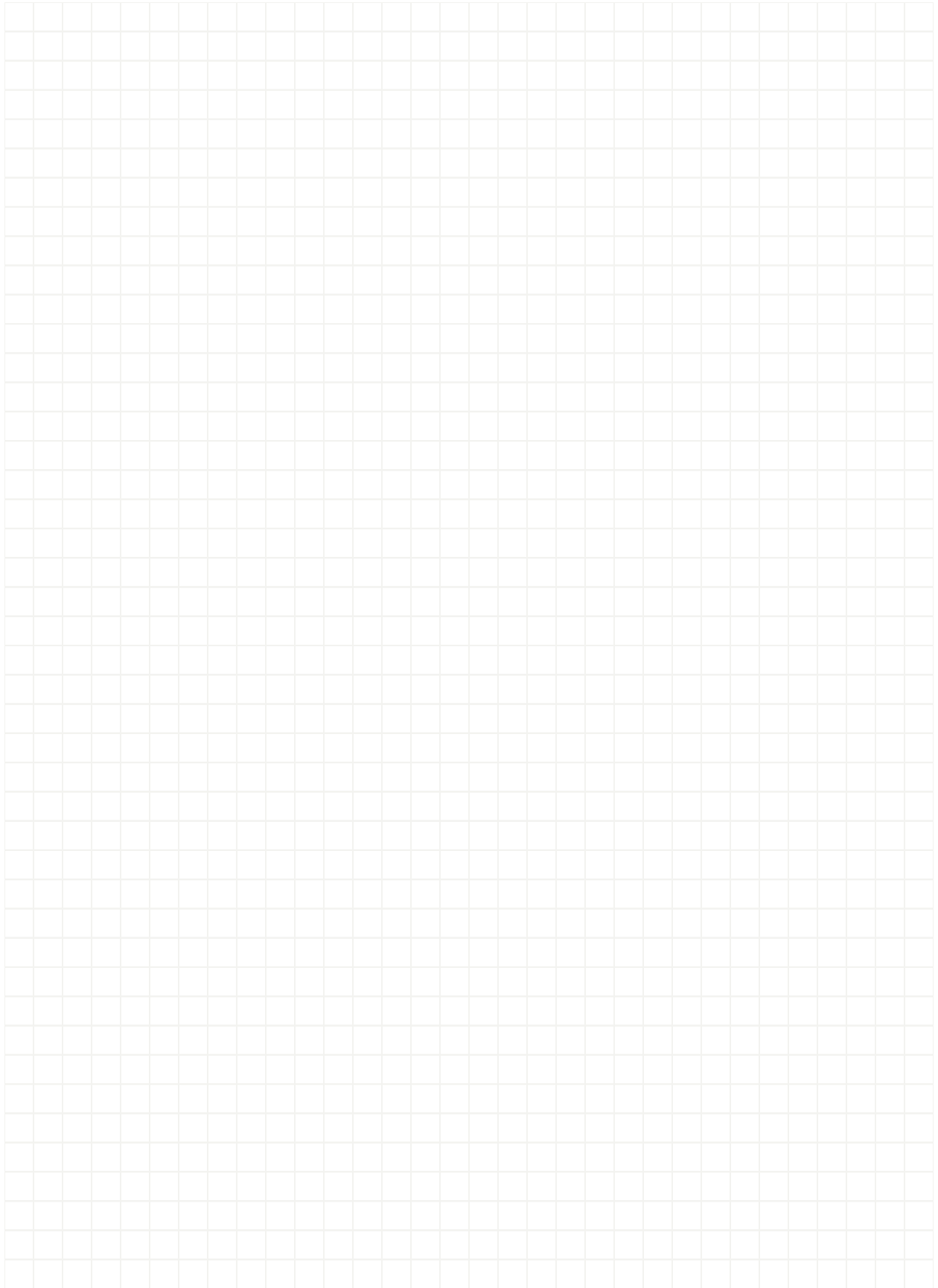














x . company