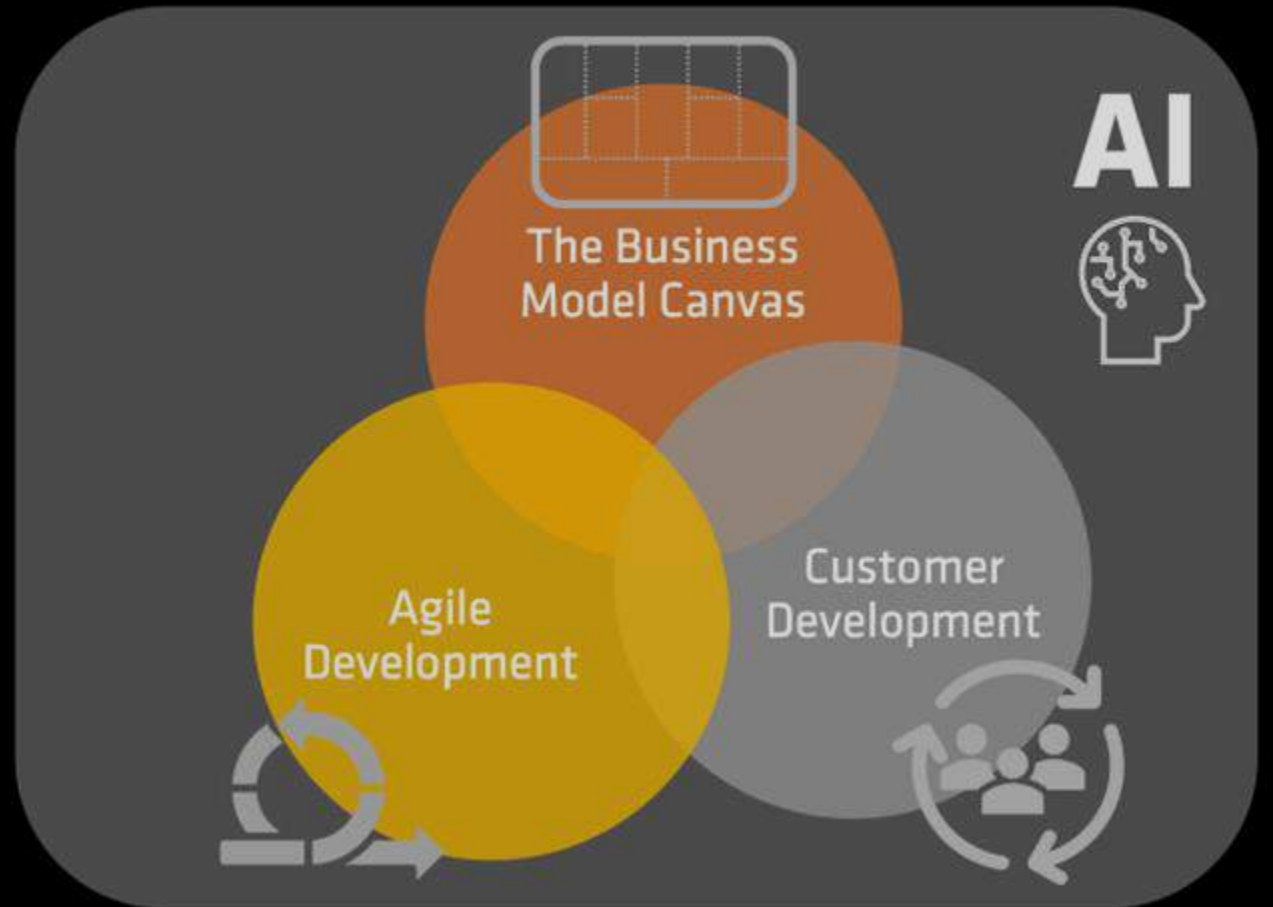


Entrepreneurship, Innovation and Technology Transfer

Testing Business Model Hypotheses

Luis Caldas de Oliveira



TÉCNICO LISBOA

Please close your computer and mobile
phone



From Hypotheses to Decisions

Building and Iterating Your Business Model



A scenic landscape featuring a paved road that curves through rolling hills. The hills are covered in green grass and some trees with autumn-colored foliage. In the distance, a herd of cows is visible in a field. The sky is a mix of blue and grey, suggesting an overcast day. The overall mood is calm and open.

The road to product-market fit

Test your key assumptions and make data-driven decisions



Reduce Risk and Uncertainty



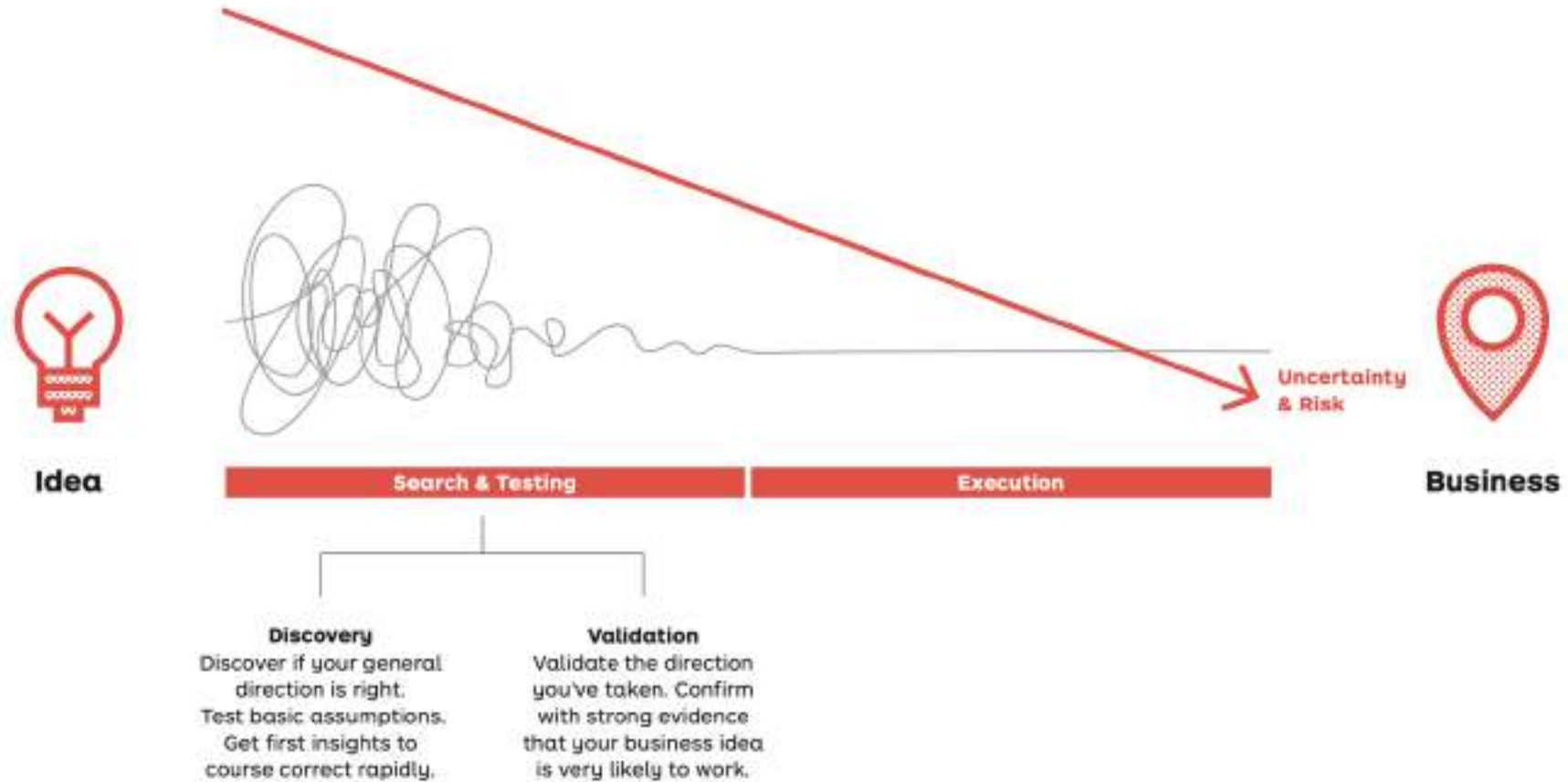
Idea



Business



Reduce Risk and Uncertainty



Customer Development

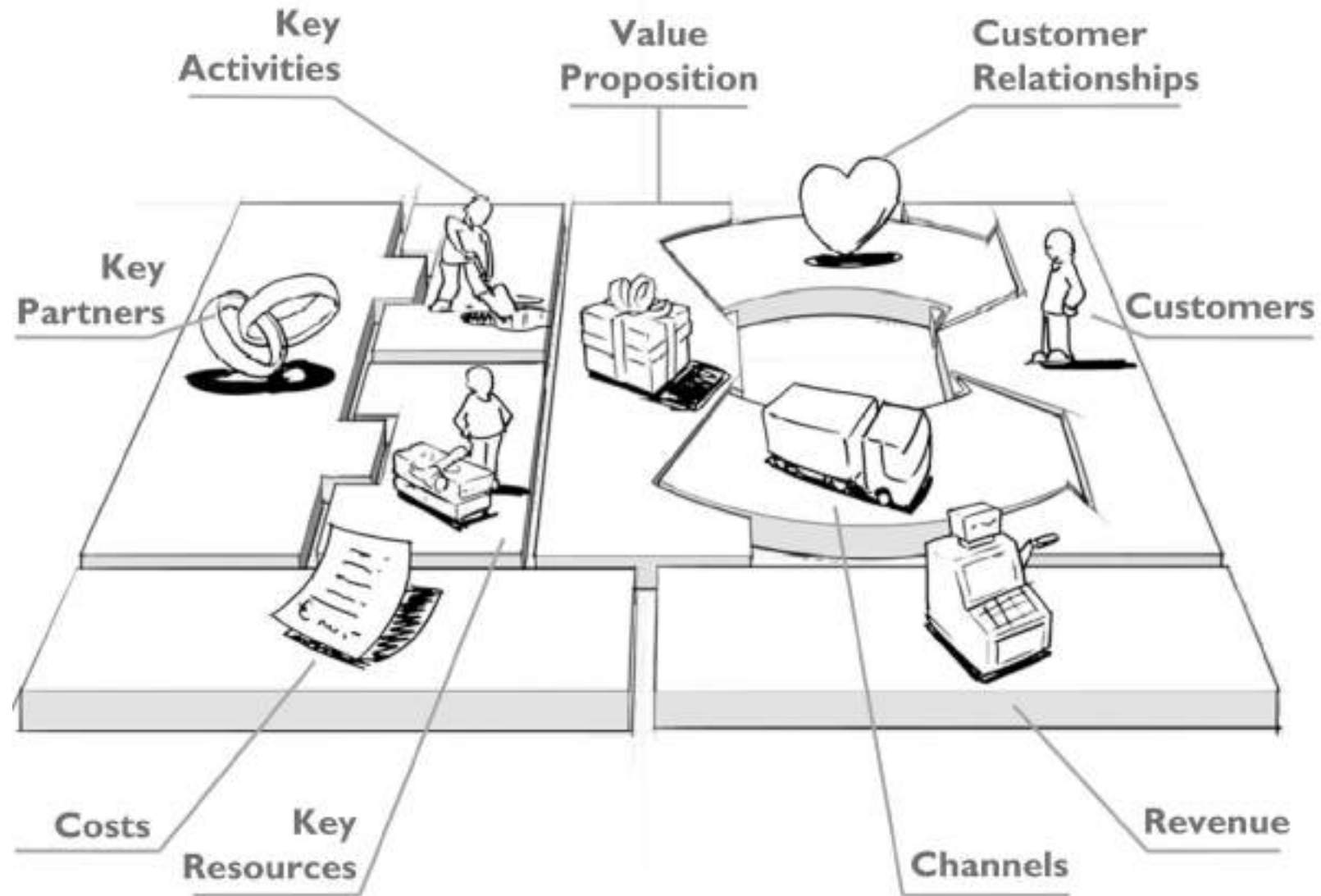


3 Questions



The Business Model Canvas (BMC)

A structured method for visualizing how a business creates, delivers, and captures value.

