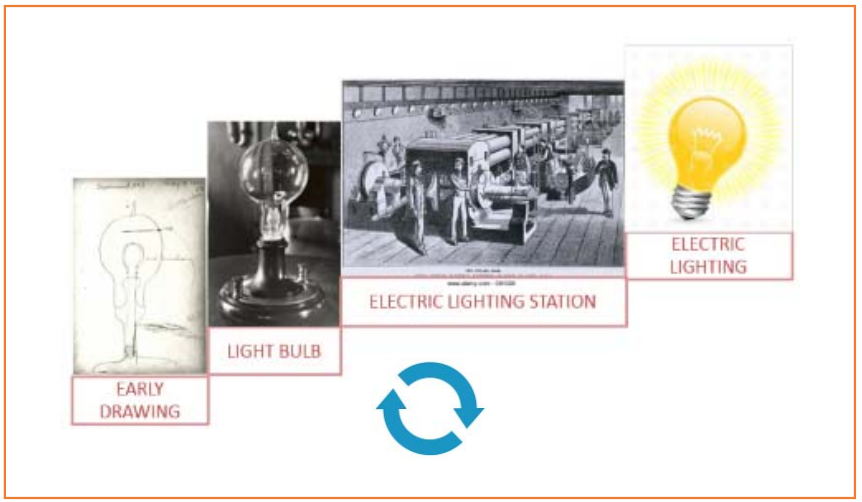
Design Thinking | Innovation in Products & Services

Presentation



Agenda

Need for Innovation | What is Design Thinking | Real | Win | Worth | Summary

Abhilash G, Principal Engineer, IDC/EPDA, 12 May 2017

Source:
Picture -

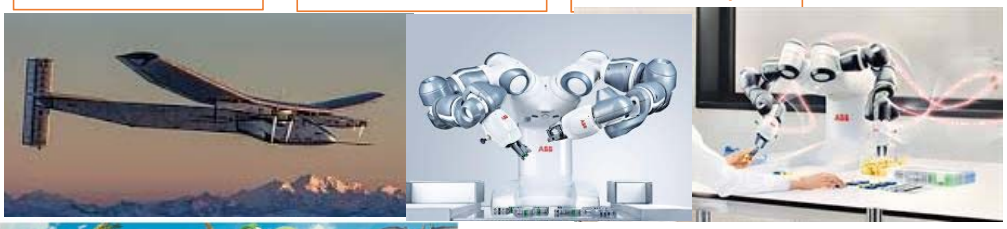
Need for Innovation| Opportunity

Identifying the Need

Innovation

Challenges facing every Industry – Why Innovate?[1]

Disruption in Products | Need for Speed | Competency Build up



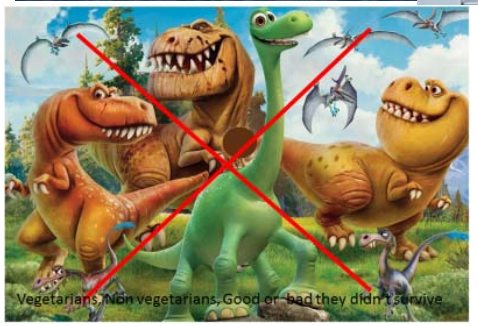


ABB is in the forefront of innovation

'If you're not at least surfing through a half dozen technical magazines a month and reading a handful of books like this per year, then it won't take a Cretaceous asteroid to make you a dinosaur.'

Tammy Noergaard in Embedded Systems Architecture

Key Factors Impacting Innovation

- Continuous Learning
- Time
- Do it Yourself
- Techniques
- Tools

IDEO Video: http://www.designthinkingnetwork.com/video/abc-nightline-ideo-shopping-cart

Innovation is the norm today!

Design Thinking | The Spirit

The Ethos of Design Thinking

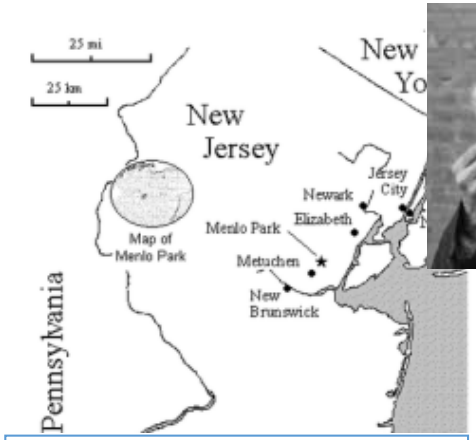
Innovation

R&D Laboratory

Edison devised the modern R&D Laboratory -At Menlo park he broke the mould of the 'lone genius inventor' by creating a team based approach to innovation by endless trial and error.

