

***Integrated  
Engineering Innovation and Entrepreneurship  
Environment***



## Topics:

- **What problem are we trying to solve?**
- How will we solve it?
- Why will this solution work?

## Old Approach to Technology Development:

- Intelligent Fast Failure
  - Fail Fast
  - Fail Often
- Think out of the box
- Fill white spaces
- New product –  
New market quadrant
- ***It is OK to fail!***

Think outside of  
“The Box”



“The Box” of all  
the things you  
currently do.



## Old Approach

- Intelligent Fast Failure
  - Fail Fast
  - Fail Often
- Think out of the box
- Fill white spaces
- New product –  
New market quadrant
- It is OK to fail!

## Changing Nature of Innovation

Over the last decade, the nature of “innovation” has changed.

## New Approach

- Intelligent Fast Success
  - Succeed Fast
  - Succeed Often
- What’s the ROI?!

**Must create an improved  
“environment for innovation”**

## What do we want?

- **New** products, services, and businesses
  - That are **high value**
    - Generate high sales and profits,
  - And have **sustainable competitive advantage**
    - Continue to be better than our competitors.



## Our specific goal:

We want to **develop and apply new technologies** for these new products and services.

***OK! What's the problem?***

## What problem are we trying to solve?

Valuable resources (you!) are applied...

To technology development activities...

That do **not** generate adequate sales and profits...

And sustainable competitive advantage.



So, this is primarily an **efficiency** problem:

- **Increasing need** for technology, but
- **Not enough resources** (people, equipment, money, etc...)

To say this another way, we need **profitable innovation**:

- Innovation is not enough!
- We need innovation that can **generate profits**!

***This is about making technology innovation  
more profitable.***

## What do we need?

We need a **set of processes** that can:

- Make better use of resources,
- Generate greater sales and profits,
- Generate products/services with sustainable competitive advantage.

We want to answer the question:

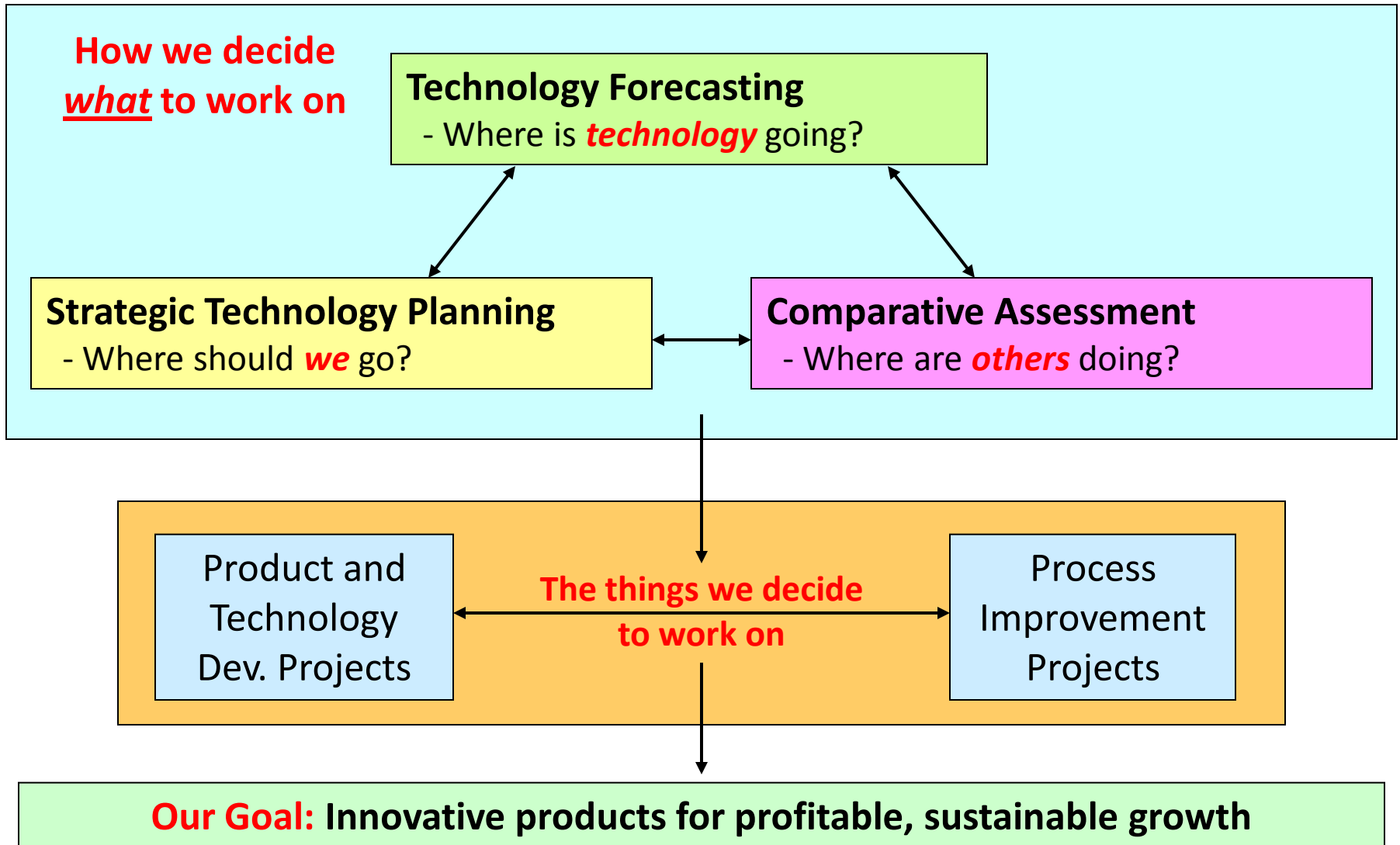
***Innovate on WHAT?!***



## Topics:

- What problem are we trying to solve?
- **How will we solve it?**
- Why will this solution work?

# The Big Picture...



# Big Picture...

## Technology Forecasting

- Identify/predict technology trends
  - That have the potential to create significant new
    - Customer needs and
      - Solutions to customer needs.

