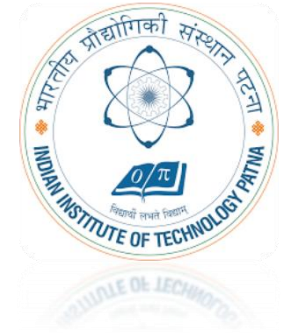


IEEE EDS Technical Talk



Chips, Character, and Keeping It Together: How Semiconductors (and You) Stay Reliable

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Device Dynamics Lab, Taiwan
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Date: 4th October, 2024, *Time :* 11 AM IST

Registration Link: https://docs.google.com/forms/d/1Zsq7ybh7D_X7fxu5oU-zgZ6qI6zRYE-amqxX3jlQhAY/edit

Gmeet Link: meet.google.com/ruv-wkqx-qfh

Device Simulation Lab,
Dept. of Electrical
Engineering. IIT Patna

Organised By: Dr. Pramod Kumar Tiwari,
Dept. of Electrical Engineering.
IIT Patna

IEEE EDS Student Branch
Chapter (SBC1459ID)

Chips, Character, and Keeping It Together: How Semiconductors (and You) Stay Reliable!

An old guy's story...

In the long run, career building is also character building.



Outline

- My Career Journey
- IC Reliability in the Value Chain
- Lessons Learned and Challenges Overcome
- Building a Career in Semiconductor Reliability
- Advice to My Younger Self
- Q&A



About Me



- ~ 20yrs in the semiconductor industry
- Father of 3 children
- Global citizen

Technical Manager, Foundry

QR, tsmc

2008 ~ 2020

QR Manager, Design House

Supply Chain, Nordic Semiconductor

2020 ~ 2022

Engineering Director, Design House

Supply Chain, Nordic Semiconductor

2022 ~ 2023

Technical Advisor, GaN Metrology

Device Dynamics Lab

since 2023

Bachelor, Physics

National Tsinghua University

Graduated in 2000.

Master, Physics

National Taiwan University

Graduated in 2006 after serving the Army.

IEEE

Senior Member

since 2023

Business

Chartered Financial Analyst

Completed all three levels of CFA program.



