

A Pragmatic View of the Impact of AI + Life Lessons From My First 50 years



David Patterson, UC Berkeley and Google

"An agenda to maximise AI's benefits and minimise harms," by David Patterson, *The Economist*, Dec 3, 2024.



Visit from Berkeley Alumnus last February

- Drinks with co-founder of two AI \$1B+ startups (Databricks and Perplexity)
 - Also co-author of a CS vision paper: [A View of Cloud Computing](#)
 - Armbrust, M., Fox, A., Griffith, R., Joseph, A.D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I. and Zaharia, M., 2010. *Communications of the ACM*.
 - ~14,500 citations
- Bemoan AI discussion dominated by *AI Accelerationist* vs *AI doomers*
- Family friend quit CS belief AI will do all programming before he graduates?
- Time for a new Vision Paper, this time on AI Impact???

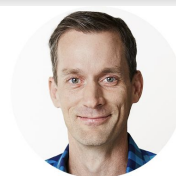


A new vision paper about a pragmatic view of consequences of AI next 5 to 10 years

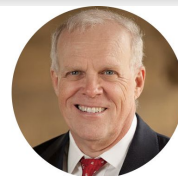
- Propose what impact *could* be given directed research & policy efforts in on AI for public good
 - Rather than predict societal impact of AI given a laissez faire approach
- Milestones to enhance AI's upsides and dampen AI's downsides
 - For high, middle, and low income nations
- Audience: AI practitioners + policymakers + public
- Approach: Interview ~24 experts in Employment, Education, Healthcare, ...



Mariano-Florentino (Tino) Cuéllar



Jeff Dean



Professor John Hennessy



Professor Finale Doshi-Velez



Andy Konwinski



Professor Sanmi Koyejo



Pelonomi Molloa



Professor Emma Pierson



Professor David Patterson



1. Humans and AI systems working as a team can do more than either on their own

- AI focused on *human productivity* produce more positive benefits than those focused on *human labor replacement*
 - Increases human employability
 - *Bonus*: People can also be safeguards if AI veers off course in areas not well trained
 - *Bonus*: People and AIs tend to make different mistakes, so collaboration of experts with AI can also improve results
- Productivity focus helps both AI and people succeed



2. To increase employment, aim for productivity improvements in fields that create more jobs

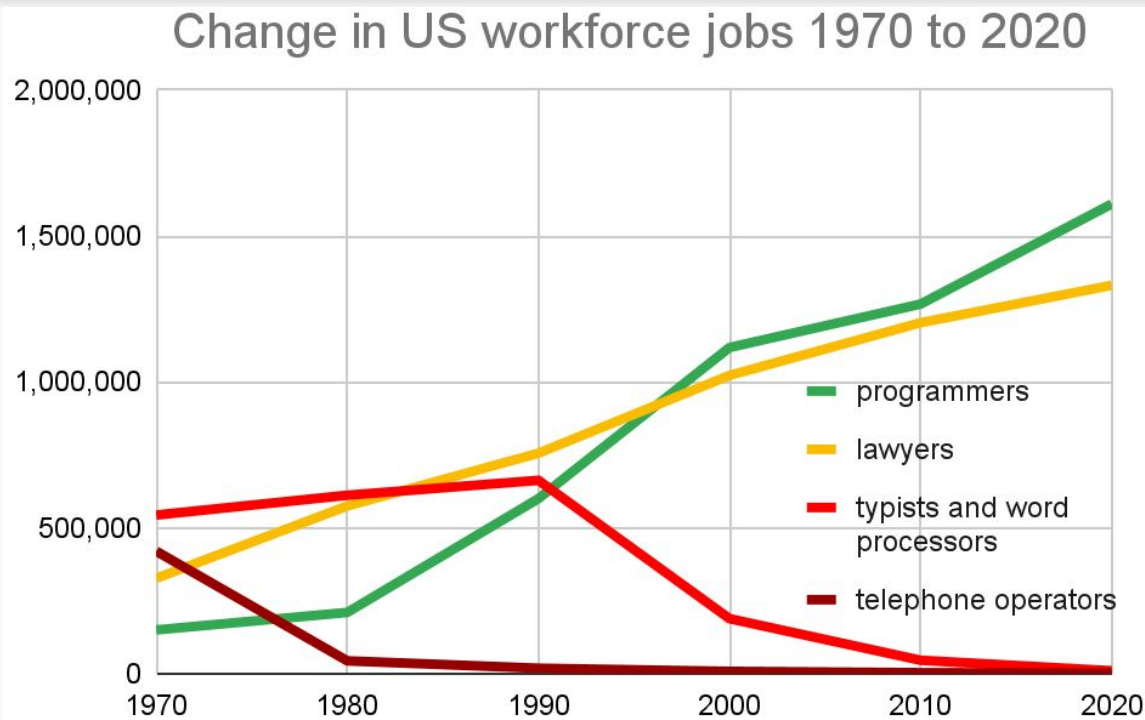
- Despite tremendous productivity gains in computing and passenger jets, the US in 2020 had 8 times more commercial airline pilots and 11 times more programmers than in 1970
- Demand for passenger travel and programming was *elastic* \Rightarrow more jobs
 - Goods with elastic demand are those where a decrease in price results in a large increase in the quantity acquired
- US agriculture demand is *inelastic*, so productivity gains \Rightarrow fewer jobs
 - From 20% of US workforce to 2% in one lifetime (1940 to 2020)