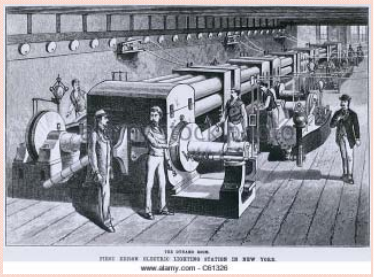
Edison reportedly stated 'Genius is one percent inspiration, ninety nine percent perspiration'.

Edison's Invention Factory



Menlo Park, New Jersey

Edison could conceive

Invented the Light Bulb	Envisioned how people would use it	Conceived fully developed Market Place
		

Design Thinking is a true descendent of this tradition!

Design Thinking | The Spirit

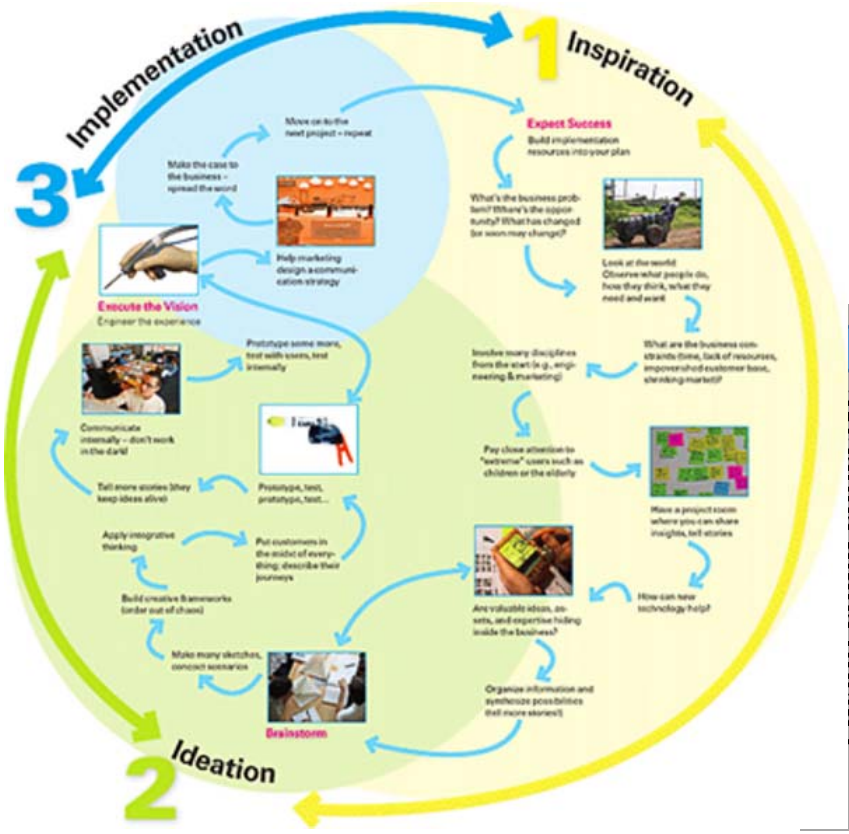
The Ethos of Design Thinking

Innovation

Design Thinker's Profile includes: Empathy, Integrative Thinking, Optimism, Experimentation, Collaboration.

Includes Inspiration, Ideation & Implementation which iterate as cycles.

Design Thinking - Approach



Inspiration	Ideation	Implementation
• Identify Gaps or Opportunities by means of Market Analysis, Interview with Customers and Observing them.	• Conceptualization of the Brainstorming, Opportunity via Decomposition of problem, Concept or Solution selection • Cash Flow Analysis to analyze benefit	• Creating a Prototype, Demonstrating and collecting early feedback
Real	Win, Worth	

Design Thinking is a true descendent of this tradition!