kevinhuang.tw

Home

CV

Blog

EB2 NIW

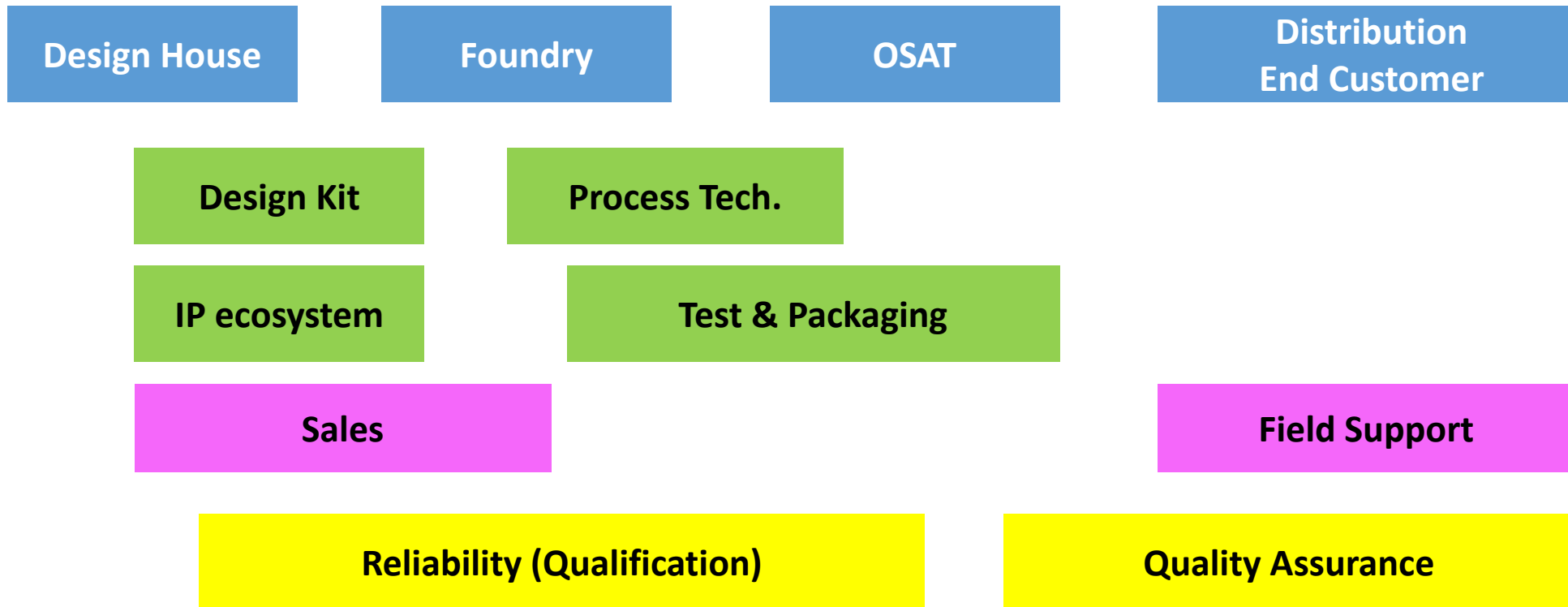
Paraguay



IC Reliability in the Value Chain

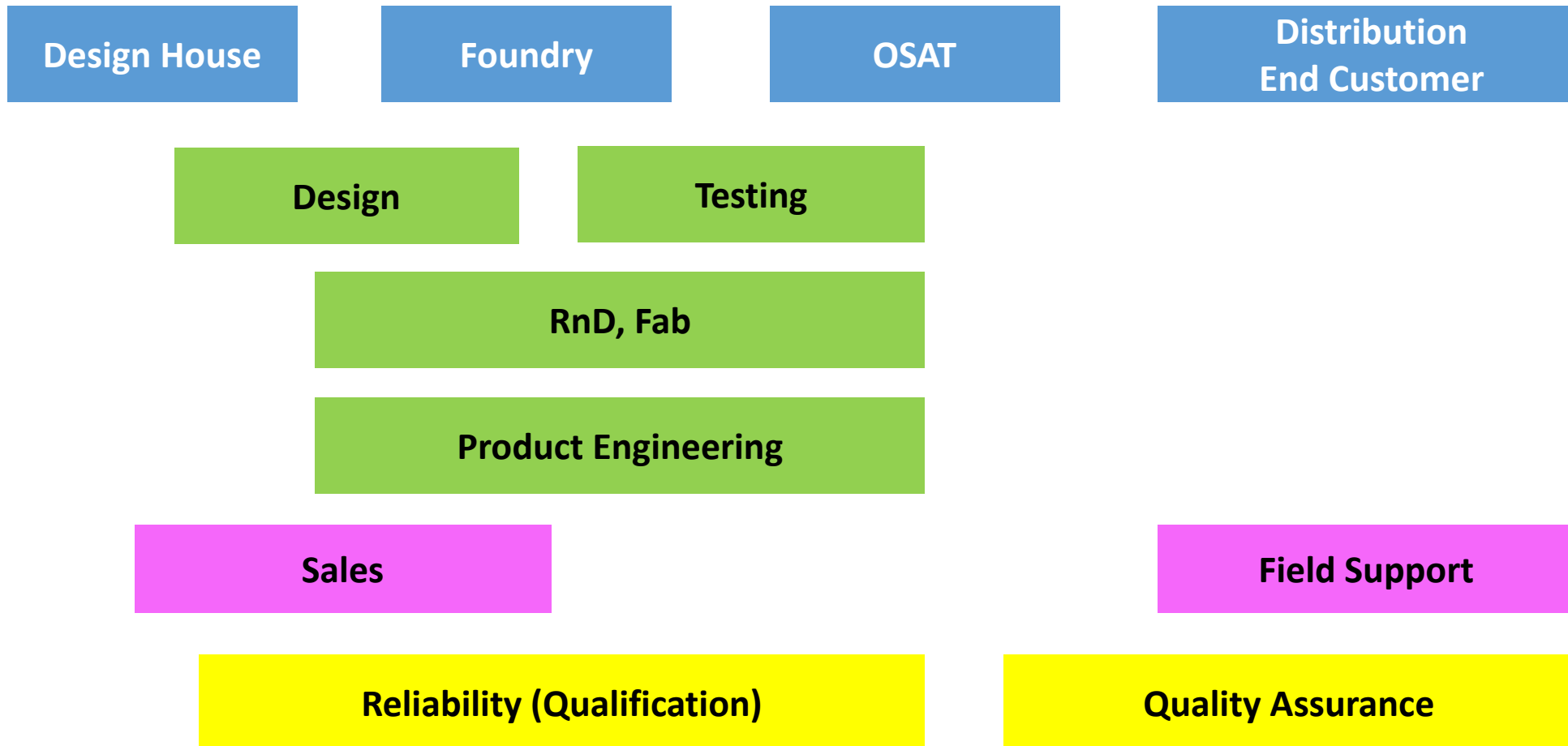
Value Chain in Semiconductor Industry

- No permission required to develop yourself along the chain



Adding Value as a Team Player

- Be a team player. Try to speak others' languages.



Reliability & Quality

Reliability (Qualification)	
Process	FEOL, BEOL
Product	Burn-in
Package	+ humidity
Board Level	+ Mechanical

Mass Production



Quality (Prevention)	
CP and FT sampling test	Statistical correlation
Monitor Qualification	Statistical correlation
Transfer Qualification	Failure mode
Field Return	Failure mode

Built-In Self Test



Strike the Balance

- No escape
 - Hard failure vs Soft failures
- You shall not overkill
 - Estimating the acceptable failure rate
- Mass manufacturing mindset
 - Design rule revision



