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Overcoming risks, Ukraine's IT sector evolves before your eyes



Aisha Down
Editor in Chief

There's much more happening here than meets the eye.

KYIV—Welcome to Ukraine. Some things are what you might expect. In the winter, snow powders the domes of St. Michael's, soldiers joke in the vast, warren-like metro, and guys in furry hats hustle hot wine and espresso from the back of coffee vans at practically every corner.

Some things aren't. Turn a corner from the train station, and you'll see Samsung and Huawei logos glowing from the tops of skyscrapers. Walk through an electronics store and shop assistants will direct you to homegrown Bluetooth speaker brands. Click through the websites of a few IT companies, and you'll find scores of high-profile clients and partners—banks like UBS and Barclays and tech giants like Microsoft and Snapchat.

In your hands is the first Ukraine Business Journal Opportunity Report, the start of a monthly series focusing on the real opportunities and challenges of Eastern Europe's next frontier economy. Our reporting team is American, British and Ukrainian—and growing fast. We're here to paint neither a rosy picture nor a bleak one—just a muscular, informative look at what Europe's Wild East has to offer.

To inaugurate UBJ's Opportunity Reports, we focus on Ukraine's IT sector. At \$3.2 billion annually, it is already Ukraine's third-largest export sector. Seemingly unstoppable, IT is projected to double in size in the next five years, as thousands more highly-trained developers hit the market. From this swelling workforce, new products are mushrooming, cutting-edge

technologies are being researched and refined, and cryptocurrencies are being bought and sold like cabbage varennyky.

Our first stories present an informative, multi-faceted look at how your business can use

Ukraine's tech talent—
whether you're a hot startup like
Legalist or

NeoPenda, an energy trader, or a low-cost bus service. We'll give you a historical view at what makes Ukrainian coders so sharp, take you through the nation's market of high-end outsourcers, and look at the nitty-gritty of setting up an R&D center in Kyiv.

Next, we've written forward-thinking, skeptical examinations of a selection of new technologies—and how they're growing on Ukrainian soil.

We aren't intimidated by hype. We ask the hard questions: Can machine-

learning techniques improve how you do business? (Probably.) Should you switch your whole accounting system to blockchain? (We doubt it.) Could you get your fridge to text you when you're out of beer? (You bet, but it'll cost you.)

Finally, we've selected a few flashy startups and stories from the Ukrainian context: innovations that range from platforms for online government to webcams that allow you to remotely check in on your golden retriever. Off-the-wall? Without a doubt. But creativity is not in short supply around here.

There are serious risks to investing and working in Ukraine. Touchy challenges—even more than the war—are sidestepping corruption, and dealing with bulky, Byzantine legislation that can make running a company here tricky. Laws remain weak or inadequate when it comes to ensuring protections for minority shareholders and intellectual property rights.

Critics say Ukraine has a lot to do to make country business-friendly. They're largely right. This is why many successful Ukrainian startups promptly register in Delaware, or move to Silicon Valley. The US option is a lot more straightforward for writing contracts to ensure that proprietary software is protected and minority shareholders—like VC investors—have rights to information.

Steps are being taken to address the issues; the government is now working on revising these somewhat archaic laws, has set up its own innovation fund to give money to startups and is

promoting four priority areas of IT, agrifood, energy and infrastructure.

But, in the end, every developing market has risks. Beyond Ukraine's challenges is the situation on the ground. Businesses from Europe and the US are making profits by using Ukraine's tech talent. In almost every IT sector, firms like Daxx, N-ix, Ciklum, EPAM, Luxoft now are trusted partners of Western enterprises.

That's the bottom line. Whether or not your business is interested in Ukraine, someone you work with—be it your telecoms provider or your veterinarian—almost certainly is.

In this fast-moving sector, what you knew last year is out of date. We hope you enjoy learning more about the new directions for IT in Ukraine.

“ At \$3.2 billion annually, it is already Ukraine's third largest export sector. ”




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The Team

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Editor in Chief
Aisha Down

Editorial Director
James Brooke

Journalists
Jack Laurenson
Natalya Datskevych
Noah Fulton Beale

Art Direction
Martin Nunn

Design and layout
Viktoria Nesterenko

Photo-research
Elvira Garanina

Photography
Vincent Mundy

Administration
Elena Nunn

Production
Alexander Bugay

Advertising sales
Christian Kalker



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For editorial comment or contribution please contact James Brooke: editor@theubj.com
For advertising in future Opportunity Reports or any UBJ product please contact Christian Kalker: advertising@theubj.com

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Upgrading IT education to match the jobs of tomorrow

by Natalya Dastayevch and Jack Laurenson



LVIV/KYIV—Modern Ukraine's IT boom does not come out of thin air.

During the Cold War, Ukraine supplied lead engineers for the Soviet rocket program that struck fear in the hearts of Westerners. Continental Europe's first working computer was designed by Sergei Lebedev in Kyiv in 1952.

Today, Ukraine boasts over 100,000 software developers—a number that grows by over 1,500 every year. But many say that gifted specialists succeed despite their education, rather than because of it.

State universities are underfunded and short of teachers. Mature talent is constantly drained as high salaries and prestigious jobs lure the best and brightest out of the

The Jibo home robot



country, leaving students and young entrepreneurs without role models or support.

But, with IT an increasingly bright star in the national economy, Ukraine's universities and businesses are planning for the future. Drawn by higher-than-average local salaries, Ukraine's IT work pool is to reach 200,000 people within the next five years.

In American and European tech circles, recognition is growing of Ukraine's expertise for high-end outsourcing. At home, Ukrainian companies and educators agree that there are few better investments today than building up talented Ukrainian coders.

State Schools Suffer

At Kyiv Polytechnic Institute, or KPI, lack of funding can freeze classroom learning—literally. The university needs \$6 million to heat classrooms this winter, but it receives only half of this from the government. It compensates by cutting temperatures. This January, some buildings were just warm enough for fingers to type code.

KPI isn't alone. Most of Ukraine's technical universities—centered in Kyiv, Lviv, Odesa and Kharkiv—suffer from funding gaps. With budgets too thin to heat buildings, buying new equipment is often out of the question.

Equipment and classrooms are among the easier problems to solve, however, Ivan Dychka, KPI's Dean, says in an interview. Companies like Samsung and EPAM have donated PCs and stocked classrooms. As a result, most students have partial access to state-of-the-art equipment.

The real challenge is to attract teaching staff, say Dychka and Anatoly Anisimov, dean of Cybernetics at Kiev National University. University salaries are painfully low—a few hundred dollars a month, compared to \$700 to \$1000 starting salaries in the private sector. Recruiters from Amazon, Facebook and other Western companies systematically review lists of Ukraine's top

“ Ukraine's IT work pool is to reach 200,000 people within the next five years. ”



Continental Europe's first working computer



students, luring many out of the country.

While top coding experts may not go work at KPI or Taras Shevchenko, Anisimov, Dychka, and hundreds of other professors provide what Ukraine is known for: a strong fundamental education.

Private Universities Have Vision

In a break with the Soviet tradition of strong state universities, private universities are making an entrance onto the tech education scene. On the campus of Lviv's Ukrainian Catholic University, or UCU,

Yaroslav Prytula, dean of the faculty of applied sciences, shows reporters around new buildings with state of the art equipment, the result of multi-million dollar national and international fundraising programs.

"Our IT specialists in Ukraine currently generate about \$3 billion for the economy," he says. "And by properly educating a new generation of experts we can further improve upon that." Setting his sights high, Prytula foresees a future where UCU—along with a few other private Ukrainian universities—will draw

top tech students into Ukraine from all over Europe.

Preparing students to enter Western Ukraine's booming IT sector, UCU's new facilities include game development labs, 3D modeling and printing facilities, virtual reality equipment and a robotics laboratory. On faculty are English-speaking experts from around the world.

And, says Dr. Prytula, its financial aid and scholarships program has made its programs available to young people from all over Ukraine. Bringing North

“Our IT specialists in Ukraine currently generate about \$3 billion for the economy.”

American fundraising techniques to Ukraine, UCU systemically asks for support from alumni and from the diaspora, especially in Canada.

It is a successful recipe. As a private university, UCU bypasses the funding shortages that plague state universities. State regulations that long hindered private education are easing. Now, Prytula sees private universities expanding, providing better options to Ukraine's young people.

"All of this has only been possible in the last few years," he says.

"Education reforms passed since 2014 have allowed UCU to begin succeeding and innovating as a private university."

Industry Initiative

The bottom line, to most IT firms hiring in Ukraine, is that the yearly crop of 1,500 IT specialists offers a strong labor base. To upgrade skills and to match students preparation with real jobs, companies like Microsoft, Ciklum and EPAM are inserting themselves into curricula, offering extra opportunities and workshops, tracking prospective graduates, and identifying potential hires long before

graduation.

There are significant gaps to fill, says Yelyzaveta Vovchenko, an education executive for Microsoft Ukraine. But Vovchenko, like counterparts at other software development firms here, see Ukraine's students as good raw material.

Borys Pratsiuk, head of R&D at Ciklum, says that what Ukraine offers—strong fundamentals and high-level math and science—is more than enough. "I can teach a person to code," he says, "But I can't teach a coder to think."



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Ukrainian Outsourcers Move up the Value Chain

by James Brooke



KYIV – When Ukraine’s IT executives try to define where the country’s outsourcing business is going, they keep circling back to India. “Ukraine is not a cheap country,” says Yury Antaniuk, Senior Director for Ukraine at EPAM Systems, a US-based company. “We cannot compete with India for the number of people in IT. We’ll never reach that number of programmers, a few million programmers.”

Borys Pratsiuk, head of R&D Engineering at Ciklum, says: “When we asked our clients why they worked with Ukraine, we expected to hear because of price. But we heard: because of quality. And our mentality: we’re more European. We don’t simply do what clients asked, we challenge that. That’s where we compete with India.”

