

# STRATEGIC ENGINEERING

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Good  
engineering  
is *more* than  
technical  
mastery.

# WHAT DO YOU MEAN “STRATEGIC ENGINEERING”?

**What defines an  
engineer?**

# WHAT DO YOU MEAN “STRATEGIC ENGINEERING”?

“Engineering is the art of building something not previously in existence that solves a problem.”

– An Engineer

“Engineering is the art of trading off specs.”

– A Wise Engineer

# WHAT DO YOU MEAN “STRATEGIC ENGINEERING”?

Strategy. *noun.*

“A high level plan to achieve one or more goals under conditions of uncertainty.”

-- Wikipedia

What makes an engineer  
*strategic*?

# WHAT DO YOU MEAN “STRATEGIC” ENGINEERING?

Strategic engineers  
**solve a problem**  
while satisfying a variety of  
**potentially conflicting specifications.**

Specifications fall into multiple broad categories:



# TECHNICAL SPECIFICATIONS

■ Can we solve the problem? Is it possible?

■ Examples

- Power
- Speed
- Torque
- Size
- Tolerance
- Strength
- Lifetime
- Temperature
- Ductility
- Throughput
- Gain
- Latency
- Phase Margin
- Amplitude
- Mismatch
- Hardness
- Strain
- Stress
- Impedance
- Compatibility



# PROJECT SPECIFICATIONS

■ How do I solve the problem with my resources and constraints?

■ Examples

- Budget
- Deadlines
- Person-hours
- Equipment
- Skills
- Experience
- Motivation
- Confidence
- Infrastructure
- Materials
- Advisors
- Contractors
- Consultants
- Suppliers
- Manufacturers
- Distributors



# PRODUCT SPECIFICATIONS

■ Am I solving the right problem?

■ Examples

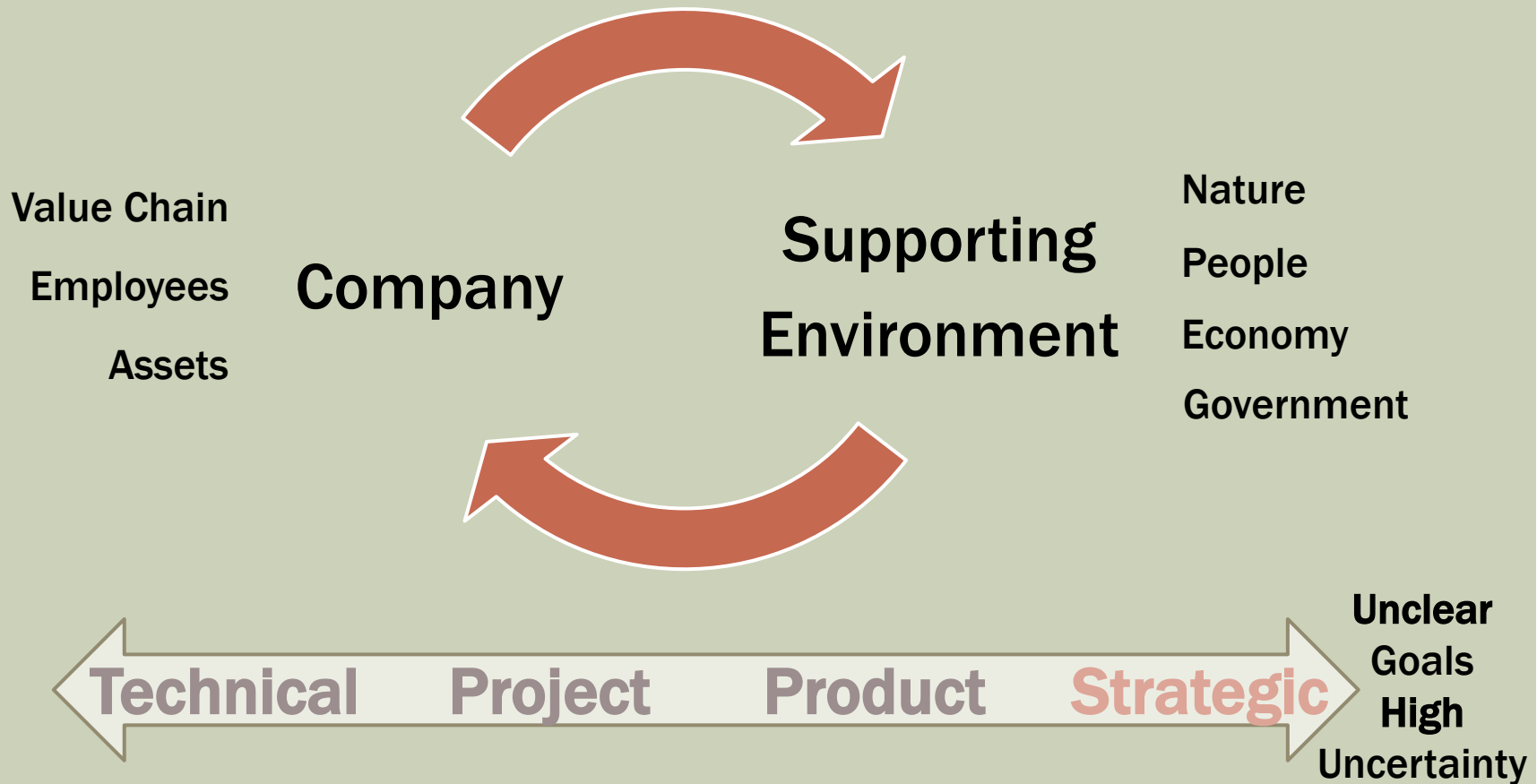
- User research
- Target market
- Personas
- Function
- Interaction
- Character
- Branding
- Marketing
- Differentiation
- Comparables
- Price point
- Profit margin