Challenges Overcome & Lessons Learned

Challenges Overcome & Lessons Learned

Challenge1

- N28HP eFuse
 - the 1st metal gate technology
 - development cycle was squeezed, not enough Si validation
 - Qualification “failed” the original criteria

Lesson1

- Data integrity
- Identify root cause and communicate clearly
- Know the real application
- Engage Customer



Challenges Overcome & Lessons Learned

Challenge2

- TDDDB low thruput
 - The most important qual. item but could only be excuted one device at a time.
 - Lack statistical meaning data to make development decision

Lesson2

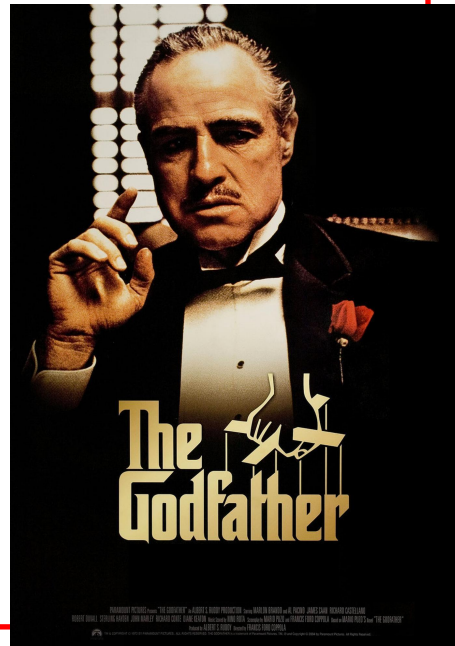
- First principles
- Open to learn new skill



Challenges Overcome & Lessons Learned

Challenge3

- People
 - Entering Customer Service
 - Being a Manager



Lesson3

- Self-reflection
- Know the people archetypes
- Transactions with value
- Professional team, not a “family”