In Lviv, Yaroslav Prytula, Dean of the Faculty of Applied Sciences at Ukrainian Catholic University, says: “Nobody working in this sector wants Ukraine to become the next India. We need to focus on developing and creating good products for export.” Small teams, specialized teams, work that is increasingly R&D—that is the direction of Ukraine’s fast-growing outsourcing industry. With 100,000 workers, Ukraine’s tech industry evolved from virtually nothing to become the nation’s third largest export sector, after agriculture and metals.

Now, the nation’s big players are looking towards the future—one, they say, in which IT departments will move from the corporate basement to the

executive floor, and where tech will be seen as a driver of business. Racking up clients and developers, they’re planning out their niche.

Strong Fundamentals
IT in Ukraine has not come from nowhere. It is an outgrowth of high-level science and engineering education during the Soviet era. Ukrainians engineers

“We don’t simply do what clients asked, we challenge that. That’s where we compete with India.”

once built the world’s largest plane and rocket motors for intercontinental ballistic missiles.

Today, modern Ukraine’s outsourcing business faces two constraints—limits on the number of workers, and Ukraine’s poor image outside the tech world. “Offer them interesting work,” Ciklum’s Pratsiuk says, describing his strategy to attract and retain good talent. “If you do something exciting, people will come. Oldschool projects where people just do boring jobs, supporting an existing big system, like a financial system, that’s super old-school.”

Business Partners, not Bodies
Moving up the value chain means specialization—and a different, deeper approach to partnerships. “We offers professional service to our clients: fin tech, ad tech, logistics tech, health tech,” said Alex Lutskiy, Ukrainian-American founder and CEO of Innovecs.

“In India, you can build a team of 1,000 people in six months. You can’t do that in Ukraine. But if you want to build a small team of high-end software engineers, Ukraine is a good place.”

Surveying the outsourcing industry here, Lutskiy does not see a future for “small companies selling bodies.” Brains and dollars are migrating to

“If you want to build a small team of high-end software engineers, Ukraine is a good place.”

companies that build expertise in a field. At Luxoft, Managing Director Aleksandra Alkhimovich, sees the same trend: from outsourcing to consulting.

For financial clients, such as Deutsche Bank, UBS, City Bank, Credit Suisse, and Swissquote, this company’s Ukraine office draws on “advanced systems—cloud computing, grid computing, big data and NoSQL, mobile plus breakthrough technology and approaches such as blockchain and

DevOps.” Other Luxoft teams do specialized work with energy companies, still others with car companies.

Moving toward consulting—as opposed to just providing workers—is an approach shared by almost all of Ukraine’s top IT companies, says Ciklum’s Pratsiuk. It reflects not just the talent on offer, but the changing role of IT in the global market.

More and more businesses, he says, are seeing IT not as necessary back-end support, but as a primary driver of their business. They don’t just want solutions, he says. Rather, they want to understand what tech can do for them—and are open to ideas. “Could you outsource your R&D to Ukraine?” asks Sam Kingston, chief operating officer of Ciklum. “That will come. There is a real opportunity to move into high-value services.”

Keeping Talent

To keep Ukraine’s outsourcing growing and evolving, executives keep a close eye on personnel. “Labor is the primary area,” says Kingston whose company



employs 2,000 people in Ukraine. One rich resource for tech recruits, he says, is the pool of numerate Ukrainians interested in a career switch. In addition, outsourcing companies increasingly look outside of Ukraine’s big five cities, recruiting talent in smaller cities and towns.

“There are people in small towns who don’t speak English, but who have strong technical skills,” Kingston continues. “That is the community we have not harvested. I have to ask: Why do I need this person to speak English?”

Innovecs and other companies offer relocation packages to help people move to big cities. In Lviv, some companies have even started recruiting tech workers from Belarus and Moldova. At the other end, outsourcing companies worry about losing their top performers to Poland and to the United States. Pratsiuk, the Ciklum R&D director, says that the brain drain is slowing, however, as IT workers increasingly take a sober look at the cost of living in

Western Europe.

Most outsourcing work in Ukraine is for foreign companies and is denominated in dollars or euros. Here, tech workers often earn two or three times the national average wage—not always the case elsewhere. “That 5 percent keeps people here,” he said, referring to the lower

“There is a real opportunity to move into high-value services.”

income tax rate usually paid by tech workers in Ukraine. “It allows people to build a house, buy a car, save. Some guys relocate, go to Poland. They live there. They see that 30 percent goes out [to taxes]. Then they come back.”

Risky Enterprises

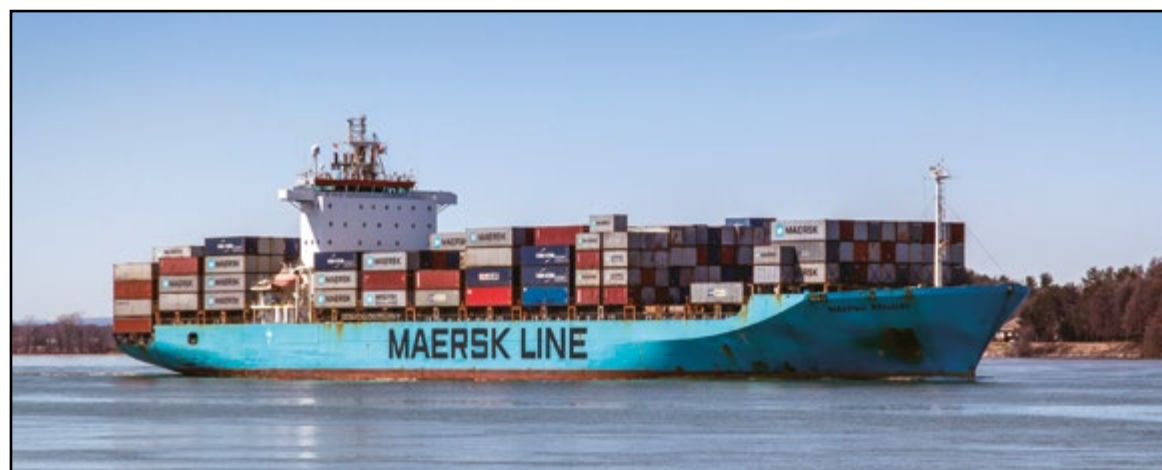
Another hurdle for outsourcing companies is Ukraine’s poor image in the general press. In Western IT circles, perceptions of Ukraine have modernized, said Kingston, a Briton whose

company won a spot last year on the list of top tech firms maintained by the International Association of Outsourcing Professionals.

“There is no longer an inflammatory conversation centered around ‘we have to rule that out,’” he said, recalling earlier attitudes toward working with Ukraine. “The image of Ukraine has improved. The image has become neutral.” EPAM’s Antaniuk is not fazed by the fact that many brand-name companies do not want to publicize that they do their tech work in Ukraine.

“No one would say, ‘This Gucci is made in Vietnam,’” says the Ukraine director of a Pennsylvania company founded by two Belarusians. “Do you want to know that? No. It will change when Ukrainian companies do more and more innovative product developments.”

Products, not services, burnish a nation’s IT reputation. And Ukraine is gradually moving in that direction.



Outsource? or set up an R&D center in Ukraine?

by Natalya Datskevych and Aisha Down

KYIV—For tech-curious business people, Ukraine offers a slew of options: high-end IT providers that size up a company’s situation and, in three months, code up a tailored, cutting-edge solution.

But fast solutions aren’t always what a business needs. For a growing number of firms—Samsung, Huawei and Microsoft among them—there’s a better way to use Ukrainian talent: confronting logistical hurdles and red tape head-on, and setting up an R&D unit in one of Ukraine’s three main IT hubs—Kyiv, Lviv or Kharkiv.

Building loyalty

Most companies know why they want to go to Ukraine in the first place: well-educated, cheap software talent. Ukraine offers “creativity and professionalism” as well as a “high technical level,” said Sergei Shumygora of Wargaming.

Farhad Shamshirzan, director of software engineering at Certent, a Toronto-based financial services company, says: “They provide us with a new talent market.” After 11 years of outsourcing to Ukraine, Certent recently set up an R&D center in Kyiv. Deciding how to work in Ukraine is less straightforward.

Some companies sign a contract with a solutions provider like Luxoft, EPAM or Ciklum. Others go solo, setting up their own operations.

The main advantage to setting up an R&D center in Ukraine is cutting out the middleman, usually a software solutions provider, says Dmitry Ovcharenko, CEO of Alcor,

“Ukraine offers ‘creativity and professionalism’”

a law firm that works with international companies in setting up centers in Ukraine. “You have your own DNA, your own corporate culture,” he explains. “If you think about a long-term project—you want to have really great people aligned with your culture.” It’s a significant selling point.

Shumygora says that Wargaming, with studios in Kyiv, Minsk and St. Petersburg, wants staffers who have a passion for war games, not just IT skills. Shamshirzan says that the trust he’s cultivated with his team in Kyiv has been a significant advantage to having an R&D center. He visits Kyiv every couple of months. “I feel





comfortable with my team, and want to take a personal approach.”

Expensive Logistics

Engagement is just one side of the bargain. Shamshirzan stresses cost.

“We were with Ciklum for nine or ten years,” he recalled. “But the cost went up in the past four years.” For certain tech solutions, Ciklum was worth it, said Mr. Shamirzan.

But he wanted developers. He concluded: “Paying that kind of fee for services was no longer reasonable.” Whether an R&D center is a cheaper way to go depends on what a company is looking for. Ukraine’s market can be hard to navigate. Companies like Ciklum and EPAM offer staff and products without subjecting outsiders to the risks of tricky legislation or real estate hunts.

“I believe people are worried about legislation—how are things usually done?” says Ovcharenko, who previously worked as chief legal officer for Luxoft in Ukraine.

“This is a reason to outsource—avoid logistical hurdles.”

Law firms can help clients cut costs and navigate the market. Foreign customers don’t face many high risks, he says—at least when it comes to the law. Ovcharenko, a California-trained lawyer, says: “Ukraine—it’s not 100 percent friendly. But the environment is pretty clear for US customers.”

There is also the question of intellectual property rights—which are poorly protected by Ukrainian law.

