

SANJAY BALIGA – VICHARA PARTNERS



A Framework for Addressing Chemical Restrictions in Global Electronic and Electrical Equipment (EEE) Sectors

*Chemical Watch Conference
September 17, 2019 (Boston, MA, USA)*

Conference Goals



Chemical Watch: Offer Information on Chemical Restrictions

Vichara: Provide Insight / Advice on Strategies for Addressing Risk

Attendees: Learn about Challenges and Identify Solutions

Presentation Goals: Advice & Perspective



- Narrow Focus
- Reactive
- Limited Options
- Isolated

Presentation Goals: Advice & Perspective



- Narrow Focus
- Reactive
- Limited Options
- Isolated



Stakeholder Engagement



- Holistic & Strategic
- Proactive
- Many Options
- Part of Team

High-Tech Electronic & Electrical Equipment (EEE)



Framework for Evaluating & Addressing Risk



- Value Your Own Expertise
- Identify Drivers Motivating Change
- Conduct Research on Specific Issue
- Have an Internal Discussion
- Arrive at a Solution
- Reinforce/Strengthen Relationships
- Adopt Changes

Framework for Evaluating & Addressing Risk



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Types of Motivational Drivers



- Technological Innovations
- Business-Related Contractual Obligations
- Regulatory Mandates
- Legal Liability
- Pressure from Institutional Investors
- Reputation and Brand
- Societal Demands

Stakeholders Demanding / Requesting Changes

- Shareholders
- Internal Corporate Departments
- Customer Chains
- Supply Chains



- Industry Associations
- Government Agencies
- Local Communities
- Advocacy Groups

Specific Mechanisms Used to Drive Change

- Investigation and Due Diligence
- Public Reporting
- Exposure Limits and Emission Controls
- Permission to Use Requirements
- Substitution Guidance
- Substance Bans



Framework for Evaluating & Addressing Risk



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Conduct Research



- Learn about Restrictions & Mandates
- Consider Whether Restrictions Apply
- Identify Chemicals Used in Manufacturing and Contained in your Product
- Consider Impact of Chemical Restrictions on Product Performance

Identify Chemicals

Questions to Consider:

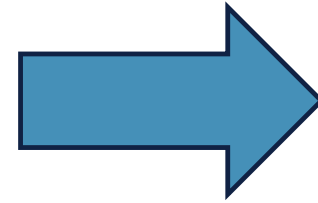
- What is your product?
- How is your product made?
- How is your product used?



Understanding the Scope of Chemicals Used in EEE



- Materials of Construction
- Process Materials
- Support Materials
- Contaminants & By-Products



EEE

Vichara Industry Map



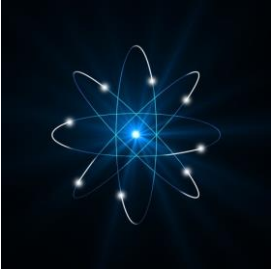
Vichara Industry Map

MATERIALS

EXTRACTION



SUBSTANCES



MIXTURES



Vichara Industry Map

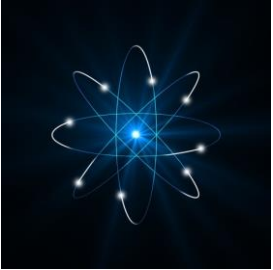
MATERIALS

OBJECTS

EXTRACTION



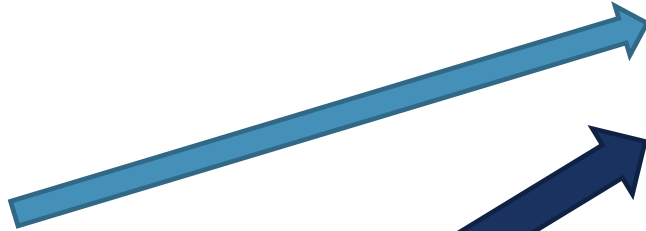
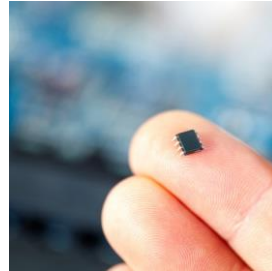
SUBSTANCES



MIXTURES



COMPONENTS



Vichara Industry Map

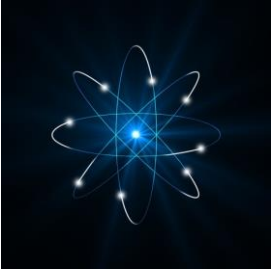
MATERIALS

OBJECTS

EXTRACTION



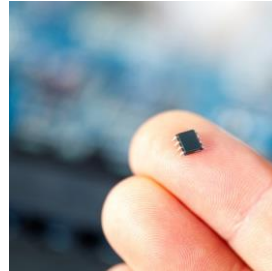
SUBSTANCES



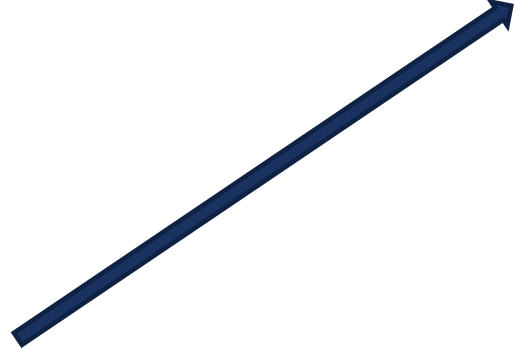
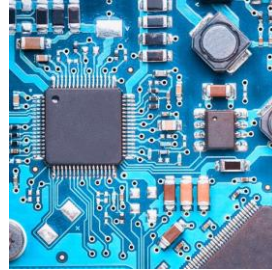
MIXTURES



