

Design Thinking

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ENT 621
Master of Entrepreneurship

Lecture 10



In The previous Lecture: Design Thinking

- **Stakeholder Mapping**
- What is stakeholder mapping?
- Why is stakeholder mapping important?
- Common types of stakeholders
- Methods for mapping stakeholders
- A step-by-step guide for mapping stakeholders

Stakeholder

Mapping

Guide

- Prototyping
- Benefits of prototyping
 - Prototyping techniques
 - Storyboards
 - Types of storyboards
 - Product - Market fit

Prototyping

Storyboard

Product-market fit

What is prototyping?

A prototype is an early mock-up or model of your product that tests out your ideas and see how viable they are. This might also be referred to as beta testing, sampling, or building a minimum viable product (MVP).

- ❖ A prototype is an initial version of a system which may be used for experimentation
- ❖ Prototypes are valuable for *requirements elicitation* because users can experiment with the system and point out its strengths and weaknesses. They have something concrete to criticize
- ❖ A prototype gives the **stakeholder** something real, or at least something that has the appearance of reality. The prototype makes the product real enough for stakeholders to bring up requirements that might otherwise be missed.
- ❖ Rapid development of prototypes is essential so that they are available early in the elicitation process

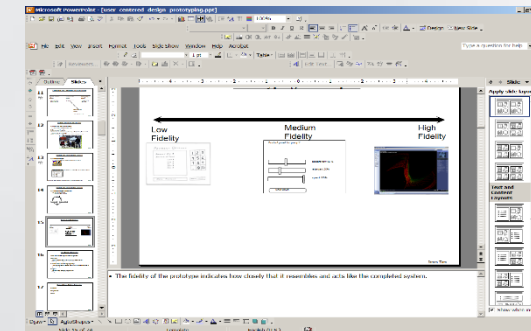
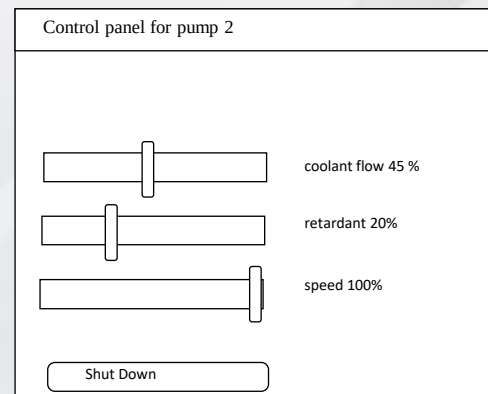
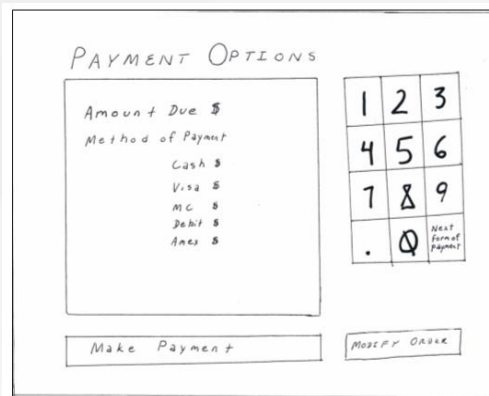
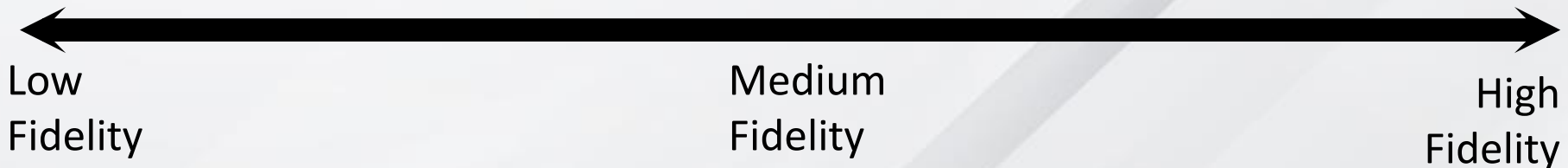
The benefits of prototyping

What prototyping does is give you a way to gather feedback and make course corrections before you've invested too much time, money, or cash into a given feature or idea. **With prototyping, you can:**

- See in real time how viable your product is
- Understand potential go-to-market issues upfront, such as cost, time for development, or materials
- Gather feedback from internal stakeholders and customers
- Test out new ideas that may not be in the market currently Get buy-in and support from investors and mentors

Prototyping Techniques

- Low-Fidelity Prototypes
- High-Fidelity Prototypes
- Storyboards
 - Passive storyboards
 - Active storyboards
 - Interactive storyboards



Low Fidelity Prototypes

- Low-fidelity prototyping is a quick, simple way to show your idea — often a sketch, paper, or click-through visualization — that requires minimal effort to create
- The Low-Fidelity prototype is not meant to look all that much like the finished product.
- It is obviously an easy-to-change mock-up.
- The Low-Fidelity prototype encourages iteration. When you sketch a Low-Fidelity prototype, you demonstrate your ideas to the stakeholders and encourage them to iterate by changing and improving your ideas.