“Foreign customers don’t face many high risks, at least when it comes to the law.”

Shamshirzan, the software engineering director at Certent, says his team is loyal, and the company does not have many proprietary secrets to steal. Just in case, he signs a contract clarifying the question with every employee.

Are these contracts enforceable in Kyiv? Shamshirzan, a Canadian, answers: “That’s a good question. We haven’t tried it yet.”

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Startups crowdfund, while investors toe dip

by Aisha Down

“He put it on Kickstarter. It raised six times its \$50,000 goal.”

KYIV — As Nazar Fedorchuk tells the story, he had his big idea while walking with a friend in a park.

“I said, ‘Hey, would it be good to have something like if you tap something here, close to your mouth, and it recorded [what you said], like really quick... So you don’t have pull out the phone or the notebook, etcetera.’ He said, ‘Yeah, totally, that would be nice.’”

Thus began Senstone—a company that manufactures



wearable, attractive voice recorders that file your spoken ideas to your smartphone. But, Fedorchuk, like most startup founders interviewed by the UBJ, didn’t think he could attract venture capital. So he put it on Kickstarter. It raised six times its \$50,000 goal.

Now for just over \$100, you can get your very own wearable Senstone voice recorder—delivery expected in April. Fedorchuk was a lucky exception, say many Ukrainian entrepreneurs. His idea was marketable and attractive to ordinary people. Business-oriented products have to win attention from big players.

But Fedorchuk still faced the perennial obstacles of anyone trying to get an IT startup going in Ukraine: a sparse business ecosystem suffering from brain drain and investors leery of Ukraine’s image—and reality—of war, corruption, and unfamiliar legislation.

Entrepreneurs Struggle Alone

For Volodymyr Dybenko, founder of TalentScan.pro, the biggest obstacle he faced wasn’t the four years it took to refine his product. It wasn’t even the \$200,000 of his own money that he spent to get the business—a streamlined platform for IT recruiters seeking hires—up and running. Rather, it was the lonely work of trying to start a successful tech business with no role models or friends along the way.

“We don’t have the environment here in Ukraine for mature startups,” he said. “All startups

that get investment move to the Valley or Israel,” he said. “It’s as if kids visit a school, but never meet other people there—only read about them.”

The ecosystem isn’t totally empty. Data from the Ukraine Venture Capital Association, or UVCA, shows that there are players in the ecosystem—incubators like Open Data Incubator and Greencubator, and VC firms like CIG and AVentures.

But, for entrepreneurs like Dybenko, getting attention from these players often doesn’t seem possible. With high risks, most Ukrainian VC firms want to take on known quantities, family or friends, says Bohdan Kupych, vice president of Borsch Ventures. Meanwhile, there just aren’t that many incubators in Ukraine. Many, like Greencubator, have a narrow focus, like low-carbon innovations.

Dybenko did eventually get some mentoring. He recently competed in a pitching competition put on by Seedstars World, a Switzerland-based startup competition that focuses on emerging markets. His days before the competition were filled with Seedstars mentorship

meetings, bootcamps and coaching sessions to help refine his pitch.

It was a welcome change. And, as Ukrainian startups achieve international recognition, Seedstars and other organizations are beginning to focus on the country. One is an Israeli accelerator and VC firm called The Neo. Founded by Eitan Katz, it models its bootcamp on the Lean methodology originally developed by Toyota. It aims to provide conditions for startups to test their products on the market

“All startups that get investment move to the Valley or Israel.”

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Talent Scan

as quickly as possible. The alternative is often years working on an idea that never launches.

Katz said that it was exactly Ukraine’s underdeveloped startup environment that drew him here.

“We thought we’d go to a place with a lot of talent, and an emerging ecosystem,” he said. “The difference between the country’s potential and its situation—that’s the potential we see in Ukraine.”

Attracting Wary Investors

A hostile environment that drains energy from entrepreneurs isn’t as much of a problem for foreign investors, say Igor Shoifot, a partner in US-based TMT investments, which funds four Ukrainian tech startups. Outsider focus on other questions—the war, corruption, an unfamiliar country and Ukraine’s lack of legislation to structure a company and protect minority shareholders.

Some investors weigh these concerns more than others.

San Francisco-based Shoifot says Ukraine’s laws are a big obstacle to attracting cash. There’s not much legislation to ensure the rights of minority shareholders, which means few guarantees that an investor can

control where their money ends up. But in the long run, this isn't a significant problem, says Shoifot—at least, not for the company itself. “Everyone and his aunt knows that you can go to a website and pay \$300 to establish a corporation in Delaware, then retain a lawyer for a few hundred a month,” he says of the ease of incorporating in the US.

The end result is that most companies get registered in Delaware, says Shoifot—and Ukraine loses money. As for the war, he says it barely registers—for him. “But to large VC firms, it's important,” he says, referring to U.S.-based companies. “Two years ago, an American bank suddenly stopped approving transactions. They'd marked Ukraine as a war zone.”

The image of instability makes Ukraine a harder sell, he says. Add to this occasional corporate raids by the tax police, and investors get cold feet. Shoifot says Ukraine's government could do a lot of work to make Ukraine more attractive.

“Ukraine should use the experience of Ireland to attract large foreign corporations—few taxes, nice campuses,” he says.

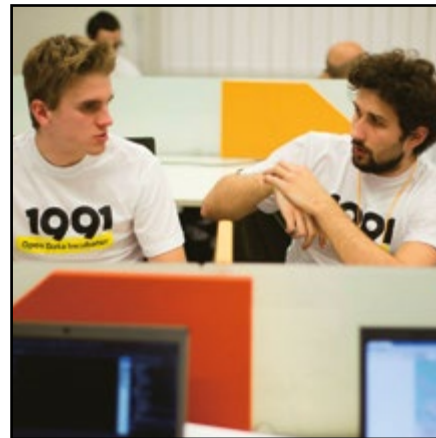
“You want to create conditions for large foreign firms to come here.” With government legislation opaque, many people looking for venture capital aren't going to wait.

Igor Ovcharenko, who organized the Seedstars event in Kyiv, says he's developed a strategy: invite

foreign investors to meet with Ukrainian investors at events like Seedstars. “You're a foreign investor, you've read about Ukraine, you've heard about the instability,” he recounts. “You're more likely to put your money in if you have a local partner who knows the landscape.”

There are still only a handful of Ukrainian IT investment funds. Stephan Chernovetskyi, head of CIG, a Ukrainian-based fund with \$90 million invested here, likes the idea. He'd be honored, he says, to invest with an international partner. That is, if they'd be interested. “For many international funds, Ukraine is just not a big enough market,” he laments.

“The difference between the country's potential and its situation -- that's the potential we see in Ukraine.”



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Beyond cryptocurrency: Ukraine's plans for Blockchain

by Aisha Down



It's hardly surprising that Ukraine loves blockchain. For a people weary of government opacity and high-level corruption, few notions are more alluring than a transparent, open record-keeping system—foolproof, owned by everyone and with no pesky middlemen to take a cut.

But while potential applications of blockchain lie far beyond the cryptocurrencies making the news, they also have significant drawbacks. As investors, caught in the hype, demand blockchain-based software products, Ukrainian innovators scramble to understand just how the powerful technology that underlies Bitcoin can reasonably be used.

Do You Really Need Blockchain?

Sergiy Khandogin is the CTO of a high-profile Ukrainian software development company. His firm, Innovecs, began looking into applications of the technology in 2016. Now it offers blockchain-based software solutions to select clients. He takes a clear-eyed approach to it.

"My understanding and my belief: blockchain itself is both more and less than the hype," he says. "It's just a technology."

Innovecs has been approached many times by entrepreneurs keen to leap on the blockchain bandwagon, says Khandogin. He turns many away. Some of the people he rejects are interested mostly in outright theft, he explains. Caught up in the Bitcoin hype, they want to invent a new cryptocurrency, attract buyers in an Initial Coin Offering (ICO), and then cash in.

"Five to ten percent of recent ICOs are real," says Khandogin. The rest, he says, "are not far from fraud."

But for others he refuses, his reasons are subtler.

Blockchain technology offers a transparent way to keep internal records and ensure no one tampers with them. But users pay a price, Khandogin says in an interview. The same mechanism that makes the technology tamper-proof and secure also uses vast amounts of computing power. And it can make doing analytics on records nearly impossible.

If, for example, you're a soda company interested in keeping tabs on your network of distributors, you can probably trust that your blockchain-based records have a truthful snapshot of exactly who's received what sugary stock. However, if you want to plot how and where you've sold soda over the past few years, you might be out of luck—or at least out of a lot of money. With each transaction separately encrypted, blockchain doesn't lend itself well to data gathering.

“With each transaction separately encrypted, blockchain doesn't lend itself well to data gathering.”



From this point of view, blockchain-based records, for many businesses, just aren't worth it.

But there are exceptions. Without giving names, Khandogin describes a model solution Innovecs designed for a consortium of energy-trading companies.

His platform allows companies to share information among each other, while ensuring that no player can revoke or tamper with what they shared. "We used blockchain to keep transactional history, with the key values and key information," said Khandogin. "Blockchain provides the trust layer." This, after the hype, is the main value of blockchain: efficient, trustworthy shared information. "What is blockchain good for?" he asks. "Keeping records."

“Five to ten percent of recent ICOs are real. The rest “are not far from fraud.”



“What is blockchain good for?” “Keeping records.”

Unlike cryptocurrencies, the blockchains underlying Exonum’s offerings are privately owned, with just a few nodes. While tampering with these private blockchains does leave a telltale track, they can’t offer the same democratic transparency as Bitcoin itself—outsiders using the system, such as voters or landowners, still have to trust the government.

Still, says Shevchenko, Exonum’s offerings represent significant

progress toward a world where the work of mediating the imperfect interfaces among government, people, and business is done by impartial, powerful code. “[Blockchain] is much more disruptive for inter-business communication” he says. “Exonum transfers trust from the level of businesses and governments of people to the level of technology. You may not trust your partner, but you can trust blockchain.”