COMPONENTS



ASSEMBLIES



Vichara Industry Map

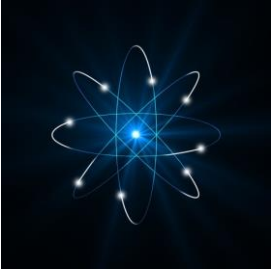
MATERIALS

OBJECTS

EXTRACTION



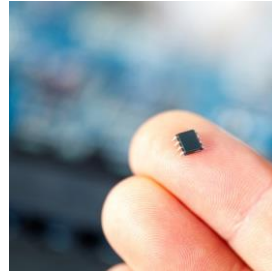
SUBSTANCES



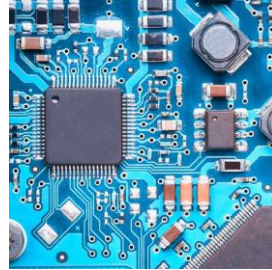
MIXTURES



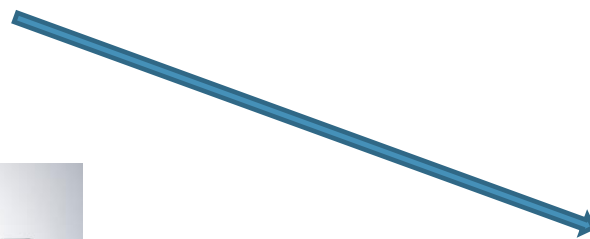
COMPONENTS



ASSEMBLIES



PRODUCTS



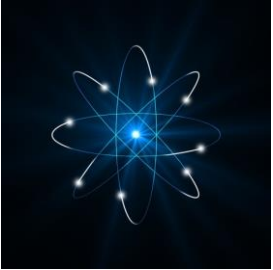
Vichara Industry Map

MATERIALS

EXTRACTION



SUBSTANCES

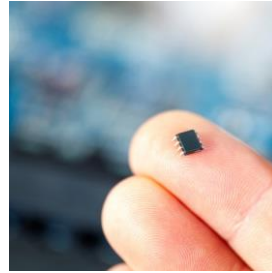


MIXTURES

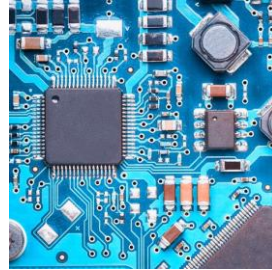


OBJECTS

COMPONENTS



ASSEMBLIES



PRODUCTS



SYSTEMS