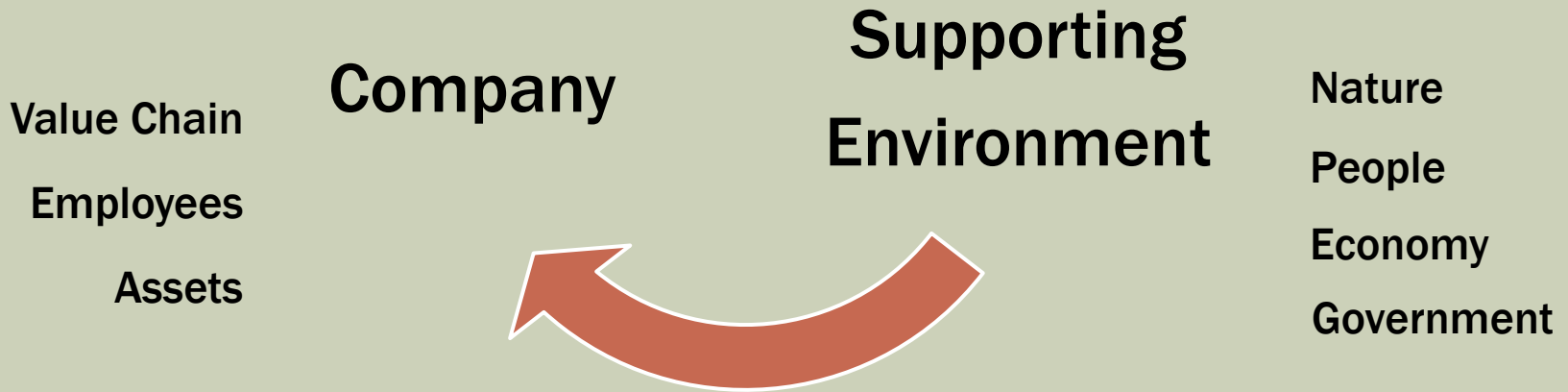


# STRATEGIC SPECIFICATIONS

- Am I solving the right problem the right way?