Disruptive Visions

For Bitfury, an international company with research headquarters in Kyiv, blockchain’s potential lies not just in propping up existing business models, but disrupting them. Founded in 2011, the company has garnered worldwide attention by putting Ukraine and Georgia’s land registries on a blockchain-based platform.

But for Alex Shevchenko, head of Bitfury’s Exonum R&D division, Eastern Europe is just the beginning. Speaking recently with reporters, he outlined ambitions spanning e-voting platforms to forging a transparent supply chain for a leading telecoms company. “We, as a company, have chosen two major verticals to go in with the blockchain technology. The first is governmental and governments,” he says. “The second is supply chain.”



“You may not trust your partner, but you can trust blockchain.”

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Ukrainian Engineers Move into Internet of Things

by Jack Laursen

“This virtual network connects homes, cars, factories and offices with smartphones and laptop computers.”

KYIV/LVIV – A refrigerator that sends you a message when you are running dangerously low on cold beer. A restaurant table that transmits your dinner order straight to the kitchen. A robotic console that monitors your home’s security while you’re out—and also allows you to remotely manage your thermostat and other appliances.

As WiFi and Bluetooth make their way into more and more devices, the Internet of Things, or IoT, expands almost daily into new frontiers. This virtual network connects homes, cars, factories and offices with smartphones and laptop computers.

IT experts predict that IoT will mushroom to 30 billion devices by 2020, generating an eye-popping \$7 trillion in revenue.

Now, the world’s entrepreneurs are brainstorming ideas that range from futuristic to humorous. In Ukraine’s expanding IT hubs of Lviv, Kyiv, Odesa and Kharkiv, the country’s young entrepreneurs plan to ride the wave.

The Plugged-in Homes and Restaurants of Tomorrow

In the future, every home device—from thermostat to refrigerator—will be connected to a central hub. The hub will be controllable from rooms away, or from kilometers away, in a car or office.

That is the vision of Branto, a Ukrainian startup. They smashed their

crowdfunding target on IndieGoGo, in September 2015, raising \$111,000 from prospective customers. Their pitch drew an additional angel investment of \$100,000. Now registered in Delaware, the company makes a spherical, smart home gadget that offers 360-degree video calls. It can act as security monitor, communications center and appliance-control center.

An outwardly traditional brick-and-mortar Ukrainian company, UBC Group, is opening refrigerator factories in Kharkiv and Vinnytsia. The twist is that UBC’s new fridges don’t just keep your lagers at optimal frostiness. Rather, their devices monitor inventory and have social media features—so patrons of a bar with a smart fridge can connect to it to get special offers.

“We are exporting our smart refrigeration appliances—that feature, for example, televisions, smart analytics and social media capabilities—to clients like Coca-Cola, Pepsi, Nestle, Carlsberg and Heineken,” says Ihor Humenny, president of UBC, a global industry leader in the production of smart refrigeration technology.

Humenny says lower operating costs and an IT-savvy workforce in Ukraine make his refrigerators competitive. UBC has exported appliances to the EU, US and Canada. In 2018, they expect to double production and hire 1,000 new workers.

Ukraine’s homegrown flashy startups use IoT to accomplish specific tasks. Petcube’s camera setup allows you to remotely monitor your pet. Kodisoft’s ‘smart’ tables feature interactive tabletop displays that send orders to restaurant kitchen. While diners wait they can read the news on the surface of their dinner table.

Such startups have seen success—crowdfunding their prototypes and landing in top Silicon Valley incubators. But, says Zenoviy Veres, an IT educator at Lviv Polytechnic University, the capital investment needed for hardware manufacturing means IoT startups can face harder battles than software startups.

“This part of the IT sector is fiercely competitive and difficult to get into,” he says. “It requires very specific

and specially qualified experts, as well as significant capital investment to experiment and develop the hardware.”

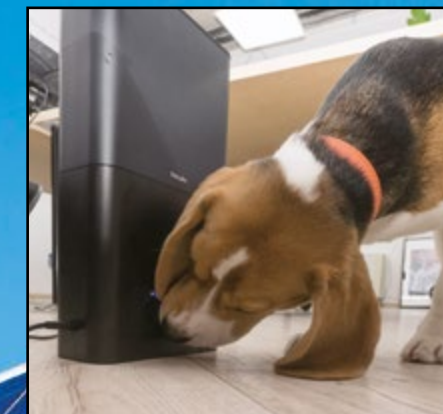
Industrial IoT

Connecting refrigerators and thermostats to the cloud translates into consumer convenience. But industrial IoT can save money, sometimes a lot.

“We are exporting our smart refrigeration appliances to clients like Coca-Cola, Pepsi, Nestle, Carlsberg and Heineken.”

In the western city of Lviv, where the rapidly-growing IT sector could account for half of the city’s economy in the next few years, software company PLVision is developing products for industrial IoT.

“In the future, all factories will eventually



become completely automated,” says Igor Salamin, a manager at the Lviv-based company that now has offices across Ukraine and in eastern Poland.

PLVision creates software that is enabling factory equipment in Canada, Sweden and the US to be managed from tablets, smartphones and computers with little direct human intervention. Clients include a range of businesses. The company unveiled an industrial IoT solution for a new solar plant in Brazil.

“Intelligent factories like this reduce costs and are easy to manage and maintain,” said Salamin. “Essentially, our software allows factories to speak with the owners and let them know what is happening.”

Industrial IoT can’t go everywhere—yet. PLVision has not made many sales in Ukraine. “We also want to move

our technologies into Ukrainian factories,” says Salamin. “But the industrial technology here, for the most part, isn’t modern enough yet for full automation and working with IoT technology.”

In Ukrainian factories, outdated hardware often is not ready for futuristic software.

The Downside of Connectivity
For some, the slow pace of

“We have to keep an eye on who has it. There is significant potential for dangerous overreach.”

adopting IoT innovations in Ukraine—and worldwide—is a good thing.

Massive cyberattacks over the past four years in Ukraine have targeted crucial infrastructure like power grids—suggesting that interconnected devices are tempting targets for malevolent hackers.

Veres, the Lviv Polytechnic educator, offers caution: “As IoT and artificial intelligence become more and more prominent, and more and more devices and people become linked up to the cloud, we have to be observant and careful about where all of our personal information is going and who is monitoring it,” he says. “Information is power. We have to keep an eye on who has it. There is significant potential for dangerous overreach.”
(Additional reporting by Natalya Datskevych)



Behind world famous tech companies, there are often Ukraine connections. The Kyiv or Kharkiv link is often invisible to users, buried deep in a Wikipedia bio.

Here is Ukraine’s map of the stars:

by James Brooke

Paypal



Max Levchin was born in Kyiv in 1975. In 1991, as the Soviet Union was collapsing, 16-year-old Levchin emigrated to the US, settling in Chicago, where he attended public high school and then University of Illinois Urbana-Champaign, two hours south of Chicago.

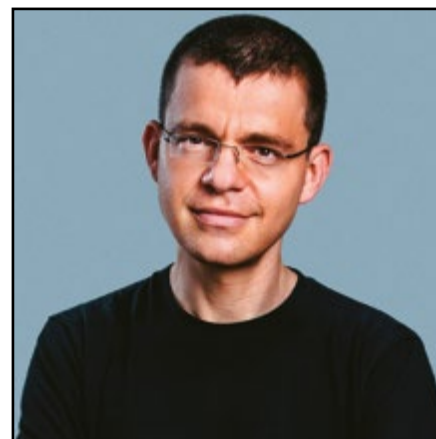
Twenty year ago, Levchin and Peter Thiel founded Fieldlink, a security company that allowed users to store encrypted data as 'digital wallets' on their personal date devices. Eventually this

payment product became known as PayPal. In 2002, the year that PayPal went public, Levchin was named Innovator of the Year by M.I.T. Technology Review.

After PayPal's successful IPO, Levchin launched Slide, a personal media-sharing service for social networking sites that was bought by Google. Then, Levchin helped start Yelp an online social networking and review service that he ran until 2015. More recently, he launched Glow, a fertility app

that helps couples conceive naturally. Currently, he serves as CEO and co-founder of Affirm, a financial technologies company.

Ten years ago, he married his longtime girl friend Nelly Minkova. They have two children. Circling back to his roots in Kyiv, Levchin contributes to FWD.us, a Silicon Valley lobbying group spearheaded by Mark Zuckerberg. The group lobbies for immigration liberalization for high-skilled immigrants to the United States.



What'sApp

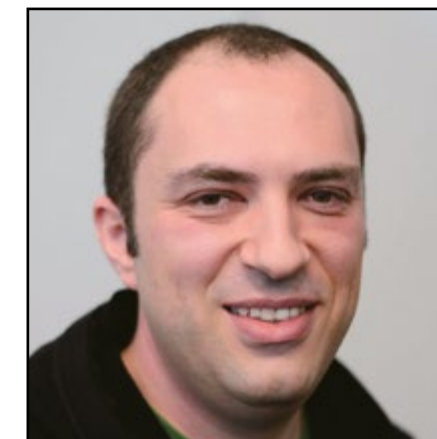


Jan Koum, cofounder of WhatsApp, was born in Kyiv in 1976 and grew up in Fastiv, 80km southwest of Kyiv. In 1992, at the age of 16, he and his mother and grandmother emigrated to the United States, where they settled in Mountain View, central California. He attended San Jose State University, but dropped out to work for Yahoo, where he stayed for nine years. In January 2009, Koum realized that Apple's new App store would open up a whole new industry. The next month, he incorporated WhatsApp Inc. in California. He and friend Brian Acton created WhatsApp, a

multi-platform mobile messaging application allows the sending of text messages, photos, videos, as well as voice and video calls. Customers find WhatsApp an easy way to send messages across borders and between different brands of mobile devices.