SIMPLE
SYSTEMS



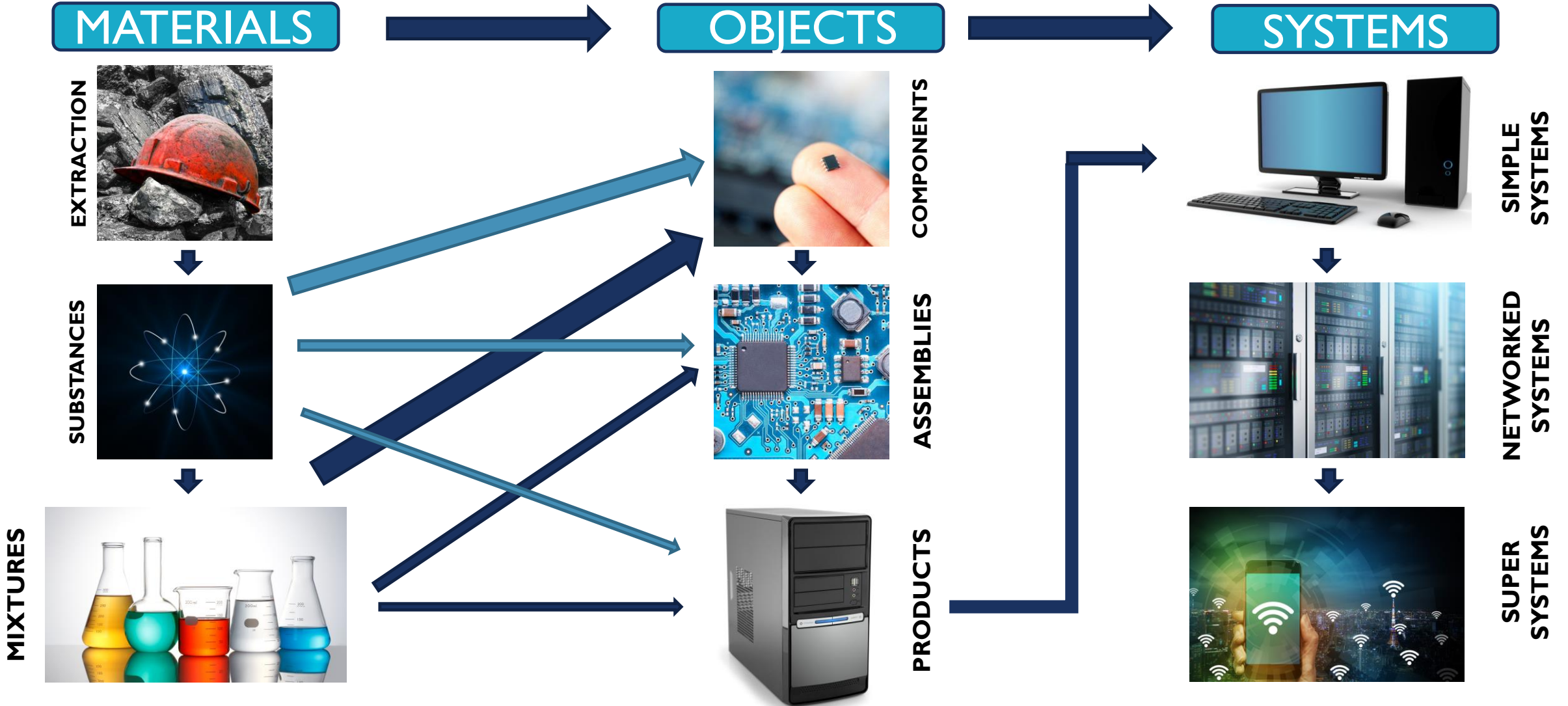
NETWORKED
SYSTEMS



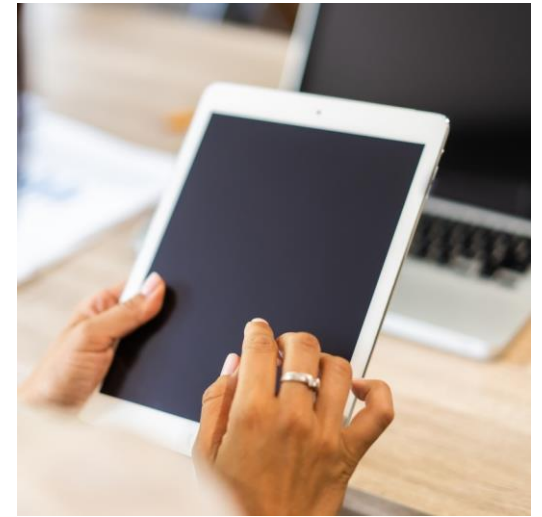
SUPER
SYSTEMS



Vichara Industry Map



Specialized Corporate Roles



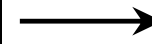
Design



Manufacturing

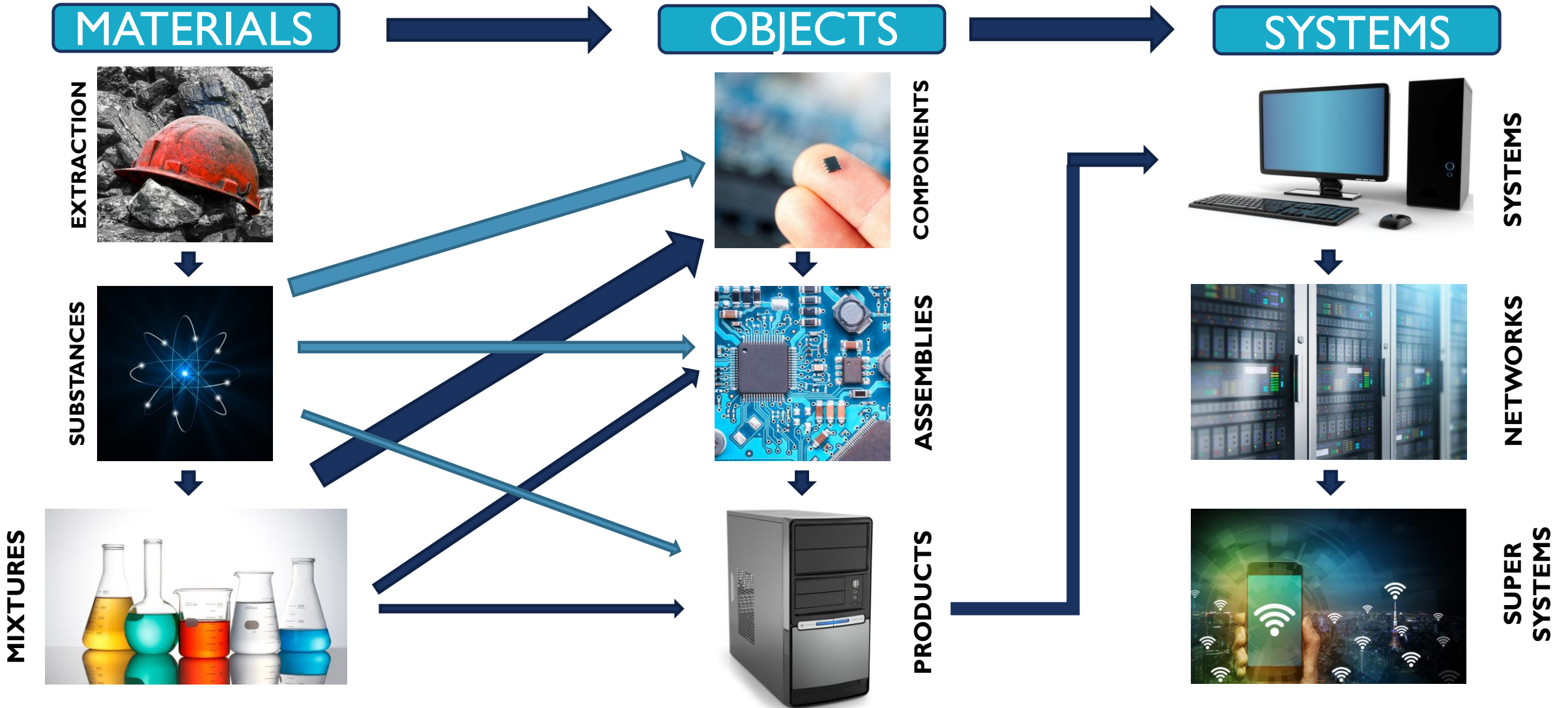


Marketing



Use

Map Your Place in Global EEE Ecosystem

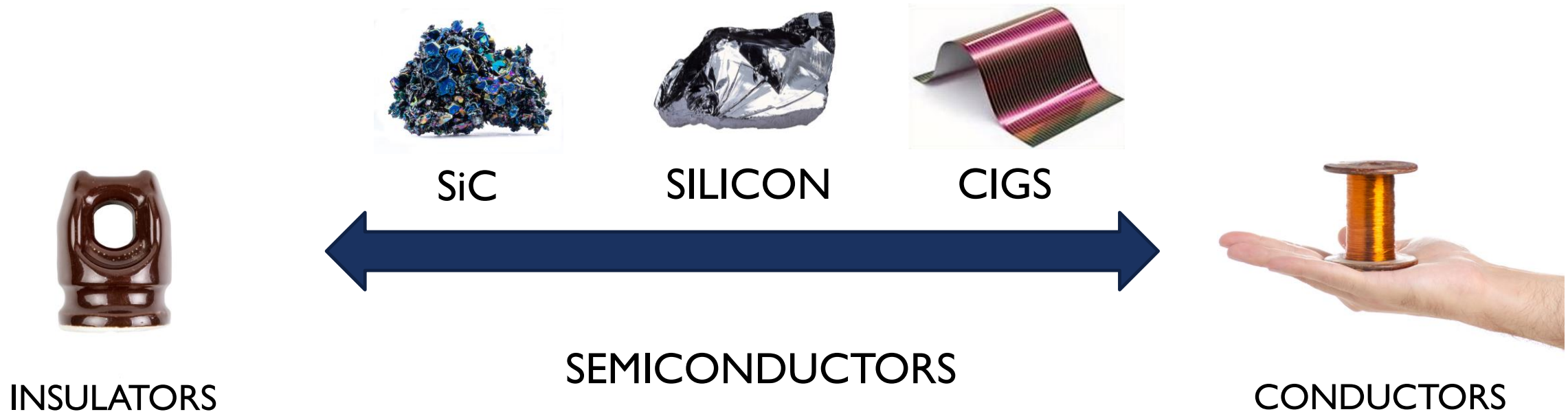


Use Materials to Control or Transform Electrical Current



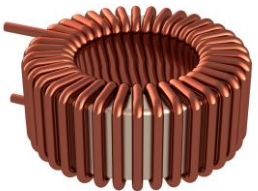
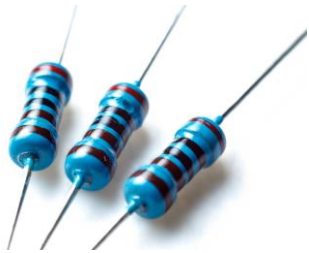
All EEE Components