## Strategic Technology Planning

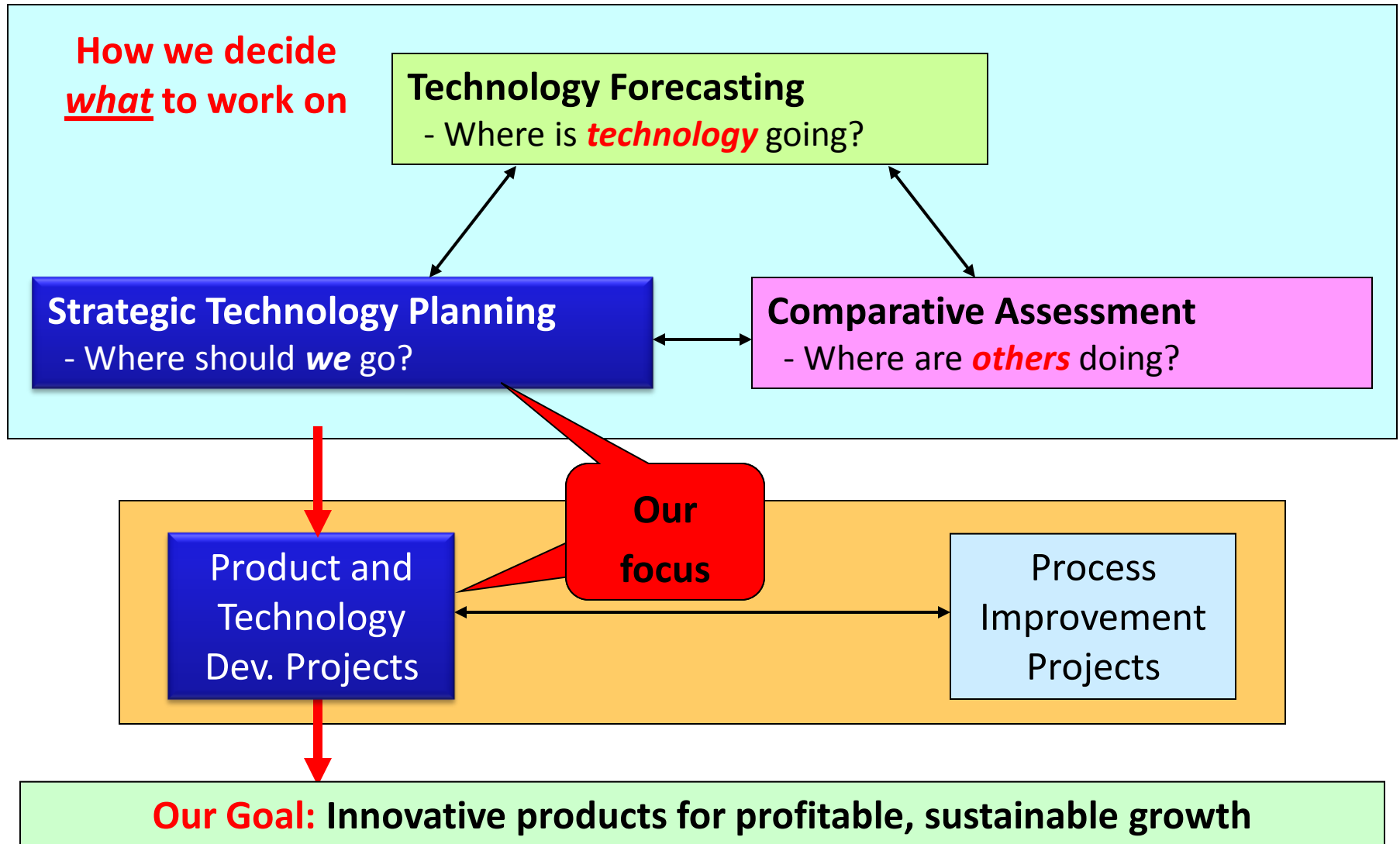
- Develop strategic plans
  - That stimulates profitable, sustainable growth
    - By incorporating new technologies in products/services
      - That provide sustainable competitive advantage.

In “real life”,  
these are done  
concurrently...