# STRATEGIC SPECIFICATIONS



**How does the supporting environment interact with the company?**

# STRATEGIC SPECIFICATIONS

**Company**

**Supporting  
Environment**



**“If you’ve got a business,  
you didn’t build that!”**

**– President Obama**  
(out of context)

**Nature:**

- Resources
- Waste management
- Environmental services

**People:**

- Talent / labor
- Customers
- Reputation
- Social license to operate

**Government:**

- Regulations
- Protection of property
- Fees & taxes
- Subsidies
- Infrastructure

**Economy:**

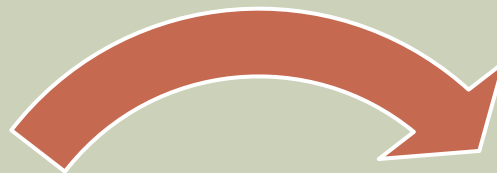
- Competitors
- Partners
- Business stability
- Credit

# STRATEGIC SPECIFICATIONS

How does the company interact with the supporting environment?

Value Chain  
Employees  
Assets

Company



Supporting  
Environment

Nature  
People  
Economy  
Government

# STRATEGIC SPECIFICATIONS

## People:

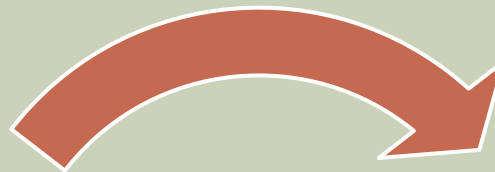
- Jobs
- Products
- Services

## Government:

- Revenue

## Economy:

- Activity



**Company**

**Supporting  
Environment**

# STRATEGIC SPECIFICATIONS

## Nature:

- Pollution
- Waste
- Resource depletion
- Ecosystem disruption

## People:

- Human health impacts

## People:

- Jobs
- Products
- Services

## Government:

- Lobbying

## Government:

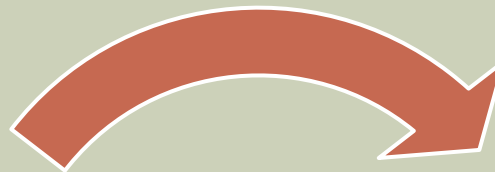
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- Market distortion

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**Company**

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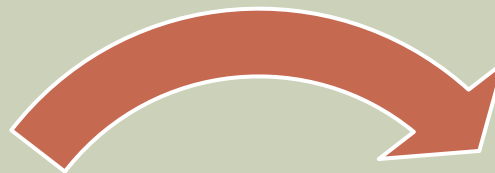
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## Economy:

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But as an engineer, why should I care?

Company



Supporting Environment

# STRATEGIC SPECIFICATIONS

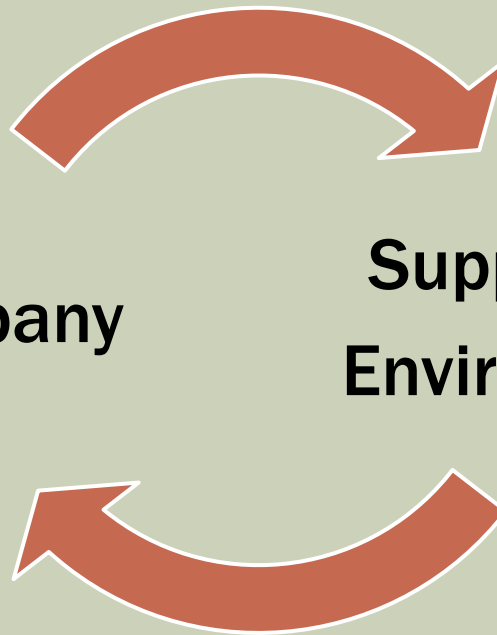
While the implications of strategic choices are uncertain, they have real consequences.