Koum's youth in the Ukrainian Soviet Socialist Republic may have influenced the value WhatsApp places on privacy and confidentiality. The app does not collect personal information such as name, gender, or age. Messages are deleted from servers once delivered. Jim

Goetz, a partner at Sequoia Capital and an early investor in the company, wrote: "It's a decidedly contrarian approach shaped by Jan's experience growing up in a communist country with a secret police. Jan's childhood made him appreciate communication that was not bugged or taped." From his home in Santa Clara, California, Koum keep an eye on his home country. In January 2014, during the height of the Maidan, Koum posted photos of revolutionaries and tweeted "praying for peace and quick resolution to the crisis #ukraine #freedom."



Grammarly



Grammarly was founded in 2009 in Kyiv by *Alex Shevchenko* and *Max Lytvyn*. This English language writing-enhancement platform works as an proofreading and plagiarism-detection tool. Now millions of people around the world—native English speakers and non-native speakers—use Grammarly every day to make their messages, documents, and social media posts “clear, mistake-free, and impactful.”

Four years after launch, Grammarly won the “Gold Award” from Top Ten Reviews in the category of “Best Online Grammar Checker Comparisons and Reviews.” Compared to three other services, it won with a rating of 8.88.

Shevchenko and Lytvyn grew up in Kyiv. Lytvyn graduated high school in Podil and earned a BA in management of information

science at International Christian University in Kyiv. (This Austrian-funded institution closed a decade later.) Shevchenko earned his BA from Kiev International University.

After graduating university Kyiv in 2001, both men followed similar paths, going to North America to get their MBAs. Lytvyn got his in 2004 from the Owen Graduate School of Management at Vanderbilt University in Nashville, Tennessee. Shevchenko got his in 2006 from the Rotman School of Management at the University of Toronto.

At the same time, in 2006 Shevchenko cofounded NameMyDropBox.com, which was acquired in 2009 by Blackboard Inc. Both Shevchenko and Lytvyn now live in the San Francisco Bay area. Both serve as cofounders of

Grammarly, which has offices in San Francisco, New York and Kyiv. Shevchenko is Grammarly’s product manager. Lytvyn is on the boards of Uniweb and Sciworth Labs, while also working as general manager of Sciworth Inc.



GitLab



Based in Kharkiv, *Dmitriy Zaporozhets* runs GitLab Inc. GitLab’s main product is its web-based repository manager with wiki and issue tracking features that use open source technology. In Kharkiv, the company has 150 employees. From around the world, it draws on more than 1,400 opensource contributors.

Tech developers flock to GitLab for collaboration and development and operations. Due to the convenience of the system, GitLab is used by over 100,000 clients worldwide, including IBM, Sony, Nasa, Alibaba, CERN, Space X, Ticketmaster, ING, NASDAQ, and Intel.

With such bluechip customers, investment money has followed. Since 2015, this Ukrainian startup has raised investment capital four times for a total of \$45.5 million. The most recent investment, last October for \$20

million, came from GV, formerly known as Google Ventures.

“GitLab’s platform accelerates the development process, with an emphasis on collaboration and automation,” GV General Partner Dave Munichello said at the time. “GitLab’s hybrid, multi-cloud solution is loved by developers, and is seeing tremendous traction in the field.” In another measure of GitLab’s global prominence, WordPress founder Matt Mullenweg has joined the company’s board of directors.

One year ago, Forbes, the U.S. business magazine, placed Zaporozhets on its list of the 30 most successful people in the world under the age of 30 in Enterprise Technology. GitLab’s website says little of substance about their Chief Technology Officer, other than: “He loves a good chocolate.”



Petcube



Alexander Neskin, Andriy Klen and Yaroslav Azhnyuk founded Petcube when all three men, fresh out of universities in Kyiv, worked at Prodigy, a digital marketing agency. Sitting in a fifth floor office at Olimpiskii Business Center, Neskin told his friends in the summer of 2012 that he was looking for a way to entertain his dog Rocky, back at his apartment.

That September, the three friends founded Petcube Inc. The original product was a 10x10x10cm cube that contains a wide-angle camera, a laser

pointer, a microphone and a speaker. Connected to a home Wi-Fi network, the cube now in an updated version, pet owners to use their smart phone to see their pets, talk with them, and play with them, using the laser pointer.

A new product, Petcube Bites, is a Wi-Fi-enabled camera with built-in treat dispenser "that lets you train and reward your pet remotely." The website exhorts pet owners: "See, talk, treat, and train from your phone." Catching the fancy of pet owners the world over, Petcube reached

its Kickstarter funding goal of \$100,000 within one week. In this fall 2013, campaign, Petcube collected \$ 250,000, becoming the most successful Ukrainian project on the crowd funding platform at the time.

Moving to tap into the near \$50 billion pet care business in the United States, Petcube has flourished. It is now headquartered in San Francisco, produces its cubes in Shenzhen, China, and develops Android and IOA applications in its Yaroslav Val office in Kyiv's Golden Gate neighborhood.



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In Ukraine, teaching computers to see and talk

by Aisha Down

KYIV—To some, machine learning conjures up images of computers beating human chess champions, or chatbots learning foul language on Facebook. But, to Ukraine’s top outsourcing firms, machine learning, ML technology, has applications that are far more common and far more weighty than playing board games.

As Ukrainian software companies move up the value chain to position themselves as top-end outsourcers, they are proving that ML can provide powerful tools for almost any business that can afford it.

How to Use a Lot of Data

Recent years have seen powerful new ways to collect data: low-cost drones shooting aerial footage of farmland, or search engines and sites tracking users’ browsing habits. Businesses have access to more information than ever before. But using it well is a different story.

Boris Pratsiuk, head of R&D engineering at Ciklum, a leading Ukrainian outsourcing company, says his department has invested heavily in ML techniques. “Machine learning, Artificial Intelligence, deep learning—it’s basically all data science,” says this engineer.

Pratsiuk can give tens of examples of applications. He says one of the most significant is computer vision.

“New techniques from computer vision allow you to utilize camera data to empower your existing system,” he explains. “That’s why a boom of computer vision is happening right now.”

To a human, understanding an image seems a lot more straightforward than playing chess. But to a computer, a chessboard is a far easier and less open-ended problem than a mess of pixels that could mean anything from “raven” to “refrigerator.”

Pratsiuk recounts that one of Ciklum’s clients was a large agricultural holding with fruit orchards prone to dangerous pests. Ten years ago, workers walked the rows of trees, looking for yellow leaves, the telltale signs of blight. Then, the agro holding installed cameras in the orchard. But that wasn’t a perfect solution.

“It still required professionals to sit in the office and review the videos 24/7,” Pratsiuk said. Now, Ciklum is training a computer to tell a good leaf from a bad leaf. Called a “neural net,” the underlying technology is modeled from the way humans



“Machine learning, Artificial Intelligence, deep learning—it’s basically all data science”

learn. The computer isn't programmed to study images for such features as shape or color. Instead, it's given a set of thousands of images of 'good' leaves and 'bad' leaves. By trial and error, it develops its own ways to differentiate them.

Building and training a neural net can take four months, says Pratsiuk. But potential applications are vast—from monitoring security cameras to optimizing pasta. "It's really a fit for developing products," says Pratsiuk. "Tell me the name of a product, and I can tell you how you can apply it."

A New Kind of Decision-Making

Machine learning isn't just a way to process large amounts of complex data. It also is a basis for developing artificial intelligence—machines that can make decisions based on information they gather.

Yury Antaniuk, director of EPAM, another leading outsourcing company here, says one of his largest projects is developing chatbots for clients. This software interacts with users to sell concert tickets, for example, or book flights.

In the past, such chatbots relied on keyword searches. Type in a phrase that includes "Sicily," and

an airline's chatbot searches for flights. Now, chatbots train on data sets. They build a model about a client's idea over the course of an interaction, says Antaniuk.

It could go farther. He describes a world of artificially intelligent personal assistants doing routine tasks for people—scheduling meetings or booking concert tickets for Friday night. "This is how artificial intelligence should develop," the EPAM director says. "It should help people be more productive, more creative, and do routine jobs. Humans are good at creating, but not good at doing routine work."



Product testing at Petcube



“Humans are good at creating, but not good at doing routine work”



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Legaltech, agritech, and edtech: How Ukraine can make your life easier

by Aisha Down

“Tech helps make government procedures more transparent.”

KYIV – Law, education and agriculture are not traditionally tech-intensive fields. While many people think of robots or social media apps when contemplating technological advances, many innovations come from businesspeople interested in just making their work lives a bit easier.

From a global tutoring platform to an app that sizes crop leaves, here’s how Ukrainian entrepreneurs are using tech to change how lawyering, learning and growing food get done.

Legal Tech

With high-tech platforms being developed to take care of everyday legal tasks, some lawyers worry about being put out of a job.

Anna Babych, partner in Aequo, one of Ukraine’s leading law firms, is excited.

“The potential [for legal tech] is high here,” she says at her Bogdan Khmelnskiy office. “Ukraine is a country yet to be developed.”

This year, Aequo held Ukraine’s first legal tech challenge. Techies, students and the public were invited to submit ideas for technological ways to make legal work easier and better.

Among the 120 submissions, Ms. Babych’s favorite was a platform focused on making corporate due diligence easier and more thorough.

“[It’s] a kind of platform that allows you to analyze connections if you’re doing legal due diligence of a group of companies,” she said. “It allows you to build up a chart of connections of the company.”

At Honcharuk & Partners, Mykhalo Honcharuk, the founder, says that he is taking advantage of online platforms to do due diligence and look up case precedents. However, he says, the court system in Ukraine isn’t now really amenable to technological solutions.

“We can’t prepare a claim for the court with an online system,” this veteran lawyer says. “You still have to go there physically.”

While streamlining routine tasks is appealing, both Kyiv lawyers emphasize the great potential of legal tech to make Ukraine’s judiciary more transparent, and accessible to its citizens.

“As you know, corruption is the main problem in Ukraine,” Honcharuk says. “Tech helps make government procedures more transparent.”

Babych described a startup that grew out Aequo’s legal tech challenge: Rate Your Judge. This platform allows lawyers to rate judges on objective criteria, such as punctuality. It has received an enthusiastic public response.