## Comparative Analysis

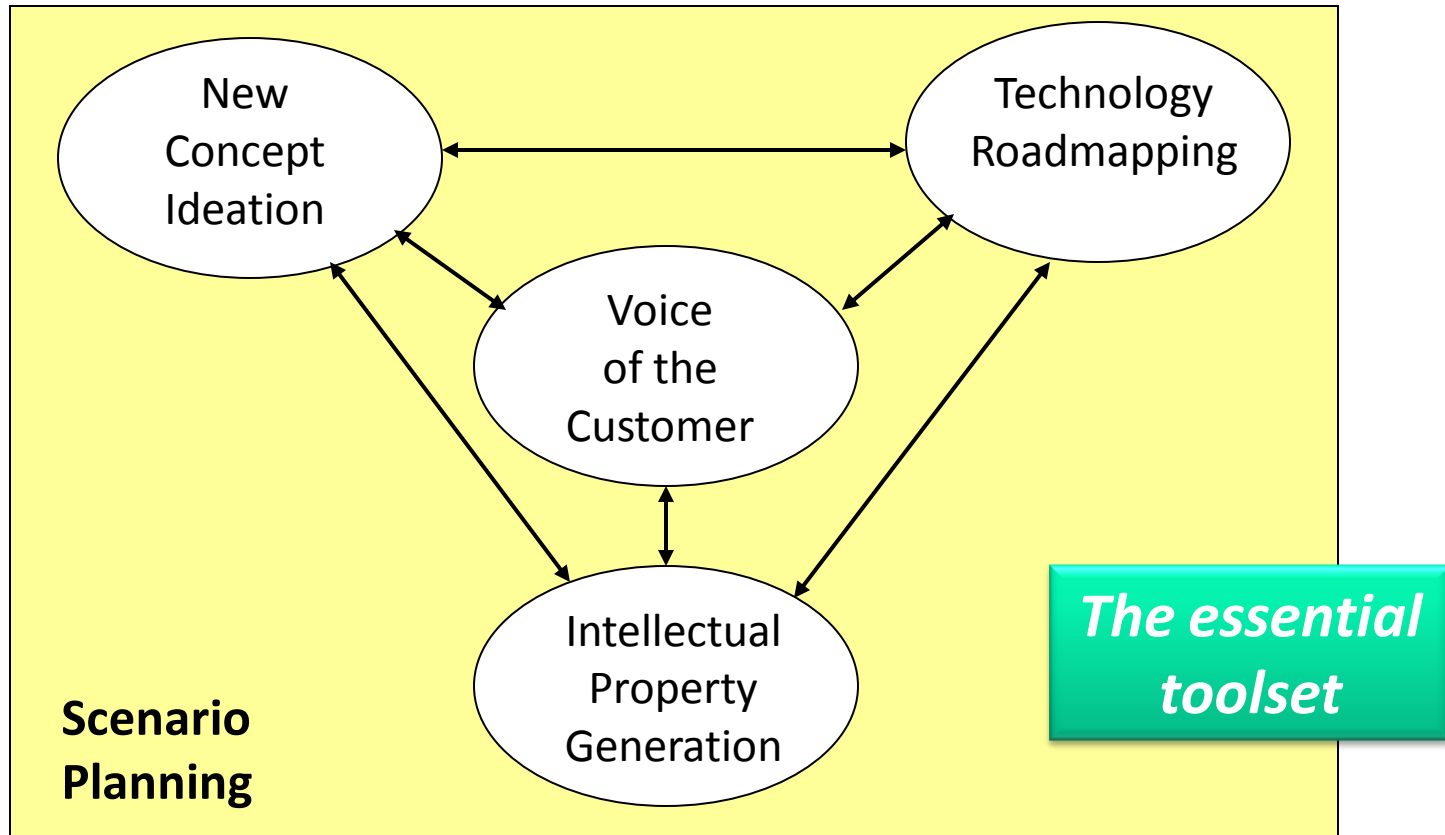
- Compare technology forecasts and strategic technology plans
  - With selected target organizations
    - To verify strategy,
      - Establish metrics and baselines,
        - And identify best practices.