Challenges Overcome & Lessons Learned

Challenge4

- Work Ethic
 - Qual fail at major customer's site

Lesson4

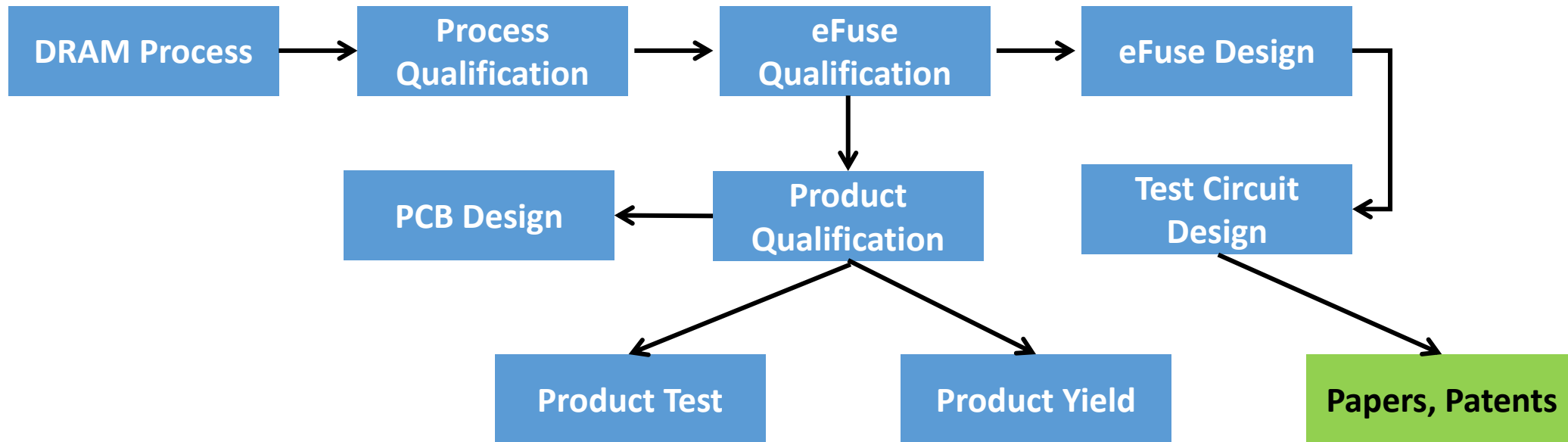
- Courage to do the right thing
- Take a stand and protect your reputation



