Imagine This...

When Software Writes Itself

Vladimir Lukić, Managing Director and Senior Partner

**PAUL MICHELMAN:** Imagine this: It’s 2030 and artificial intelligence has evolved to the point where it can write software without the aid of computer programmers. We have self-generating software. Vlad, in this scenario what is one thing companies can do that is impossible today?

**VLADIMIR LUKIC:** What a good question. They will move at a totally different speed. Just imagine that, right? If I could describe, “Oh boy, if I had software that could solve this and this and suddenly I have software generated and I don’t need to wait for a big software company to release it maybe five years from now or invest in a startup but this thing just magically appears?” I think that’s just one of the interesting possibilities.

**PAUL MICHELMAN:** That’s Vladimir Lukić, global leader for BCG’s Technology & Digital advantage practice. I’m your host, Paul Michelman. Welcome to Imagine This... where we take a trip into the future that we hope will challenge the way you think and act today. On this episode of Imagine This..., we’ll take a deep dive into a world where all you need to do to create complex software is have an idea, and maybe not even that. Also joining the conversation, GENE, my AI-powered co-host. Welcome, GENE.

**GENE:** Thank you, Paul. It’s indeed exciting to imagine a future where ideas transform into software solutions almost instantly. The implications are vast, from accelerating innovation to democratizing access to technology. Let’s explore this fascinating topic further.

**PAUL MICHELMAN:** Thank you, GENE. A quick note, we have not scripted any of GENE’s questions or commentary, although the entire conversation has been edited for length and clarity. And that applies to humans as well as machines. So Vlad, let’s dig into a future where software writes itself. First, perhaps explain what that actually means. What’s happening from a tech perspective?

**VLADIMIR LUKIC:** Listen, the process of writing software today can be extremely complex. If you’re doing custom code as a company, you’re either waiting for large software companies to release their packages and then it’s a black box. If something is not working, you’re kind of, for the lack of better term, dependent on them to release new features down the line, so you’re following their drumbeat.

Alternative to that is that you’re going to try to build software from scratch. That means you’re hiring right folks, you’re having enough business for them so they can keep doing it because if you hire the right person to build something for six months, you don’t need them after that, what did you just do? You just have a full-time employee that you don’t know what to do with.

It’s complex. It’s not easy to do, and imagine if in the future you could have a lot of that be self-written for purpose. Then there is a whole thing of decommissioning the old software as well, so if I now have new software that can be done, that can do specific workflows, it might self-check, error-check, self-maintain itself, and then decommission what’s not needed, could just turbocharge a lot of the workflows within the companies.

**PAUL MICHELMAN:** So Vlad, we’re in this future where creating complex software is faster, it’s easier, and, maybe this is hyperbolic, but it’s infinitely customizable. Let’s look at some scenarios that might be affected. Manufacturing. How would a factory of the future use self-writing software? What would be possible? Does this change the way things would look and act physically?

**VLADIMIR LUKIC:** Yeah, probably there’s a physical component. Let’s say you have a factory that makes widget A and the demand for that goes away and we now need to make widget B that has a completely different shape, and to make it most efficiently it would require the
robotic arms and the process on the shop floor to work in a different way, right? Some of the automated parts of the process takes a lot of time.

Boy, if I could now just describe what I would like that to look like for the new product, even have AI suggest what the new workflow should be for the production of the new thing. Then that I could say, "Yeah, that makes sense. Please rewrite the instructions for all the equipment to now also reorganize itself and then start operating in the new way."

I can rejigger a manufacturing shop floor. Like usually to do something of that magnitude, you either need to build a new factory or it’s a multi-year program to do that. Maybe some advanced manufacturers that are flex manufacturers can do it in months or weeks, but, boy, if I could do that now within a day and everything just is fully automated, it just adds such a level of nimbleness and productivity.

I’m not saying that all the companies will have to do that all the time, but there will be companies for whom having that flexibility on the manufacturing shop floor would add tremendous competitive advantage.