Value Chain  
Employees  
Assets

**Company**

**Supporting  
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Nature  
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# THE IMPORTANCE OF STRATEGY

## Good Strategy

- Competitive advantage
- Strong public image
- Recognized leadership
- Increased customer loyalty
- Decreased financial risk
- Decreased legal risk
- Increased margins
- Increased productivity

## Bad Strategy

- Product/service failure
- Poor public image
- Recognized laggard
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## Toyota Prius



# THE IMPORTANCE OF STRATEGY

## Hummer



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## Patagonia

**DON'T BUY  
THIS JACKET**



COMMON THREADS INITIATIVE  
Together we can reduce our environmental footprint.

[TAKE THE PLEDGE](#)

# THE IMPORTANCE OF STRATEGY

## Eastman Kodak



## Bad Strategy

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## Chevron



# THE IMPORTANCE OF STRATEGY

## Furniture Foam



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## Nucor





# THE IMPORTANCE OF STRATEGY

## U.S. Metal Mining



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# THOUGHT EXERCISE

## Discussion Prompt:

*“You have been chosen to lead a new product development team at DEFAULT Power Tools. The product you will be making is a contractor-grade, cordless drill intended for use by professional craftsmen and tradesmen. As an expert in power tools, you are aware that battery design constrains many of the product decisions of a cordless drill (e.g., weight, cost, power, duration of charge).”*

# THOUGHT EXERCISE

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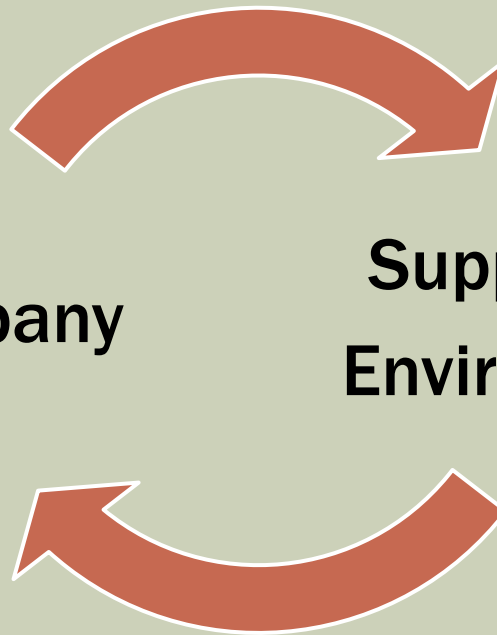
*“What key information is needed to make a good decision for your organization regarding battery design? Why is this information important?”*

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**Supporting  
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# CONCLUSION

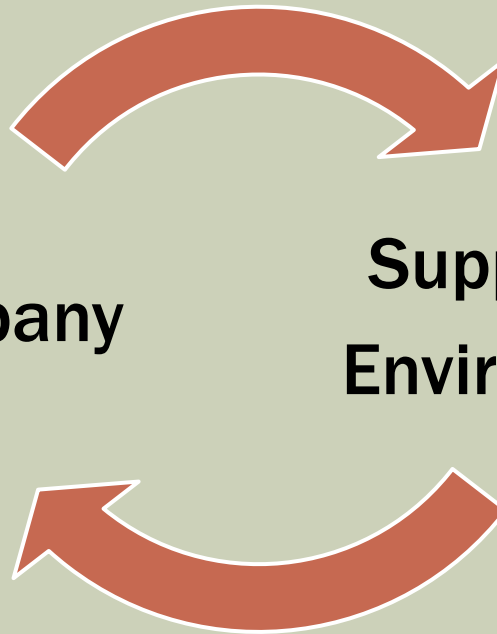
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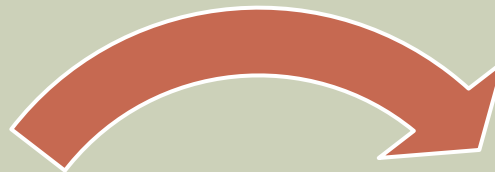
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Questions?