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TOMORROW'S CERAMIC SYSTEMS

Ecosystems Approach to Disruptive Innovation

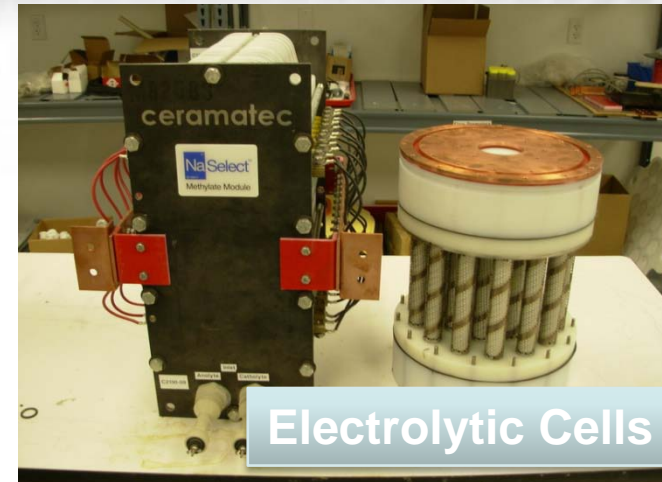
Presented by

Anthony Nickens
VP, Ceramatec Inc.

Ceramic Leadership Summit April 2014

Ceramatec Overview

- Founded 1976
- Advanced R&D Company
- *100% Privately Owned*
- Self Sustaining Business Unit
- Concept to commercialization
 - R&D --> prototype --> pilot scale fabrication
- Core competencies:
 - electrochemistry, ionic conducting ceramics, & advanced materials
- Customers
 - 50% Fortune 100/500 Companies
 - 50% Govt.



Innovations



Definition

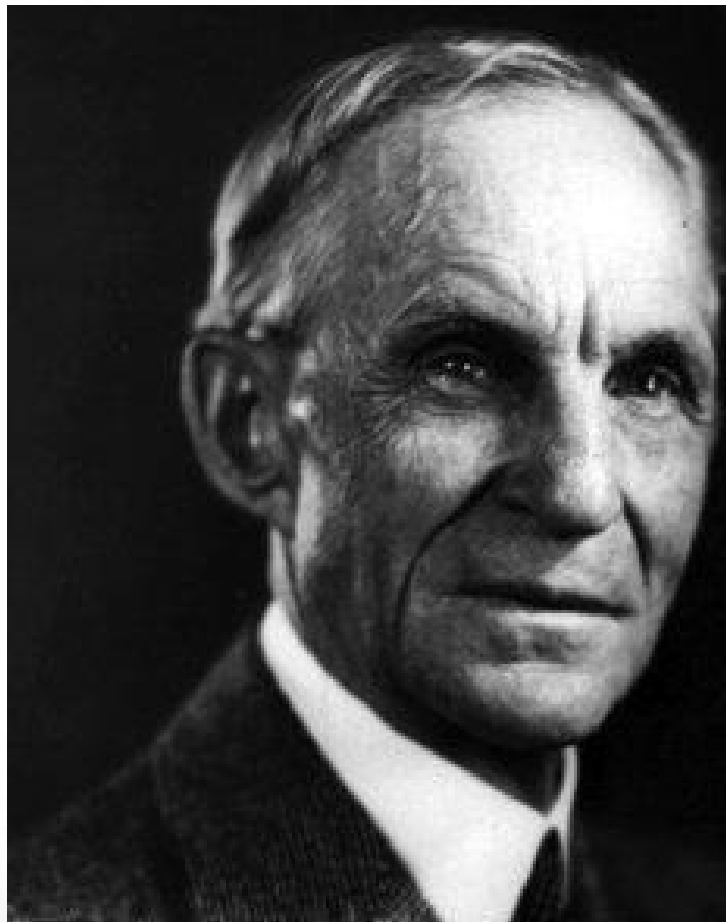
A **disruptive innovation** is an **innovation** that helps create a new market and value network, and eventually disrupts an existing market and value network (over a few years or decades), displacing an earlier technology



Disruptive Innovations

- Resets and produces new markets
- Engine for robust organic growth and jobs
- Vital for future competitiveness and leadership in markets
- High Capital Requirement
- Typically High Risk, High Payoff
- Opportunity to improve lives around the world
- Military strength and deterrence implications