Use Materials to Control or Transform Electrical Current

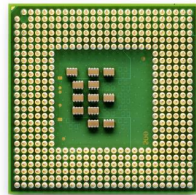
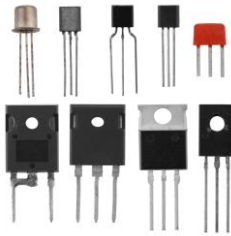


EEE Components

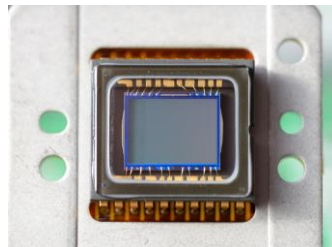
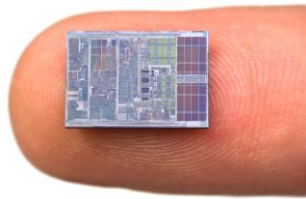
PASSIVE COMPONENTS



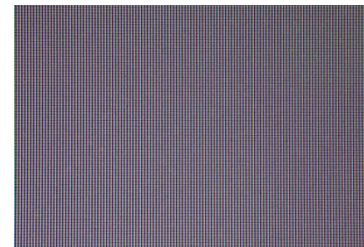
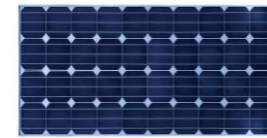
ACTIVE COMPONENTS



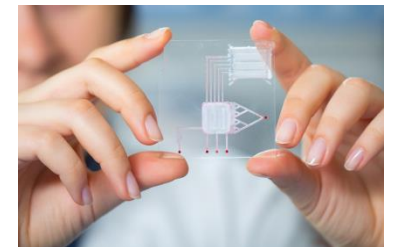
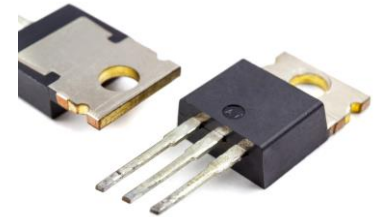
ELECTRO-MECHANICAL COMPONENTS



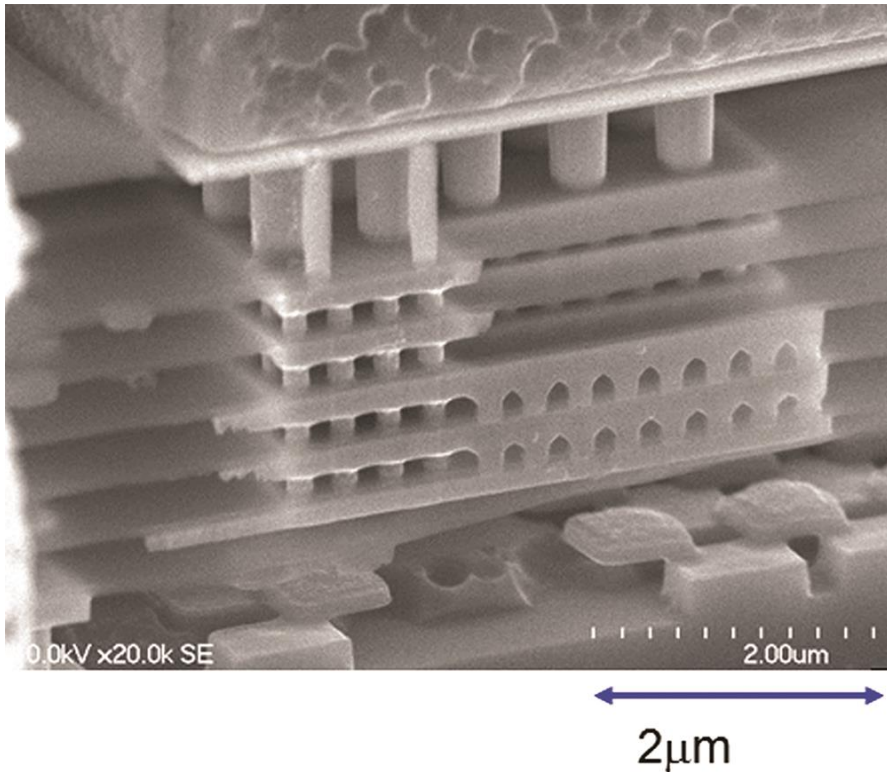
OPTO-ELECTRICAL COMPONENTS



BIO-ELECTRICAL COMPONENTS



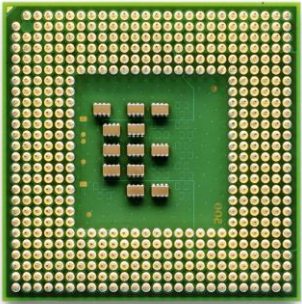
Manufacturing Semiconductor Components



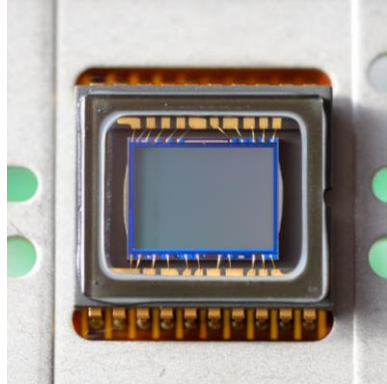
- Composed of Semiconductor Materials
- Consist of Tiny Structures Containing Conductive and Insulating Elements
- Exquisite Control of Electrical Current through Different Shapes, Sizes and Distribution Patterns of Structures

Four Basic Techniques: 1) Patterning, 2) Materials Addition, 3) Materials Removal and 4) Materials Modification