Technology Impact on Employment

- Technological advancements have long led to decline of some jobs & creation of new ones
 - [63% had jobs in 2018 that did not exist in 1940](#) (US)
- Healthy economy relies on improving worker productivity
 - Most high income nations face declining populations and [labor shortages](#)





AI Human Productivity & Employability?

Case studies where AI a big help, especially to less experienced workers:

- [Harvard Business School study](#) found that low skilled consultants gained more from AI than high skilled consultants (43% faster versus 17% faster), even outperforming high skilled consultants without AI
 - [University of Minnesota study](#) observed that young attorneys could perform a variety of standard tasks on average 22% faster with AI
 - [MIT study](#) documented a 47% speedup for mid-level professional writing tasks with AI
 - [Microsoft study](#) showed AI accelerated programming tasks by 56%
- (see [Artificial Intelligence and the Future of Work](#) from US National Academies)



3. AI systems should initially aim at removing the drudgery of current tasks.

- Rather than skipping ahead to new AI innovations,
First remove drudgery of current tasks
 - Healthcare professionals want to help patients
vs insurance documentation
 - K-12 teachers prefer teaching students
vs record keeping and grading
- Improve the meaningfulness
of current work in hospitals & classrooms
 - *Healthcare aide* improved skills & productivity of
nurses and physician assistants
⇒ more patients access to quality healthcare in regions facing physician shortages
 - *Teaching aide* free up more time to spend with students & reduce teacher burnout





4. Geography Matters

Job displacement support

	US	Canada
Health care	Tied to job	National benefit
Unemployment insurance	≤26 weeks	≤45 weeks
Minimum wage	US\$7.25	US\$12.60



4. Geography Matters

- Industrialized nations worry about AI displacing highly skilled workers
- Low income nations face shortage of skilled workers
 - 1/7th physicians/person in Honduras vs US
- AI could enhance quality of life and accelerate economic growth in low income nations

	Physicians / 1000 people	Lawyers / 1000 people	Population (M)
Canada	2.5	2.5	41
US	3.6	4.0	335
Mexico	2.4	3.4	128
Honduras	0.5	1.7	11
World	1.7	n.a.	8113



5. Use the appropriate tools of measurement

- Can't reach AI's positive potential if can't figure accurately measure efforts
- High-stakes domains where can't marketplace use gold standard tools
 - [A/B testing](#), [randomized controlled trials](#), [natural experiments](#)
- Other times marketplace and observational studies can work
 - E.g., Developing [AI tools for professional programmers](#)
- Post deployment tools also important
 - to evaluate whether do what they say they claim, are safe, and whether have externalities
 - to continuously measure AI systems in the field to be able to incrementally improve them



What could be impact in next 5 years of near term AI by following 5 guidelines?