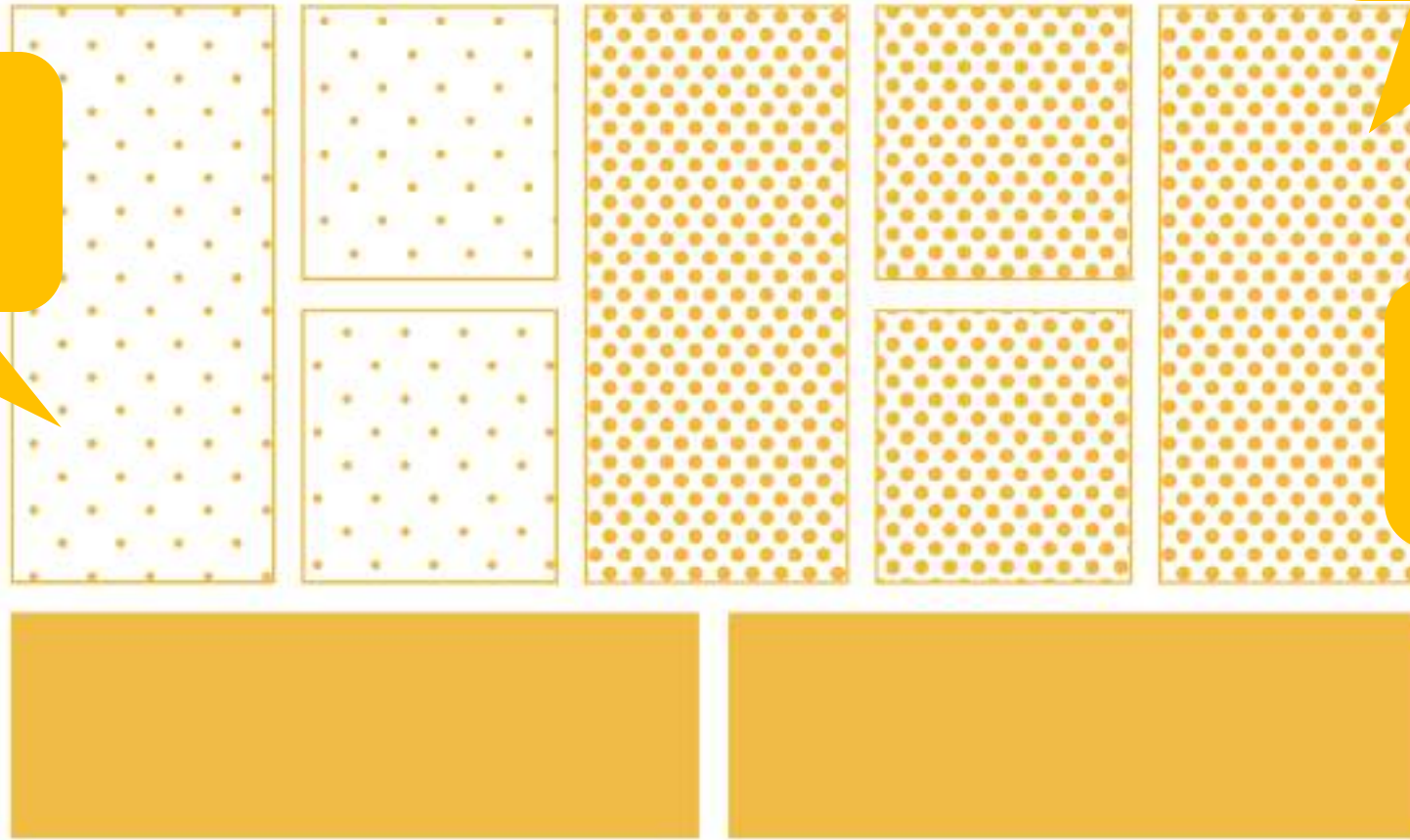


Reducing Risks

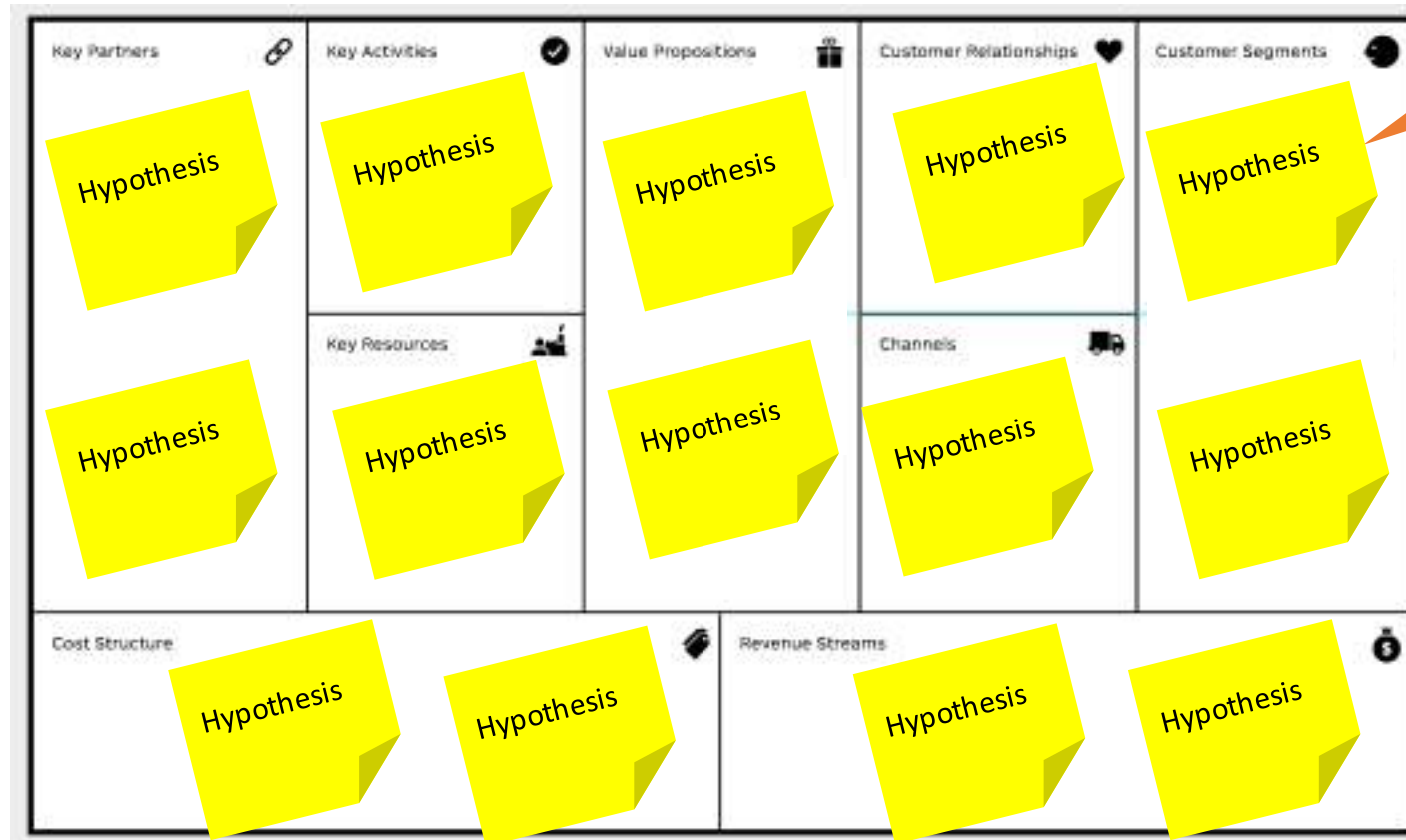
Feasibility risk:
We can't build and
deliver

Desirability risk:
Customers aren't
interested

Viability risk:
We can't make
enough money



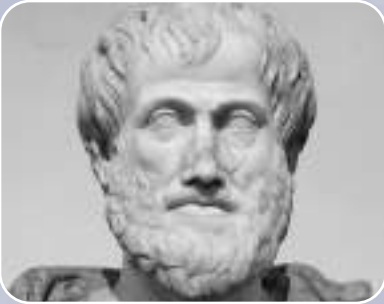
Business Model Hypotheses



Hypotheses need validation: use sticky notes!