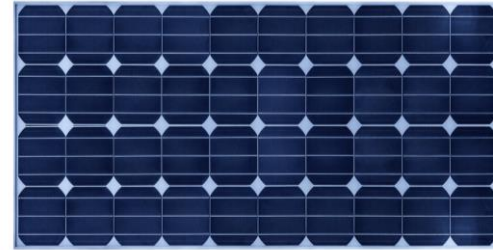
Major Types of Semiconductor Components



INTEGRATED
CIRCUITS



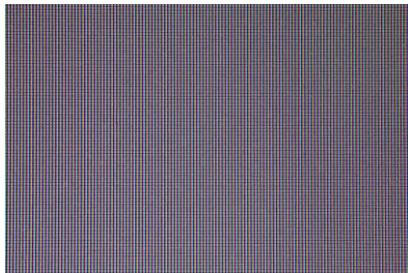
MEMS



PHOTOVOLTAICS



LIGHT EMITTING
DIODES (LEDs)



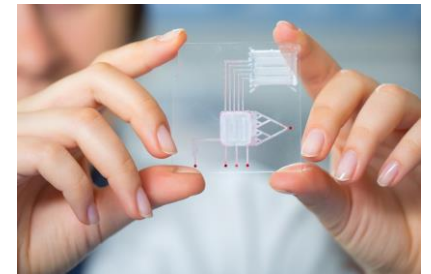
LIQUID CRYSTAL
DISPLAYS (LCD)