Building a Career

I Started by Saying “YES” to Everything

- Expand and Construct



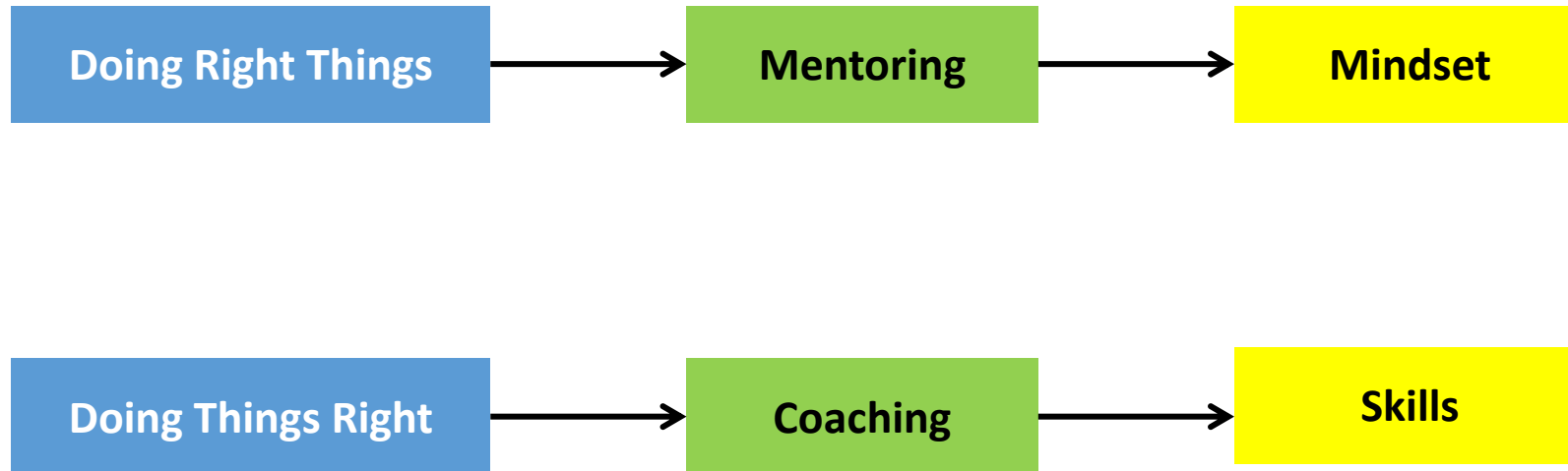
Manager

Customer Service



Then I Say “NO” to Everything Else

- Ownership and Accountability
 - Learn to lead by acknowledging my ego
 - Spiral up or down is leader’s choice



Principles

DOs

- Expand and Construct
 - Learn from upstream and down stream by providing support
 - Summarize the lessons learned at least monthly
- Invest time on portable assets
 - Publishing
 - Build external reputation and connection

DON'Ts

- Only interested in what's written in the job description
- Asking recognition with words but not track records
- Afraid of being “stupid”