# This course...



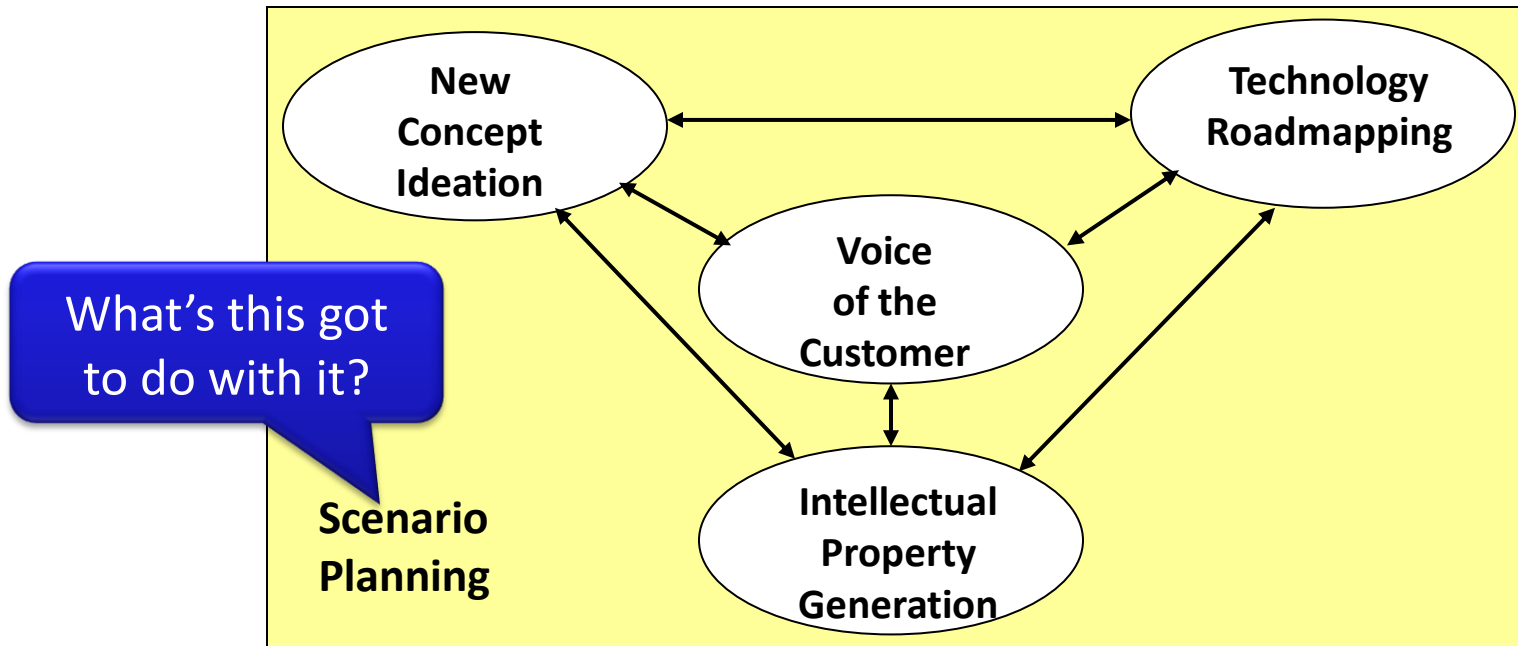
# Strategic Technology Planning

*What is it?!*



# Components of the IEIEE

- **Voice-of the-Customer Input Process:**
  - ~ Reveals unrecognized customer needs - what we **don't** know.
  - ~ Validates our perceptions and plans - what we **do** know.
- **Ideation Process:**
  - ~ Generates breakthrough **solutions**.
  - ~ Generates/discovers new customer **needs**.
- **Technology Roadmapping Process:**
  - ~ **Defines and communicates** technology directions, associated opportunities, and resource requirements.
  - ~ Explicitly highlights technology **gaps**.
  - ~ Creates a mindset and provide structure for conceptualizing and capturing a technology **vision** for the future.
- **Intellectual Property Generation Process:**
  - ~ Provides **sustainable** competitive advantage.
  - ~ **Limits** competitors' offerings.