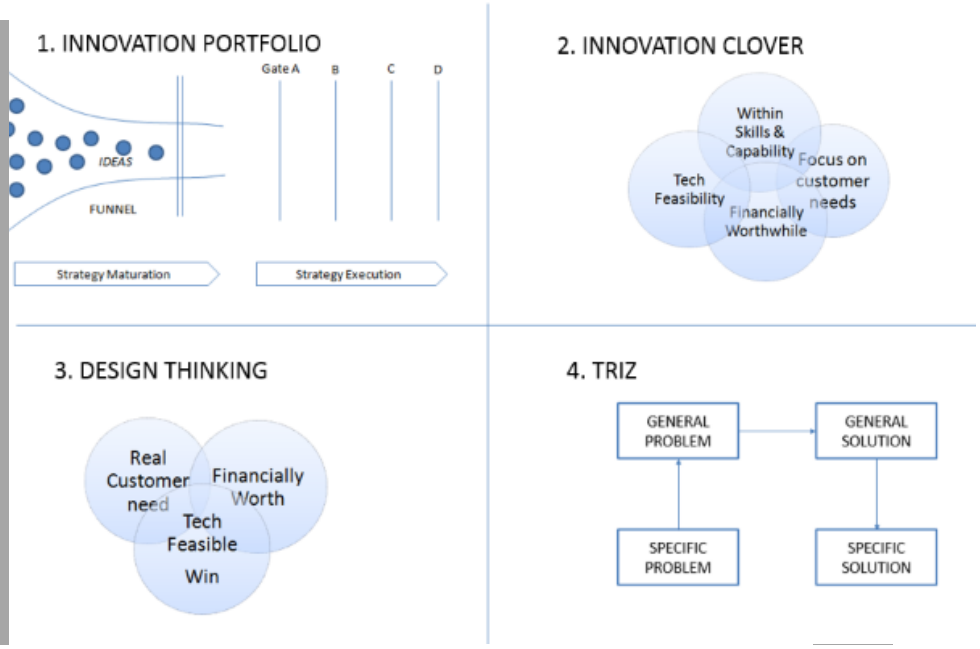
Innovation| Approaches

Schools of Thought

Innovation

Innovation Portfolio-Traditional funnel
Innovation Clover –Invent into Customer needs, within skills
Design Thinking –Customer Empathy
TRIZ – Pattern based and more Data and Systems driven including Patents

Innovation - Approaches



Innovation Portfolio	Innovation Clover	Design Thinking	TRIZ
• Traditional Funnel	• Invent into customer needs	• Customer Empathy • People driven	• Pattern based Data and Systems oriented approach

Design Thinking is a true descendent of this tradition!

Product Development Process | Empowering teams

How could it differ?

Innovation

Product Development Process might follow a staged gate model. The activities performed various stages are performed by experts in well defined roles. For example, Product/Technology Management is involved in Business Case, NPV Analysis. The worth is evaluated by Higher Management. The concept development is mostly done by a couple of selected architects.

Product Development @Org

Engineering Product/ Technology Manager
Performs product Initial Planning Phases involve Needs Analysis, building business case, discussion with Technology Management.
Evaluates the plans and costs.

Real, Worth Analysis done in early phases.

How could it differ with DT

Ideas from teams can turn to products.

Team members should know about Real, Win, Worth Analysis

Brings an intrapreneurship to the organization

Real, Worth Analysis done for every idea generated and applied by the team.

Effects in transformation towards Innovation and Speed with Customer empathy !

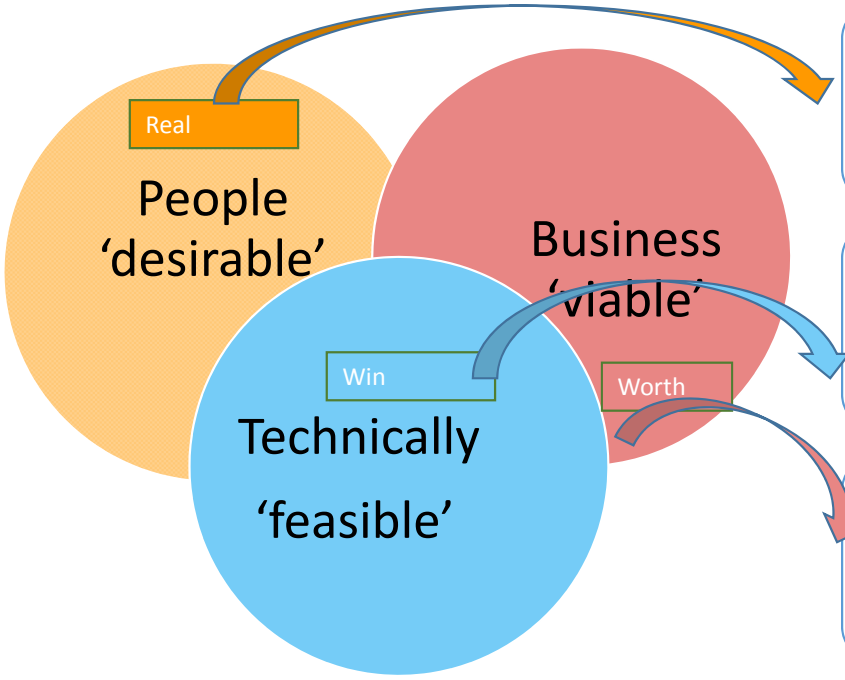
Design Thinking | Real, Win, Worth Analysis