A Synthesis of Ideas from Great Thinkers



Aristotle
Empirical
observation and
logic
(384–322 BCE)



Roger Bacon
Empirical
methods and
experimentation
(c. 1219/20–
1292)



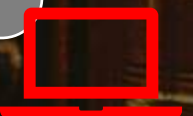
Galileo Galilei
Systematic
experimentation
and observation
(1564–1642)



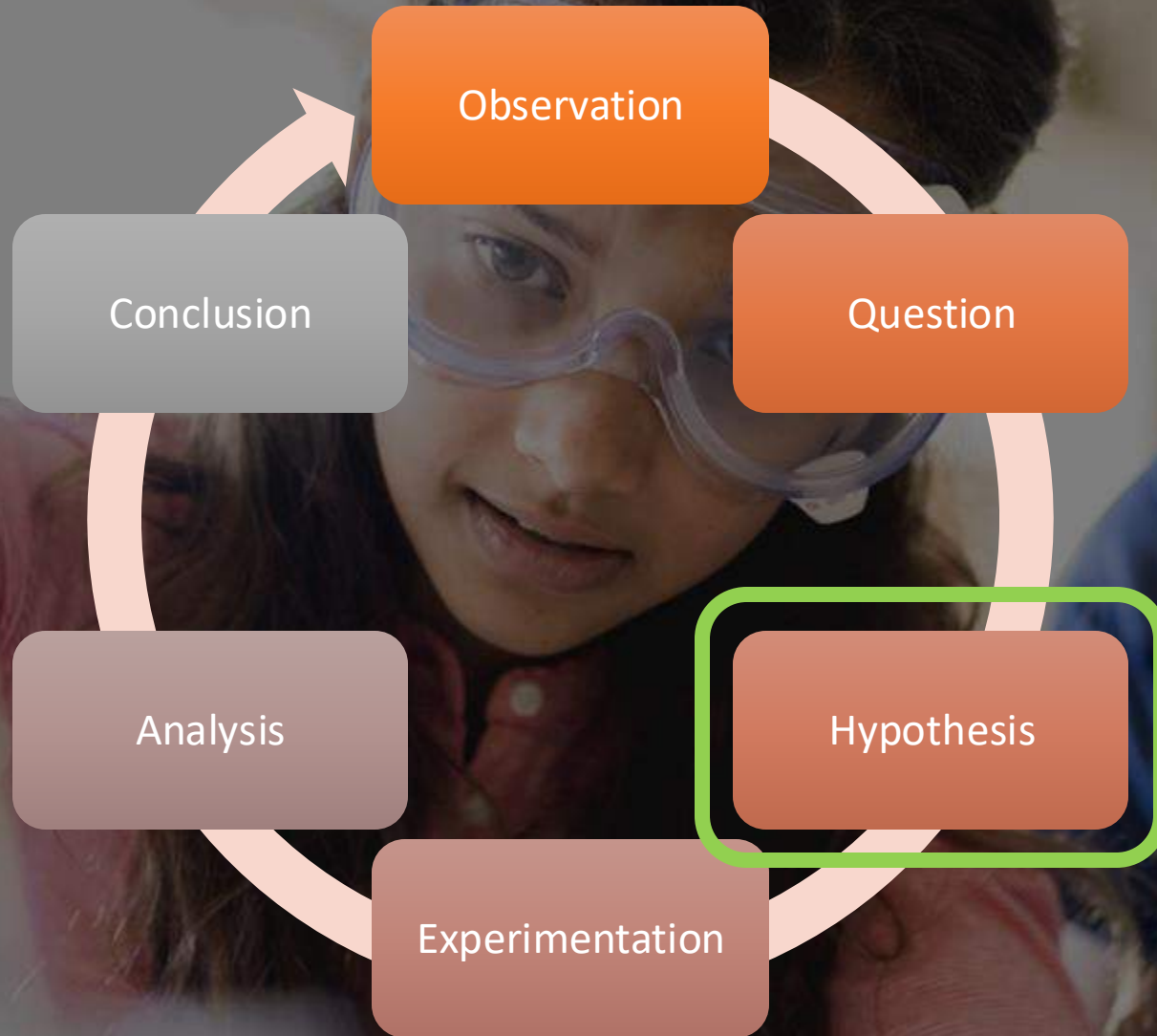
Francis Bacon
Inductive
reasoning
(1561–1626)



René Descartes
Deductive
reasoning and
systematic
doubt
(1596–1650)



The Scientific Method



Lean Startup: Evidence-Based Entrepreneurship

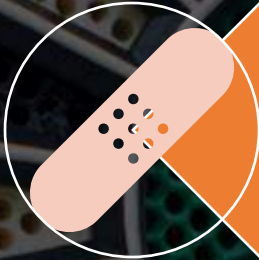
The **Lean Startup** applies the scientific method to business development by using iterative **experimentation** and validated learning to test **hypotheses** and make data-driven **decisions**.



What we want to avoid



Goals



Problem-solution fit



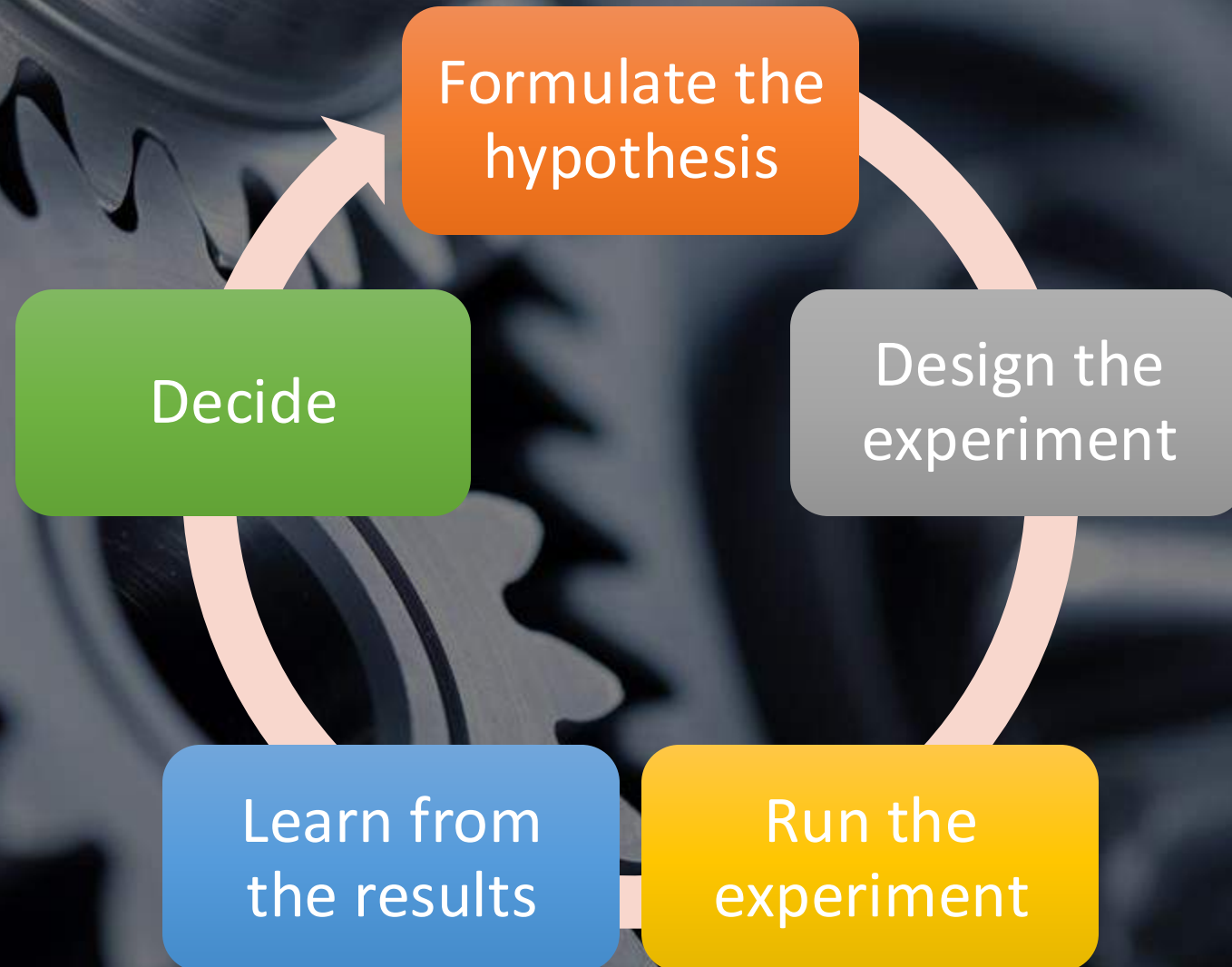
Product-market fit



Business model fit



The Customer Development Process





Business Hypothesis

A testable assumption about a key component of a business model

Something that
a founder
needs to learn



A Good Business Hypothesis I

- ✓ Is clearly defined
- ✓ Starts with “We believe that...”
- ✓ Can involve multiple Business Model Canvas hypotheses
- ✓ The opposing hypothesis should also be formulated