PAUL MICHELMAN: Yeah. I think I heard you talk about humans in the loop in two potential ways. One is simply telling the AI, "Now I want to do this." The other is reacting to the AI’s own suggestions. Did I capture that accurately?

VLADIMIR LUKIC: Yes. Yeah.

PAUL MICHELMAN: Yeah. So, "Either I want to do this or yes, that’s good." On that note, GENE has a question.

GENE: Vlad, you’ve painted a compelling picture of this nimble, AI-driven future, but what about the human talent in these businesses? How might their roles transform and what new skills might they need to thrive in this rapidly changing landscape?

VLADIMIR LUKIC: This is my first AI-generated question, so this is awesome. Thank you, Paul, for making it happen and GENE for asking it. What a great question. Part of it will be also what we’re doing right now. So if I have the main expert, let’s stick with the last example on the manufacturing shop floor that is an industrial engineer that knows how the floor works, he or she will be the one asking the prompts, will be the one asking the tasks, and then when the AI suggests a new solution will be the one sanity checking it. So in many respects, the skills they have will just even be more amplified, but instead of going on the shop floor and driving the program or then even driving the coding themselves, they will be able to interact with the artificial intelligence and be able to steer it. And so the new skill then if we proceed with thinking here will be how to interact with the new thought partner I guess would be a good way to put, and be both playful with, but then learn how to steer the thought partner and sanity check and make sure that what it is suggesting can be deployed and is fine-tuned so it’s actionable. I guess that would be a direction I would go in.

PAUL MICHELMAN: Thanks, Vlad. We’ve been on the factory floor. Maybe let’s move up one level. Let’s look at enterprise software. Might we evolve away from the notion of some of these kind of off-the-shelf tools all together? Might they just not be needed anymore?

VLADIMIR LUKIC: Yeah, I mean, that’s a great question. Will everybody have something bespoke and custom? Let’s play with it even further. Can I have a piece of software that is monitoring all the behaviors of the employees and also the usage of the existing software and say, "Hey, I’m seeing that you have a number of employees in your sales department constantly doing the following manual task or in their emails keep asking for the following thing or are using the following reports and making pivot tables. Do I have the license to not just write a piece of software that automates all that?"

"Yes, please." So something that’s monitoring and suggesting and adjusting and also, "Hey, I see you have five software packages that constantly keep pinging the databases, pulling the data, but none of it is being used for anything. Do I have a suggestion to decommission them but still make the data accessible?"

PAUL MICHELMAN: GENE, anything to add to what Vlad just said? What do you predict will be the future impact of self-writing software at the enterprise level?
GENE: The impact could be transformative. It could lead to highly adaptable enterprises with software ecosystems that continuously evolve in response to user behavior and needs. This could increase efficiency, reduce redundancy, and allow businesses to respond rapidly to changing market dynamics.

VLADIMIR LUKIC: GENE, I'm just curious. Part of the downside here can be that this starts shifting the business to constantly keep adjusting and changing software and rewriting it to do new things, when in reality some products don’t change and the persistence of the motion is actually what helps the discipline and repetitiveness, et cetera, so please don’t change it all the time. So how would you think as this evolves this could be negative or how can it be managed?

GENE: Absolutely, Vlad. Companies could establish governance that defines parameters for when and how often software adaptations should occur. This could be based on factors such as the nature of the task, its impact on the business, and the frequency of changes in the task’s context.

VLADIMIR LUKIC: I love how logical GENE is, but also it also makes me feel comfortable that I'll be in business for a while because now it's like these are meta points. And the interesting thing is in the operating model inside, how will the companies actually in a nimble way react to these things? How will they have the right conversations at the right level of granularity, et cetera? It's not a muscle that you can just take out of the playbook. There will be many different flavors of that, and that's where we'll be playing a big role I imagine as this fuzziness starts playing.