**“If I had asked people
what they wanted,
they would have said
faster horses.”**

—Henry Ford



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Disruptive Innovations



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Ceramic Based Innovations



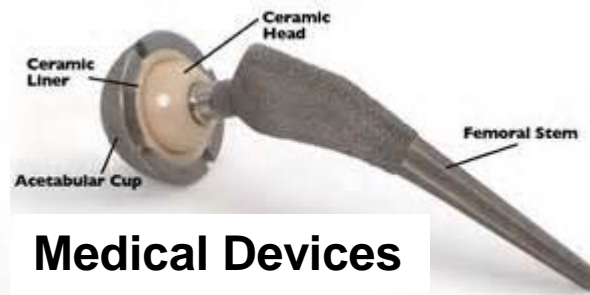
**Ion Transport
Membranes**



Sensors



Space Shuttle Tiles



Medical Devices



Body Armor



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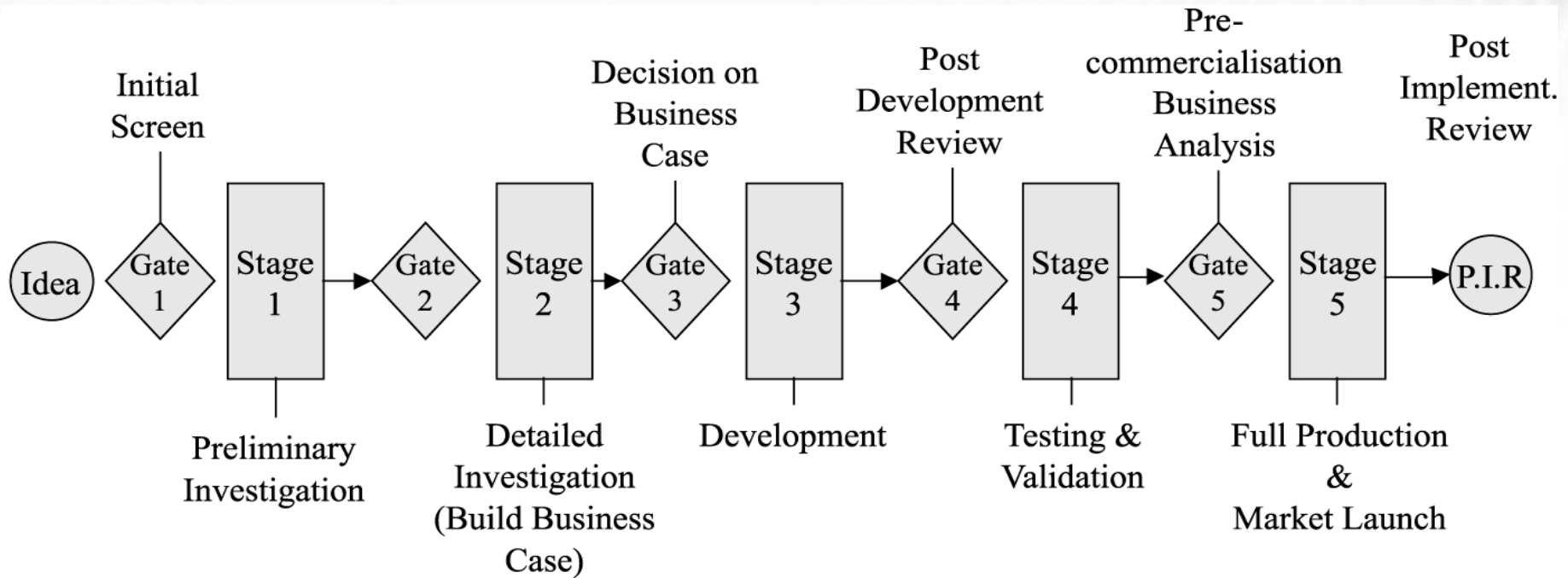
“If we don’t cannibalize our own products someone else will.”

- S. Jobs



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Stage Gate



Source: Cooper (1994)

Stage Gate Process good for Disruptive Innovation?

