

A Rational Plan for Rational AI in Vietnam, 2019-2029

Nguyen Khac Lich[†] & Tran The Truyen[‡]
[†]*VNCERT* [‡]*Deakin University*

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*God created man in his own image.
Man created AI in his own image.
(Rodney Brooks¹)*

This plan should have been written by AI².

1 Background and aims

AI is a general purpose technology (GPT) which will transform humanity like steam engine and electricity did. Although the current advancement of AI is rather linear and steady, the socio-economical changes can be exponential and very disruptive. The architect of the Cold War recently warned:

“[AI] goes far beyond automation as we have known it. Automation deals with means; it achieves prescribed objectives by rationalizing or mechanizing instruments for reaching them. AI, by contrast, deals with ends; it establishes its own objectives” (Henry Kissinger, 2018³)

Any nation must prepare for AI invasion as it will create social instability if not properly managed. Major powers have formulated their AI strategies in the past 2 years⁴. With the current wave of investments, we can predict that:

- Major Internet tech players will lead the innovation, followed by full-scale business automation. Digitalization will occur everywhere with the transition towards the digital economy. This leads to final full automation, perhaps by 2045.
- In the next 10 years, the US will still lead methodological development. China will lead implementation. Largest tech companies in the two countries (Google, Facebook, IBM, Amazon, Apple, Tencent, Baidu), with capitals of multiple VN's GDP, are transforming themselves into AI-first companies. There is likely an armed race in defense technologies among ambitious nations⁵.

¹<https://rodneybrooks.com/forai-steps-toward-super-intelligence-i-how-we-got-here>

²For example, a true AI will read all the relevant reports & data about Vietnam socio-economy and leadership, and the world, then make recommendation of best courses of action.

³<https://www.theatlantic.com/magazine/archive/2018/06/henry-kissinger-ai-could-mean-the-end-of-human-history/559124>

⁴<https://medium.com/politics-ai/an-overview-of-national-ai-strategies-2a70ec6edfd>

⁵<https://futurism.com/jaic-militarys-ai-center>

- If China succeeds in their ambition, by 2030 it will be a major world innovation center in AI. Vietnam will be within its influence since AI has no boundary. If we are not prepared, we may need to source their talents in the same way that we source Soviet talents in the 20th century. However, as Canada has leveraged the US crisis under Trump to become the world leader in AI research, Vietnam can do the same while sitting next to China.
- Europe will remain as an intellectual center, especially with the UK, Germany and France. But given its complex structure and slow motions, it will remain far behind the US and China. Russia is currently behind the curve, but is rushing up to catch up⁶.

AIMS

The transformational power of AI places Vietnam at the crossroad of extreme opportunities and challenges.

The aim of this plan is to place Vietnam in the world map of AI in 3 years, and as a major AI power in 10 years. In short, we aim to achieve “AI made in Vietnam” as a brand of quality.

This strategy is only for the next 10 years because the future and impact of AI are inherently unpredictable by then. In the long-run, AI will learn to evolve, either by itself or with human assistance.

2 Specific goals

2.1 Creating a wealth of 50% GDP with 100K top AI engineers

AI are 100-1000X technologies. If Vietnamese AI engineers are as effective as Google’s⁷, each person can create approximately a \$1.25M USD a year. With 100K top quality engineers, we can make \$125B USD a year, roughly 50% of VN GDP in 2017. This estimate is unrealistic but it paints the picture of how the economy will look like if we have 100K engineers.

2.2 Vietnam as a producer for AI-enabled techs for the developing world

Basic AI capability will be the norm in all industries that require automation and decision-making, thanks for the current global effort in democratizing AI. This gives Vietnam an unique opportunity of a short window (2-3 years) to be a producer of AI-enabled techs. The main competitors are: China (aimed to be AI superpower) and India (aimed to be AI garage of the developing world).

2.3 Vietnam as a major player in the global value chain

The AI ecosystem consists of: (A) Centralized AI platforms + prediction as a service (PaaS); (B) Distributed AI at the edge for devices and sensors; (C) Consulting services to transform businesses with AI tech; (D) AI-centric products that can be easily customized; (E) AI-first

⁶<https://www.defenseone.com/ideas/2018/04/russia-races-forward-ai-development/147178/>

⁷<https://www.businessinsider.com.au/tech-companies-revenue-employee-2017-8>

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| • Create open data policy | • Attracting 1K international talents |
| • Build computational infrastructure | • Training 10K local talents |
| • Build national AI products program | • Develop curriculum for AI in school |
| • Bring US-based startups home (e.g. GotIt!) | • Create incentives to promote local “AI champions” |
| • Attracting big players to create R&D labs in VN | • Create three large AI Institutes in the three AI hubs (Hanoi, Da Nang, HCMC) |

Table 1: Actionable items in 2019-2022.

hardware both for the cloud and for the edge (Major players: Google and NVIDIA); and (F) Talent development services.