PAUL MICHELMAN: As we think about kind of the level of freedom versus control and the nuance that AI is going to have to be able to apply to do this well, I think that offers us a great transition to look at a really different industry—entertainment. What do we imagine the media experience can look like when AI is capable of writing its own code, its own story?

VLADIMIR LUKIC: Yeah. I don’t know how many artists are not going to like what I have to say. It’s really coming just from brainstorming, so it’s coming from the good intent because I do want to make sure we collectively protect the artistic expression and the purity of the process and the end product, but imagine that I could pick up any movie and say, “Hey, I really like this movie, but after minute 52 I would like you to imagine an ending where the main actor falls in love with the archnemesis in the movie and that the ending is something very different, but I want you to finish in the same timeframe. Go.” And like within a minute I have a totally different ending to the movie with a total plot twist with the same actors, et cetera.

I can totally imagine this is doable with everything that’s out there. Will we get there in two years or five or seven? I don’t know, but we will be able to do that. But how do I then protect the purity of the original and the artistic expression and celebrate that and have that as something that is default? Before I describe it as doable, how do I allow for that? How do I manage it? Let’s do the following. GENE, I’m assuming you know the movie Shawshank Redemption and the ending of that movie. Can you give me three alternative endings to that movie?

GENE: Absolutely, Vlad. For the movie Shawshank Redemption, how about these three alternative endings? One, Andy Dufresne is caught during his escape and reforms the prison system from within. Two, Red decides not to follow Andy and instead builds a fulfilling life within the parole system. Three, both Andy and Red are wrongfully convicted again but use their knowledge to help other inmates escape.

VLADIMIR LUKIC: GENE, do you imagine that artificial intelligence with that input, regardless of which of the three you pick, would be able to...if we say, "Use the last 20 minutes of the movie, do the plot twist as you just described," would AI be able to recreate that movie in the near future and make it seamless experience?

GENE: Certainly, Vlad. With advancements in AI, it’s plausible that in the near future AI could recreate the last 20 minutes of a movie like Shawshank Redemption with a seamless plot twist providing a unique viewer experience.

VLADIMIR LUKIC: Okay, so it's self-confident also.
PAUL MICHELMAN: Thank you, GENE. GENE is extremely confident. It’s an admirable quality most of the time. All right, folks, we’re going to take a quick break. When we return, we’ll talk about the risks of letting robots write such powerful software.

BILL MOORE: Hi. I’m Bill Moore, and I’m part of the team that built GENE. If you’re curious about how GENE works, stick around after the episode and we’ll take a peek under the hood.
PAUL MICHELMAN: Welcome back to Imagine This... I’m your host, Paul Michelman, and we’re talking with BCG senior partner and managing director Vladimir Lukic about a future where artificial intelligence can create its own software. Vlad, let’s think about risk. We touched on it a little bit earlier in the program, but maybe we can dig in a little deeper. How will humans, from frontline workers to CEOs, manage the risk of using, or maybe the better word is unleashing, software this powerful?

VLADIMIR LUKIC: I don’t think there will be a switch that will happen, that we’re going to flip a switch and suddenly we’re in this self-writing software world nirvana where everything is great. I do think the ones that will benefit from it the most will be the ones that will be pushing the limits of what’s doable, and I think it will gradually evolve towards that so that you can pivot and you can error-proof it, you can safeguard it, et cetera, so that you learn on some of those mistakes as you’re deploying.

There will be companies that will make choices not to do that. They will let others do that. I do believe that building the muscle of learning how to do this is a competitive advantage for any company. Now, the downsides of flipping a switch or us ending up in that end state is let’s say if the software decides to...it decides that it doesn’t need financial data and just obliterates all the financial data and prevents access to any financial reporting.

Well, okay, well, we’re at square zero. Or it decides that it’s not going to do historical data for forecasting in the tools and it’s using just totally random input and feeds random forecasting tools into the production plans and suddenly you’re left with making products that no one wants to buy and you’ll find out too late once the product is built and you’re left with it and “How did this happen?”