Using Real, Win Worth for screening opportunity

Innovation

The sweat spot of Innovation can be found in intersection of People –desirable (Real), Technically-feasible(Win) and Business viable (Worth)

Design Thinking - Approach



Is there a Real Customer Need?
-Market Research
-Customer Interviews
-Observation at Customer Visit

Can we Win with a solution?
-Decomposition of major elements
-Identify solutions per element and down-select
-Identify solutions to Latent needs
-Combine the solution

Is it Worth it?
-Prepare a Base case model
-Perform Cash Flow Analysis
-Based on Net Present Value are we able to break even in 3 years?

Steven D. Eppinger, MIT Sloan

Material Link

https://emeritus.org/management-certificate-programs/innovation-design-thinking/

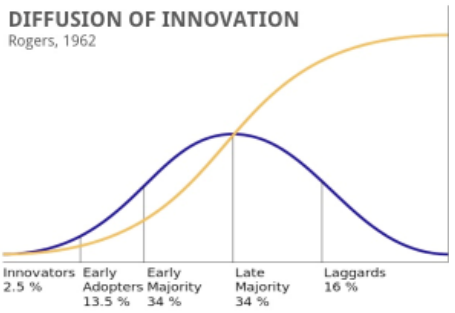
The sweet spot of Innovation

Design Thinking | Real

Is there a Real Customer Need?

Innovation

*Whether the need is real or not realized is identified by mix of methods of market research and performing a competitor analysis –leading to **a gap analysis, interviewing customers** and closely **observing them** during customer visit.*



Customer Needs Example: Cordless Screwdrivers

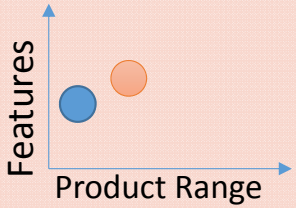
Source: Slideplayer.com

Arriving at Needs Statements

Primary and Secondary Needs
1. The system provides capture of experiences 1.1 The service captures as images, videos with audio, animation/3D videos. 1.2 The service captures experience using sensors smell, temperature, and necessary to recreate the experience. 1.3 The service provides capturing from multiple people.
2. The system provides store of experiences 2.1 The service provides storing the experience in different formats including existing ones like jpeg,mpeg4,etc, 2.2 The service provides storing in smaller storage needs.
3. The system provides synthesizing/curate experiences 3. 1 The service synthesizes from multiple sources 3.2! The service personalizes the experience for the user. 3.4! The service automatically synthesizes the preferences.
4. The system provides delivering experiences 4.1 The service delivers the experience at home 4.2 The service delivers at a theme park/ museum 4.3 The service delivers experience at a tourist destination 4.4 The service delivers at location of customer choice
5. The system is easy to use 5.1 The service/product is for everyone to use anywhere in the world across cultures and backgrounds. 5.2 The service/product provides ability to search and share content and also perform reviews and share the reviews
6. The system provides search facility 6.1 The service/product provides search for the destinations, content, reviews to aid decision making. 6.2 The service/product provides indexing with best search engines like Google.
7. The system provides a ranking of content 7.1 The system provides measuring content based on the value it created in terms of decision making, in terms of influencing customers.

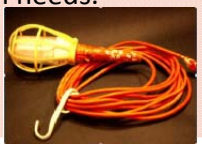
Market Analysis

- Identify Gaps in product ranges/solutions inside our own or competitor market segments



Interviewing Customers

- Visit customers and discuss with them one to one – face to face what key features they find beneficial and what they see to be improved.
- Lead users would guide us with inputs on some hidden needs.



Observing Customers

- Observe customers to Identify latent needs

Weigh needs and arrange them based on customer value

Design Thinking | Real

Case Study

Innovation

Identifying Customer Need is Real?