A hand-drawn low-fidelity prototype of a payment screen. The title "PAYMENT OPTIONS" is at the top. Below it, there are two main sections. The left section is a box containing the text "Amount Due \$" and "Method of Payment". Under "Method of Payment", there are five options: "Cash \$", "Visa \$", "MC \$", "Debit \$", and "Amex \$". The right section is a numeric keypad with a 3x3 grid of buttons labeled 1 through 9, a decimal point ".", and a "0" button. To the right of the "0" button is a small box labeled "Next Form of Payment". At the bottom of the screen, there are two buttons: "Make Payment" and "Master Card".

Low Fidelity Prototypes

- Hand drawn mockups of some design ideas
- Focus on:
 - Brainstorming as many ideas as possible (discount usability)
 - Making it clear enough to be understandable
- But don't focus on making it “pretty”
 - They are not computer-generated images (*don't* use drawing programs to generate them)
- May be used to elicit feedback from the user

Low Fidelity Prototypes

- Physical prototyping:

Creating a mock-up of your product to understand dimensions, buttons, features, or design so you can see what it looks like in real life. This could be a quick 3D printout, simplified model, or a single sample from a supplier. This is not usually functional, but you can get a sense of size, materials, and how it appears.

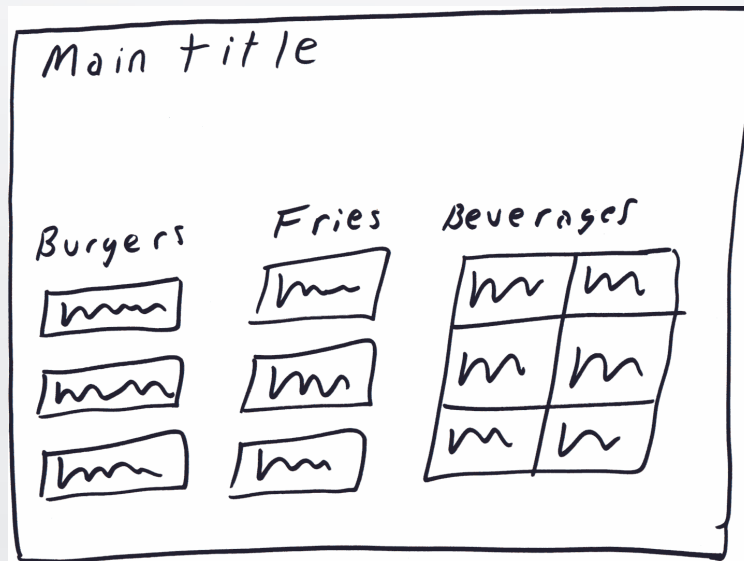
- Design or visual prototyping:

On a software level, mapping out the usability — how a person moves through the software step by step — within a dashboard, website, or marketing campaign, so you can collect feedback from users and teammates on logic, intended functionality, and overall design. This often takes the format of a sketch, either within a software tool, PowerPoint, or simply on paper. You can't interact with any features, but the prototype represents how it would work in different contexts and what it looks like