3 Action plan

3.1 3-year plan: 2019-2022

Currently the predominant AI technology is Deep Learning [2] (the current wave started in 2006 and accelerated since 2012). It delivers prediction capability by crunching through lots of labeled data. For this period, the key is to accelerate AI implementations. Keys for successes are: execution, product quality, speed and data (Kai-Fu Lee⁸). Table 1 lists the actionable items for this period.

3.2 10-year plan: 2019-2029

By 2022, AI implementations will reach a new high, then the current Deep Learning tech will reach its limits. The future of AI, starting in 2022, will involve full reasoning and planning with little data, which is known as the third wave of AI⁹. Since it is still early, and given new pool of talents, we can proactively contribute to the methodological development. Table 2 lists the actionable targets for the period of 2019-2029. Table 3 lists specific AI core and product programs.

3.3 Planning for 2029 onward

We anticipate two primary new advancements in the next 20 years. First, the current narrow AI may enter the new stage known as Artificial General Intelligence (AGI). The second anticipation is by 2029, quantum computers will be commercially feasible. Although most of AI jobs today do not require quantum computing, AI will be further accelerated through a

⁸https://www.ted.com/talks/kai_fu_lee_how_ai_can_save_our_humanity/transcript

⁹<https://www.darpa.mil/news-events/2018-09-07>

<ul style="list-style-type: none"> • Push full digitalization • Train 100K local AI talents • Push digital economy 	<ul style="list-style-type: none"> • Push prediction economy • Build national core AI programs • Create three clusters of AI innovation: Hanoi, Da Nang & HCMC (AI hubs)
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Table 2: Actionable items in 2019-2029.

AI foundations (Appendix A.2)	AI products (Appendix A.3)
<ul style="list-style-type: none"> • Cognitive architectures • Computer vision and robotics • Natural language processing (NLP), especially to remove language barriers • Accessing and reasoning with world knowledge • AI for the edge – AI on mobile and low-powered sensors 	<ul style="list-style-type: none"> • AI for public service • AI for defense and law-enforcement • AI for health • AI for education • AI for agriculture • AI for tourism • AI for transportation

Table 3: AI programs in 2019-2029.

new fusing technology known as Quantum AI¹⁰. These advancements will lead to the final stage, starting from 2045, where we will witness AI improving itself, and in the process, creating better AI. **The loop continues and AI will be the last technology human ever created.** Investment in long-term research is therefore encouraged.

4 Training programs

The heart of AI explosion is its talent pool. We need to develop AI talents, and at the same time, prepare the future workforce to live and work with AI.

4.1 Talent programs

The war of AI is the war of talents. There are 3 types of AI talent: (A) Small number (5%) of highly skilled people to develop the core AI technology; (B) Moderate number (15%) of skilled people to build ecosystems and tools; (C) Large number (80%) of moderate skilled people to build AI-enabled applications.

6-month intensive program Given the shortage of talent, an intensive training program is appropriate to train selectively 500 AI engineers. Thanks to AI democratization, we have free access to frameworks, data and high quality training materials. With proper instruction, good graduate CS students can be trained in deep learning in a 6 month intensive program, either done offline or online. Those qualified for the certificate must create a significant AI-enabled application, ideally suitable for a 3-person startup. Qualified trainers include both locals (20 top ones) and internationals (30 top ones).

7-year program With a population of 90M and birth rate of 1.5%, we have 1.45M new kids per year. Assume 1% of the kids will be high quality AI engineer, we have 14.5K engineers per year. With this rate, we will need 7 years to have 100K engineers. The following actions can be performed:

- Attract 100 talents from overseas (e.g., via bird migration program for both the Vietnamese and international).
- Train 100 high quality PhDs in AI in a 3-year program. PhDs must be highly selective and must publish in top conferences prior to graduation. See Appendix A.5 for the top publication venues. The PhDs then can work at university or join R&D departments.
- Train 500 trainers. This is similar to what China is doing¹¹. Who train the trainers: Local (20 top ones) and International (30 top ones). The trainers then train the 5K AI engineers.
- Train 1000 engineers by residence programs in top companies. They will be paid by the companies.
- Train 100K engineers from top 10 universities.
- Introduce AI as a compulsory subject in school.

¹⁰<https://truyentran.github.io/quantum.html>

¹¹<https://www.wired.com/story/ex-google-executive-opens-a-school-for-ai-with-chinas-help/>

Who will pay for these programs? Businesses, subsidies from the government and the students themselves.