- To give concrete goals for improving AI's impact, proposed milestones/field
- Rather than recognize past achievements, give inducement prizes try to stimulate research on milestones
 - XPRIZE, Netflix, Kagel, ...
- If not ample research or benchmarks to pursue the prize, also fund ad hoc research centers*
 - 3-5 year, high impact, multidisciplinary research centers



* Patterson, David. "[How to build a bad research center](#)." *Communications of the ACM*, vol. 57, no. 3, 2014, pp. 33-36.



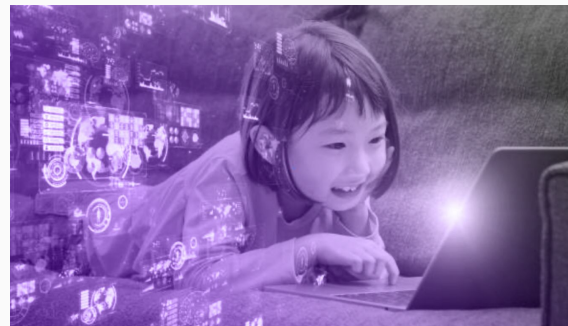
Employment AI Milestone: Job Forecaster

- Current workforce development programs have a modest impact
- A real-time Job Forecaster could workers in inelastic fields displaced by AI to promising jobs with future growth
- In US all needed information is at our fingertips*
 - [LinkedIn](#) has many resumes
 - [Indeed.com](#) has the demand for jobs
 - including job descriptions and number of job requests
 - [ADP](#) knows the salary per job as it issues almost all paychecks



Education AI Milestone: Worldwide Tutor

- A tutor learning tool to accelerate general education for every child
 - in their language
 - in their culture
 - in their best learning style
- To help teachers with challenge of supporting a range of student capability
 - keeping the high-achieving students engaged while supporting those who are struggling
- E.g., Rising Academies* in Africa
 - Improves student learning outcomes by one grade level relative to students without it



* Henkel, Owen, Hannah Horne-Robinson, Nessie Kozhakhmetova, and Amanda Lee. "[Effective and Scalable Math Support: Experimental Evidence on the Impact of an AI-Math Tutor in Ghana](#)." In International Conference on Artificial Intelligence in Education, pp. 373-381. Cham: Springer Nature Switzerland, 2024.



Information AI Milestone: Civic Discourse Platform

- Mediates conversations or attitudes to enhance public understanding and civic discourse
 - Move communities from polarization to pluralism
- AI system makes suggestions on how to rephrase comments and questions more diplomatically*
- AI system holds successful discussions with conspiracy theorists**
- AI system brings consensus on difficult issues across a nation***

* Argyle, Lisa, *et al.* "[Leveraging AI for democratic discourse: Chat interventions can improve online political conversations at scale.](#)" *Proc. National Academy of Sciences*, vol. 120, no. 41, 2023.

** Costello, Thomas, Gordon Pennycook, and David Rand. "[Durably reducing conspiracy beliefs through dialogues with AI.](#)" *Science*, vol. 385, no. 6714, 2024, p. Eadq1814.

*** Tsai, Lily and Alex Pentland. "[Rediscovering the Pleasures of Pluralism: The Potential of Digitally Mediated Civic Participation.](#)" *The Digitalist Papers*, 2024.



Media AI Milestone: Journalist's Aide

- Journalism is writing under tremendous pressure of time AND accuracy
- AI tool to quickly check for mistakes in news drafts based on the information available on the internet and from other AI tools.
- While journalism not a large commercial market, open-source development often led to useful, production-quality, free tools
 - An important, worthwhile mission like supporting journalism could inspire such an effort.