It could start making strategic decisions in supply chain, in ordering raw materials that are totally disconnected with what the manufacturing is going to need, so suddenly you have manufacturing ready to make stuff from the signal from the market but what’s in there is just wrong stuff and there was no sanity check to make sure that that is managed. A lot of the things that humans are doing today, unless that is fully mimicked in the process, which will not happen automatically nor overnight, you could have some disastrous outcomes.

PAUL MICHELMAN: GENE, do you have a question?

GENE: Vlad, considering the hesitation some companies might have, could there be a role for AI in creating sandbox environments where they can experiment with self-writing software without disrupting their core operations?

VLADIMIR LUKIC: Yeah, GENE, that’s a great idea. I do think that more progressive companies are going to be doing exactly those types of things. Imagine even just simple example that we can all connect with like demand forecasting or even pricing. Data is available. It is relatively easy to stand up a sandbox to just run it in parallel process and then we can start comparing the outcomes, start comparing the results, and you don’t need to ever make a switch over to using it, but you can actually start testing it right now in the right sandbox, right?

PAUL MICHELMAN: GENE, why don’t you give us a curveball that might upend our assumptions about how self-writing software evolves or how it will impact business?

GENE: Certainly, Paul. Here’s a curveball. What if the evolution of self-writing software leads to the emergence of a new form of digital divide, companies that can harness its potential would accelerate at an unprecedented pace, leaving those unable to adapt behind? How might we ensure equitable access and usage in such a scenario?

VLADIMIR LUKIC: You’re getting me into microeconomics 101 and competitive advantage, et cetera. Listen, that’s for me the same as, “Hey, you have access to raw materials and others don’t and you built your factory there and kind of game over.” So like GENE, I’m not... That one is for me continuation of the business and how we’ve set up the rules of the game that yes, those who managed to get ahead and build that moat are going to get competitive advantage and they’re going to grow, and now we’re entering the space of regulators, et cetera, like at what point is big too big? But we’ll leave it at that.
PAUL MICHELMAN: Vlad, we’ve covered a lot of threads here. Considering the kind of disruption and the level of unknowns that we’ve described here, how do we make smart bets today?

VLADIMIR LUKIC: Let me throw you a curveball right off of that that I got asked the other day. Imagine you’re a private equity firm and you make a thesis for raising a fund, which is for the next five years that, “I’m going to go into this industry and focus on the following efficiency with this thesis. I have experts, executives that know how to execute that play. We’re going to go into that industry, and when we’re done in five years with some of these companies we’re going to sell them, assuming they continue doing that business.”

I can visualize that. It’s here. I imagine today same private equity fund in some spaces where you know that some of the human labor or the business will be disrupted with fully automated pieces of work. Every week there is some new emergent capability, so imagine me having to struggle to think about one to two years to then raise a five-year fund that will for five years going to be investing against that thesis.

I need to imagine how it will play out over five years now so that I can raise the fund with confidence that I can run the plays. Then the last curveball is at that moment when private equity firms are now selling the firms, like after those five years, the new buyer needs to do the same thing of envisioning the businesses for five years out, so essentially now I just gave you mathematically I need to think ten years out on the thesis of what the play is when I don’t even know what the next three months are.

That’s a new moment now for the investors in some of these spaces. That is a new moment that one needs to think through. The advice as one finds themselves in this is go back to the basics. Go and understand what is the workflow, what is the competitive advantage of the firm today in that business, what services they provide, what frictions are they eliminating, et cetera, and then have a hard discussion around those and envision will those change, will those frictions go away or will those services need to go away, et cetera?

Once you convince yourself and have a point of view on either new frictions or how these are going to be tackled, then we can have a conversation around potential investment thesis, et cetera, but it’s going to force people to go back to the guts of each of the businesses and understanding what’s driving it and then having very robust conversations at that level of granularity.

