

# You Don't Need a Bigger Boat

Applied R&D at startup scale

*Jacopo Tagliabue*  
SIRIP @ SIGIR 2023



# Ciao!



## Serial Entrepreneur

- Founder of Tooso, acquired by [TSX:CVO](#)
- Led AI at Coveo from growth to IPO
- Now building [Bauplan!](#)

## R&D at Reasonable Scale

- 25+ papers in 3 years on ML/NLP/IR ([best paper](#) at NAACL 21)
  - Collaborations with Stanford, NVIDIA, Mozilla, Farfetch, Microsoft, etc.
- Organizer of SIGIR eCommerce and [EvalRS](#)
- Adj. Prof. of [MLSys at NYU](#)

## Open source

- ~2k ★ in open source projects
- Released 3 massive e-commerce [IR datasets](#)
- Trained the 1st [industry-aware CLIP](#), FashionCLIP (~500k downloads in 3 months!)



How do you build  
a IR /ML startup?

*(Wrong answers only)*





# Today

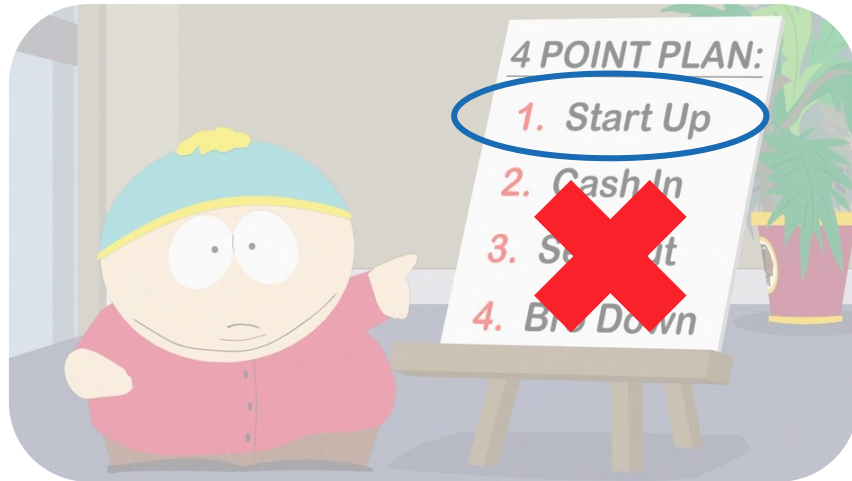


*We will talk about this*

- Picking a problem (B2B)
- “Laws of Physics”
- Executing at Reasonable Scale



# Today

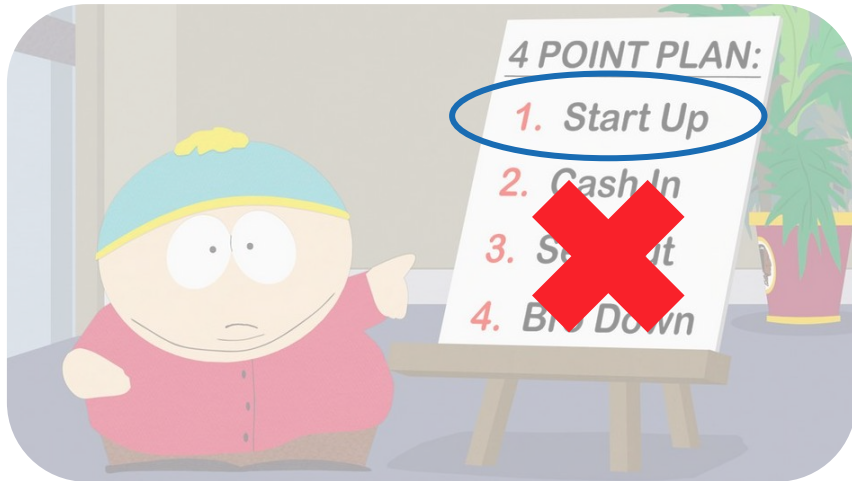


*We will **NOT** talk about this*

- GTM, Sales and Marketing
- Fundraising and VCs
- M&A



# Today



*We will **NOT** talk about this*

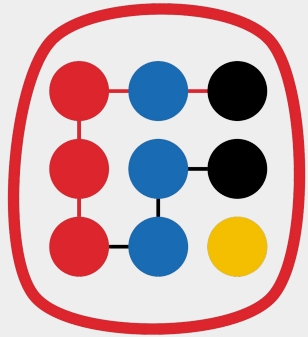
- GTM, Sales and Marketing
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- M&A