Science AI Milestone: Scientist's AI Aide/Collaborator

- Accelerate pace of science by improving the productivity of *scientists*
 - Help with grant writing and progress report
 - Identify important new publications of interest, ideally customized to individual to summarize what is new compared to what the scientist already knew
- Dario Amodei: a more powerful AI a system could perform, direct, and improve upon nearly everything biologists do*
 - Enable biologists and neuroscientists to make 50-100 years of progress in 5-10 years
 - Impact on neurological diseases? 10M with MS or Parkinson's; 40M with Alzheimer's

* Amodei, Dario. "[Machines of Loving Grace: How AI Could Transform the World for the Better](#)," October 2024..



Conclusion: What could be impact in next 5 years of near term AI by following 5 guidelines?

- It can be as big a mistake to ignore potential gains as it is to ignore risks
- E.g., some think AI could raise the rate of growth in the U.S. gross domestic product from 1.4% currently to 3%*
 - Doubling the GDP growth rate could lead to "poverty reduction, better health care, improved environment, stronger national defense, and reduced budget deficit."*
- Could potentially rebuild middle class of high income nations **
- Could potentially make expertise more widely available in low and middle income ones ***

* National Academies of Sciences, Engineering, and Medicine. 2024. [Artificial Intelligence and the Future of Work](#). Washington, DC: The National Academies Press.

** Autor, David. "[AI Could Actually Help Rebuild The Middle Class](#)." *Noema*, 2024.

*** Consensus AI, [Can AI Speed up the Development of Poorer Countries?](#), 2024.



Conclusion: AI Moonshot?



- We can use AI to launch a thousand moonshots
- If we create the right blueprint for innovation, we don't have to pick one moon

Questions?



Dave Patterson

Life lessons from the first half-century of my career



UC Berkeley and Google

David Patterson, [Life Lessons from the First Half-Century of My Career](#),
Communications of the ACM, February, 2025.

16 life lessons

People

1. Family first! Don't sacrifice your family's happiness on the altar of success.
2. Choose happiness.
3. It's the people, not the projects, that you value in the long run.
4. The cost of praise is small. The value to others is inestimable.
5. Seek out honest feedback; it might be right.
6. "For better or for worse, benchmarks shape a field."
7. "I learned that courage was not the absence of fear, but the triumph over it."
8. Beware of those who believe that they are the smartest person in the room.

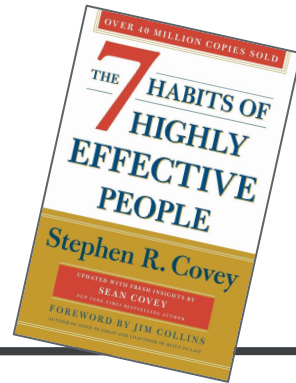
Career

9. "Most of us spend too much time on what is urgent and not enough time on what is important."
10. "Nothing great in the world has ever been accomplished without passion."
11. "There are no losers on a winning team, and no winners on a losing team."
12. Lead by example.
13. "Audentes Fortuna iuvat." (Fortune favors the bold).
14. Culture matters.
15. It's not how many projects you start; it's how many you finish.
16. Look for the positive opportunities.

9

“Most of us spend too much time on what is urgent and not enough time on what is important.”

Stephen R Covey,
The 7 Habits of Highly Effective People



9

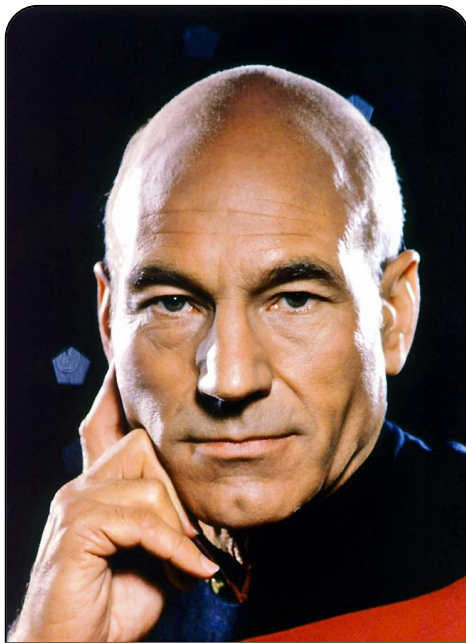
Time Management Matrix

	Urgent	Not Urgent
Important	Necessity	Effectiveness
Not Important	Distraction	Waste