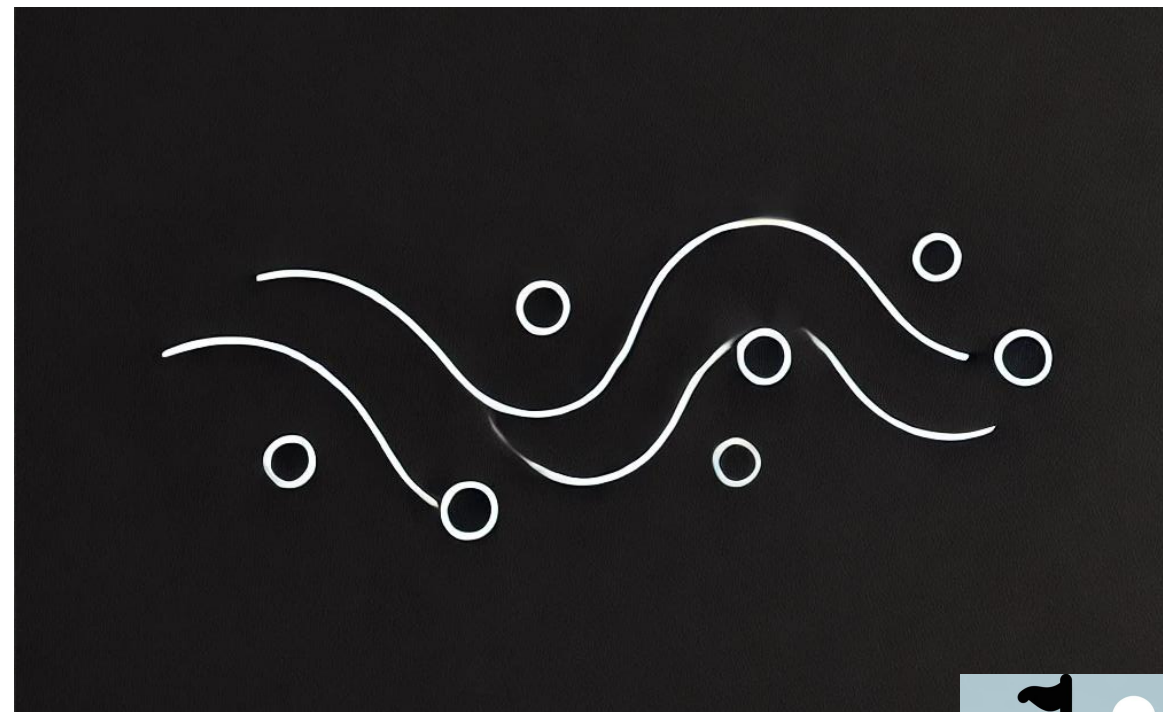
Principles

Living Forwards



"Principles" by Ray Dalio

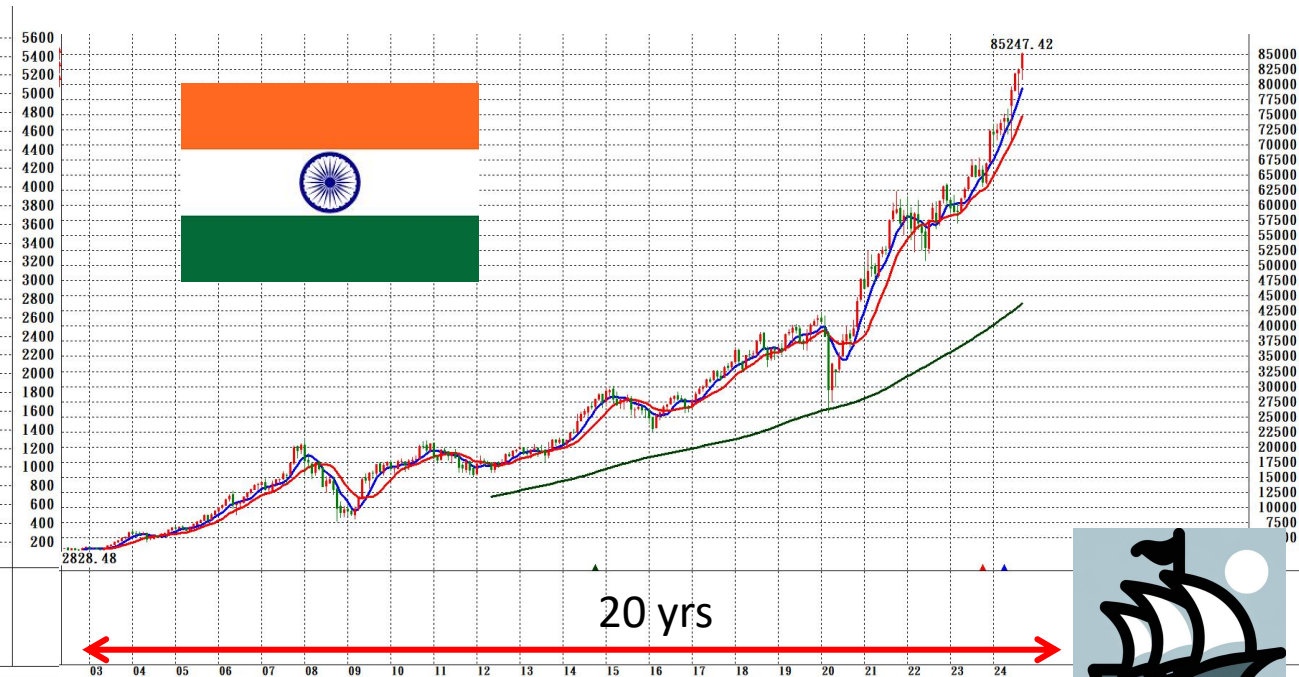
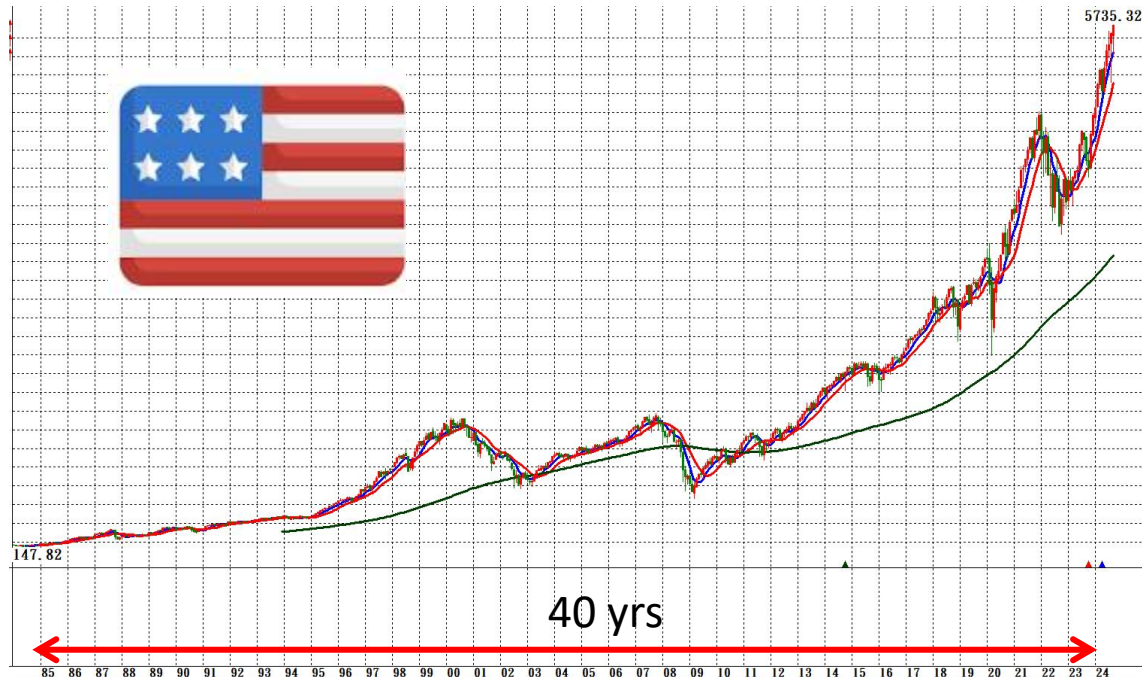
Connecting the Dots Backwards