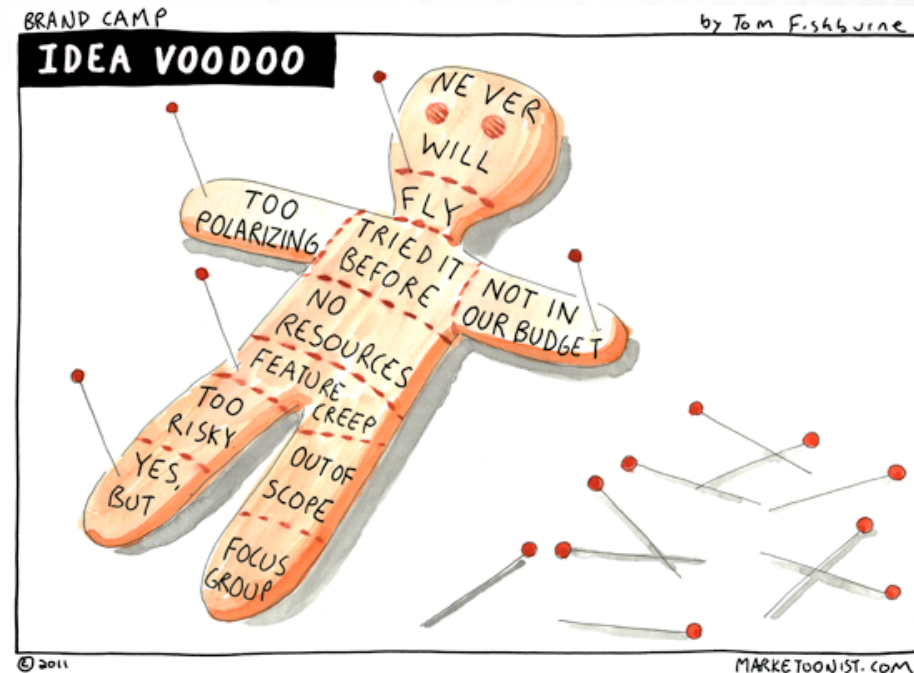
Formal Gates: Idea Killers Dream??



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Idea Killers-- Beware

- This will never work.....
- We tried this before.....
- Let's do full economics
 - Very beginning of research
- Business Units
 - We could use that \$ now and make \$ quickly



Idea Killers are all around.....



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Six key **ingredients** and **enablers**
to create Disruptive Innovations

Six “Ps”



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1st Key: PEOPLE

- It is all about good people
- Visionary Leaders
- Hiring: most important business decision



- Strategic competitive advantage
- Invest in good people to make them great



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1st Key: PEOPLE

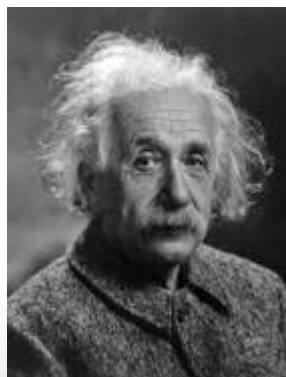
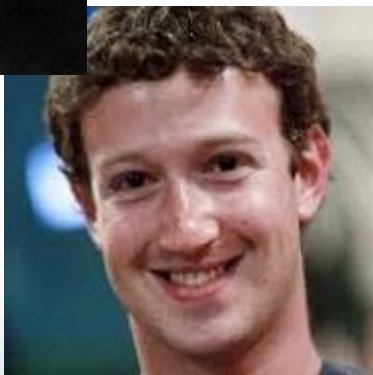
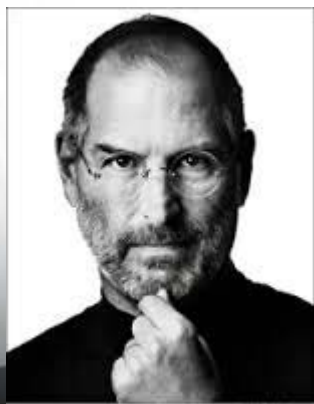
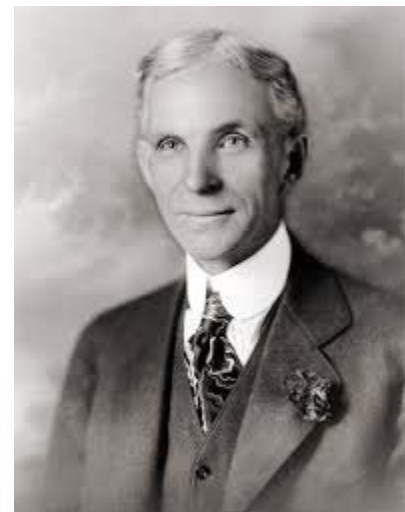
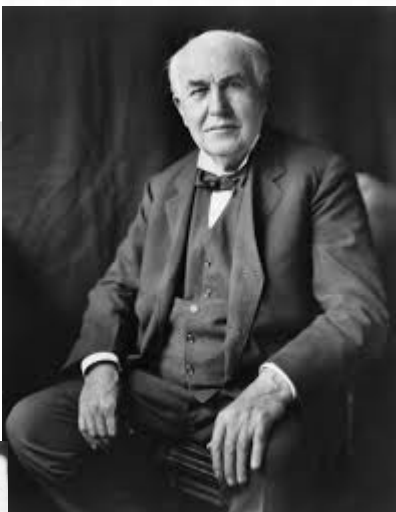
- Competence
- Imaginative
- Energy
- Attitude
- Driven
- Focused
- Wired Differently
- Cross functional