POWER ICs

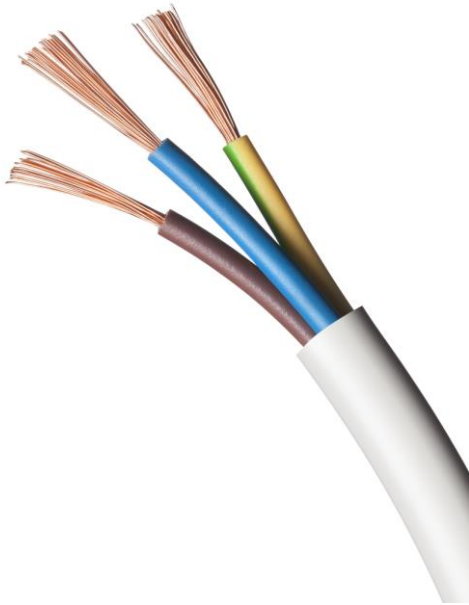


ANALOG SENSORS

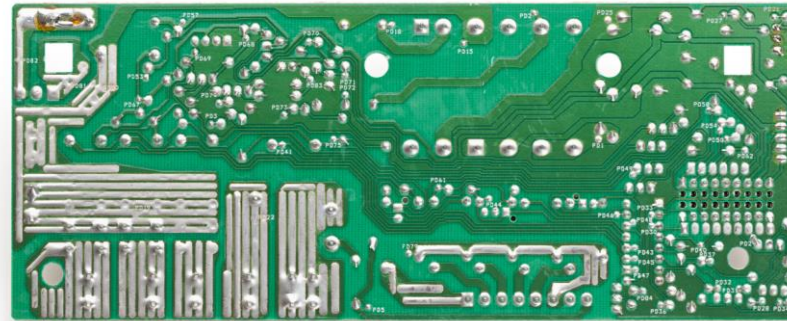


BIO-ELECTRIC
SENSORS

Non-Semiconductor Components



CABLES, WIRES &
INTERCONNECTS

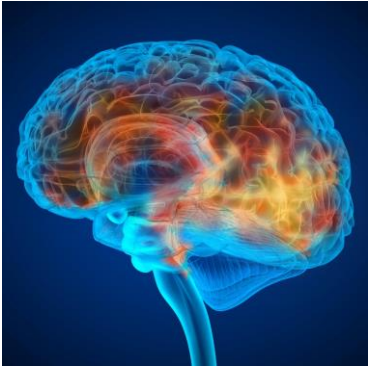


CIRCUIT BOARDS



ELECTRIC MOTORS

EEE Assemblies



THINK



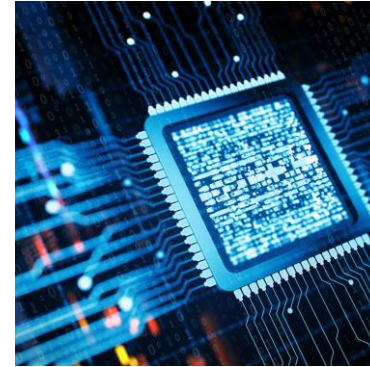
SENSE



INTERFACE



COMMUNICATE



POWER



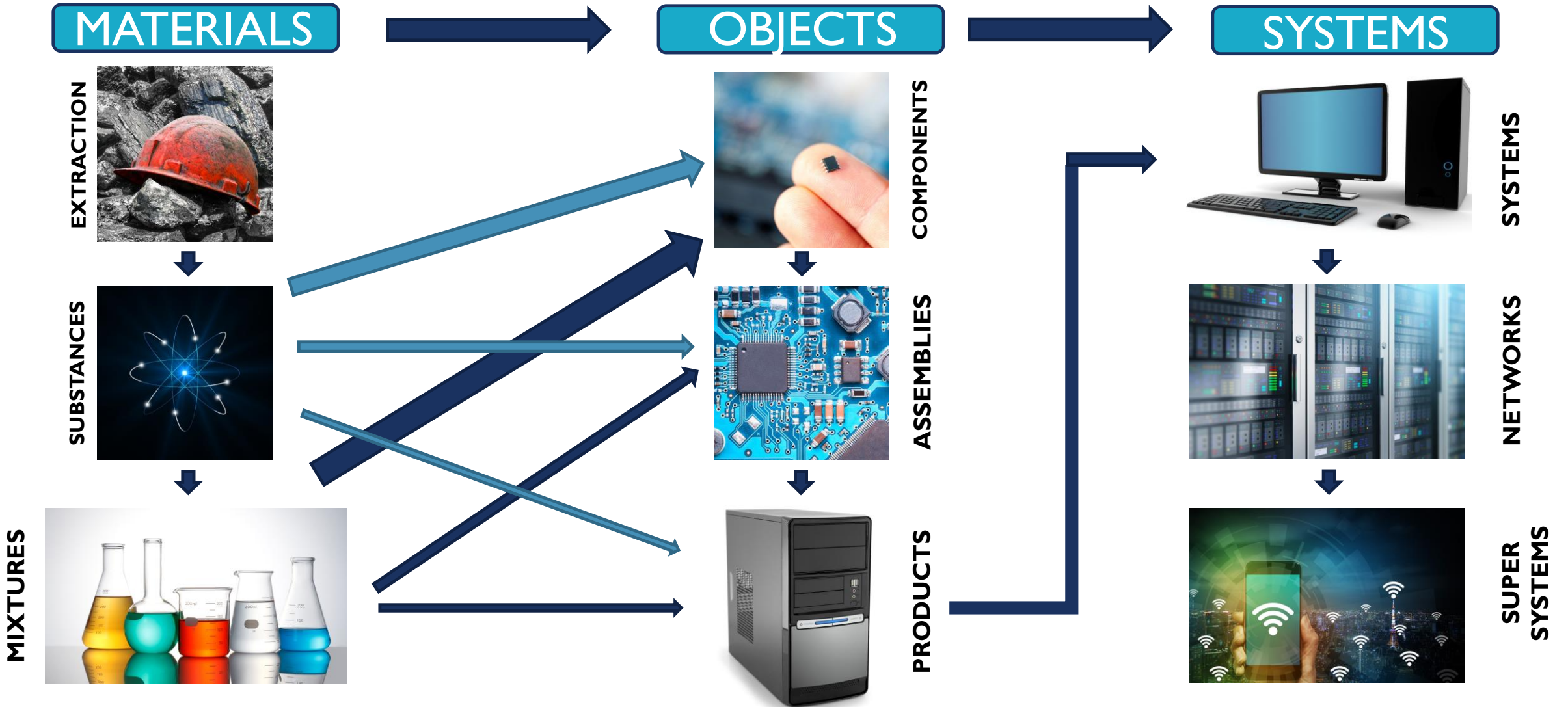
ACT

- Composed of Collections of Components
- Provide Exquisite Functionality
- Products Created from Collections of EEE Assemblies

EEE Products



The Profound Impact of Change



Potential Impact of Chemical Restrictions



- Changes in Manufacturing Processes
- Changes in Product Performance
- Customers Require Requalification
- Chemical Substitutions Result in Additional Hazard
- Replacement Chemical Equally (or More) Hazardous
- Future Regulation of Replacement

Framework for Evaluating & Addressing Risk

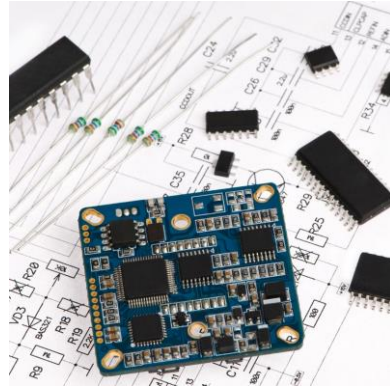


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- Arrive at a Solution
- Reinforce/Strengthen Relationships
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Identify Stakeholders for an Internal Discussion



DESIGN



ENGINEERING



PROCUREMENT



SAFETY



ENVIRONMENTAL



OPERATIONS



GOVERNMENT
RELATIONS



FINANCE



MARKETING



CUSTOMER
SERVICE

Framework for Evaluating & Addressing Risk



- Value Your Own Expertise
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Arrive at a Solution



- Consider Implications of New Compliance Plan Carefully
 - Different Solutions Carry Different Levels of Risk
 - Adjustments to Safety Protocols Require Training/New Behaviors
 - Be Aware of Future Regulations/Restrictions

Framework for Evaluating & Addressing Risk



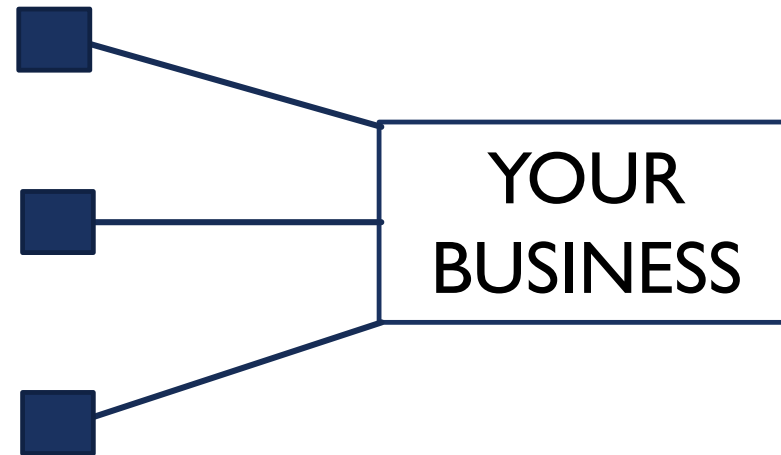
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Relationships With External Stakeholders

YOUR
BUSINESS

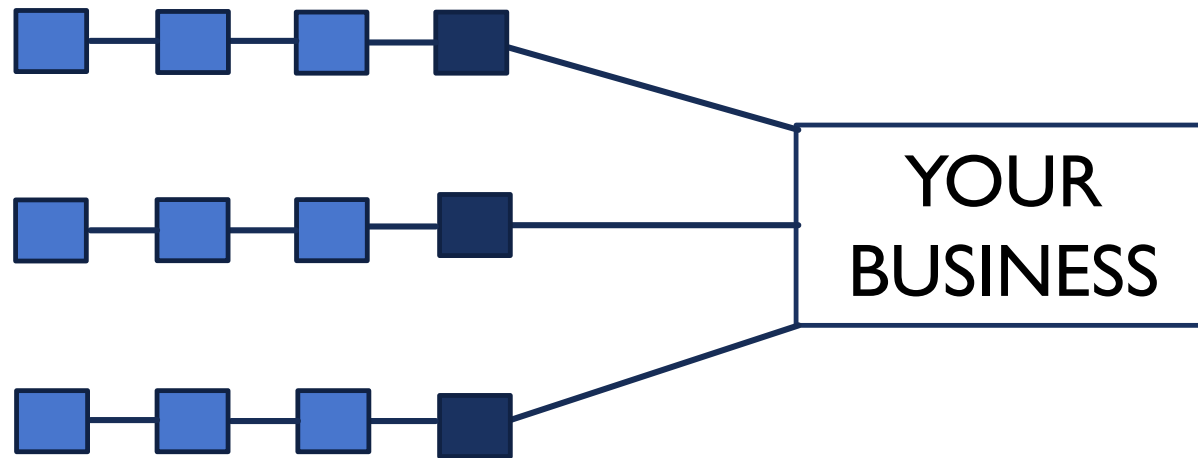
Relationships With External Stakeholders