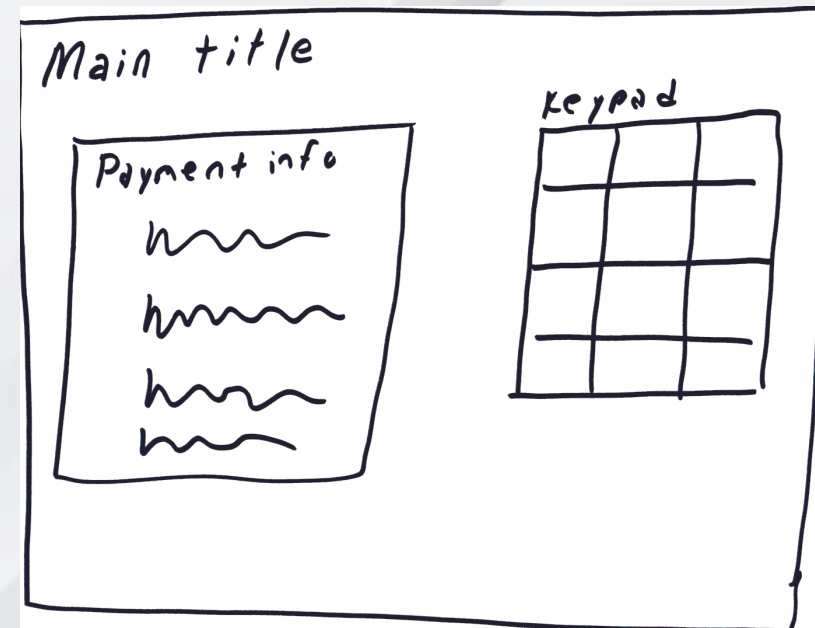
Low Fidelity Prototypes

- Sketches:
 - A drawing of the high-level appearance of the intended system
 - The crudity of the prototype means people concentrate on high level concepts
 - It may be hard to envision the progression of a dialog

Screen 1: Initial order screen



Screen 2: Payment screen1



Medium Fidelity Prototypes

- Many different types
 - Range from simple computer drawn images to partially working systems
- They may take longer to generate and change than simple low fidelity representations
- Benefits
 - It seems more like the completed system so it provides a clearer idea of how it works
 - May be used to elicit feedback from the user when low-fidelity approaches cannot be used
 - Depending upon the type of medium fidelity prototype it may allow for some user testing.
- Pitfalls
 - User's reactions are usually "in the small"
 - Blinds people to major representational flaws because of a tendency to focus on more minor details
 - Users reluctant to challenge/change the design itself
 - Designs are too "pretty", egos...
 - Management may think its real!