**Never blindly trust startup advice - including this one!**



# Starting up

“A journey of a \$1B begins with a single Git commit” - (maybe) Lao Tzu





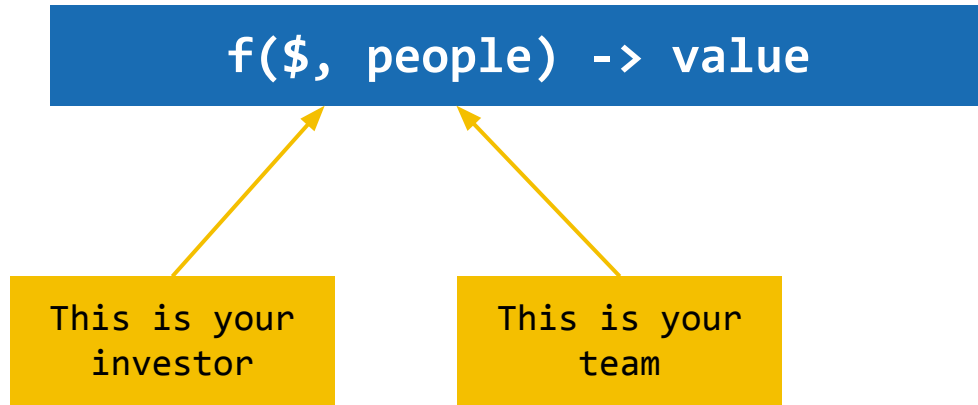
What should you devote  
the next 7 years of  
your life to?





# What is a startup?

Companies are functions from “resources” to “value”:



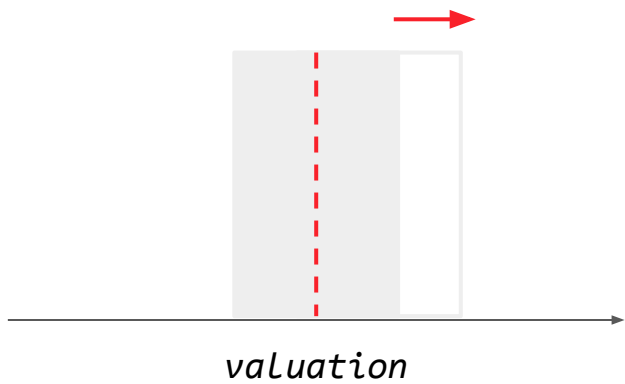
*Q: How do you create as much value as possible?*



# R1 on value creation

Paul Graham: “Make something people want”

- If nobody wants what you built, you did *not* create any value.
- Improve upper bound!



*(This essay is derived from a talk at the 2008 Startup School.)*

About a month after we started Y Combinator we came up with the phrase that became our motto: **Make something people want.** We've learned a lot since then, but if I were choosing now that's still the one I'd pick.

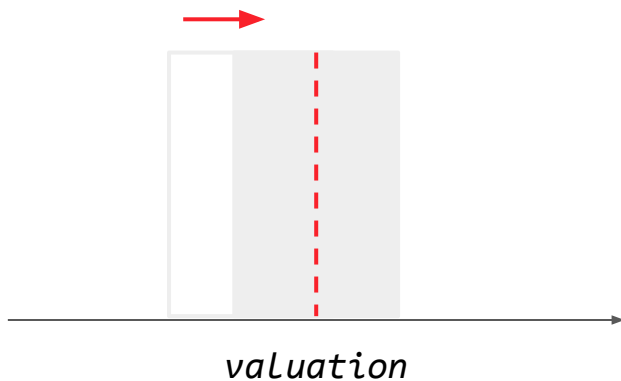


# R2 on value creation

Larry Page:

“Make something hard”

- If you're solving hard problems, there is less competition.
- Improve lower bound!