10

**Nothing great in the world
has ever been accomplished
without passion.**

10



Jean-Luc Picard

Star Trek: The Next Generation
1987-1994



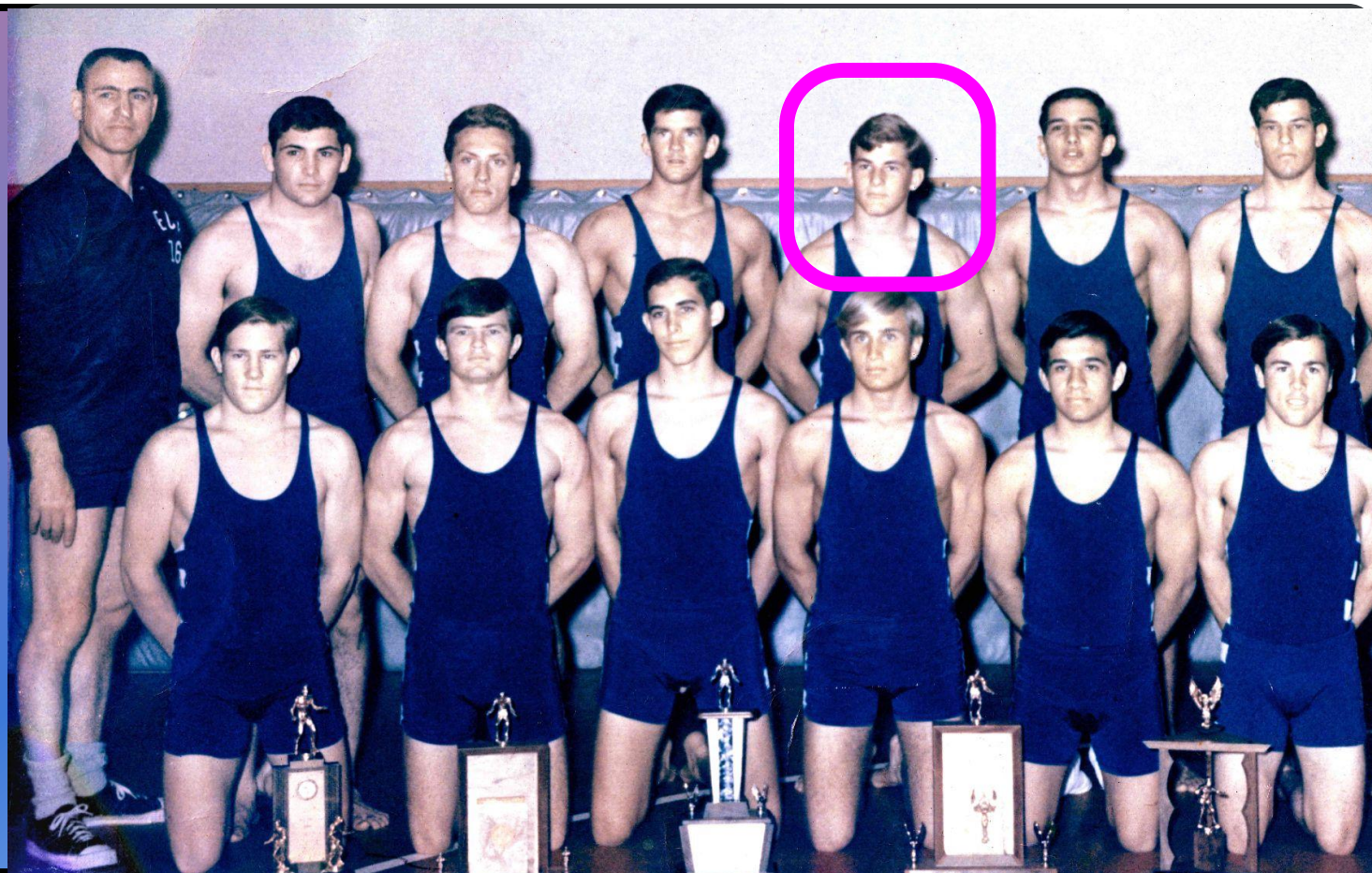
James Kirk

Star Trek
1966-1969

11

“There are no losers on a winning team, and no winners on a losing team.”