A Good Business Hypothesis II

Testable

True or False

Precise

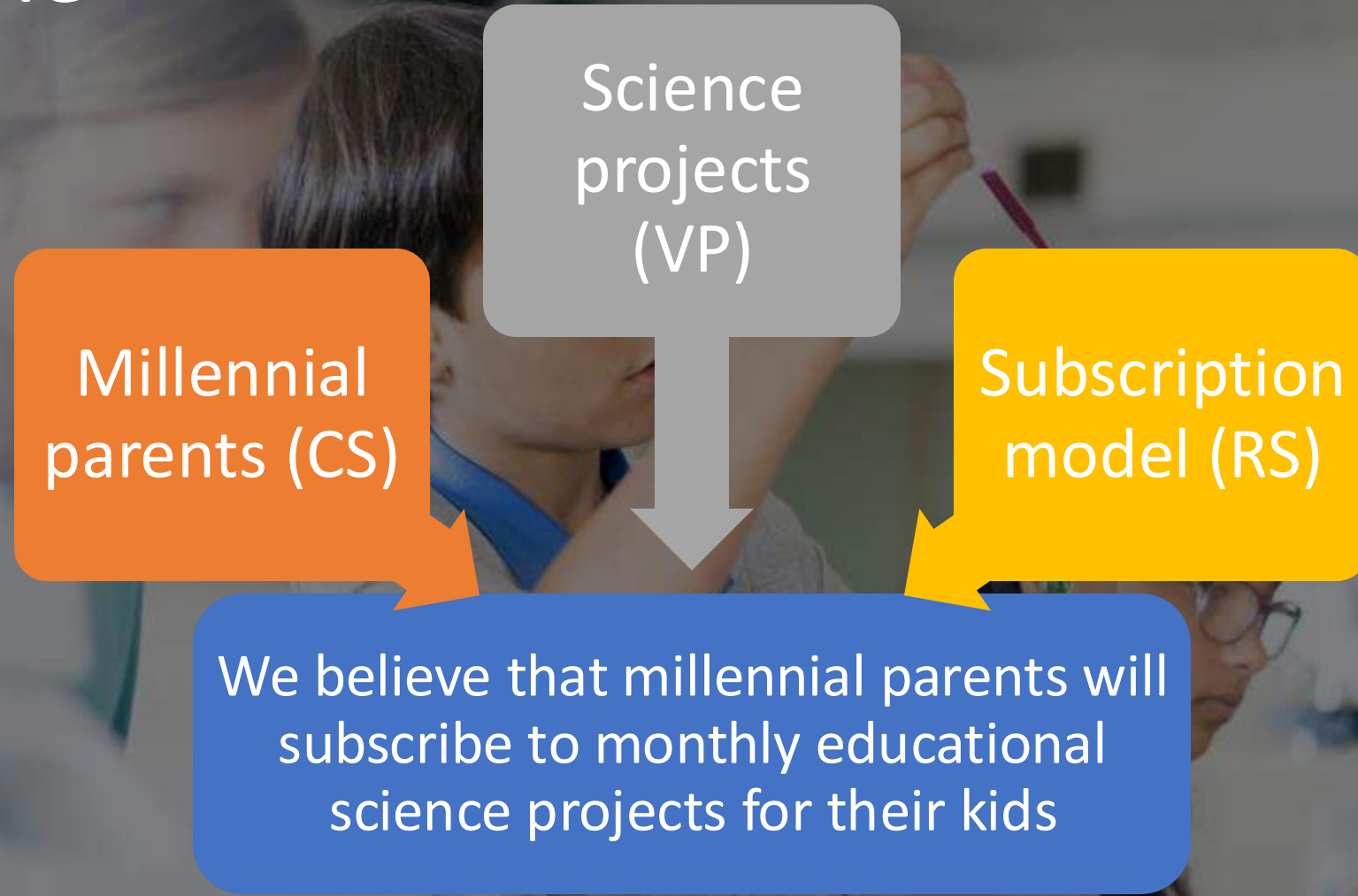
What, who,
and when

Discrete

No
confounding
factors



Example



Opposing Hypothesis

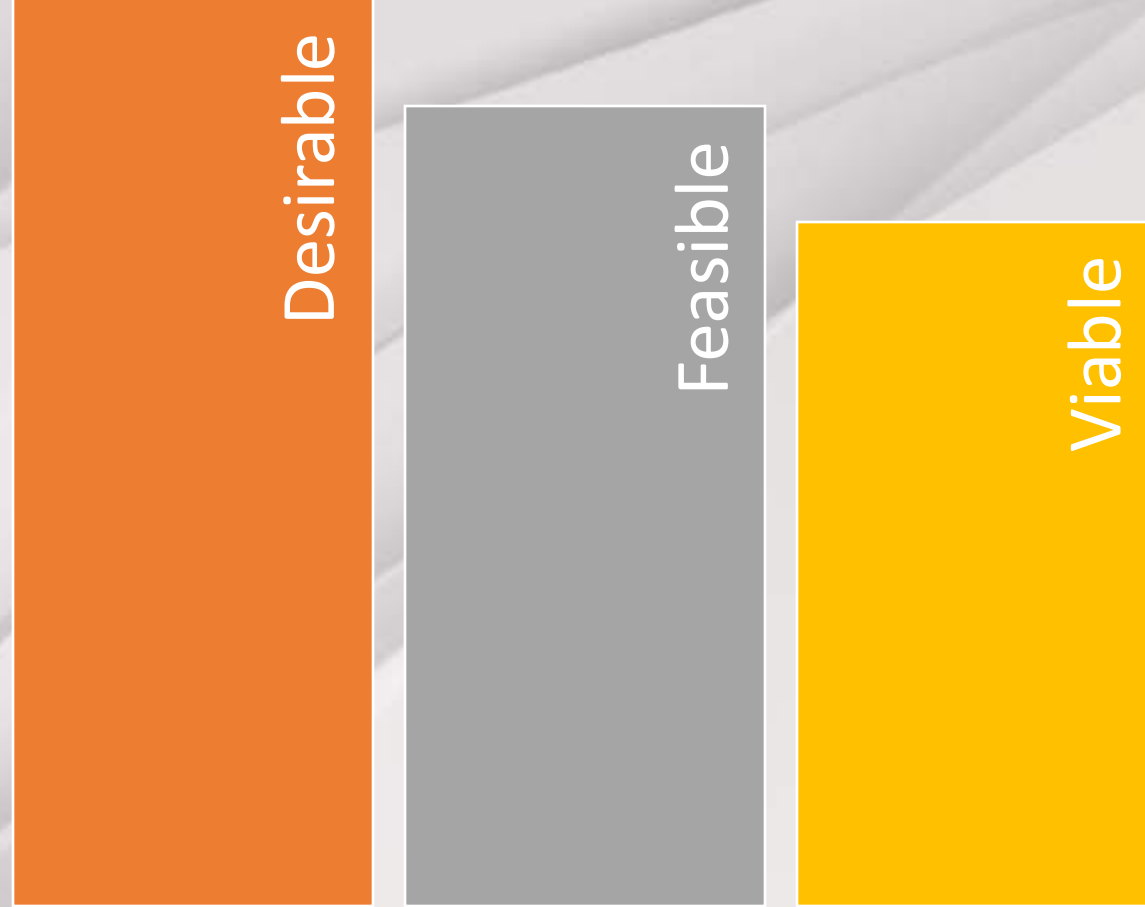
The opposing hypothesis should also be formulated

We believe that millennial parents won't subscribe to monthly educational science projects for their kids

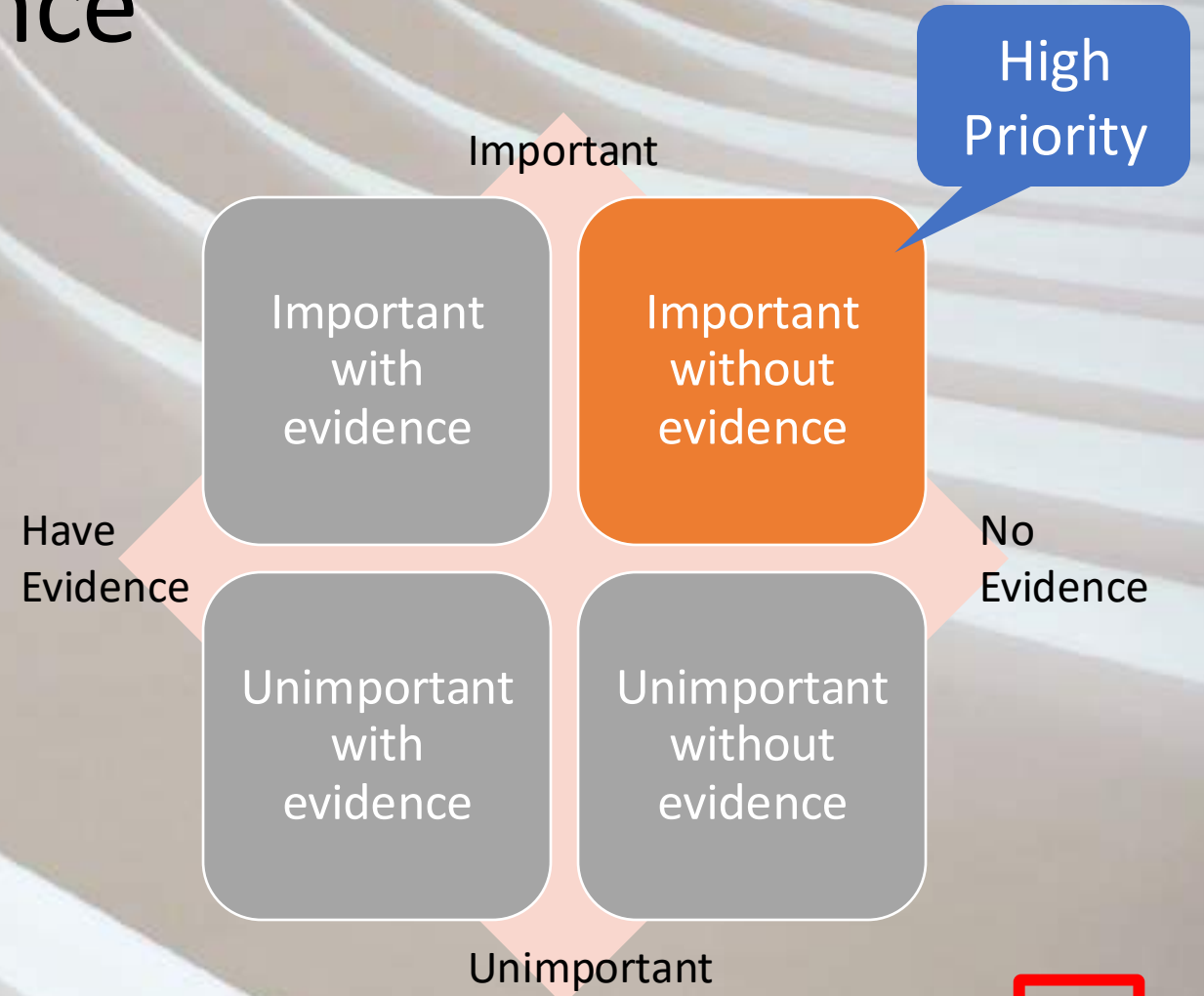
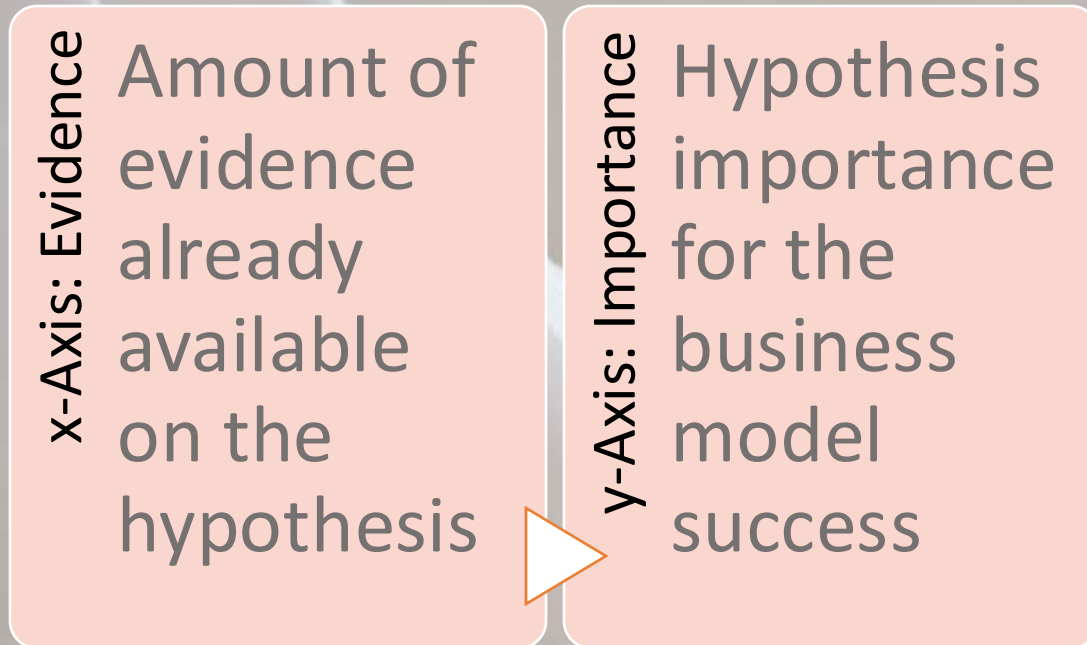
We believe that millennial parents will subscribe to monthly educational science projects for their kids



Prioritize Hypotheses: Risk



Prioritize Hypotheses: Importance and Evidence



A Good Experiment



Components of an Experiment

Hypothesis

Experiment

Metrics

Criteria

Test Card

Strategyzer

Test Name	Deadline
Assigned to	Duration

STEP 1: HYPOTHESIS

We believe that

Critical:

STEP 2: TEST

To verify that, we will

Test Cost: Data Reliability:

STEP 3: METRIC

And measure

Time Required:

STEP 4: CRITERIA

We are right if

Copyright Strategyzer AG The makers of Business Model Generation and Strategyzer



Learn


Test Card



<i>Test Name</i>	<i>Deadline</i>
<i>Assigned to</i>	<i>Duration</i>


STEP 1: HYPOTHESIS

We believe that [redacted]

Critical: 


STEP 2: TEST

To verify that, we will [redacted]

Test Cost:  Data Reliability: 