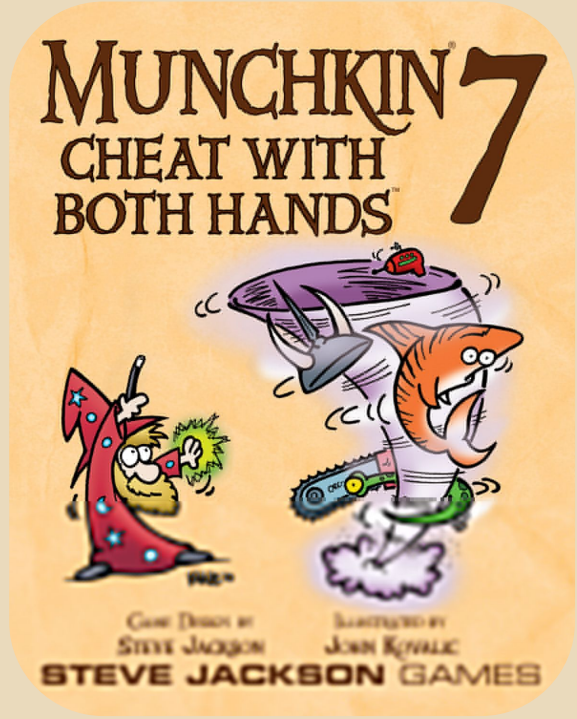




# R3 on value creation

Munchkin (yes, the card game):  
“Cheat\* like there is no tomorrow”

- What do you get that others don't?
- What is your unfair advantage?
  - Years in industry X
  - Personal network in Y
  - Ph.D. in Z



\* Unless you're doing crypto, this is a metaphor!



# Laws of Physics

“The enemy of art is the absence of limitation” - Orson Welles

## **Artificial Intelligence, Economics, and Industrial Organization**

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Hal Varian



You are expected  
to reach \$100M ARR  
in 7 years.

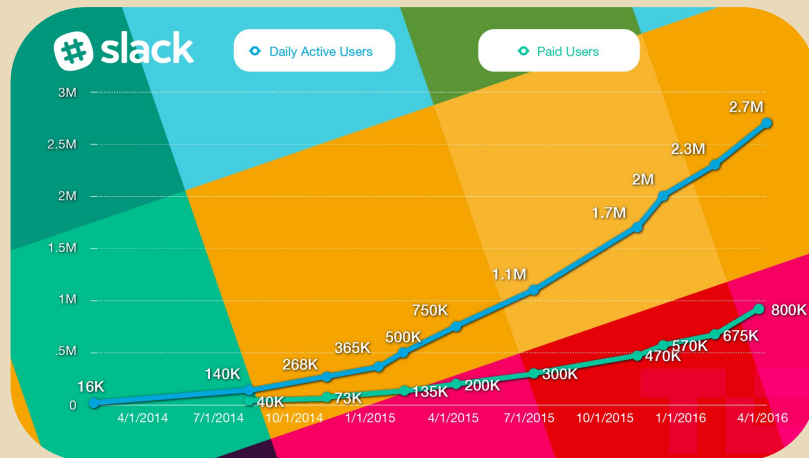


If you're not  
scared, you're not  
paying attention!



# Scale is all you need

- A venture-backed company is expected to reach \$100M ARR in 7 years.
  - *This is insane!*

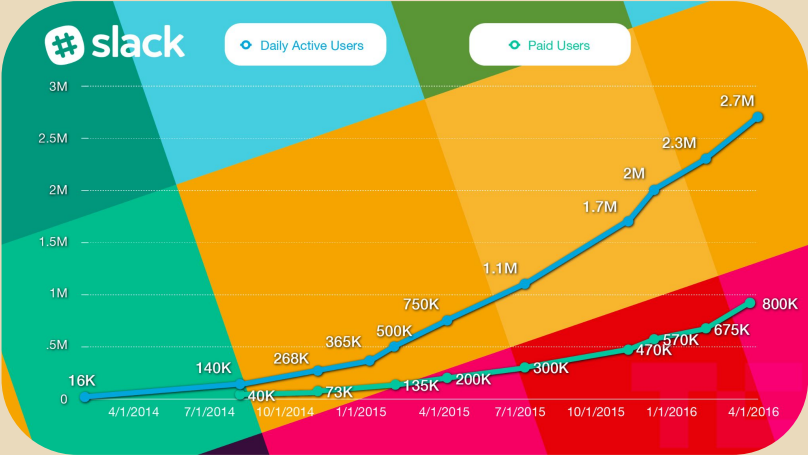






# Scale is all you need

- A venture-backed company is expected to reach \$100M ARR in 7 years.
  - *This is insane!*
- The standard SaaS story:
  - Supply side scale (no marginal costs!!!)
  - Demand side scale (network effect!!!)