Advice to My Younger Self

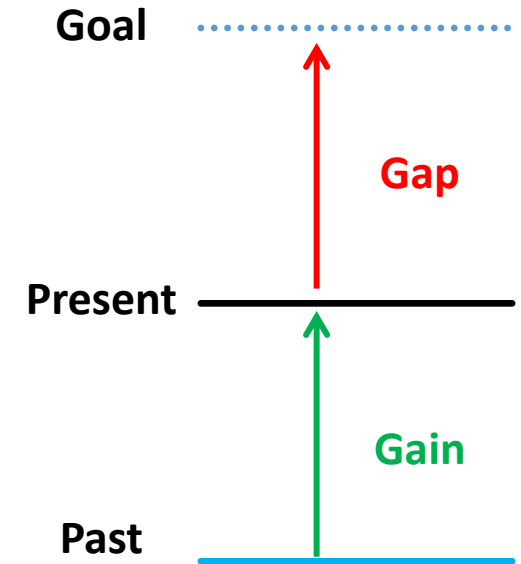
Advice to My Younger Self

- Think long term
 - Our brain is wired linearly but the world operates exponentially
 - Underestimate the good or bad in this year, and overestimate what can be achieved in 5 or 10 years



Advice to My Younger Self

- No permission required
 - Think strategically but do not over analyze the tactics. Just start the project.
 - “Passion is the result of a good life design, not the cause.” — William Burnett
- Gain mindset
 - Using vision as the compass but not the destination
 - “Happiness is where you start, not where you finish.” — Dan Sullivan
- Play infinite game
 - It’s not about winning at the finish line. It’s to keep playing with the best outcome possible.
 - Choose the quest with the assigned character. Own the game.



Closing Remarks

“Your new life is going to cost you your old one.”

“The people who are meant for you are going to meet you on the other side.”

— Brianna Wiest, author of “The Mountain Is You”

“It’s not about the income or the outcome, but about who you become.”

— Dana Jaunzemis

“Success or failure will not change you; it will just amplify who you are.”

— Yours truly