1. *Market Analysis and Competitor Feature Analysis:*
   Search in Market & Competitor Product information will provide deep insights
2. *How customers are using it? Do customers see value?*
   1. *Using a combination of interviews, customer visit based observations, checking with Business, Marketing and Sales or other Functions.*
3. *Are there latent needs which were never addressed? Have we observed any?*

Arriving at Needs Statements

Insights from Analysis

- 1. 9/10 thermostats not programmed
- 2. Customers found them too complex
- 3. Programming would have saved money and energy

From Needs Statements

- The installation is simple
  - 1 minute to fix the device on to wall.
  - Do settings by just a simple turn.
- !. The thermostat learns from customer behaviour and programs itself.

Nest Learning Thermostat

- Install Nest Thermostat, turn up and down to your temperature needs. It learns your preferences over two weeks and creates a program itself.

Mission Statement (Objective) – Identify Target Market/Customer base and identify Demographics.

It includes a little green leaf on the display when entering a temperature range most likely saves money.

Insights into Customer Need lead to great products!

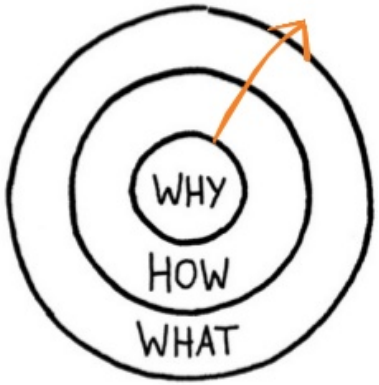
The Golden Circle

Leaders and organizations with the capacity to inspire think, act and communicate from the inside-out. **They start with Why.**

When we communicate our purpose or cause first, we communicate in a way that drives decision-making and behavior.

It literally taps the part of the brain that inspires behavior.

Simon Sinek - Start with Why



Collect Ideas from Each Individual, Identify teams and break for 10 minutes!

Make sure team get adequate break!

Once back from Break!

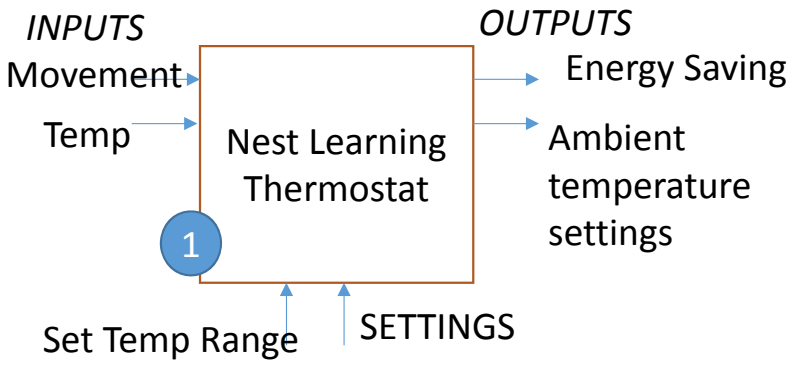
Team Brainstorms on the ideas, comes with one Idea as a team they want to continue with.