The standard SaaS  
story is *not your*  
*story!*



# Costs in (B2B) IR

MC: given I have  $k$  customers, how much customer  $k+1$  is going to cost me?

- Additional infra for training and inference (is it shared?)
- Manual tweaks and asymmetry of evaluation:
  - Few can fix search, anybody can tell you it sucks!

## Report: Musk had Twitter engineers boost his tweets after Biden got more views

Musk reportedly gets "power user multiplier" to rank his tweets above others.

JON BRODKIN - 2/16/2023, 1:16 AM

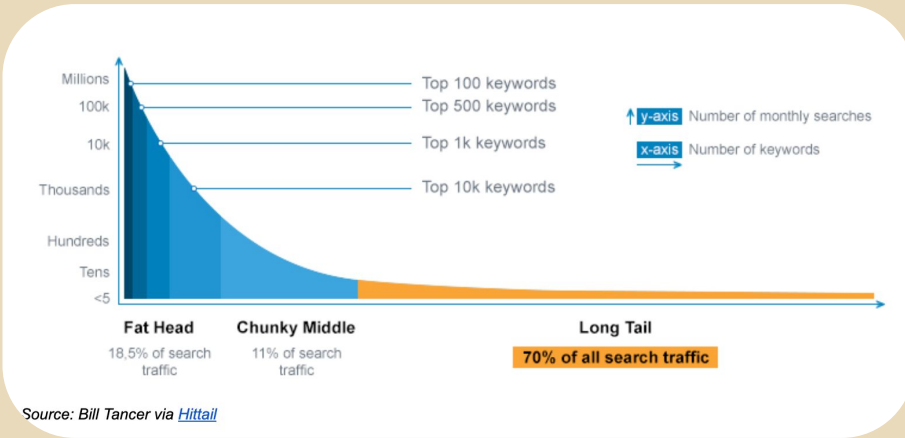


# Network in (B2B) IR

- B2C:
  - a single distribution;
  - adding customers gets you new data for the tail;
  - > accuracy, > \$\$\$

## Taming the Tail: Adventures in Improving AI Economics

by Martin Casado and Matt Bornstein



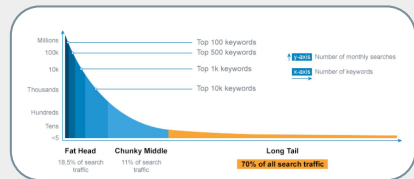
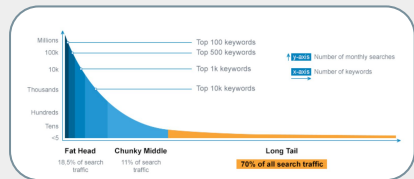
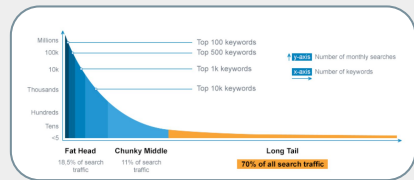
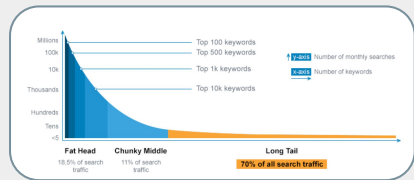
Source: Bill Tancer via [Hittail](#)



# Network in (B2B) IR

- B2C:
  - a single distribution;
  - adding customers gets you new data for the tail;
  - > accuracy, > \$\$\$
- B2B:
  - multiple distributions;
  - adding customers won't get you more data for existing ones;
  - > robustness, > \$\$\$
    - Fancy models are useless!

**Mo' models, mo' problems**  
 CLIP-like models and generalization in modern e-commerce platforms





## A new hope (?)

- (Maybe) general models will help!
- (Maybe) privacy-friendly data sharing will help!