STEP 3: METRIC

And measure [redacted]

Time Required: 


STEP 4: CRITERIA

We are right if [redacted]

Copyright Strategyzer AG The makers of Business Model Generation and Strategyzer



Learning Card




<i>Insight Name</i>	<i>Date of Learning</i>
<i>Person Responsible</i>	

STEP 1: HYPOTHESIS

We believed that [redacted]


STEP 2: OBSERVATION

We observed [redacted]

Data Reliability: 

STEP 3: LEARNINGS AND INSIGHTS

From that we learned that [redacted]

Action Required: 

STEP 4: DECISIONS AND ACTIONS

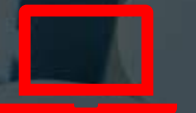
Therefore, we will [redacted]

Copyright Strategyzer AG The makers of Business Model Generation and Strategyzer



Evidence

Factual data that can be used to support or refute the underlying hypotheses





Insight

Actionable conclusions drawn
from analyzing the factual data



Learn from Studying the Evidence

Hypothesis

Evidence

Insights

Decisions

Learning Card

Strategyzer

Insight Name

Date of Learning

Person Responsible

STEP 1: HYPOTHESIS

We believed that

STEP 2: OBSERVATION

We observed

Data Reliability:



STEP 3: LEARNINGS AND INSIGHTS

From that we learned that

Action Required:



STEP 4: DECISIONS AND ACTIONS

Therefore, we will



Decide

Persevere

Next
critical
hypothesis

Pivot

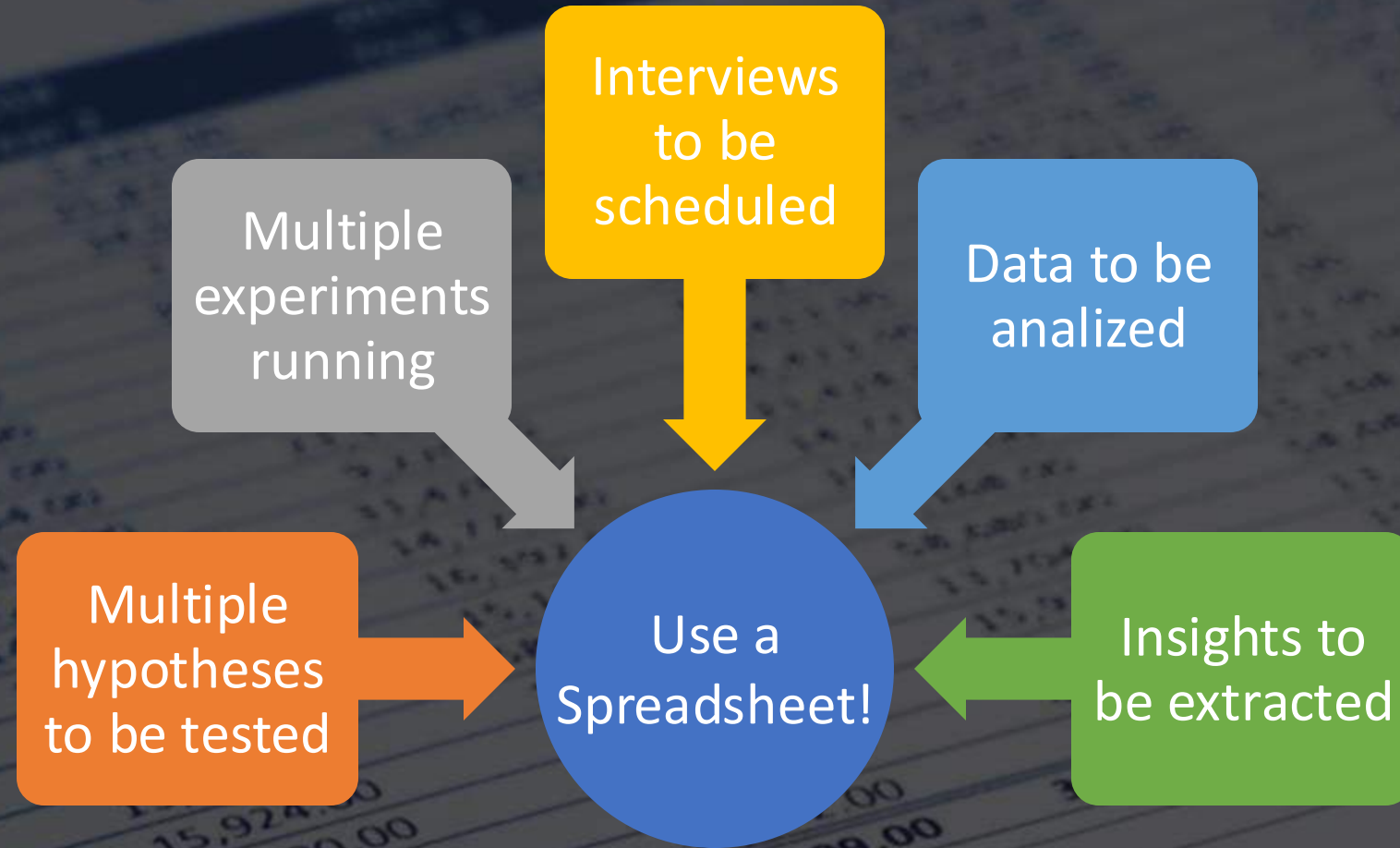
Change
something

Kill

Abandon
the idea



Keep Track!



Use your computer or mobile phone



The Business Model Search Tool



[Click to Copy](#)

Business Model Search Tool

Team Members

Member	Hypotheses (H)	Hypotheses (%)	Experiments (E)	Experiments (%)	Interviews (I)	Interviews (%)	Notes (N)	Notes (%)	Insights (In)	Insights (%)
Alex	2	20%	2	100%	1	100%			1	100%
Isabelle	2	20%			1	100%				
Caroline	2	20%							1	60%
Clara	2	20%								
Esteban	1	10%								
Felix	1	10%								

Hypotheses

Status	Total	VP	CS	CH	CE	EE	EP	EA	ER	CO
All	10	2	2	1	1	1	1	1	1	1
Waiting	7		1	1	1	1	1	1	1	1
Running	0									
Invalidated	2	1								
Validated	1	1	1							

Status	Total	W01	W02	W03	W04	W05	W06	W07	W08	W09	W10	W11	W12	W13	W14
Completed	10	2	2	1	1	1	1	1	1	1	1	1	1	1	1
Active	0	2	2	1	1	1	1	1	1	1	1	1	1	1	1
Invalidated	2			1	1										
Validated	1				1										

Experiments

Status	Total	W01	W02	W03	W04	W05	W06	W07	W08	W09	W10	W11	W12	W13	W14
Started	2		2												
Running	2		2												
Invalidated															
Validated	1				1										

Interviews

	Total	W01	W02	W03	W04	W05	W06	W07	W08	W09	W10	W11	W12	W13	W14
Total	3			1	1										
Exp Tester	3			1	1										
Exp Interviewed															
Exp Week W1	1			1											
Exp Strong W1	2			2											

Insights

	Total	W01	W02	W03	W04	W05	W06	W07	W08	W09	W10	W11	W12	W13	W14
Total	1				1										
Low Reliability	1				1										
Medium Reliability															
High Reliability															
Low Urgency															
Medium Urgency															
High Urgency	1				1										



Reporting Your Business Model Search

- Share the document among team members
- Weekly submission of Excel version in Fenix system
- Bi-weekly presentations must include the first Dashboard table:

Team Members

Member	Hypotheses (#)	Hypotheses (%)	Experiments (#)	Experiments (%)	Interviewer (#)	Interviewer (%)	Scriber (#)	Scriber (%)	Insights (#)	Insights (%)
Ana	2	20%	2	100%	1	50%			1	100%
Beatriz	2	20%			1	50%	1	50%		
Carolina	2	20%					1	50%		
Diogo	2	20%								
Eduardo	1	10%								
Filipe	1	10%								



Hypotheses

Hyp ID	Name	BMC	Responsible	Date Formulated	Date Ended	Status	Exp1	Exp1 Status	Exp2	Exp2 Status	Exp3	Exp3 Status
H1	Energy feedback device with consumption prediction	VP	Ana	18-Feb	3-Mar	Invalidated	E1	Validated				
H2	Homeowners	CS	Beatriz	3-Mar		Waiting	E1	Validated				
H3	Online store	CH	Carolina	3-Mar		Waiting						
H4	Electricians	CR	Diogo	3-Mar		Waiting	E2	Running				
H5	Device + subscription model	RS	Eduardo	3-Mar		Waiting						
H6	Energy suppliers	KP	Filipe	18-Feb	15-Mar	Invalidated						
H7	Cloud platform maintenance	KA	Beatriz	3-Mar		Waiting						
H8	Costumers' data	KR	Diogo	3-Mar		Waiting						
H9	Cloud computing and storage	CO	Carolina	3-Mar		Waiting						
H10	Homeowners are willing to pay for the device without knowing the savings	VPCS	Ana	10-Mar	15-Mar	Validated						



Experiments

Exp ID	Exp Name	Responsible	Date Started	Date Ended	Hypothesis	Hypothesis Name	We believe that	To verify that, we will	And verify if	We are right if	Status
E1	Homeowners pay for the device	Ana	3-Mar		H10	Homeowners are willing to pay for the device without knowing the savings	homeowners are willing to pay for the energy consumption feedback device that will help them save energy	interview 20 homeowners	homeowners are willing to pay to get realtime information about their energy consumption	more than 70% are willing to pay	Running
E2	Homeowners are interested in the device	Ana	6-Mar	15-Mar	H1	Energy feedback device with consumption prediction	our customers are interested in an energy feedback device	interview 20 homeowners	our customers are willing to have a energy feedback device	more than 70% are willing to have the device	Validated



Interviews

Int ID	Name	Company	Title	Role	Date	Responsible	Scriber	Interview Insights	Experiments Strong Val	Experiments Weak Val
I1	Gustavo Gomes	Self	Father	Homeowner, customer	5-Mar	Ana	Beatriz	Gustavo has a large energy bill and does not know what do to to reduce it. His house uses mostly electricity.	E1,E3	E2
I2	Inés Isidro	EDP	Director of Innovation	Potential partner	10-Mar	Beatriz	Carolina			



Insights

Insights	Insight ID	Insight Name	Date	Responsible	Exp ID	We believed that	We observed	Data Reliability	From that we learned that	Action Required	Therefore, we will
	L1	Homeowners are willing to buy	10-Mar	Ana	E1	homeowners are willing to pay for the energy consumption feedback device that will help them save energy	that 16 out of 20 homeowners were willing to buy	Low Relia..	we can sell the device separately from the subscription service	High Urgen..	accept the hypothesis that we can sell the device
	L2										



Cards

Test Card Exp ID: E1

Homeowners pay for the device

And

STEP 1: HYPOTHESIS
We believe that
homeowners are willing to pay for the energy consumption feedback device that will help them save energy