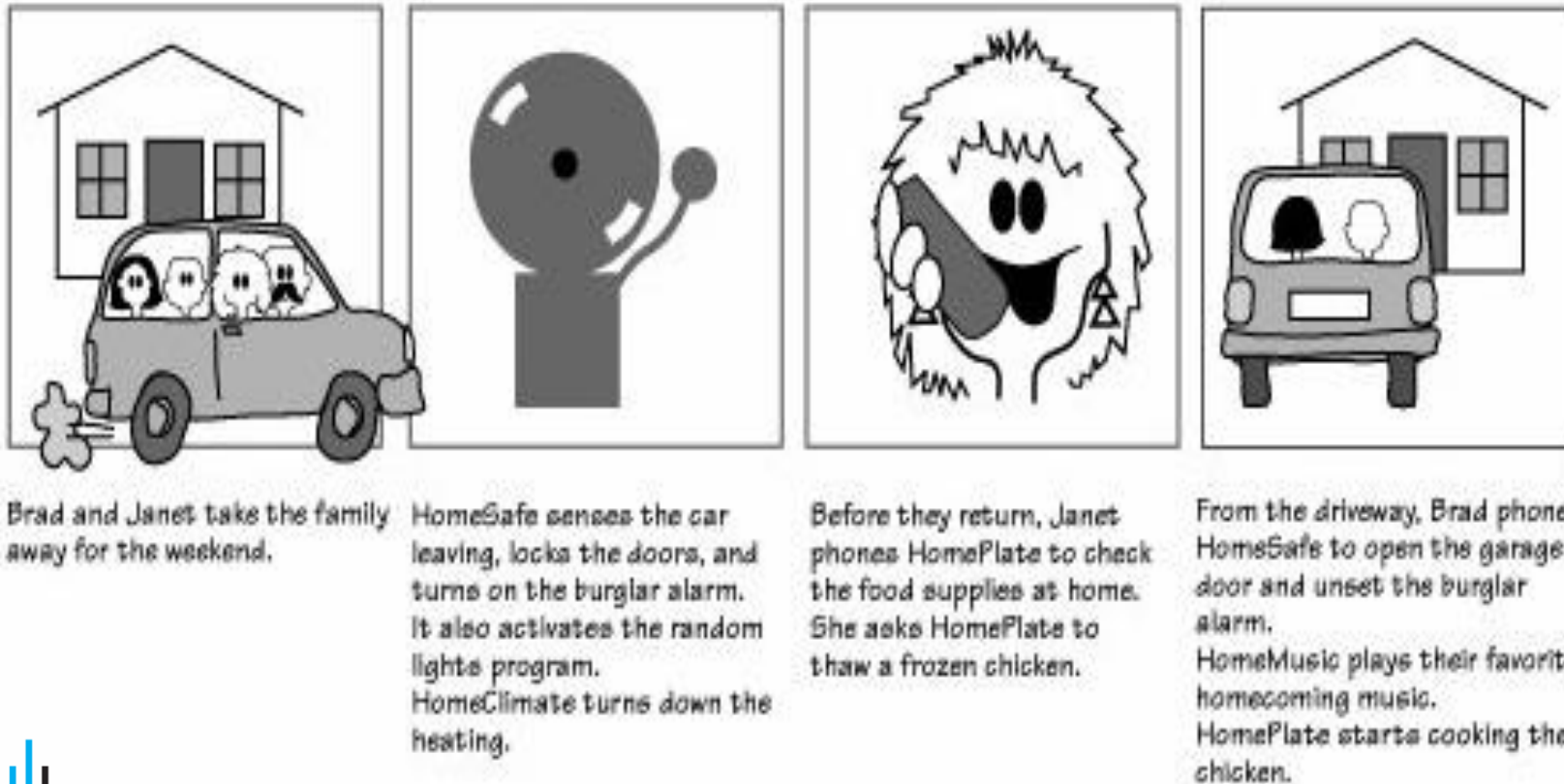
High Fidelity Prototypes

- High-fidelity prototypes are built using software tools and have the appearance of working software products.
- They appear to do whatever the use case does, and give stakeholders the opportunity to "use" a realistic-looking product and decide whether the product displays the correct requirements.
- The high-fidelity prototype gives the stakeholders greater opportunities to explore all the possibilities for the use case - *the exception and alternative paths;*
- The high-fidelity prototype is also effective for discovering usability requirements.
- High-fidelity prototypes, on the other hand, function much closer to the final product. They may have more design elements or interactivity, and can be used for more complex testing

Storyboards

- Building a storyboard means thinking of the proposed functionality as a story and breaking it into a series of steps, or discrete actions Many storyboards show the user at a screen in each panel
- Sometimes one picture is enough to illustrate all the actions and outcomes for a use case.
- For more complex use cases, or for playing out of several use cases or aspects of the whole product, you need a sequence of pictures.

A storyboard demonstrates to the potential users how a product or different parts of a product, could work. Each panel represents an identifiable part of the story. The requirements analyst uses this kind of prototype to play through the product, experimenting with it and learning the requirements.



Types of StoryBoards

- Passive StoryBoards
- Active StoryBoards
- Interactive StoryBoards

What Storyboards Do

- In software, storyboards are used most often to work through the details of the human-to-machine interface.

Passive Storyboards

- Tell a story to the user
- They consist of sketches, pictures, screen shots, PowerPoint presentations, or sample application outputs.
- The analyst plays the role of the system and simply walks the user through the storyboard, with a "When you do this, this happens" explanation.