Design Thinking | Win

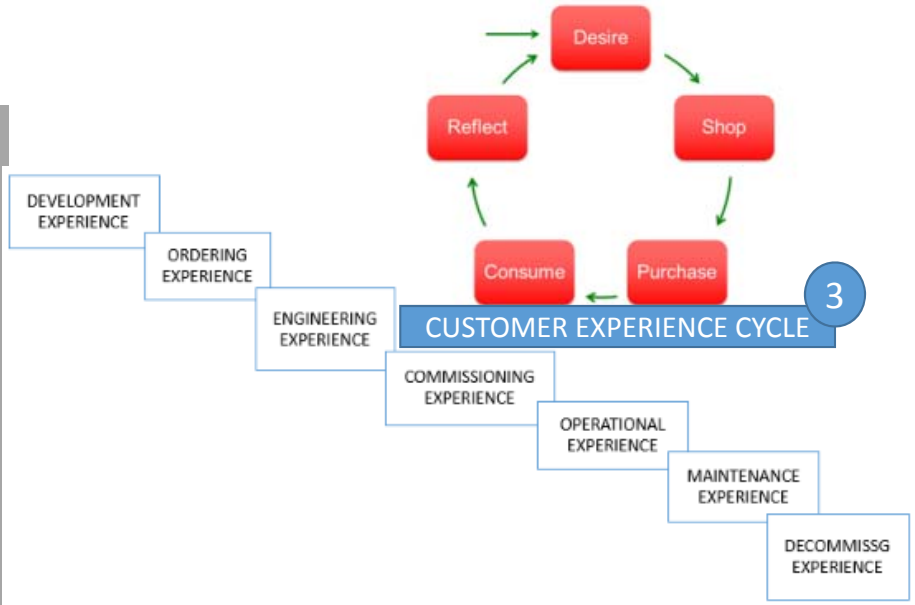
Decomposing the Concept

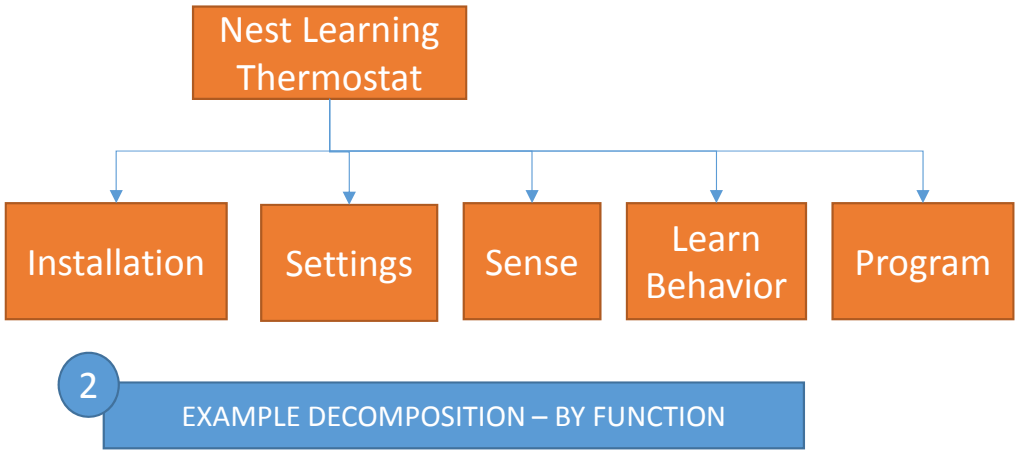
Innovation

Divide and Conquer :
Define Decomposition of Concept based on functions, inputs, outputs, settings etc. Create map of customer usage of the product or service.



Preparing Decomposition





Weigh needs and arrange them based on customer value

Design Thinking | Win

Concept Generation and Selection

Innovation

Concept generation through Individual work, Brainstorming, then coming to basic elements and then down-selecting and combining concepts is a continuous process.

1. *Prepare a tabular form where decompositions become columns.*
2. *Identify available and new approaches to solve these decomposed step. We can use SCAMPER.*
3. *The approach of concept generation and down selection is based on brainstorming, explore externally and explore internally.*

Preparing Concepts

Installation	Settings	Sense	Learn Behavior	Program
Stick by having a Magnet.	Set values by typing.	Temperature sensors	Supervised Learning	Change settings.
Stick by means of screws.	Set values by turning dial.	Nest Sense - Sense	Nest Sense – Learning Algorithm	Having small PLC Program
Stick by means of 3M tape.				

AN OLDER THERMOSTAT

Solution example

NEST Thermostat:
https://nest.com/support/article/About-SETTINGS

Arrive at the most promising solution!

Activity: Team brainstorms and does concept generation. Solution is ready & shared with facilitator!

Activity 3 and then break!

Design Thinking | Worth

Is it worth it Analysis?

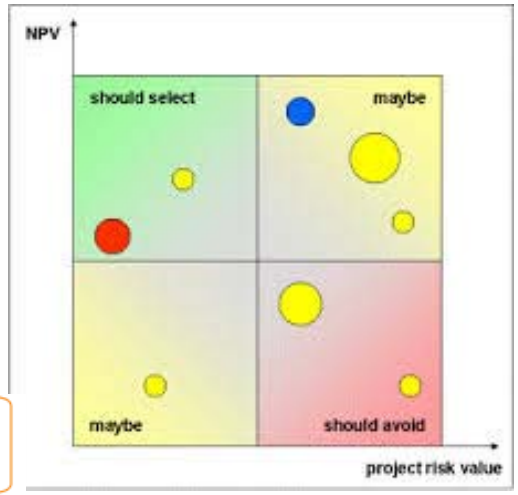
NPV Link : http://financial-dictionary.thefreedictionary.com/net+present+value