SUPPLIERS

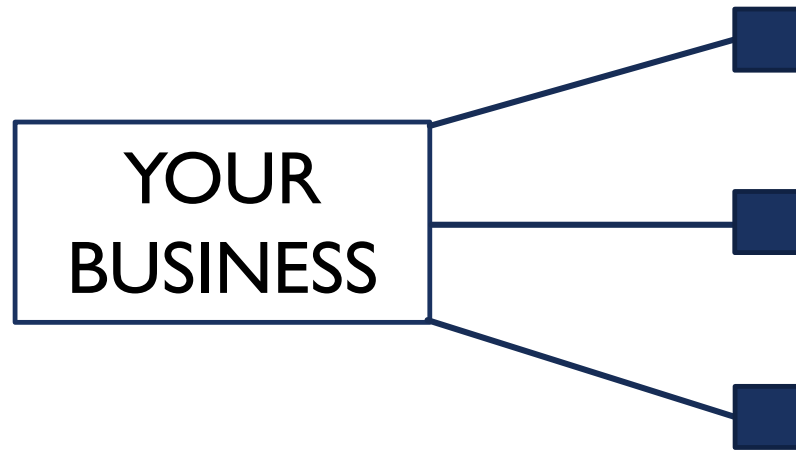


Relationships With External Stakeholders

SUPPLY CHAINS

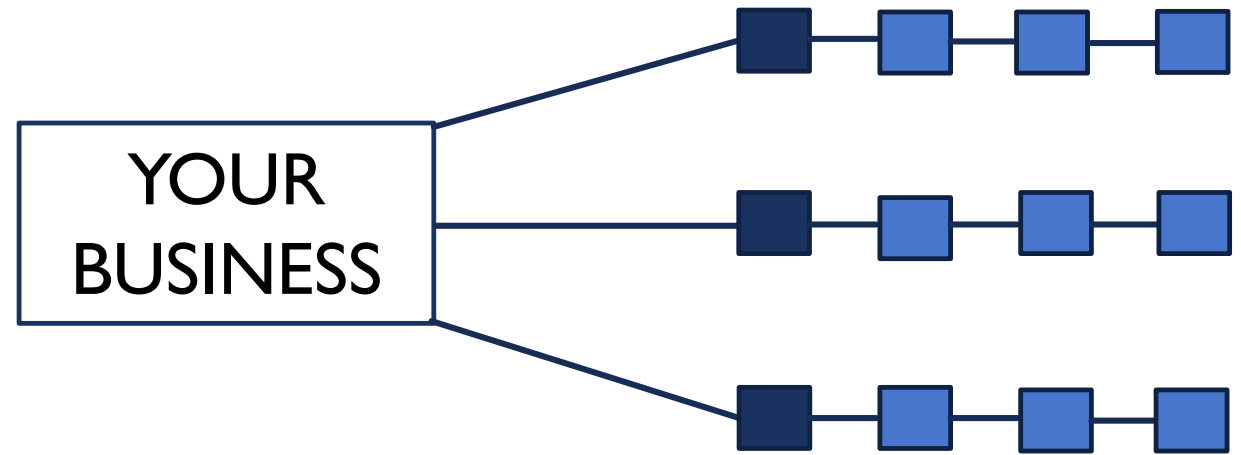


Relationships With External Stakeholders



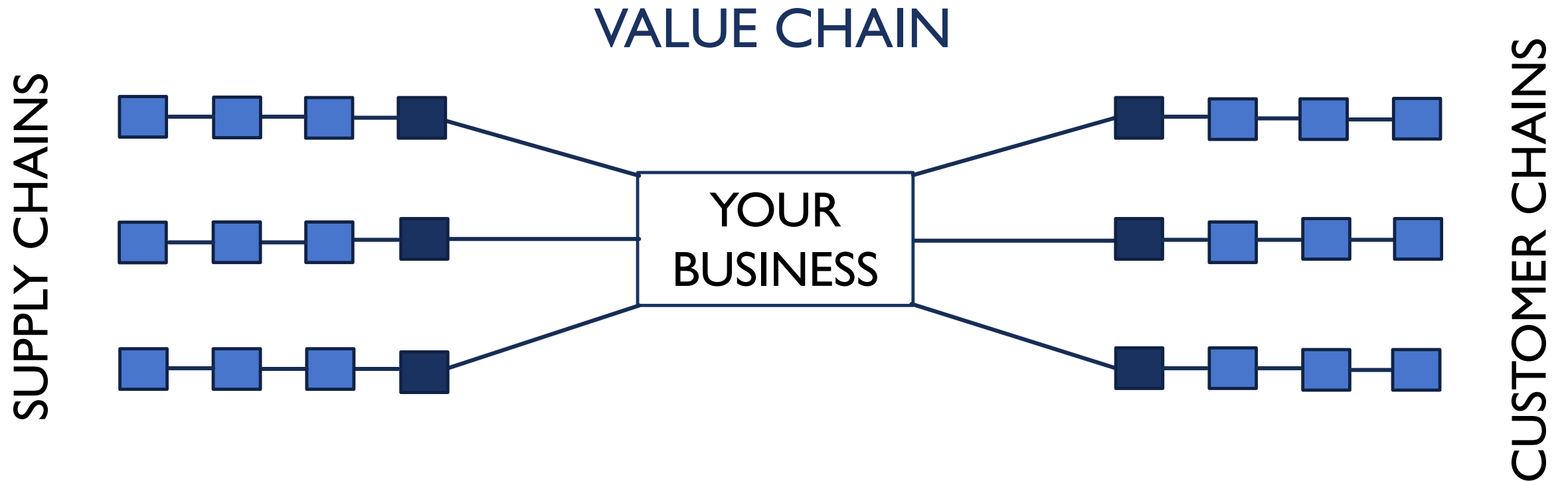
CUSTOMERS

Relationships With External Stakeholders

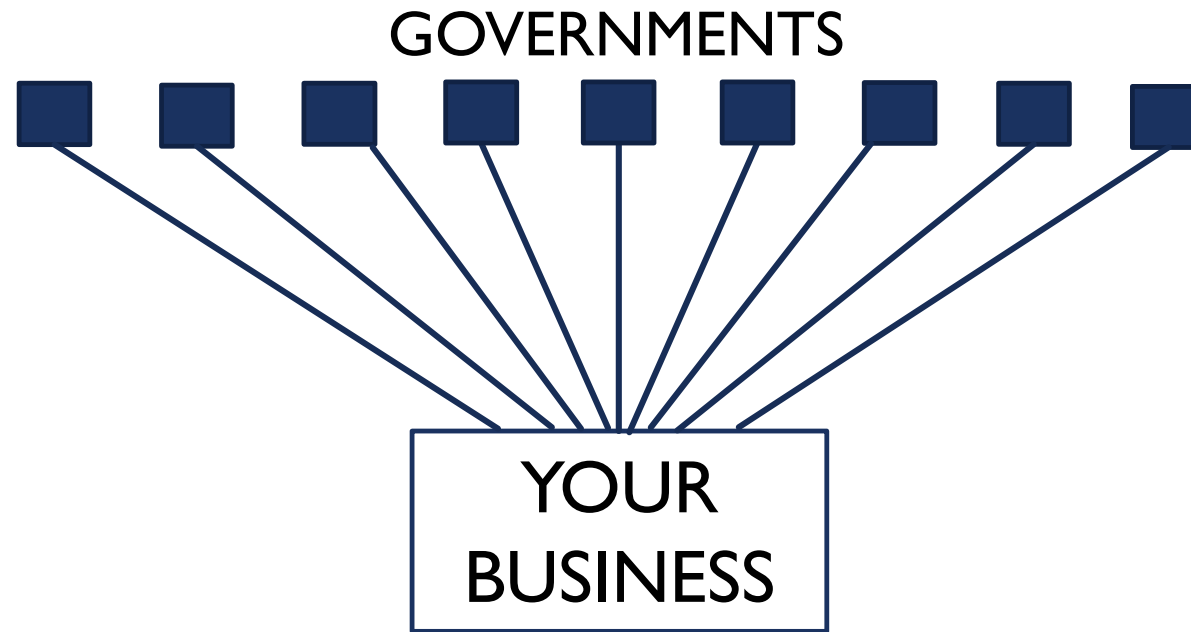


CUSTOMER CHAINS

Relationships With External Stakeholders