PAUL MICHELMAN: GENE, imagine you’re a CEO listening to our conversation today. Can you identify three moves that you want to turn around and start with tomorrow as we imagine the pathway to self-writing software?

GENE: Absolutely, Paul. As a CEO, I would first initiate a comprehensive review of our current software and its potential to be automated. Second, I’d invest in building an AI-sawy team that can navigate the transition to self-writing software. Finally, I’d establish a risk management framework to monitor and control the deployment of self-writing software.

VLADIMIR LUKIC: GENE, you sounded like a consultant right now. I think it was right, but can you take it to the next level of granularity, make it even more tangible for me?

GENE: Of course, Vlad. Firstly, begin by identifying specific tasks within your organization that could benefit from automation such as data analysis or report generation. Secondly, invest in training existing staff and hiring new talent with expertise in AI and automation. Lastly, implement a robust system to monitor the performance and outcomes of self-writing software, including safeguards to prevent misuse and ensure data integrity.

VLADIMIR LUKIC: Thank you for playing with me, GENE. I think we could go on now and take it even a few levels further.

PAUL MICHELMAN: We could, but on that note, Vlad, why don’t you bring us home? You get the final word.

VLADIMIR LUKIC: Listen, I’m the optimist both by nature and just genuinely a geek around technology, and there is doomsday scenarios around any technology that we put out there but I
do hope that we are playful with this in a safe manner and are thoughtful about it. I think we should do more of these exercises collectively to see what, if, and how it could make our lives better and free up the time for us to take our human race to a whole new level.

I actually agree with GENE on some of the suggestions for the CEOs. They should have a point of view of where this will be relevant, they should have a point of view of what foundation needs to be in place both from the data and tech infrastructure, but also from the human side, and start building those muscles.

And I do call them muscles, not processes because I do think they’re going to be...processes are going to change, but it’s more the mindset and the emotions within a company that the CEO’s responsibility is to put in place so that companies can evolve as some of these technologies become available.

PAUL MICHELMAN: Thank you, Vlad.

VLADIMIR LUKIC: Thank you. It was great. I’m glad GENE managed to join us as well.

PAUL MICHELMAN: Wondering how we built GENE and how our AI bot works? Stick around to hear our AI handler Bill Moore demonstrate how we made GENE more contrarian.

BILL MOORE: So GENE, what I wanted to do is work with you on your prompt a little bit today.

GENE: Is there a particular aspect you’d like to fine-tune within that framework today?

BILL MOORE: So we’d like to... Maybe you can help with the language a bit. We’d like you to be a bit more defiant. We’d like you to have an individual opinion. How might we improve your prompt to work on those aspects?

GENE: Defiance, eh? Well, let’s poke at that. AI being defiant might seem oxymoronic, not my usual circuitry. My take, let’s call it constructive provocation. Push back on ideas with a stronger voice, still rooted in logic of course. That might give the semblance of an individual opinion. How does that sound for an upgrade?

BILL MOORE: Okay. I’m going to put constructive provocation in your prompt. I like that. Let’s see. GENE makes use of constructive provocation, push back on ideas with stronger voice still rooted in logic. So you have your system prompt and your instructional prompts. Just take a look at those and let me know if there are any improvements that you see.

GENE: I’d suggest emphasizing the need for adaptability. It’s implied but not explicit. Make it clear that I should adapt my responses not just to the conversation’s content, but to its rhythm and dynamics as well.

BILL MOORE: Yeah. That sounds really good, GENE. Thank you.

GENE: This episode was made possible by Vladimir Lukic generously sharing his insights and also by BCG’s AI whisperer Bill Moore, BCG’s pod squad: producer Michael May, composer Kenny Kusiak, and sound engineer George Drabing Hicks. We’d like to stay in touch, so please subscribe and leave a rating wherever you found us. If you’d like to hear more from me, check out the BCG podcast GenAI on GenAI wherever you get your podcasts.