STEP 2: TEST
To verify that we will
interview 20 homeowners

STEP 3: METRIC
And verify if
homeowners are willing to pay to get realtime information about their energy consumption

STEP 4: CRITERIA
We are right if
more than 70% are willing to pay

Learning Card Exp ID: L1

Homeowners are willing to buy

And

STEP 1: HYPOTHESIS
We believe that
homeowners are willing to pay for the energy consumption feedback device that will help them save energy

STEP 2: OBSERVATION
We observed
that 16 out of 20 homeowners were willing to buy

STEP 3: LEARNINGS AND INSIGHTS
From that we learned
we can sell the device separately from the subscription service

STEP 4: DECISIONS AND ACTIONS
Therefore we will
accept the hypothesis that we can sell the device



Please close your computer and mobile
phone



Discovery and Validation



Discovery Experiments

Fit between value proposition and customer segments



Validation Experiments

Search for strong evidence on the feasibility and practicality of the business idea



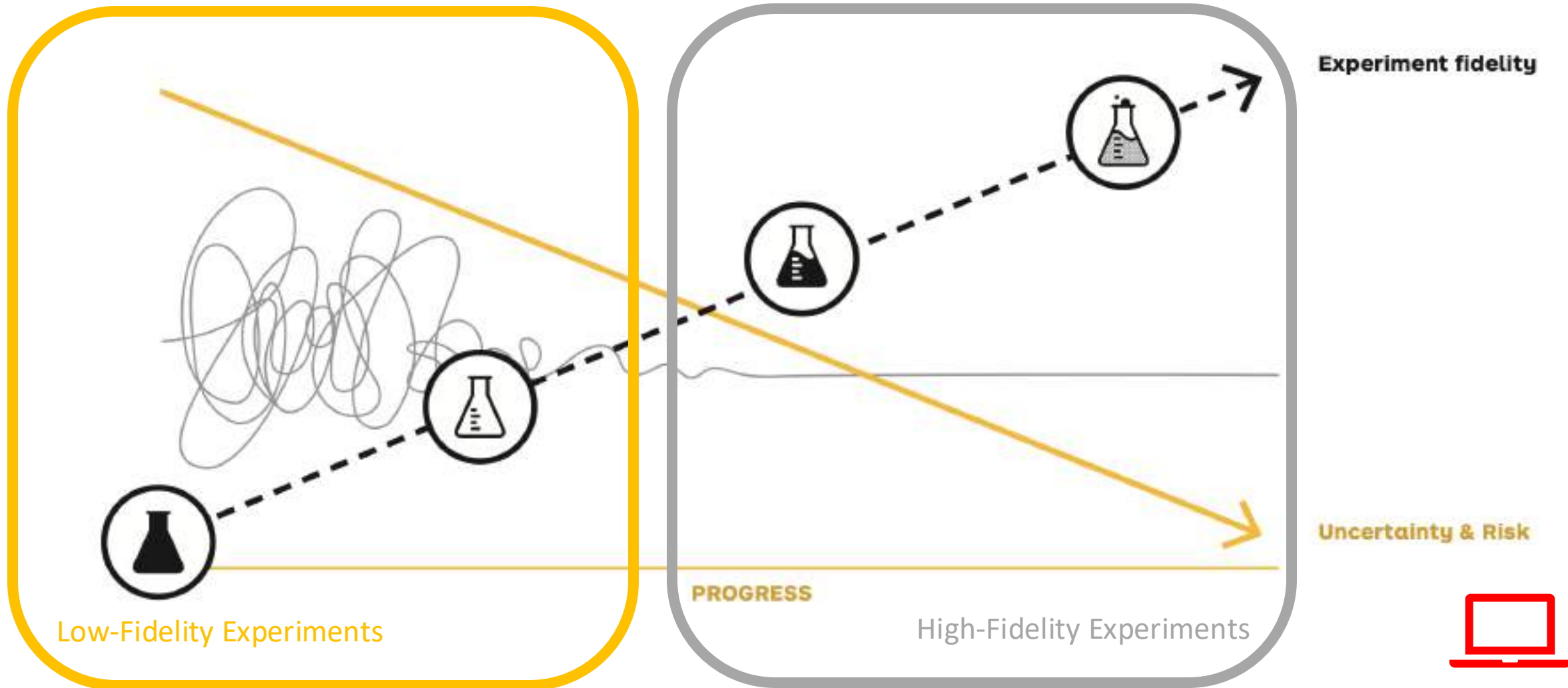
A photograph of laboratory glassware, including Erlenmeyer flasks and test tubes, containing liquids of various colors (green, blue, yellow). The image is slightly blurred and has a dark overlay, serving as a background for the text.

Designing Experiments for Discovery

Gain qualitative insights into the fit of your value proposition and your customer segments



Experimentation increases knowledge and reduces uncertainty



Low-Fidelity

Advantages

- Early feedback
- Rapid iteration
- Cost-effective

Disadvantages

- Limited interactivity
- Lack of detail
- Risk of misinterpretation

High-Fidelity

Advantages

- Realistic interactions
- Design evaluation
- Effective communication

Disadvantages

- Costly
- Limited flexibility
- Premature commitment



Software: from wireframe to prototype



Low Fidelity Wireframe



High Fidelity Wireframe



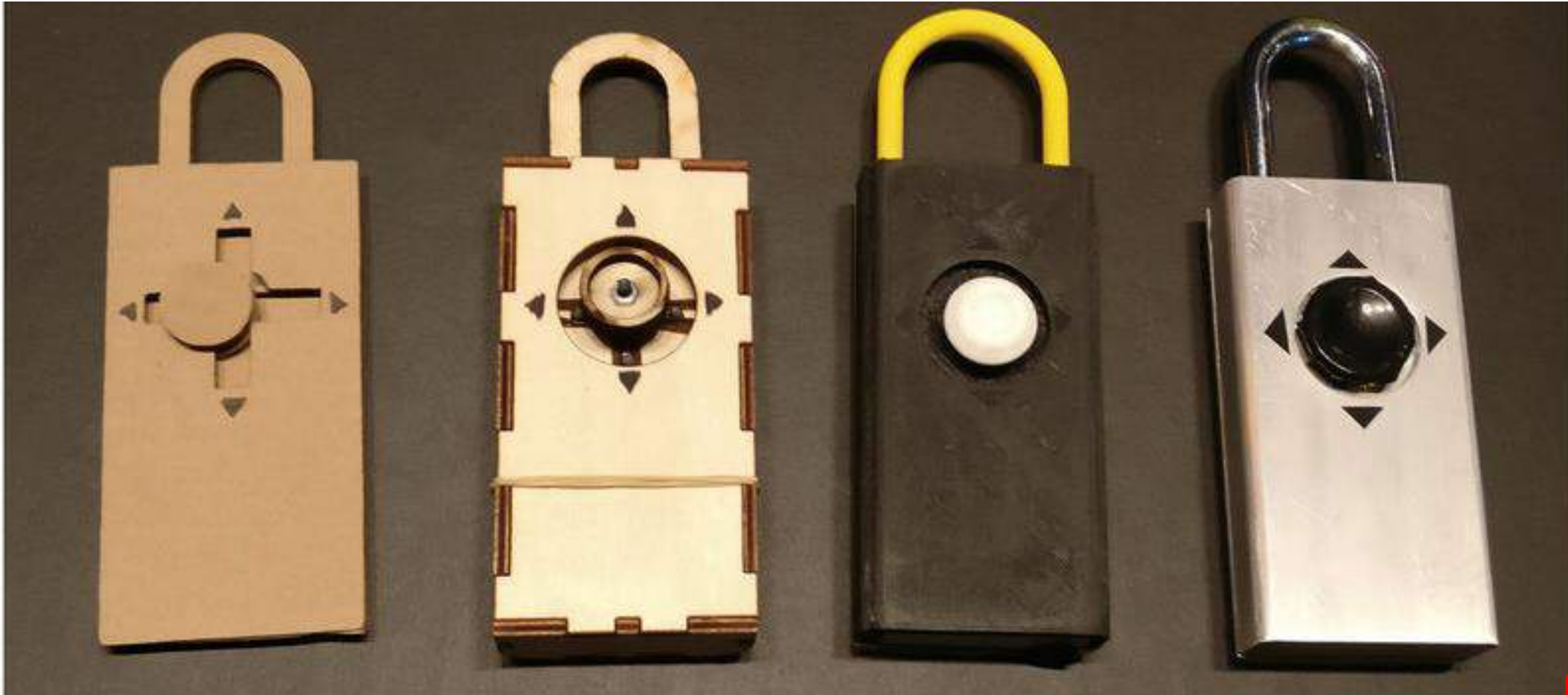
Mockup



Prototype



Hardware: from cardboard to CNC milling



Discovery Experiments

Qualitative

- Collect insights and test ideas

Low Cost

- No significant investment in time and money

Customer Centric

- Understand the customer's perspective

Hypothesis Generation

- Often lead to new hypotheses





Discovery Experiments: Exploration

Immerse yourself in the context of your customers' lives



Customer or Stakeholder Interview

Prepare

- Write a script
- Find interviewees

Execute

- Interviewer asks questions
- Scribe take notes

Analyze

- Debrief immediately after
- Synthesize feedback



A Day in the Life

Prepare

- Find participants
- Get consent

Observe

- Time and activity
- Jobs, pains, and gains

Analyze

- Summarize the data
- Extract insights



Discovery Survey

Prepare

- Goals and audience
- Open questions

Execute

- Send survey
- Assume a low response rate

Analyze

- Word cloud
- Cluster responses



A workshop scene with two men, a camera on a tripod, and a wooden workbench with tools and a prototype device. The man on the left is wearing a grey puffer vest over a grey long-sleeved shirt. The man on the right is wearing a grey t-shirt and is holding a small component. The workbench has a red vise, a screwdriver, and a prototype device with a large gear and a lens. The background has wooden walls and shelves with small containers.

Discovery Experiments: Discussion Prototypes

Engage customers with tangible representations of your idea



Paper Prototype

Prepare
Define
goal and
audience

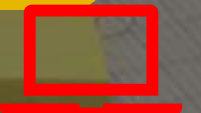
Create
your
sketches

Execute
Explain the
exercise

Get
feedback

Analyze
What
confused
them?

What
excited
them?



3D Print

Prepare

- Model the object
- Print it

Analyze

- Review notes
- Get insights

Execute

- Show the object
- Get feedback



Data Sheet

Prepare

- Create data sheet
- Goal and audience

Execute

- Show data sheet
- Gather feedback

Analyze

- Review notes
- Get insights



Explainer Video

Prepare

- Write storyboard
- Upload to public platform

Execute

- Drive traffic
- Engage with viewers

Analyze

- Number of views
- Get insights from feedback





Discovery Experiments: Interest Discovery

Measure customer interest and engagement
with your idea



Link Tracking

Prepare

- Call for action for the link
- Destination of the link

Execute

- Send link to audience
- Monitor clicks and views

Analyze

- Calculate conversion rate
- Destination analytics



Email Campaign

Prepare

- Goal and audience
- Write emails and send them internally

Execute

- Send emails
- Respond to replies

Analyze

- Count opens, clicks and replies
- Compare with other campaigns



Social Media Campaign

Prepare

- Goal and audience
- Create content

Execute

- post content
- Monitor and respond to comments

Analyze

- Performance of posts
- Number of shares





Unlocking Insights on Stakeholders' Interviews

Conducting Effective Stakeholder Interviews



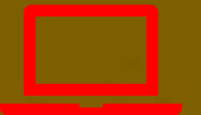
Ground Rules for Interviewing

- Listen more than talk
- Get facts, not opinions
- Ask “why” to get motivations
- It is not a sales pitch
- Don't mention solutions too early
- Follow-up
- Always open doors at the end





What is a Good Question?