1. *You want to make an investment. Now you want to analyse the returns.*
2. *Simply put investing in business include risks. Therefore your expectation is return is higher than if the amount was invested in bank for the period for the period at a interest rate.*
3. *Net Present Value is a Comparison of this sort comparing Cash flows.*

Analysing Worth

		10%	
Amount	Year	1.1000	PV
-$1,000.00	0	1.0000	-$1,000.00
-$1,000.00	1	1.1000	-$909.09
-$1,000.00	2	1.2100	-$826.45
$4,000.00	4	1.4641	$2,732.05
		NPV =	-$3.48

$$NPV = \text{inital investment} + \frac{\text{Cash flow Year 1}}{(1+r)^1} + \dots \frac{\text{Cash flow Year n}}{(1+r)^n}$$



Example of Net-Present-Value Calculations

A, B, and C each have $100,000 to spend on a rental house. By the end of year 1, whoever buys the house will have earned $9,000 in rent after paying all expenses, and the owner will then sell the house and earn $103,000 after paying all closing expenses. Each of them has different requirements for their investments. A would like to earn a 4.5% return, B would like to earn 12%, and C would like to earn 13%. Whose investment needs will be met by buying the rental house?

	A	B	C
	4.5%	12%	13%
Initial investment	$100,000	$100,000	$100,000
Cash income from rent by end of year 1	9,000	9,000	9,000
Cash income from asset sale at end of year 1	103,000	103,000	103,000
Total year 1 income	112,000	112,000	112,000
Present value of year 1 income at the selected discount rate	107,177	100,000	99,114
Net present value, or the difference between present value and necessary investment of $100,000	7,177	0	(886)*
	Buy	Buy	Don't buy

A's net present value is positive, which means the investment will exceed A's requirements. B's net present value is 0, which means the investment will exactly meet B's requirements. C's net present value is negative, which means the investment will not meet C's requirements.

*The parentheses indicate a negative number, in this case −$886.

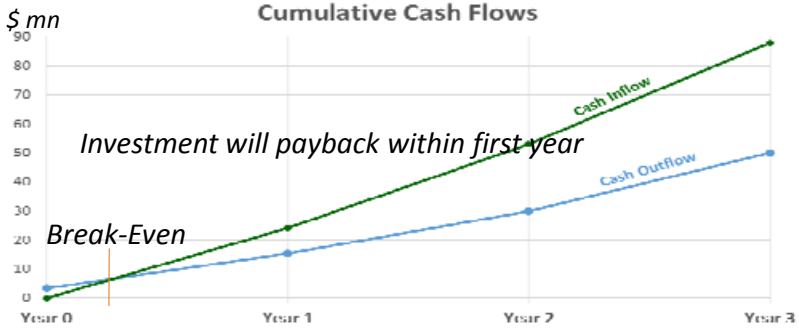
Is it Worth ? : Net Present Value is positive. The Project is worth Pursuing

Design Thinking | Worth

Is it worth it Analysis?

Values in million US Dollars

Details	*Year 0*	*Year 1*	*Year 2*	*Year 3*
Sales Revenue - B2B for Content Creation		12.95	14.95	17.27
Sales Revenue - B2B for Hosting Services		1.30	1.70	2.42
Sales Revenue - B2C		11.10	13.98	17.61
Total Revenue (Cash Inflow)		**24.04**	**28.93**	**34.89**
Business Set-up Cost	1.00			
Capital Cost of Content Creation Equipment	0.47	1.55	0.78	1.24
Application & Platform Development Cost	0.80			
Total CapEx (Cash Outflow)	**2.27**	**1.55**	**0.78**	**1.24**
Annual Cost for Cloud Platform Services		0.20	0.22	0.24
Market Launch	1.00	1.00		
Marketing Expenses			0.25	0.25
Content Creation Cost		6.55	9.61	14.25
Creative Team Salaries		1.37	2.01	2.09
Sales & Marketing Salaries		0.42	0.52	0.64
IT Support Team Salaries		0.30	0.37	0.46
General & Admin Salaries		0.14	0.18	0.22
Other Operating Expenses		0.50	0.62	0.76
Total OpEx (Cash Outflow)	**1.00**	**10.49**	**13.77**	**18.92**
Total Cash Outflow	**3.27**	**12.04**	**14.54**	**20.16**
Net Cash Flow	**-3.27**	**12.01**	**14.39**	**14.73**
Period Present Value (@ 8% discount rate)	*-3.02*	*10.29*	*11.42*	*10.82*
Net Present Value	**29.52**	**Worst Cast**	**Base Case**	**Best Case**
NPV *@ 8% discount rate*		**0.13**	**29.52**	**60.53**