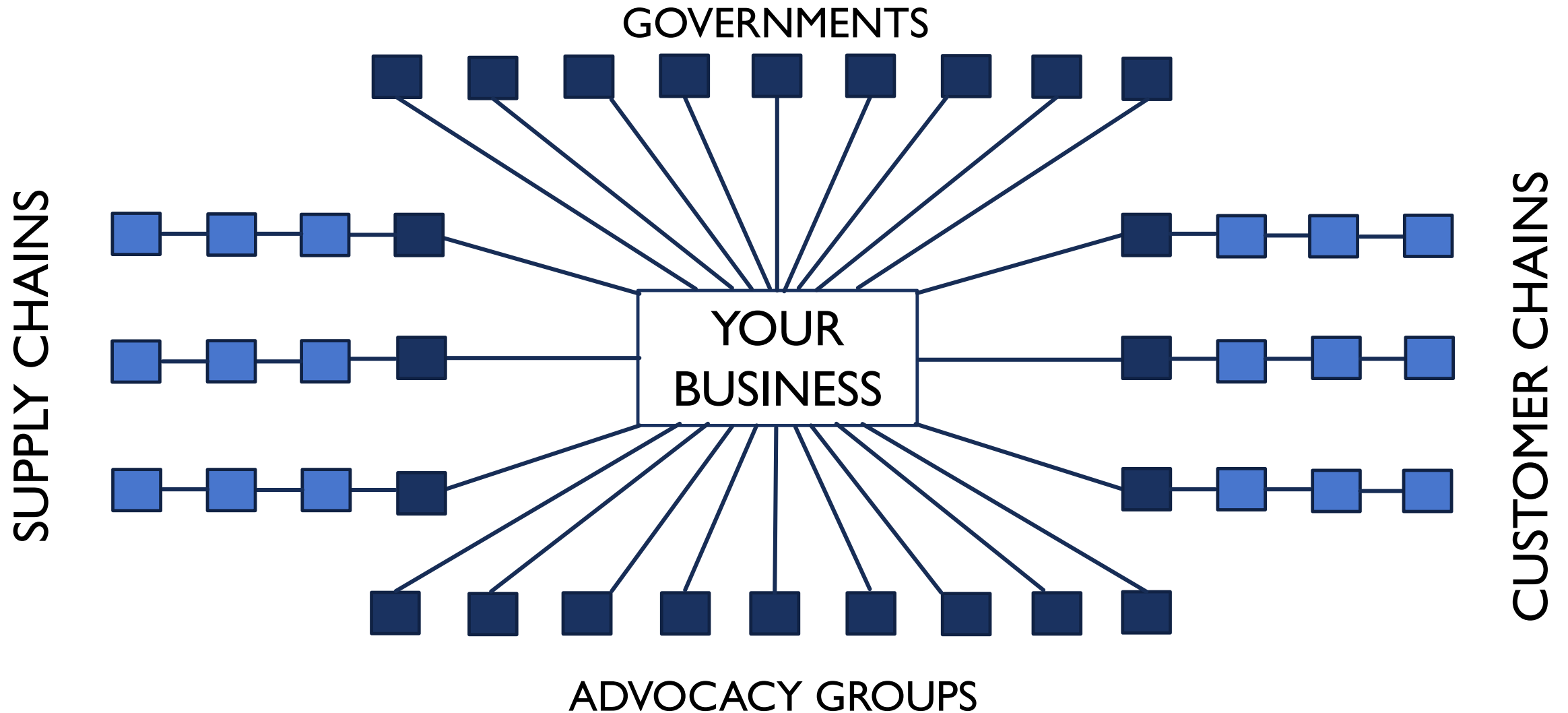
Relationships With External Stakeholders



Relationships With External Stakeholders



Relationships With External Stakeholders



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My Gift to You



Download the Vichara Industry Map and a free white paper at:

www.vicharapartners.com/chemicalwatch2019

Thank You!



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