Willing to take Risks, Fail and Succeed



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2nd Key: PESOS Money!!!!

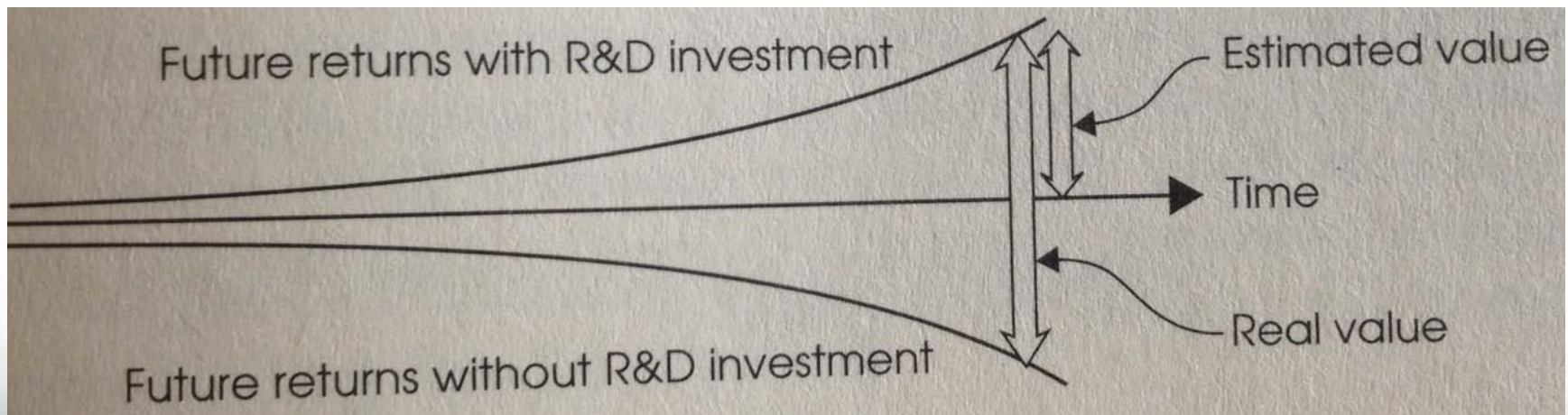
CASH IS KING

- Without \$\$, No Disruptive Innovation
- \$\$ Commitment Long Term
- Set aside \$\$ for High Risk, High Payoff technologies



2nd Key: PESOS Money!!!!

- Long term investment \$ must be protected
- Beware of Business Units & CFO
Grab for \$\$
- Senior Leader Commitment
- Have a clear \$\$ baseline