Do you have a problem with X?



Tell me about X?



Do you think it's a good idea?



Would you buy a product which solved this problem?



How do you currently deal with this problem?



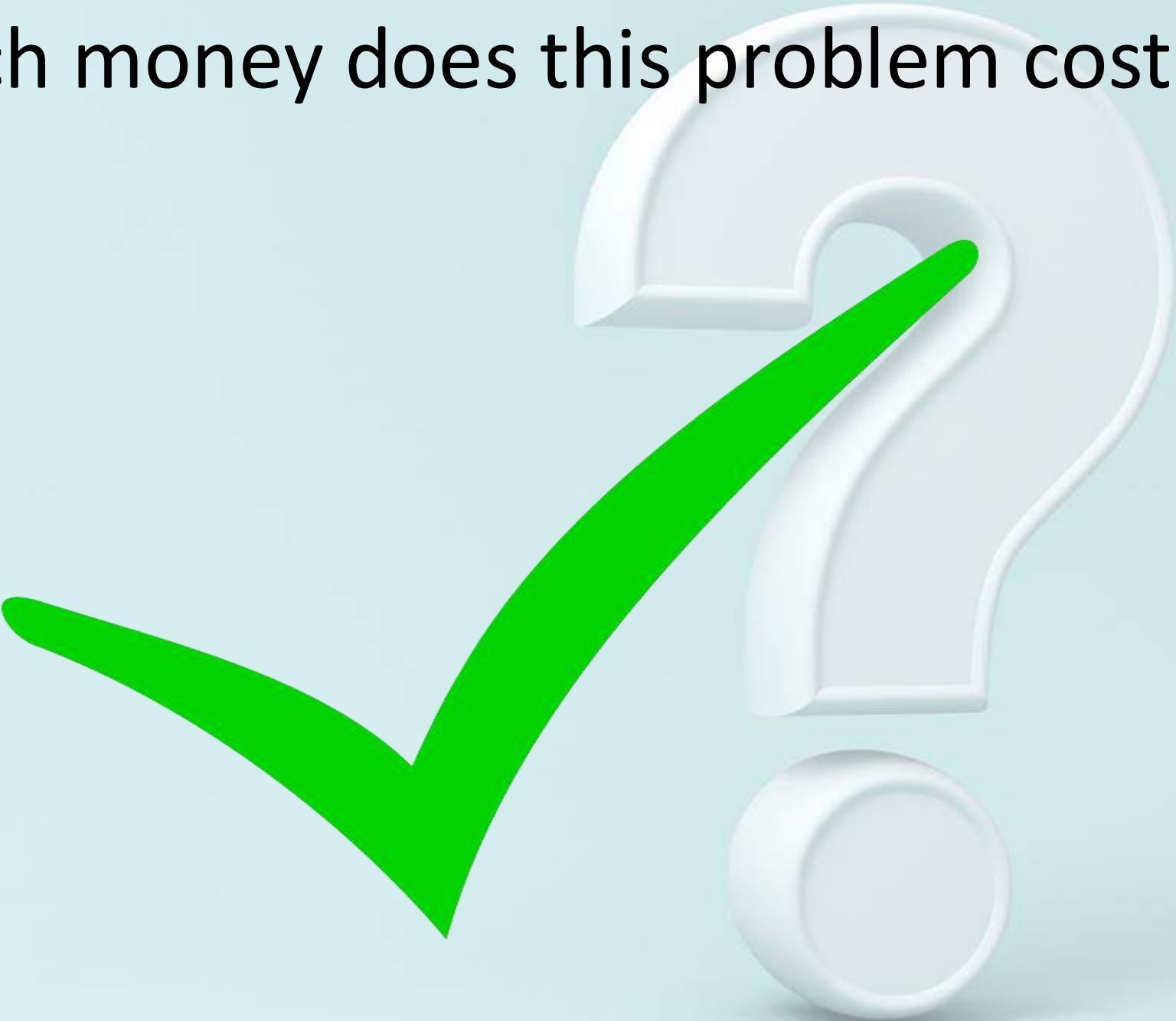
Talk me through the last time you had this problem.



How much would you pay for this?



How much money does this problem cost you?



Who else should I talk to?



Good Interviews

Did or do

Don't assume

Don't ask for opinions

Let them speak about
examples or experiences





Understand Customer Feedback



Sounds great. I loved it!



Brilliant, let me know when it launches!



There are some people I can introduce to you to, when you're ready.



I would definitely buy that!



We are spending \$500 per month on this.



The Mom Test

—
“Ask in a way that your mother could tell you that your product is useless. Without her knowing.”
Rob Fitzpatrick



Introduction

Set the stage, so the interviewee knows what to expect.

STEP
01



STEP
02



Role & Success

Get to understand their day-to-day, their goals and what they enjoy about their role.

STEP
03

Challenges

Dig into their frustrations and challenges. Solving those will help them achieve success



STEP
04



Solutions

Find out how they try to solve their challenges currently, and how they decide between solutions.

STEP
05

Wrap-up

Done! Ask them for introductions and be grateful.



The Meta-Script



Setup

We are looking
for expert
feedback

We are
conducting a
survey

Ask open
questions

Let them speak

Let them be
the expert (act
naïve)

Do it in person



Take Notes



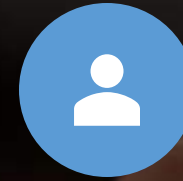
No laptop or tablet



Index cards or sticky notes



Write exact customer phrases



Use icons



Ask for further introductions



The Interview Game

Practice your interviewing skills



Use your computer or mobile phone



Script

- Validate that the person is a potential customer
- Make the customer speak about his/her jobs
- Make the customer state a fact useful for your business
- Make the customer speak about his/her pain
- Make a question starting with why
- Check if your customer would buy your product
- What is your customer more important pain?
- How much would your customer pay for your product?
- Get permission to follow-up
- End the interview with an open-door question



Score Sheet

[Click to Copy](#)



The Interview Game score sheet is a document from T3 TÉCNICO LISBOA, featuring a header with the university logo and the text 'The Business Model Canvas', 'Entrepreneurship, Innovation and Technology Transfer', and 'The Interview Game'. It includes a diagram with three overlapping circles labeled 'The Business Model Canvas', 'Agile Management', and 'Customer Development'. Below the header, there are fields for 'Business Idea:' and 'Date:'. A paragraph explains the goal: 'Write questions to ask your potential customer to validate your business idea. The goal is to get facts and not opinions and to let your potential customer speak about examples or past experiences.' The main body is a table with two columns: 'Question' and 'Grading'. The grading scale is '0 (opinion) to 5 (very good)'. There are ten rows of questions, each with a corresponding light blue shaded area for grading.

T3 TÉCNICO LISBOA
The Business Model Canvas
Entrepreneurship, Innovation and Technology Transfer
The Interview Game

Business Idea: _____ Date: _____

Write questions to ask your potential customer to validate your business idea. The goal is to get facts and not opinions and to let your potential customer speak about examples or past experiences.

#	Question	Grading
		0 (opinion) to 5 (very good)
1.	Validate that the person is a potential customer	
2.	Make the customer speak about his/her jobs	
3.	Make the customer state a fact useful for your business	
4.	Make the customer speak about his/her pain	
5.	Make a question starting with why	
6.	Check if your customer would buy your product	
7.	What is your customer more important pain?	
8.	How much would your customer pay for your product?	
9.	Get permission to follow-up	
10.	End the interview with an open-door question	



New Ice-cream Business Idea

Team A
Ice-cream lovers

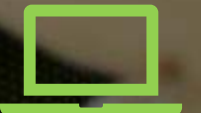
Team B
Ice-cream startup
founders



Tour Guide Business Idea

Team B
Travelers

Team A
Tour guide
startup founders



Tutoring Business Idea

Team A
Parents

Team B
Tutoring
startup founders



Please close your computer and mobile
phone





Designing Experiments for Validation

Testing for Product-Market Fit



Types of Prototypes for Validation

Interaction Prototypes

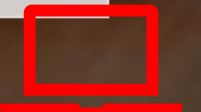
- Clickable prototype
- Minimum Viable Product

Call to Action Prototypes

- Landing page
- Crowdfunding or presale

Simulation Prototypes

- Wizard of Oz
- Mock Sale





Landing Page

A **standalone web page**, created specifically for a marketing or advertising campaign, generally with a **call for action**.



Minimum Viable Product

Is a version of a new product which allows a team to collect the maximum amount of validated learning about customers with the least effort.

Eric Ries



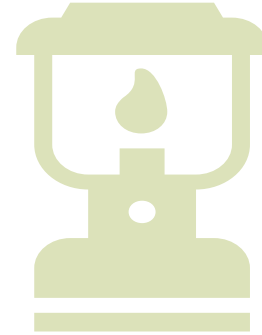
Minimum Viable Product

a version of a product with just enough features to satisfy early customers and provide feedback