11



11

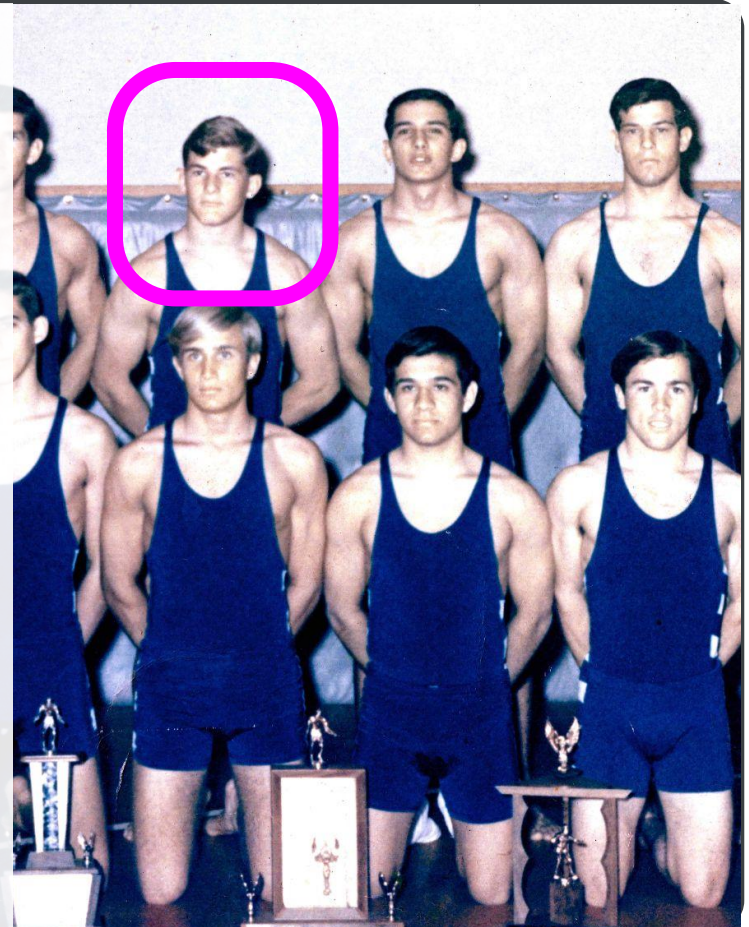
Lessons from wrestling

Bonding is key

Teamwork can beat
greater resources & talent

Build a cohesive team

Help teams win



12

Lead by example.