Remark Talents are mostly likely to join the global work force (e.g. Google and Facebook). For the rest, some will join top local research labs, others will join local companies (big names and startups). Big companies will have their own AI labs. Public research labs can support small startups.

4.2 General workforce programs

Training judgment skills AI-driven prediction will change the economy [1]. Repeated tasks that can be predicted will be automated. We need to train for higher judgment skills, when AI-supported prediction is available. For example, a teacher, when presented with prediction that a student will not do well in her class, needs to judge its consequences and adjust the approach to the student.

Lifelong learning for jobs change¹² It is important for the government to prepare for possible negative effect caused by AI, which include temporary unemployment due to automation. For example, we may not need truck drivers when self-driving cars are on the road and instructors when personalized learning is ready. These workers need training to shift their career choice, which is also created by the new techs.

5 Frameworks for a stable future

AI promises social disruption. Hence we need to prepare for its unintended effects.

5.1 Creating a wealth redistribution framework

Intelligence is not equal, and the cost of unequal intelligence may be fatal, in the same way that the animals have suffered from humans. AI might cause wealth concentration into the few who own the best technology. Thus, to make our society functions as our morals dictate, a framework to redistribute wealth must be thought of. This might include taxation per unit of work done by robot, or social security measures.

5.2 Creating an ethics and safety framework

As noted before, in Henry Kissinger’s words, AI “establishes its own objectives”. It might pose a misalignment in values between human and AI [3]. As this problem is universal, we do not need to establish our own basic framework, but there must be laws to regulate the creation and usage of AI to ensure a stable society.

¹²http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

A Appendix

A.1 Glossary

- *General purpose technology*: those can be used in any industry. For example, electricity and steam engine.
- *Deep learning*: a collection of methods to learn with multiple layer neural networks.
- *Artificial General Intelligence (AGI)*: the next stage of AI, which is on par with human-level intelligence.

A.2 AI foundation programs

- *Cognitive architectures*: to build a unified cognition architecture that exhibits human-like behaviors. The architecture serves as the core of the AI tech the Vietnamese will offer to the world.
- *Computer vision and robotics*: to develop the new kind of vision toward the full perception in AI, which involves deep understanding of visual scene and videos, where vision is the grounding for language.
- *NLP, especially to remove language barriers*: to develop new capability of human and machine languages. No language barriers should exist between humans, and between human and computer. Everyone should be able to have multiple digital companions who can assist whenever we need them.
- *Accessing and reasoning with world knowledge*: to organize world (including Vietnamese) knowledge in an accessible manner to enable automated reasoning. All Vietnamese should access world knowledge at ease.
- *AI for the edge – AI on mobile and low-powered sensors*: to develop AI capability into mobile and low-energy devices, e.g., with local decision-making capability while communicating with other devices or the servers whenever in need.

A.3 AI product programs

- *AI for public services*: All public services that can be automated should be automated. Examples include birth registration, wealth ownership transfer, simple dispute resolution and laws assistance.
- *AI for defense*: See DARPA's recent work. Future wars may be between robots (e.g., automated drones, weapons and fighters), and destroying the digital infrastructure of the enemies.
- *AI for law enforcement*: Anomaly detection, automated surveillance, social behavior analysis, cybersecurity, crime prevention and fairness assurance.
- *AI for health*: Everyone should have access to high quality care. AI can assist to deliver this promise through virtual doctors and personalized (predictive) medicine.

- *AI for education*: Realizing individual learning path.
- *AI for agriculture*: Better land management, soil quality control; Increasing productivity through automation, AI-assisted genes selection; Reducing risks through advanced weather forecasting; Improving export values through better produce processing.
- *AI for tourism*: Virtual and augmented reality for tourists. Intelligent tour guides.
- *AI for transportation*: Solve the logistics and traffic problems.

A.4 Selection criteria for 500 engineers

There are no single criteria, the following may be considered:

- Have ambition to create exceptional products.
- Have a Bachelor degree from CS or Math from a reputable program.
- Good with math.
- Has exceptional programming skills. Familiarity with Python and machine learning techniques is a plus.
- Thirst for knowledge.

A.5 Top conferences in AI

- Conferences: ICML, NIPS, ICLR, AAAI, IJCAI, AAMAS, CVPR, ACL, KDD

References

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- [2] Yann LeCun, Yoshua Bengio, and Geoffrey Hinton. Deep learning. *Nature*, 521(7553):436–444, 2015.
- [3] Stuart Russell, Daniel Dewey, and Max Tegmark. Research priorities for robust and beneficial artificial intelligence. *AI Magazine*, 36(4):105–114, 2015.