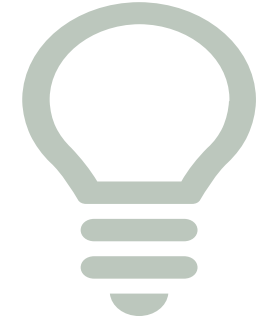
Minimum

- just the important features



Viable

- sufficient enough for early adopters



Product

- something that can be used

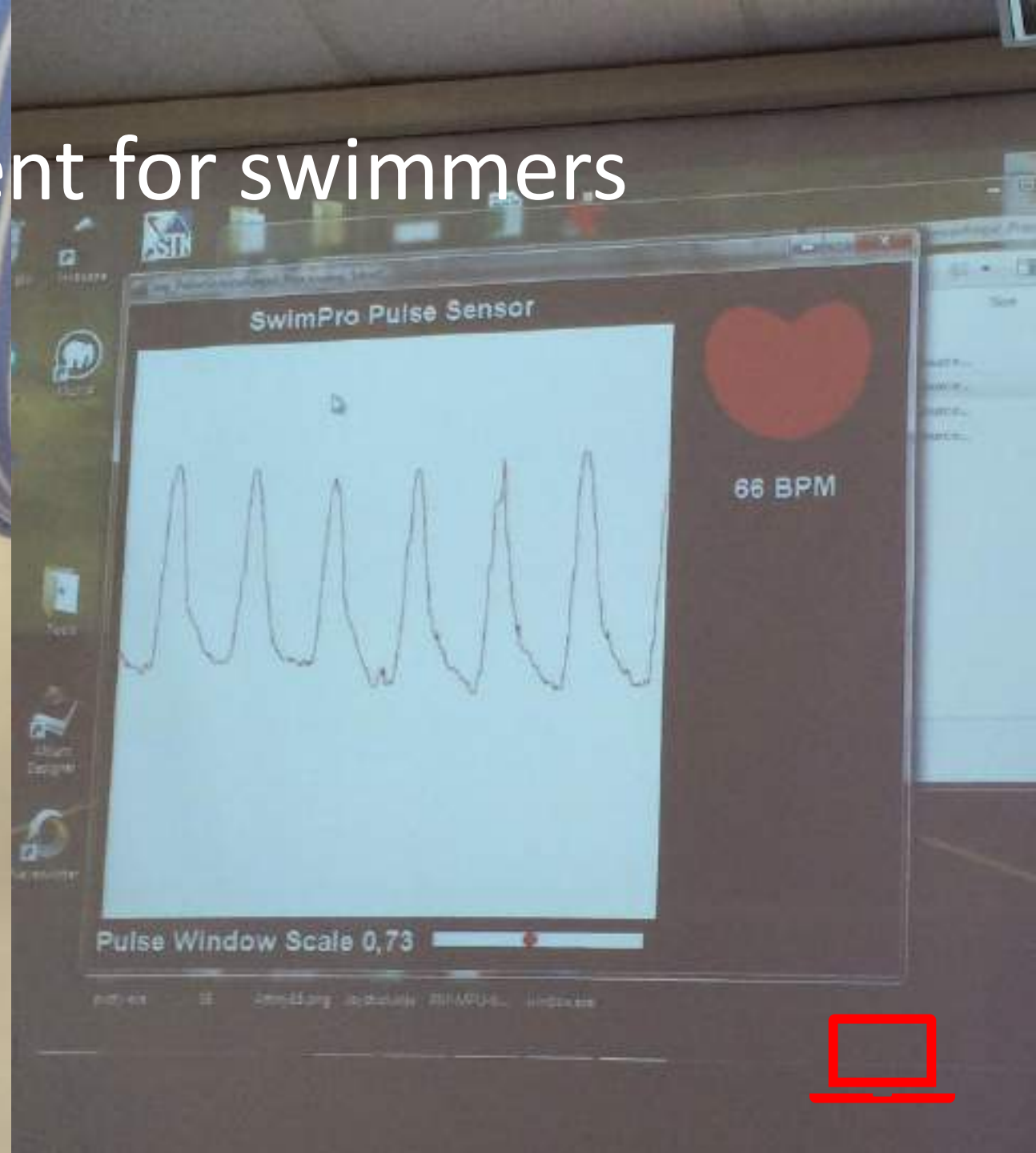
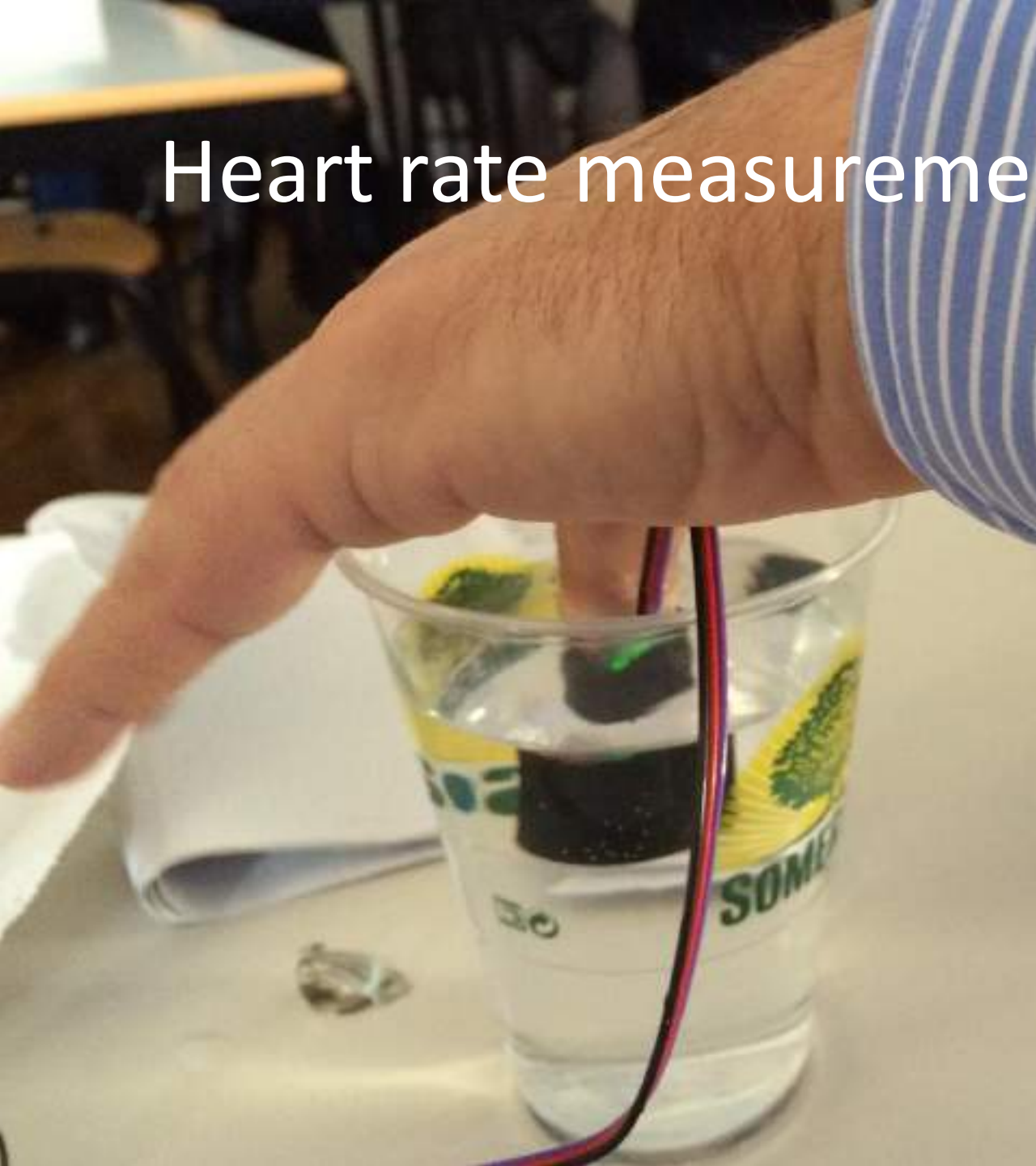


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Large scale mowing and agricultural weeding



Heart rate measurement for swimmers

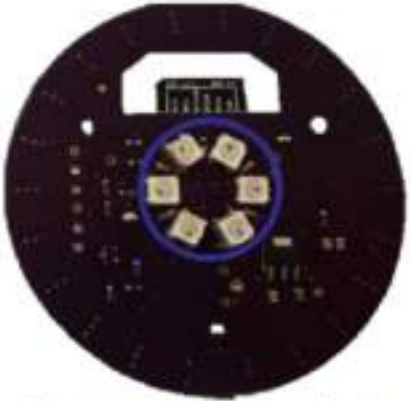


Real-time Energy Consumption Feedback

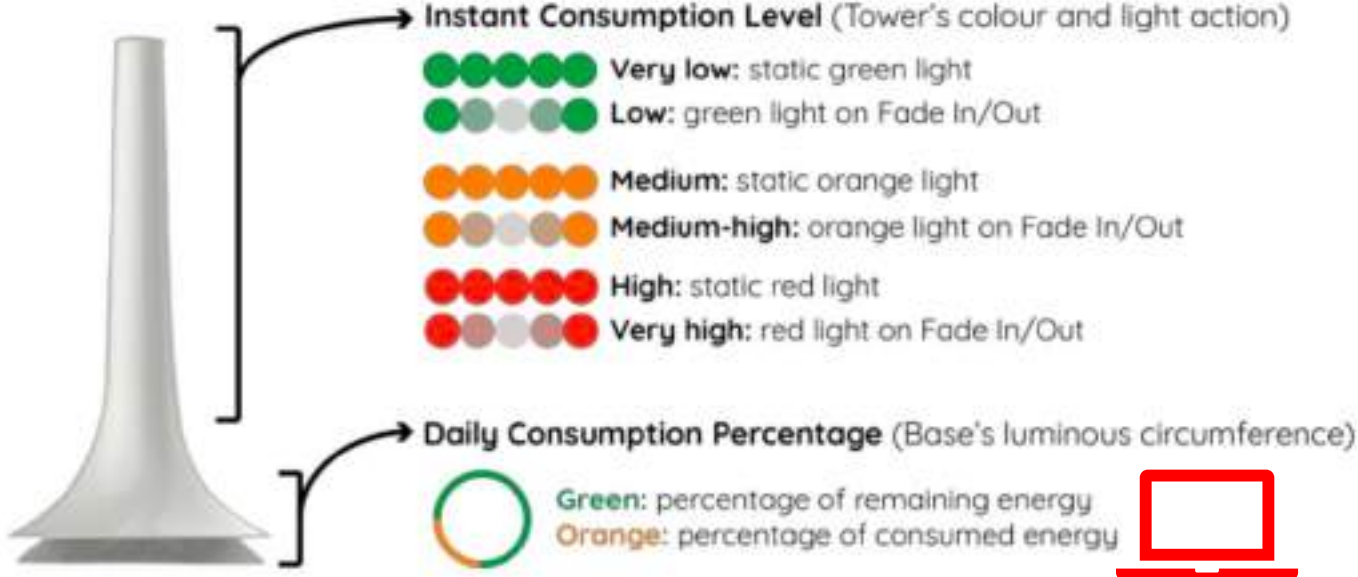
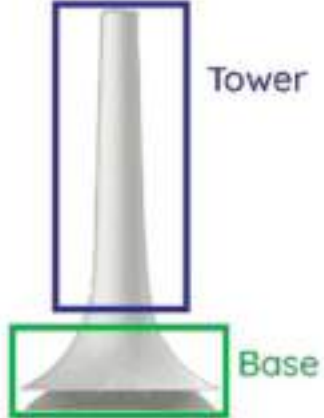
Gonçalo Andrade



Base LEDs population



Tower LEDs population



Real-time Energy Consumption Feedback

Gonçalo Andrade

Table 8.3: Before and after energy consumption – daily average – in kWh and percentage

	Treatment					Control
<i>i</i>	<i>Household 1</i>	<i>Household 2</i>	<i>Household 3</i>	<i>Household 4</i>	<i>Household 5</i>	<i>Household 6</i>
$\bar{W}_{before}(i)$	19.75	10.39	4.12	8.82	12.75	11.46
$\bar{W}_{after}(i)$	16.60	8.79	2.96	6.43	8.15	11.68
$\Delta\bar{W}_{\%}(i)$	-16%	-15%	-28%	-27%	-36%	+2%





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