*This is a hard problem, nobody really solved it!*

[nature](#) > [scientific reports](#) > [articles](#) > [article](#)

Article | [Open Access](#) | [Published: 08 November 2022](#)

### **Contrastive language and vision learning of general fashion concepts**

[Patrick John Chia](#) , [Giuseppe Attanasio](#), [Federico Bianchi](#), [Silvia Terragni](#), [Ana Rita Magalhães](#), [Diogo Goncalves](#), [Ciro Greco](#) & [Jacopo Tagliabue](#)



# Executing at Reasonable Scale

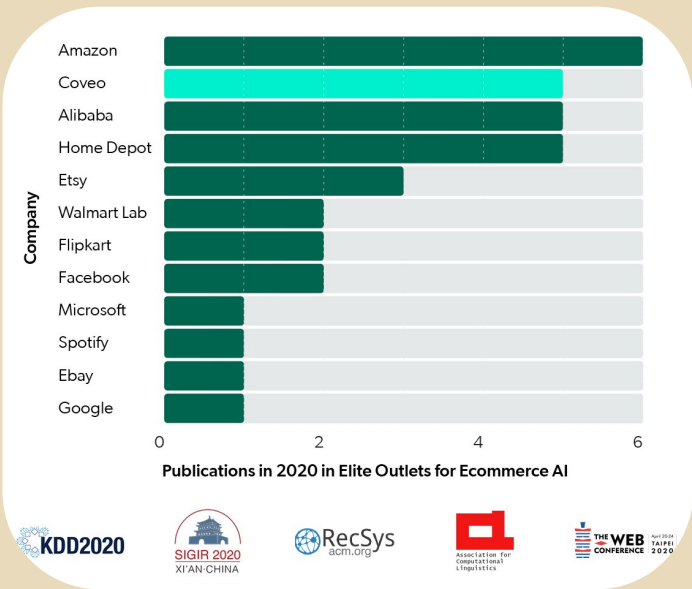
“The first thing we do, let's kill all  
the lawyers.” - William Shakespeare





# Do hard stuff, but how?

- How do you build hard things with limited resources?







# Do hard stuff, but how?

- How do you build hard things with limited resources?
- Product focus
  - Pick the subset of hard things that create the most value.

## Assembling a Query Engine From Spare Parts

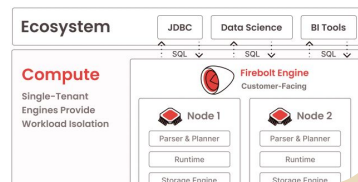
Mosha Pasumansky  
Firebolt Analytics  
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Benjamin Wagner  
Firebolt Analytics  
benjamin.wagner@firebolt.io

### ABSTRACT

Building a new cloud data warehouse is a daunting challenge, requiring massive investments into both the query engine and surrounding cloud infrastructure. Given the mature space, it might seem like a Herculean task to enter the market as a small startup.

At Firebolt we assembled a working, high-performance cloud data warehouse in less than 18 months. We achieved this by building our query engine on top of existing projects and then investing heavily into differentiating features. This paper presents our decision-making and learned lessons along the way.





# Do hard stuff, but how?

- How do you build hard things with limited resources?
- Speed above all
  - End-to-end scientist: cut the middleman!
  - Streamline onboarding: cut the lawyers!
  - Invest in 10x tools: open source is your friend!

Beware the data science pin factory: The power of the full-stack data science generalist and the perils of division of labor through function



ERIC COLSON

March 11, 2019 - San Francisco, CA

## You Don't Need a Bigger Boat

An end-to-end (Metaflow-based) implementation of an intent prediction (and session recommendation) flow for kids who can't MLOps good and [wanna learn to do other stuff good too](#).

After few months of iterations, this project is now stable. *Quick Links:*

- Our MLOps [blog series](#) is completed;
- A new open source [repo](#) has been released, showing a simplified version of many of the concepts in this project, to provide a gentler entry point into modern MLOps pipelines;
- A second open source [repo](#) has been released in collaboration with Outerbounds and [NVIDIA](#), showing a Merlin-focused version of many of the concepts in this project.



# Do hard stuff, but how?

- How do you build hard things with limited resources?
- Work with academia
  - Young researchers are hungry, competent and cheap: share the cost of exploration!
  - Be part of the community: open source & open science will encourage free collaborations.

## Applied Research at Reasonable Scale

Building ML-heavy products without breaking the bank



Jacopo Tagliabue

Published in The Techlife · 11 min read · Nov 16, 2022



# Do hard stuff, but how?

- Work with academia
- Caveat emptor
  - Academics have their own incentives (publishing!), which may distract you!
  - Cutting-edge work needs maturity to be absorbed and leveraged from a HR, PR, product perspective.
    - Typically works best after series B!