Dr. Clay Christensen's article in HBR 2008

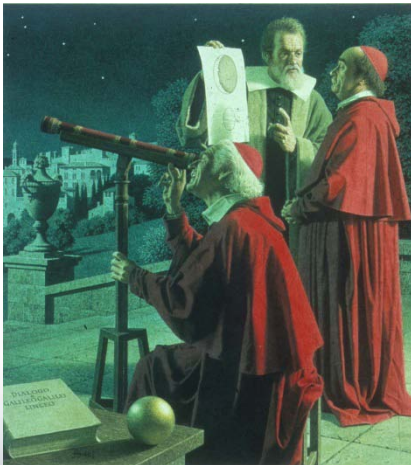


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3rd Key: PASSION

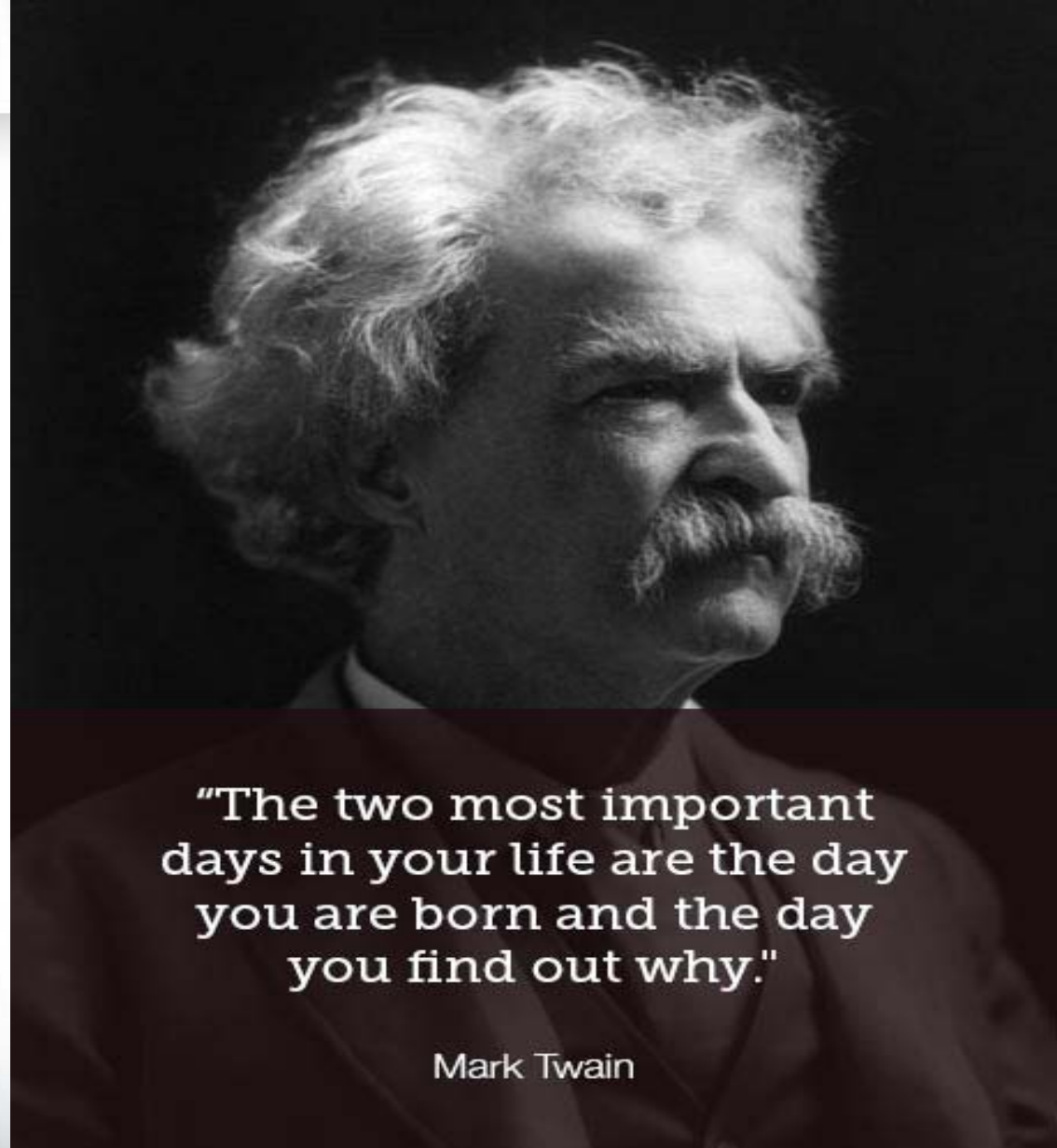
PAS*SION

- *noun* \ 'pa-shən\ : a strong feeling of enthusiasm or excitement for something or about doing something



“Passion is the genesis of genius.”
- Galileo Galilei





"The two most important
days in your life are the day
you are born and the day
you find out why."

Mark Twain



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3rd Key: PASSION

- Passion for *work*
- Passion for *overcoming challenges*
- Passion *reaching milestones*
- Passion working with *team or individual*
- Passion for *changing the world*



4th Key: PERSISTENCE

per·sist·ence

noun: **persistence**

- firm or **obstinate** continuance in a course of action in spite of **difficulty** or **opposition**



4th Key: PERSISTENCE

***“It isn’t about how hard you can hit.
Its about how hard you can get hit,
and how much you can take, and
keep moving forward.”***

- Rocky Balboa Quote From The Rocky Balboa Movie.