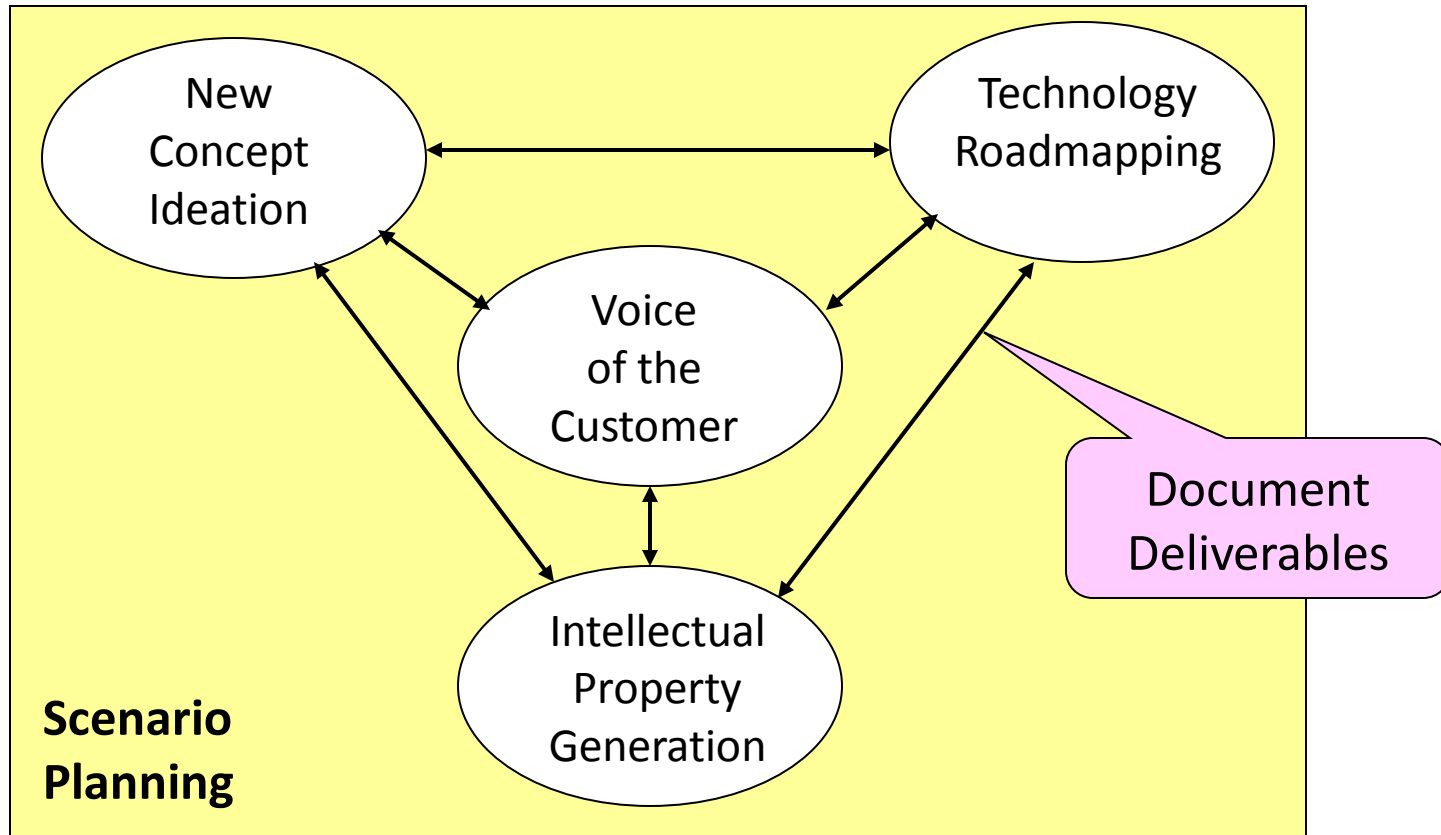


Given the **long lead times** for technology development, projects must be directed at **moving targets** and **future needs** and solutions.