## Applied Research at Reasonable Scale

Building ML-heavy products without breaking the bank

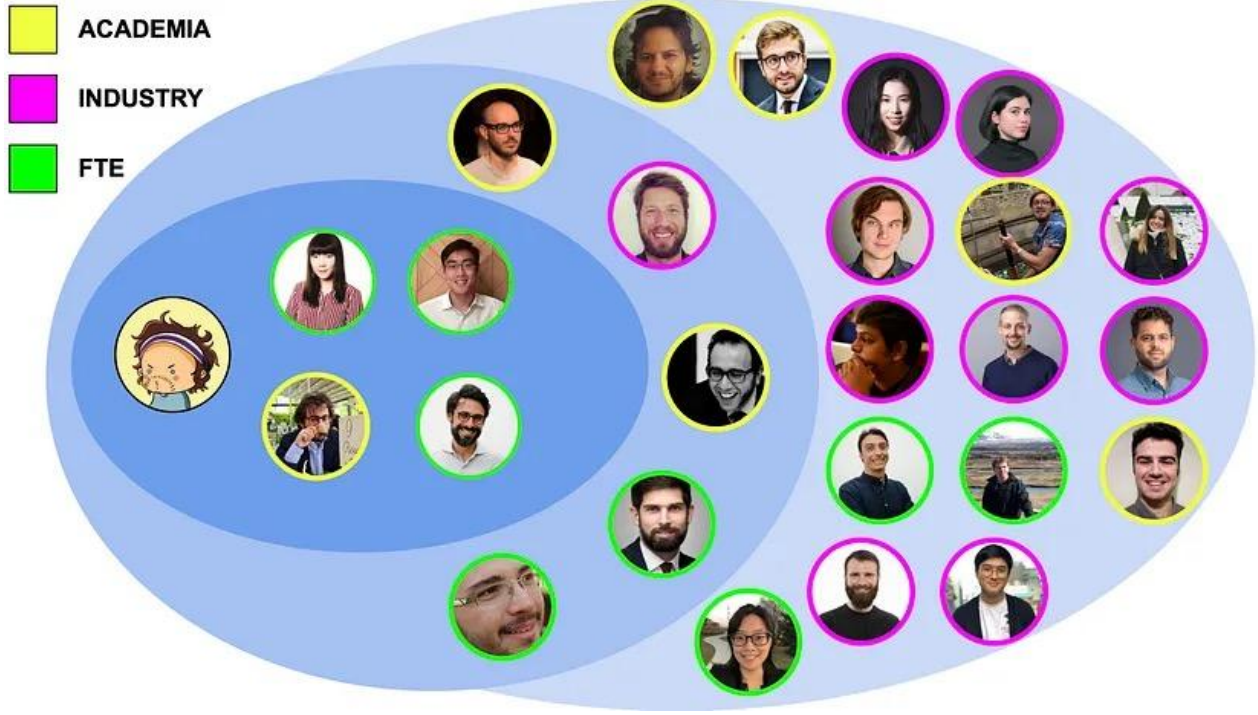


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It takes ~~a village~~ an onion!



Outerbounds



# What's next?

“So much to do, and so little time” -  
The (1989) Joker





# Some parting thoughts

- Find a co-founder with complementary skills.
- Do your homework!
  - SAFE, ARR, NPS, PLG: you should know these like you know HR, nDCG and MRR.
- Give it all. And if you make it, pay it back!

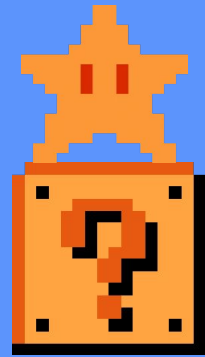




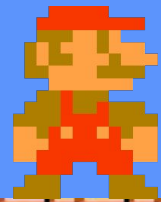
“Training is  
nothing, will is  
everything!”



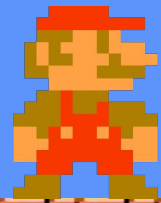
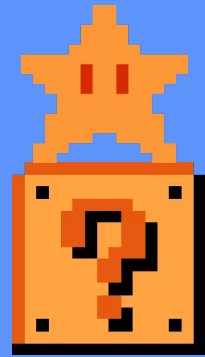
We will be at **KDD23**: come for  
the papers, **stay for the pizza  
hackathon!**



<https://reclist.io/kdd2023-cup/>



Have more questions? Are you  
looking for funding or for a  
startup job? **Get in touch!**



**BAUPLAN**