4th Key: PERSISTENCE

- Focused
- Determined
- Energy
- Relentless
- Alternative strategies
- Celebrate failures and learn



5th Key: PATIENCE

- pa-tience

noun: **patience**

- the capacity to **accept or tolerate delay**, trouble, or suffering without getting angry or upset.



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5th Key: **PATIENCE**

- Ability to accept failure as a learning opportunity
- Bigger the risks...more failures
- Envision a pathway to overcome



6th Key: PARTNERSHIPS

Partnership: The coming together of dissimilar entities with similar goals and expectations.



6th Key: PARTNERSHIPS

- Customers
- Internal Company
- Strategic Suppliers
- Consultants



It takes a village.....!

“In this new wave of technology, you can't do it all yourself, you have to form alliances.”
- Carlos Slim Helu



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Partnerships

Example *APCI and Ceramatec*

- 1992
- Bring together strengths of both organization
- Top Leadership Commitment
- Trust at all levels in both organizations
- Good Communication
- Six “P”s



Ion Transport Membranes



Six “Ps” + One: **CULTURE**

- Culture is THE BINDING Agent
- BINDING Agent must not be rigid
- Culture: Key enabler and barometer
- Chipping away of Innovation Culture will lead to the House of Cards (Six Ps) falling down
- Culture set by CEO



Culture & The Six P's

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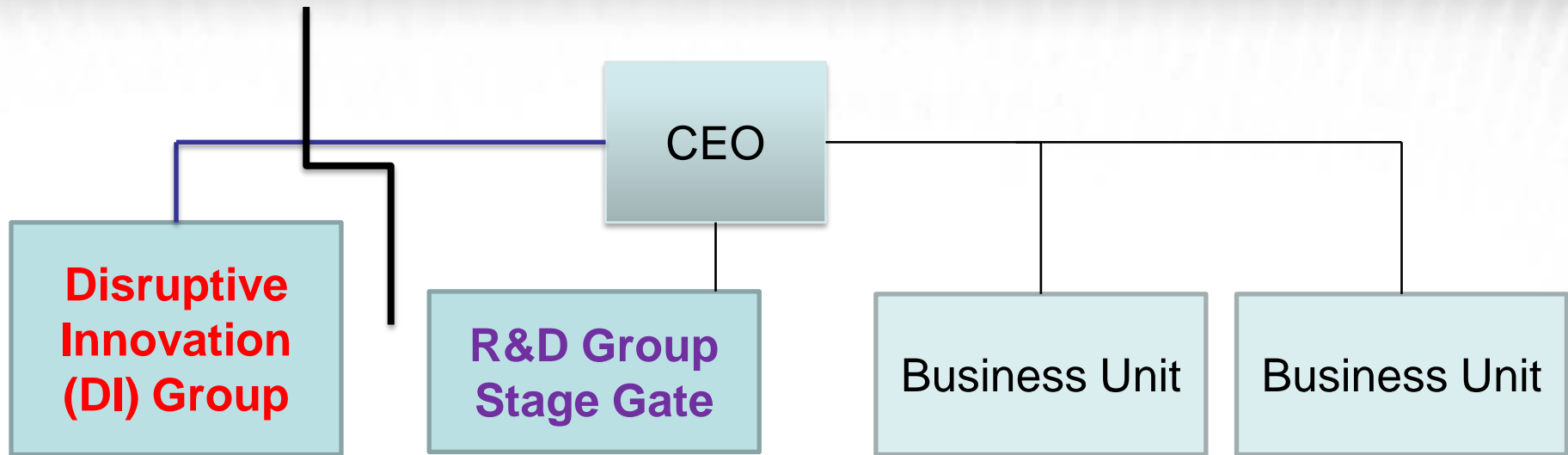
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Culture



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Organization Structure to Promote DI



- CEO un-wavering commitment to DI Group
- DI Group
 - Separate from Business Units
 - Separate from Conventional R&D Group
- Freedom to operate within DI Group



Example: Tesla Motors

- ✓ People: Visionary Leader with conviction
- ✓ Pesos
- ✓ Passion
- ✓ Patience
- ✓ Persistence
- ✓ Partnerships
- ✓ Implemented “Can Do” Culture



Example: Office of Naval Research

- ✓ People: Visionary Leader, Protected by CNO
- ✓ Pesos: Set aside funds
- ✓ Passion
- ✓ Patience
- ✓ Persistence
- ✓ Partnerships
- ✓ Research Culture



Shipboard Laser Weapons



Innovation:

Enjoy the Journey!



Thank you!



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