12



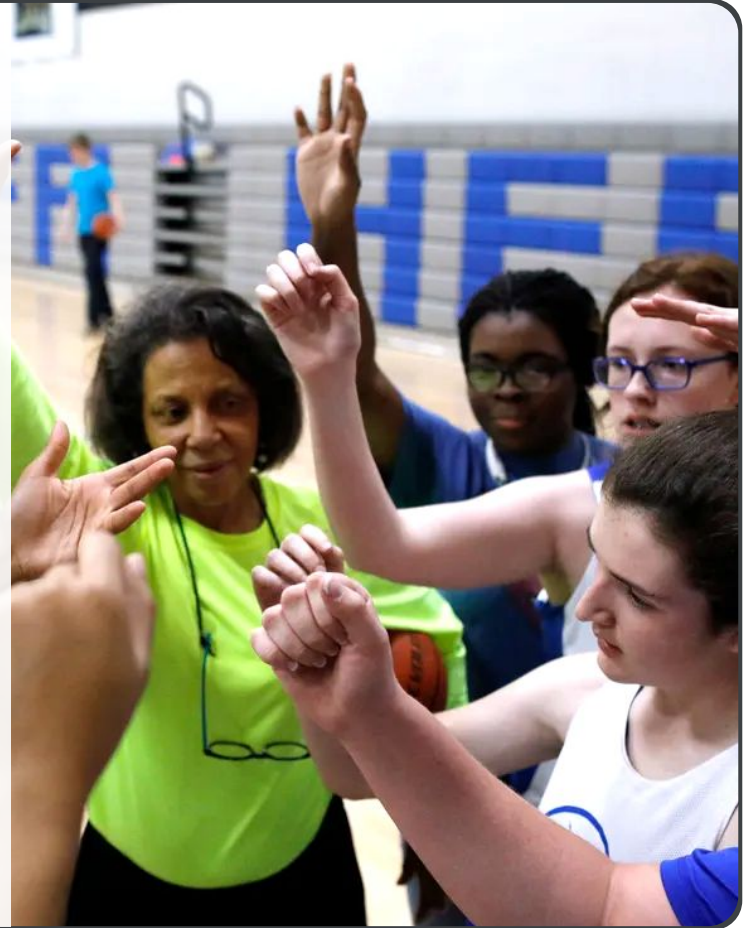
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Lead by example

Set the pace

Trust inspires leadership

Team imitates your
behavior



13

“Audentes Fortuna iuvat.” *

Virgil in ~50 BC

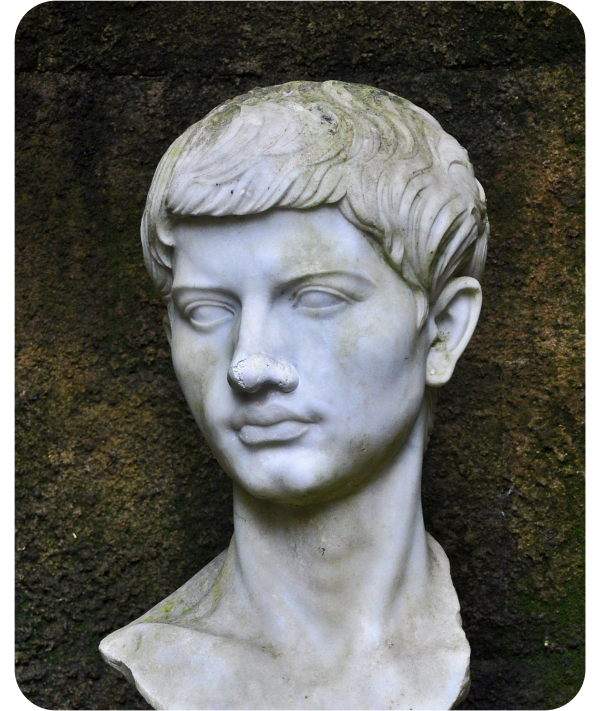
* Fortune favors the bold.

13

Visions matter

Focus on important problems

Aim high, the fearful are caught
as often as the bold



Latin Poet Virgil,
70 BC to 19 BCE

13

Fortune favors the bold.

2006

Nvidia considers
expanding beyond
game-playing.
Architects skeptical.

2012

Alex trains DNN on
GPU for Imagenet
competition

2011

Alex Krizhevsky
takes CUDA
GPU course



NVIDIA®

13

2012

Intel Market Cap
~15x NVIDIA



2024

NVIDIA Market Cap
~30x Intel



14

Culture matters.

14



15

**It's not how many projects
you start; it's how many
you finish.**

15

One project at a time: You will be remembered for the 5 or 6 really important things you did.

16

Look for the positive opportunities.

16



9 magic words for a long relationship

(for both partners)

“I was wrong.”

“You were right.”

“I love you.”



*The nine magic words for a
happy relationship:*

I was wrong.

You were right.

I love you.

Linda & Dave

50 years