**Scenario planning** provides a context for anticipating the **future** location of **moving** targets.

# An Integrated Strategic Technology Planning Environment:

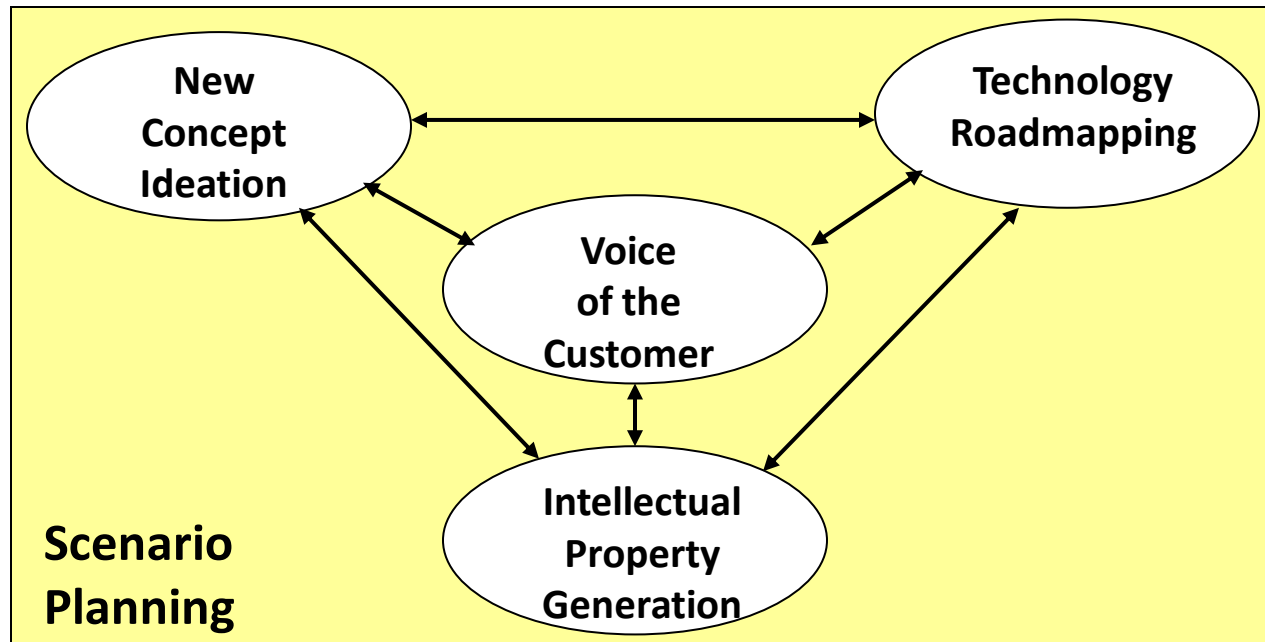
**Connecting** the pieces is essential!





## Topics:

- What problem are we trying to solve?
- How will we solve it?
- **Why will this solution work?**



# Voice of the Customer Input Process:

- **Purpose**

- ~ Validate our perceptions and plans - what we **do** know.
- ~ Reveal unrecognized customer needs - what we **don't** know.

- **Desired Strengths**

- ~ Systematic vs. anecdotal – turns over most of the rocks.
- ~ Fact-based vs. opinion-based prioritization of needs.

- **Potential Weaknesses**

- ~ Can create inappropriate customer expectations.
- ~ Risks compromising intellectual property – tip our hand.
- ~ Can keep us from being more inventive than our customers.

# Intellectual Property Generation Process:

- **Purpose**

- ~ Provide *sustainable* competitive advantage (we can).
- ~ Limits competitors' offerings (they can't).

- **Desired Strengths**

- ~ Supports intangible asset based growth (vs. tangible asset).
- ~ Stimulates an “innovation mentality”.
- ~ Foundation for *internal* technology transfer.

- **Potential Weaknesses**

- ~ Needs novel, non-obvious inventions = high-grade raw materials.
- ~ Needs useful, profitable inventions = valid value proposition.
- ~ Needs purpose, direction, priorities = strategic focus.

# New Concept Ideation Process:

- **Purpose**

- ~ Generate breakthrough solutions (stimulates research).
- ~ Generate/discover new customer needs (stimulates markets).

- **Desired Strengths**

- ~ Improves effectiveness of “brainstorming” (ideas per minute).
- ~ Liberates inventors from artificial/inappropriate constraints.
- ~ Inclusive - provides equal opportunity for all ideas/inventors.

- **Potential Weaknesses**

- ~ Can lack focus (afraid to miss cool ideas).
- ~ Can miss the customer value proposition (cool but useless ideas).
- ~ Needs a destination for ideas (good ideas can drift off into space).

# Technology Roadmapping Process:

- **Purpose**

- ~ Define and communicate technology directions, associated opportunities, and resource requirements to all stakeholders (what, why, how).
- ~ Explicitly highlight technology gaps (can't get there from here).
- ~ Create a mindset and provide structure for conceptualizing and capturing a technology vision for the future (means as an end).

- **Desired Strengths**

- ~ Forces clear understanding and articulation of direction (no hand waving).
- ~ Provides convenient portal/linkages to lower planning levels (projects).

- **Potential Weaknesses**

- ~ Easy to roadmap what we know, hard to roadmap **unknown** routes.
- ~ Can induce tunnel vision - is this where **customers** want to go?
- ~ Just a map - no built-in mechanism for driving to the end: New technology transferred into new products.