“This is one of the areas where the demand of society is quite high,” she says. “All the startups that relate to the judiciary, courts, court cases and analytics are quite high.”

EdTech

Would you like to learn to dance? Speak a new language? When Kirill Bigai founded the



“For the next 10 years, tutoring will be the best way to learn something.”

online tutoring platform Preply, he was trying to learn Chinese in Kyiv.

“I only had a couple days a week,” he recalls in an interview at a café near Preply’s office on Khreshatyk street in central Kyiv. “It was almost Mission Impossible. I made so many calls.”

Out of Bigai’s difficulty came Preply, one of the world’s leading sites matching tutors and learners for online study sessions. Started in Kyiv in 2013, the platform now has tens of thousands of tutors worldwide. It serves clients in 150 countries.

Preply isn’t just interested in tutoring, but effective tutoring, says Bigai.

In order to make its matches effective, it has software that monitors tutoring sessions and machine learning algorithms that study what makes these sessions effective.

Bigai and his company play in a hot market: the worldwide teaching market will be worth \$100 billion in 2018, he says. It will double by 2021.

He has competitors. Internet platforms, such as EdX and Duolingo, offer internet-based learning as a way to capture the long distance education market.

But, says Bigai, Preply’s focus on tutoring is unique, and important.

“I understand that every person needs personal attention,” he said. “Every person is different.”

“Duolingo—it’s good if you want basics,” he says. “But to get really fluent, you need a tutor. For the next 10 years, tutoring will be the best way to learn something.”



AgriTech

Ukraine's largest industry is agriculture. It's third-largest industry is IT. Combine the two, the reasoning goes, and you have a sure bet. Sure enough, Ukrainian startups and large Ukrainian tech firms—like Ciklum—have been at the forefront of bringing farming into the 21st century.



Many startups, like Petiole and AgriEye, focus on getting farmers more information—developing apps to analyze soil and leaf area, and drones to scan fields for blight. Other companies address a problem at the other end—what farmers can do with their new wealth of information.

Borys Pratsiuk, head of R&D at Ciklum, a top Ukrainian

“Many tech solutions in agriculture lag behind counterparts in telecommunications and other fields.”

outsourcing firm, explains a machine-learning solution under development to help computers recognize blighted leaves, using information from cameras monitoring a greenhouse.

This solution spares hours of human labor, he says. Well-trained computers can process a database of pictures far faster than people can.

For all the promise of tech, farmers have a different mentality than coders. Many tech solutions in agriculture lag behind counterparts in telecommunications and other fields.

“The platform approach is still years away,” says Bohdan Kupyck, vice chairman in Borsch Ventures, a fund which invests in agritech startups.

“Implementation of large info systems is very difficult, and in agriculture, even more so. IT departments are taking over farming.”

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Outside the Box: Creative IT in Ukraine

by Jack Laurenson

LVIV – To students pondering future careers, Yaroslav Prytula, a dean at Ukrainian Catholic University, suggests video games. Designing them. Ukrainian outsourcers might look to cutting-edge machine learning technology for handsome revenues.

Ukrainian parents might want their math-savvy kid to be a rocket scientist.

But coding the signature ‘bullet time’ special effects for gruesome head shots in Gameloft’s “Sniper Fury”? That, says Prytula, is cash.

Design opportunities

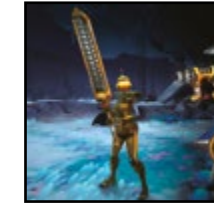
Game design and development, special effects production and video production have all taken off in Ukraine in recent years. They are pushed along by Ukrainian enthusiasm for hyper-realistic virtual entertainment. World players like Luxoft and Gameloft are firmly established in Ukraine already. Gameloft, with a center in Kharkiv, sells 2.8 million games a day and aggressively hires promising Ukrainian designers.

Meanwhile, homegrown studios like Nravo and Room 8 Studio have generated their own games. Room 8

“Gameloft, based in Kharkiv, sells 2.8 million games a day”



SNIPER
FURY



Studio’s “Riot Runners” won an award at Kyiv’s Indie Prize Showcase. It features miniature robots fleeing from giant robot overlords while collecting money. Ukrainian educators ride the wave. “Creative IT in Ukraine is growing fast,” says Prytula, dean of the faculty of applied sciences at the Catholic University. He says the university provides students with courses in game design, creative problem solving, and extra elective courses to prepare them for jobs in the sector.

“Game development, as well as video and special effects production, are a well-developed part of the IT sector here, with some companies starting to do outsourcing work for big game studios and Hollywood,” he says in an interview on campus. “There’s a substantial international market for games and apps produced here.” According to Prytula, about one third of his students go on to work in the creative IT industry. Design is a particularly attractive, promising opportunity and high salaries.

“We push our students hard to think about a future in these creative fields,” says Prytula. “Specialists in this area can often command a much higher salary, on the same level as western Europe or even the United States.”

World Industry

It’s not just a local phenomenon. Games are one of the world’s fastest-growing industries. UNESCO estimates the annual revenue of the global gaming industry at \$116 billion. In comparison, cinema box offices reported combined

international revenues of \$41 billion in 2017. Ukrainian studios capitalize on the boom, making games for Russian and Ukrainian markets as well as English-language markets. But it’s a competitive and expensive playing field.

“All R&D and design projects are more expensive than coding,” says Zenoviy Veres, who works with Ukrainian software giant SoftServe. He says more needs to be done to produce talented and creative specialists in Ukraine. The risk is loss of business to foreign competitors. “At the moment, each

“Creative IT in Ukraine is growing fast”

company spends on average \$2,000 per new worker in preparing them and training them for their job,” Veres said. “The industry needs places of education to provide a broader spectrum of knowledge so we have the best specialists.”

Creative thinking and collaboration with foreign IT partners and clients opens doors for Ukraine. “We have to recognize that IT has become a huge driver of innovation and entrepreneurship here,” says Igor Salamin from PLVision, a Lviv-based software company with a large R&D center in Odessa. “It’s also a huge driver of increased creativity, modernization, and it’s bringing us closer to our western partners and western mindsets.”



Games that Educate

For some Ukrainian innovators, the gaming boom isn't just about entertainment. It also offers creative ways to think about education. Andriy Tabachyn is CEO of Nravo games, Ukraine's largest independent producer of games for mobile devices. "Since 2009, we've created almost 30 different games that are available on all mobile devices and played by about 25 million people worldwide," he says. "But it's an incredibly competitive sector. Everywhere, you see smaller, independent studios getting taken over by the bigger players."

With Nravo's game studio a cash cow for future ventures, Tabachyn is taking his creative IT background in a more philanthropic direction—into classrooms. "In 2014, we started developing free educational games for kids, for mobile platforms," he says. "Now, working with the city council here and other partners, like Microsoft, our products are being rolled out into classrooms." Showing reporters around his R&D facility here in central Lviv

—Western Ukraine's IT hub—Tabachyn is optimistic about his ed-tech spinoff company, called EdPro.

His office looks like Santa's workshop combined with a modern day Leonardo Da Vinci's studio. It's littered with prototypes, 3D printers and blueprints. He presents reporters with a patented 65-inch (165 cm) touchscreen display showing an interactive demonstration lesson on dinosaurs. "At least one of these screens is now in every school in Lviv," he says, as a tyrannosaurus runs across the monitor. "We're using games, interactive digital apps and programs to make education here more modern, more fun. That's the future."

“Since 2009, we've created almost 30 different games, played by about 25 million people worldwide”



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Break through the noise...
Communicate through innovation

Ukraine battles on the front line of cybersecurity

by Noah Fulton Beale

KYIV—To many in the West, ‘Ukraine’ conjures up ‘cyberattacks.’ Despite headlines, though, most machines and businesses in Kyiv have remained untouched by the major attacks that have hit the news in the past years. But the cost to doing business—wariness from international partners, and the constant need for vigilance—has touched everyone.

Hybrid War

Four major cyberattacks in Ukraine made international headlines in the last four years. In 2014, a pro-Russia group called CyberBerkut targeted Ukraine’s first presidential elections after the Euromaidan. Then, hackers took down portions of Ukraine’s power grid during two consecutive winters, endangering thousands of lives

and raising concerns about the vulnerability of essential infrastructure.

Last June, the NotPetya attack struck 1,500 entities in Ukraine before spreading around the world. Ukrainian cybersecurity experts say that Ukraine, enmeshed in ongoing conflict with Russia, is the victim of a new form of hybrid warfare—one that includes high-level cyberattacks.

Ukraine isn’t the only victim of the attacks. “All countries are very vulnerable,” says Oleh Derevienko, head of ISSP, a leading Ukrainian cybersecurity company. But, though the international community often stops short of naming a perpetrator, it’s clear that all the attacks took major resources to carry out.

Derevienko says the attacks are peaks of a continuous wave of

developing hacking weapons. He calls them a “Massive Coordinated Cyber Invasion,” with each attack larger than the one before. Such a campaign, lasting for many years, requires sophisticated planning and dedicated teams of hackers. The time and logistics necessary to pull off these attacks, he says, points to a nation-state assailant: Russia.

An Image of Chaos

Cyberattacks can endanger lives, as residents of Kyiv learned when the city’s grid was hacked during two bitter winters. They can also be a form of military attack against adversaries’ infrastructure and capabilities.

But threatening lives isn’t the only aim. Derevienko says that a main reason why a nation-state assailant might hack is to create “a sense of uncertainty, a sense of chaos in a country.” When this

“All countries are very vulnerable”





uncertainty is broadcast through media coverage, the real damage of the attack is amplified.

“One reason Russia does these attacks is they want to create a perception worldwide that Ukraine is not safe for business,” says Junaid Islam, CEO of Silicon Valley cyber security firm Vidder.

As cyberattacks buffet a fragile economy and slowly warming business climate,

Ukraine’s government and businesses are focusing more attention on cyber security.

A national cybersecurity strategy involving the military and a special cyber police force is in effect. Legislation enacted last fall creates a legal framework for cyber defense and collaboration between government and companies. According to Derevienko, a crucial next step is to train more cybersecurity professionals.