Market Size Projection

	Base Projection	Worst	Base	Best
B2B				
No. of Govt Tourism Development Bodies	196			
No of Airlines	1,096			
No of Major Hotel Chains	45,500			
Others	5,000			
Total	**51,792**			
Market Size (Expected to Opt for VT)	10.0%	8.0%	10.0%	12.0%
Expected Market Share in first year	5.0%	3.0%	5.0%	7.0%
Market Share (No. of B2B customers) in first year	**259**			
B2C				
World' Population	110,000,000,000			
Business & Other Category Persons Targeted for Virtual Tourism	0.05%	0.04%	0.05%	0.06%
People with disabilities	190,000,000			
Target Market Size of Disabled persons for Virtual Tourism	0.25%	0.20%	0.25%	0.30%
Market Size	55,475,000			

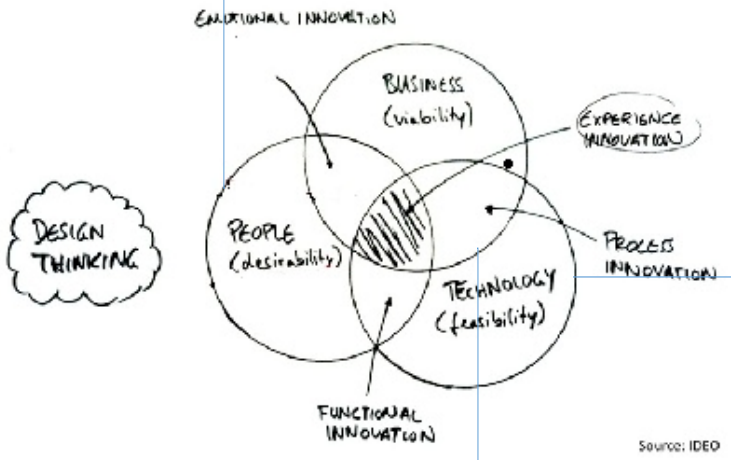
The Market Size Considering B2B and B2C is big. The Discount Rate at 8% is considered high since there are risks involved in the initial market traction. The Total Revenue at end of Year 1 is 24.04 Million USD. The Total CAPEX is 2.27 Million USD. The Break Even happens within the 1st Year. Net Present Value is 29.52 Million USD. Uncertainty involved as considered in Worst and Base cases.

Is it Worth ? : Net Present Value is positive. The Project is worth Pursuing

Real-Win-Worth| Conclusion

Is it a GO or NO-GO?

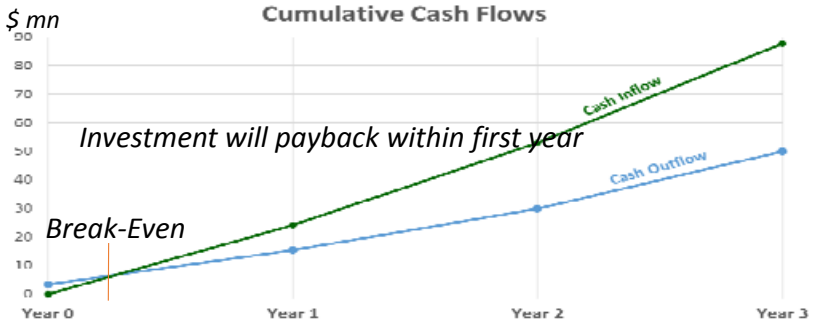
It's a GO!



Delivering Real Customer Latent needs

- !. The thermostat learns from customer behaviour and programs itself.

Technology that WINS market



Positive NPV

One Person from team presents on behalf of the team -Real-Win-Worth and states it is a Go or No Go!

After Activity 4 : Thank You!

Real-Win-Worth| References

Books and Material

1. Tim Brown, 'Change By Design'- How Design Thinking Transforms Organizations and Inspires Innovation.
2. Karl Ulrich, Steve Eppinger, Anita Goyal, 'Product Design and Development', MIT Press.
3. Simon Sinek, 'Start with Why'.
4. Don Norman, 'Design of Everyday Things'.
5. C. K. Prahalad and M. S. Krishnan, 'The New Age of Innovation: Driving Cocreated Value Through Global Networks'
6. Course: Innovation in Products & Services : MIT Sloan – Emeritus