## Process Weaknesses and Implications:

Process	Weaknesses	Implications
<b>IP Generation</b>	<ul style="list-style-type: none"> <li>~ Needs novel, non-obvious inventions.</li> <li>~ Needs useful, profitable inventions.</li> <li>~ Needs purpose, direction, priorities.</li> </ul>	~ File cabinets full of valueless invention disclosures waiting to be filed.
<b>Technology Roadmapping</b>	<ul style="list-style-type: none"> <li>~ Hard to roadmap unknown routes.</li> <li>~ Can induce tunnel vision.</li> <li>~ No mechanism for transferring technology.</li> </ul>	~ File cabinets full of directionless roadmaps.
<b>Ideation</b>	<ul style="list-style-type: none"> <li>~ Can lack focus.</li> <li>~ Can miss the customer value proposition.</li> <li>~ Needs a destination for ideas.</li> </ul>	~ File cabinets full of cool, useless ideas.
<b>Voice of the Customer</b>	<ul style="list-style-type: none"> <li>~ Can create inappropriate customer expectations.</li> <li>~ Can keep us from being more inventive than our customers.</li> <li>~ Risks compromising intellectual property.</li> </ul>	<ul style="list-style-type: none"> <li>~ <b>Disappointed customers.</b></li> <li>~ <b>Delighted competitors.</b></li> </ul>

*These are the problems we are trying to solve!*

## Interaction Compensates for Process Weaknesses:

Process	Weaknesses	Interaction
<b>IP Generation</b>	<ul style="list-style-type: none"> <li>~ Needs novel, non-obvious inventions.</li> <li>~ Needs useful, profitable inventions.</li> <li>~ Needs purpose, direction, priorities.</li> </ul>	<ul style="list-style-type: none"> <li>← Ideation</li> <li>← Voice of the Customer</li> <li>← Technology Roadmapping</li> </ul>
<b>Technology Roadmapping</b>	<ul style="list-style-type: none"> <li>~ Hard to roadmap unknown routes.</li> <li>~ Can induce tunnel vision</li> <li>~ No built-in mechanism for transferring technology.</li> </ul>	<ul style="list-style-type: none"> <li>← Ideation</li> <li>← Voice of the Customer</li> <li>← IP Generation</li> </ul>
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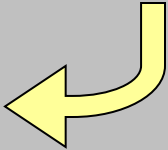
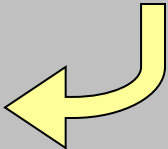
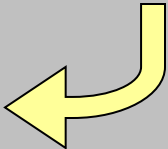
## Personal Experience:

- If you are not doing all of these processes,
  - Or if you are not connecting the processes,
    - Then you may be spending a lot of time and money,
      - And receiving very little benefit.
- **If you don't integrate these processes, then maybe you should just stop doing any of them!**
  - Otherwise, you simply raise expectations,
    - But ultimately disappoint all parties involved.



# An integrated system compensates for weaknesses:

- Table shows links *from* each element of the environment *to* the other elements.
- Read as (example): New Concept Ideation (From) prevents atrophy of the Technology Roadmap (To).

	From			
To	Technology Roadmap	New Concept Ideation	Voice of the Customer	IP Generation
Technology Roadmapping		Prevents atrophy - provides new destinations in unknown territories.	Validates selected routes - provides mid-course corrections.	Supports secure technology transfer for sustainable competitive advantage.
New Concept Ideation	Supplies boundary conditions to effectively focus "brainstorming".		Reveals new/unrecognized customer needs - innovate on what?!.	Provides means of systematically capturing and protecting inventions.
Voice of the Customer Input	Provides insight into direction - stimulates buy in to direction - controls customer expectations.	Pushes the envelope - insures that you are more inventive than your customer.		Supports secure discussion forum for generating intellectual property.
IP Generation	Supports strategic development of high-impact bullet-proof patent portfolios.	Provides high-grade raw materials - generates novel, non-obvious inventions.	Validates usefulness of intellectual property - increases value of IP portfolio.	