Cooperation with other countries

Though international attention for Ukraine’s ongoing war is sparse, Ukraine cooperates with other countries on cybersecurity. It’s a mutually beneficial arrangement: international experts come to share their knowledge and to learn about the latest cyber weapons.

“Our recruiters...have this blacklist of people with ‘bad history.’”

NATO has supported technical development since 2014. The US committed \$5 million in aid last September. Part of a larger effort to align Ukraine more closely with the West, the government pursues EU standards for cyber security.

Aleks Mehrle, US-based president of Ukraine Global



Trade and Investment, says helping Ukraine achieve this goal will help the EU and US gain a strong trading partner and ally. Reducing the risk, he says, has a “huge upside.”

Employers have a black List

While governments negotiate, others have taken security into their own hands. Software development is Ukraine’s third largest export. Companies are generally tight-lipped about their security protocols.

Boris Pratsiuk, head of R&D engineering at outsourcing firm Ciklum, says that they have a “special department, with special equipment” keeping clients’ projects safe. Asked if Ciklum had problems with people trying to compromise their security, he admitted that they had, but declined to comment further. He said: “I cannot tell you. But we solved the issues. We found them.”



Ukraine’s IT companies quietly collaborate against employees with dual loyalties who leave backdoors open for hackers to exploit. “Our recruiters...have this blacklist,” Pratsluk said, explaining that his interview process for potential employees involves a check against an industry-wide list of people with “bad history.”

One big problem, according to Islam and Derevienko, is common worldwide: the most basic security procedures are ignored. The ‘NotPetya’ attack that caused half a billion dollars of losses last June exploited a flaw in Windows XP that Microsoft had issued an update for. The attack struck computers that had not installed the update. Islam says that outdated software and poorly-secured email create a crisis that hostile players easily exploit, especially in Ukraine. “Where we are today is just making people aware there is a fire.”

Derevienko says top business managers and government officials are often poorly informed about cyber threats. “Only 40 percent of CEOs are briefed on cybersecurity,” he worries. “Wherever you invest, you have to take care of cybersecurity...You have to understand that cyber risk is a business risk.”



“Only 40% of CEOs are briefed on cyber security.”



Lviv builds \$150 million IT city to cope with growth

by Jack Laursen

Lviv – As Ukraine’s largest IT association, Lviv’s IT Cluster draws international attention to Western Ukraine each fall by holding IT Arena, Eastern Europe’s largest annual tech talk fest.

Now, the Cluster moves from words to concrete. Construction starts this year on Lviv’s Innovation District IT Park, known in town as IT City. With \$150 million invested and a spacious 10-hectare building site, IT City will offer workspace for dozens of tech companies and thousands of workers. It’s also, say planners, a transformative boost to Lviv’s growing tech ecosystem.

Tech Makes Hot Real Estate
Promoters say that 100 percent of IT City’s 38,500 square meters is already pre-leased.

It’s not a surprising statistic. The development will break ground with Lviv’s office rents growing faster than anywhere else in the nation. In a recent survey, 91 percent of IT CEOs in Lviv said they needed to relocate to better offices.

The real estate boom speaks to the strength of Lviv’s tech

“The IT workforce generates another 72,000 jobs in Lviv.”

economy. It is surging by 20 percent a year—ten times Ukraine’s national GDP growth rate in 2017. This figure comes from the IT Cluster itself, which now counts 9,000 people and 60 companies among its members.

“IT and tourism have for a while now been identified as by far



the two biggest drivers of Lviv’s growing economy,” says Stepan Veselovskyi, CEO of the Cluster.

“The City Council wanted more input from the business community in implementing more IT projects, for the greater benefit of the whole city, [so] we all began to step forward and improve this cluster.”

20,000 IT Workers in Lviv

Around 20,000 IT workers, drawn from all over Ukraine, now work in the city. Earning salaries denominated in dollars, this IT workforce generates another 72,000 jobs in Lviv.

“We calculated that every worker in tech creates another 3.6 jobs for the city,” says Veselovskyi. “So it’s not surprising that the City Council wants more funding and investment into this area.”

Their data indicates that the average salary for an IT worker in

Lviv is \$1,500 per month, higher than the national IT average. Advanced specialists can command salaries that match those in some parts of the EU—up to \$6,000 per month.

Clusters Generate Growth

The purpose of a cluster is growth. Good ecosystems like Silicon Valley accelerate ideas and make collaboration smooth and effective. When their entrepreneurs reap dazzling successes, these ecosystems become talent magnets.

In Ukraine’s five biggest cities—Kyiv, Kharkiv, Odesa, Dnipro and Lviv—IT clusters, or industry associations, are bringing players in the tech industry together, according to Dr. Yaroslav Prytula, Dean of Applied Sciences

at Lviv’s Ukrainian Catholic University. This means growth.

“Private companies are coming together, working together and bringing so many brains together for the good of the country’s economy as a whole,” he said in an interview. “They are really helping to drive the success of this sector.”

“Lviv’s IT cluster brings significant benefits to the whole city.”

Zenoviy Veres, an IT expert for software giant SoftServe and a professor at Lviv Polytechnic University, says Lviv’s IT Cluster brings significant benefits to the whole city.

“The cluster has many education’s programs in universities and schools around



the city, where trainees are being mentored by active professionals," he says. "They are also critically important in bringing all of the best talent and IT specialists into Lviv from around Ukraine."

Lviv IT and the World

Veselovskyi, CEO of the Lviv Cluster, echoes a common assessment: "Our annual IT Arena event—a huge conference with speakers and live music and events—is fast becoming the biggest tech event in Eastern Europe."

Last fall, this forum drew 2,300 attendees and 100 speakers, many from such industry leaders as Facebook, Apple, Amazon and Google. In a snowball effect, these visitors generate more investment and more demands on infrastructure in a once quaint Hapsburg-era provincial city.

"Ten years ago, city authorities began to realize that there was a significant lack of decent office space in the city," says Veselovskyi.

Growth pressures push the project from blueprints to ground breaking.

In addition to office space for 4,000 people, IT City will have a new Catholic University campus, supermarkets, hotels, and hundreds of apartments. With completion expected in 2020, IT City is to usher in a new growth era for a sector slated as an economic pillar of modern Ukraine.

“Our annual IT Arena event is fast becoming the biggest tech event in Eastern Europe.”

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Government for the People: Putting Ukraine's Paperwork Online

by Natalya Datskevych

KYIV — Historically, getting official paperwork done in Ukraine—or anywhere—doesn't happen fast. Kyiv city streets are dotted with signs for notary publics. Government procedures remain paperbound and bureaucratic.

But times are changing. Europe, the US and Ukraine civil society press the government here to reform. With rising pressure for efficiency and transparency, paperbound bureaucracy increasingly looks very 20th century. Instead politicians, NGO workers and enterprising techies are developing e-government platforms to fight corruption and make government more accessible to citizens.

State Services Online

The aim of creating online e-government is not just greater ease, says Alex Vyskub, who works in the State Agency for Electronic Government of Ukraine. Minimizing face-to-face interactions can make corruption and passing bribes a lot more difficult.

Developing platforms and legislation for online governance is the aim of the agency where Vyskub works, created in 2014 in the aftermath of the Euromaidan revolution. Supervised by experts from Estonia, the agency aims to put 100 top-priority government services online by the end of this year. Half will be designed for businesses.

The platform is copied from Estonia's X-Road. A fellow former Soviet republic, Estonia now is recognized worldwide as a successful pioneer in e-government. In Ukraine, the platform is called "Trembita"—after the traditional mountain horn of the Carpathians.

Trembita puts key services online. It also provides an online way for government agencies to interact and transparently request information from each other.

Trembita accomplishments include launching online business registration, and making online platforms for social services like subsidies for children. By



“Of all 100 key services, about 35 to 40 percent are already operating.”

2020, the platform will launch an online licensing system for businesses selling alcohol and tobacco. “Of all 100 key services, about 35 to 40 percent [of those supporting businesses] are already operating,” Vyskub says.

Transparency helps businesses. To cut corruption in Ukraine, officials need to clean up how businesses interact with government. Vyskub's agency has launched several initiatives. One deals with commercial real estate. Previously, businesses had to visit local offices to register ownership of buildings. Now owners of small and medium-sized businesses have to register with an online database

if they want to obtain property rights.

This database, Gazko, keeps the businesses' documents and ensures their building is legal and properly taxed. “This liquidated a huge corruption hole in the country,” asserts Vyskub. A second initiative involves land registry. In earlier decades, Ukrainians visited local officials to register ownership of land plots, or to get a green light for development.

Now, applications for land registry are filed into a network where the officials who process them are randomly selected from all over the

country. “This allows us to break off connections between local government officials and the licensee approaching them,” says Vyskub.

Overall, Vyskub sees progress, and improved ease of doing business. These e-government steps, he says, “not only save time and resources for business, but also eliminate schemes for abuse that existed because of excessive bureaucracy.”

Transparent Procurement

Trembita's work focuses mostly





“It protects private property, and it allows people to interact with the government without bribes.”

on small businesses. More of interest to medium and big businesses, Ukraine already developed an online platform to manage government auctions and tenders—with transparency. Called ProZorro, it was founded in 2015. In 2016, it won the international Open Government Award. By cutting collusion on bids, it already is saving taxpayers millions of dollars on state procurement.

Modernizing Legislation

Despite these steps forward, large swathes of the Ukrainian government’s interactions with the private sector remain

tangled in paper and prone to corruption.

One big obstacle: despite government intentions to take procedures online, much of Ukraine’s legislation doesn’t allow internet forms to replace physical documents. “Legal tech has a high potential for the Ukrainian market,” says Mykhailo Honcharuk, head of a law firm here. “But it’s difficult to implement if a government regulation doesn’t allow it.”

This is slowly changing, he adds. For example, a law passed in December allows certain claims

to be prepared for Ukrainian courts online. “It’s a new law, and we don’t know how it will work,” he said. It will take one year to test.”

But, looking to the future, online transparency is the way this tech savvy nation will go, he says. “Tech helps to make government procedures more transparent. It protects private property, and it allows people to interact with the government without bribes.”

(Additional reporting by Aisha Down)



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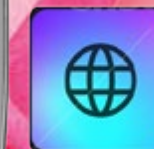
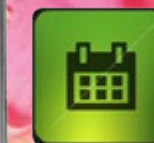
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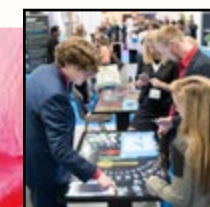
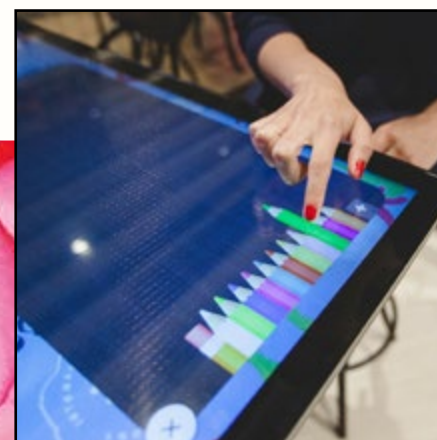
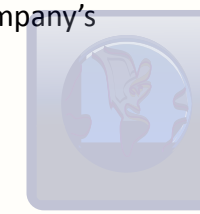
Made in Ukraine: Restaurants of the Future

by Jack Laurenson

KYIV – Dmytro Kostyk’s made-in-Ukraine ‘smart’ tables can display the morning news, screen beer advertisements, and file orders to the kitchen—all from a spill-proof, interactive tabletop display ● And, from his showroom in downtown Kyiv, Kostyk, founder and CEO of Kodisoft, plans to take on the world—or at least the world’s food courts ● “This is the future of restaurants,” says Kostyk, 30, as he demonstrates how a diner can use the table’s colorful, lighted surface to investigate menu offerings ● Kostyk isn’t the only inventor to hit on touchscreen tables ● But his, he says, far outstrip the competition ● A South Korean company has produced an interactive restaurant table that isn’t readable under direct light, he says ● Meanwhile, in another Kyiv restaurant, a Chinese-made ‘smart’ table greets patrons with a warning: “Do not place any food or drink on the table.” For Kostyk, who insists on perfection, this isn’t good enough ● His tables—retailing at \$15,000 apiece—are the only ones that can stand up to the messy demands of a restaurant environment, he says ● To prove his point, he stands on top of one ● “Other [tables] can be used maybe in a safer and less-demanding office scenario—for presentations and such,” he allows. The secret? Kostyk, a graduate of Kyiv Polytechnic Institute, says his smart tables are 100 percent made in Ukraine—from feet to touch screen ● “This is the strongest and fastest touch screen on the market, for any device,” he says ● His tech talent is from Kyiv, too, he adds ● His R&D center is 10 minutes from his alma mater, though, like many Ukrainian companies, Kodisoft’s website lists a contact address in San Francisco ● A frequent visitor to Silicon Valley, Kostyk sees his competition as weak—and his potential reach



as global ● The company has built 1,000 tables and sold them in 20 tech-competitive markets, including Britain, Canada, Dubai, Japan, Russia and Singapore ● Installed in shopping mall food courts, the tables allow customers to order meals from surrounding restaurants, book movie tickets, play games and even connect to social media ● Kostyk demonstrates: after connecting his phone to the table, he snaps a group selfie, shares it onto the table, then swipes it across the table’s surface and onto this reporter’s phone ● Software can be customized by restaurant owners ● In one Abu Dhabi cafe popular with students, the owner integrated English-learning games onto the table ● In a shopping mall in Singapore, users can buy drinks and gifts for people sitting at other tables ● Soon, the company will introduce open-source app development for the table, akin to Apple and Android’s app stores ● The table is also a business tool for restaurants ● Its interactive menu has allowed some venues to cut waiting staff ● Meanwhile, its display can screen advertisements, providing another revenue stream ● One cafe equipped with smart tables dramatically cut prices of food and drinks after putting sponsored content on their tabletops ● With his company now valued at \$86 million and plans to go public on the New York stock exchange, Kostyk is focusing on trend-setting venues—airports and shopping malls in Europe, North America and Asia ● It’s working ● Next year, Singapore’s Changi Airport will put 300 of Kodisoft’s tables throughout the hub’s dining venues ● Coffee giant Starbucks also will start using the company’s smaller, two-seat table at locations in Canada ●



by Noah Fulton
Beale

Four hot
Ukrainian
startups let you
read, write, code
and remotely
feed biscuits to
your puppy

Petcube

Does your pet cat Ginger shred your armchair while you're at the office? Does Fido find crayonstastier than kibble? For anxious pet owners, Petcube's setup—camera, microphone, and treat dispenser that you can operate from afar—might just be the answer.

Controlled by a smartphone app, this kit allows pet owners to see, talk to and interact with their pets through their phones. A favorite of Hollywood celebrities and Silicon Valley investors, it was founded in 2012 by graduates of Kyiv Polytechnic Institute. They got the idea after CTO Alex Neskin made a robot to play with his dog while he was out of his apartment. Not everyone took Petcube seriously, says CEO Yaroslav Azhnyuk. He recalls: "The project looked silly because you're using a camera with a laser pointer to play with cats." Now, after grants from Ukrainian organizations, a successful crowdfunding campaign, and

●● The Petcube team has raised over \$14 million. ●●

a term at the prestigious Y Combinator accelerator, the Petcube team has raised over \$14 million. Today, Petcube is displayed in stores worldwide.

The founders' ambitions have not dimmed. In the US alone, there are 80 million households with pets. Next comes a big data approach -- using machine learning technology to study pet behavior and health. Azhnyuk, the CEO, says: "Our goal is to connect all pets to the internet—and then give them a voice."

Readdle

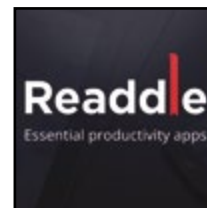
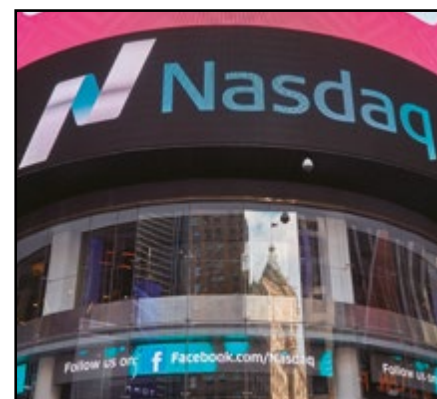
The group of friends who went on to found Readdle didn't know much about business. They just wanted to make something useful to people. It started in 2007, when co-founders Alex Tyagulsky and Adrian Budantsov acquired two of the first iPhones in Ukraine, brought from the US by a mutual friend. They loved the phones, but were disappointed by their limitations, especially the astronomical cost for most Ukrainians.

"The device cost \$600, but you couldn't read using it," recalled Denys Zhadanov, VP of marketing. So they built a web-based document reader app. It was an immediate success, quickly gaining 60,000 users. But monetization was another story.

"We didn't know the whole concept of a startup or how a business model worked," Zhadanov said. "We were trying to figure that out, struggling, not making any money. Then we got a phone call from Apple." It was an invitation to be featured in the launch of the App Store. The opportunity made Readdle a consistent leader on the Business

●● Readdle's apps have over 80 million downloads. ●●

and Productivity App Store charts. Now, with 130 people working from their headquarters in Odessa, Readdle's apps have over 80 million downloads. Their offerings run the gamut of mobile productivity apps, from calendars to email to scanning. But their reader, Documents, is still the most popular: 1 million new users every month.



Senstone

Do your best ideas hit you when you're walking in the park or out with friends? Do you forget them by the time you fish out pen and paper, or open a recording app on your phone? You're not alone. So does Nazar Fedorchuk, Oxford PhD and a lawyer and entrepreneur from Lviv. But, coming this spring, Fedorchuk has a solution.

Senstone is a wearable voice recorder—a high-tech notepad that not only captures speech, but uses machine-learning algorithms to remove background noise and convert spoken memos to text. It then syncs the text to users' smartphones.

Fedorchuk got the idea after he finished a project with the US Department of Justice, passing legislation to reform Ukraine's criminal justice system. "I have a bad memory," says Fedorchuk. He wanted a "reminder button" for his life—an "accessible, super easy to use, automated" way to remember dinner plans and business ideas. In 2016, he assembled a small team and began making prototypes. Development focused on function and form. They needed the AI-powered voice transcriptions to be reliable. They wanted the product to be

●● They launched a crowdfunding campaign that raised \$300,000 in 38 days. ●●

compact and fashionable. One year ago, they had a working model in hand. They launched a crowd-funding campaign that raised \$300,000 in 38 days. Senstone has been featured in leading tech publications. This Kyiv-based company shipped its first manufactured units to customers for beta testing in December.

GitLab

You might not have heard of GitLab, but the people building your spaceships have. It's a platform to allow software developers to collaborate easily. Some call it "the Google Docs" of code.

It's used by over 100,000 organizations worldwide, including NASA, IBM, and NASDAQ.

But its roots are in Ukraine. Co-founder Dmitriy Zaporozhets created the first version of the web-based software from home in Kharkiv, during off time from work for a consulting firm. The house didn't have running water, but that wasn't his main worry. Instead, for Zaporozhets, the bigger challenge was to find a good way to collaborate with his team. And so he started GitLab: a platform that pioneered new ways for coders and engineers to simultaneously work on the same project.

●● GitLab has raised over \$45 million. ●●

The company takes collaboration seriously. Their open-source software was developed by 1,800 volunteer contributors. They envision "a world where everyone can contribute" to digital products, "from legal documents to movie scripts and from websites to chip designs." Most functions of GitLab are available for free. The company charges for its more robust version for company-level users. GitLab has raised over \$45 million, including a \$20 million round last fall. In that round, the lead investor was Google Ventures.

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