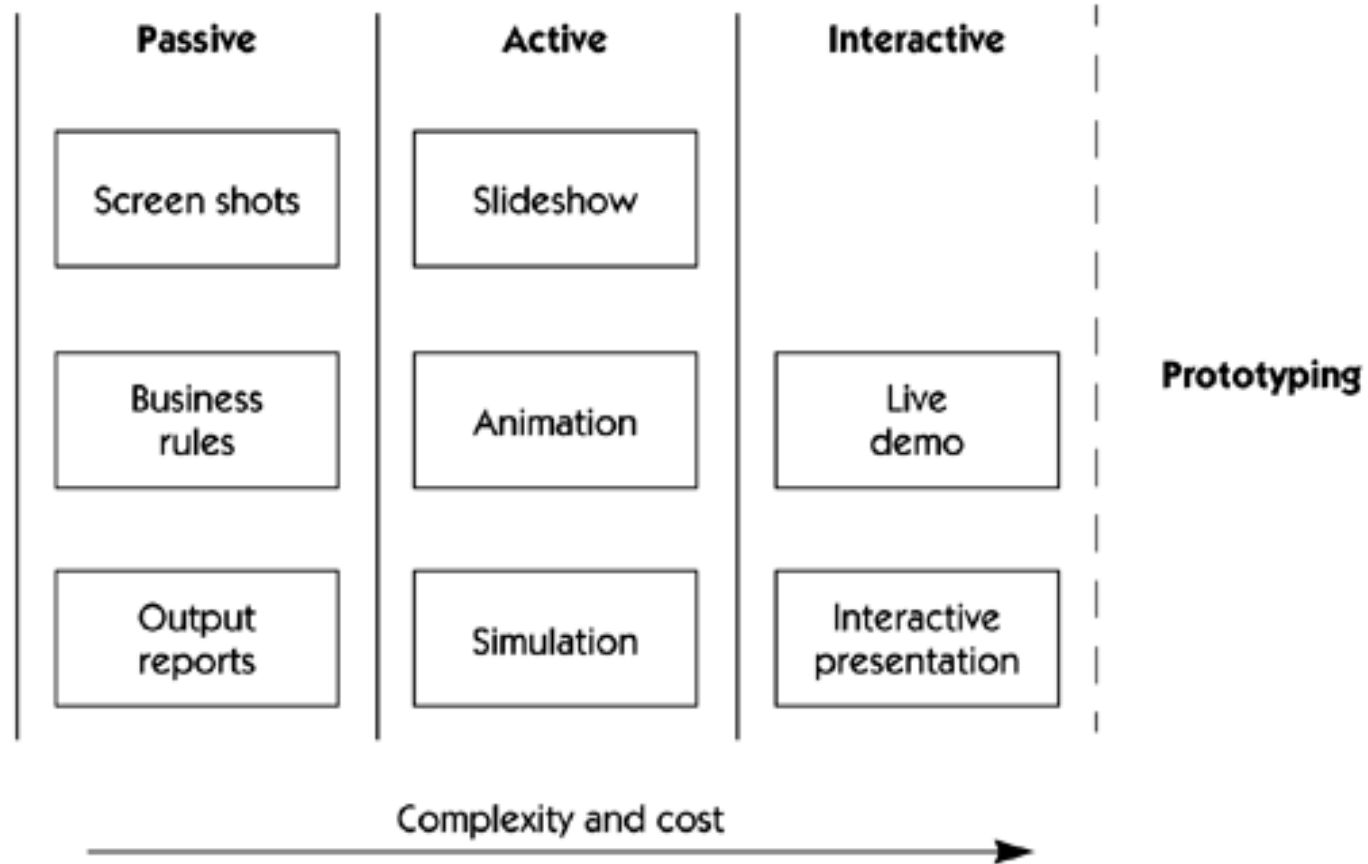
Active StoryBoards

- Make the user see "a movie that hasn't actually been produced"
- Active storyboards are animated or automated, perhaps by an automatically sequencing slide presentation, an animation tool, a recorded computer script or simulation, or even a homemade movie.
- They provide an automated description of the way the system behaves in a typical usage or operational scenario.

Interactive StoryBoards

- Let the user experience the system in as realistic a manner as practical.
- They require participation by the user.
- Interactive storyboards can be simulations or mock-ups or can be advanced to the point of throwaway code.
- An advanced, interactive storyboard built out of throwaway code can be *very close to* a throwaway prototype.

Storyboarding



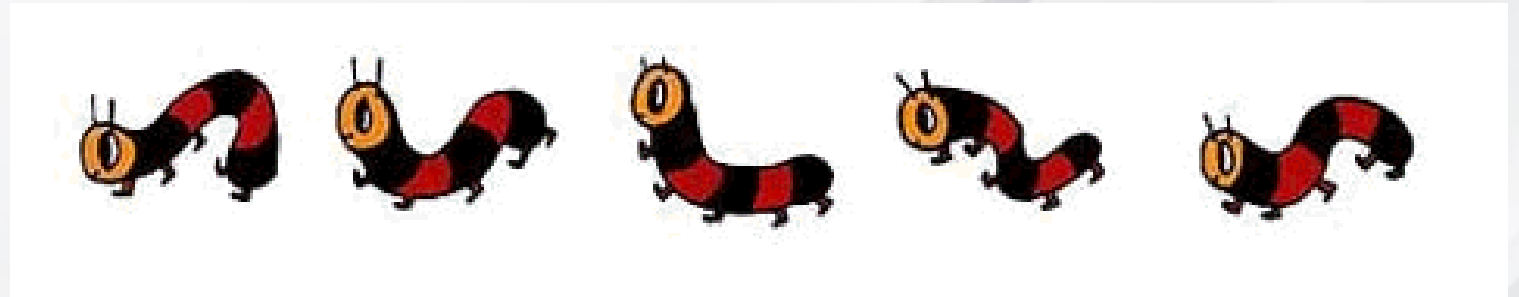
Storyboards for User Based Systems

- Storyboards for user-based systems deal with the three essential elements of any activity:
 - Who the players are
 - What happens to them
 - How it happens

Three Essential Elements

- The ***who*** element defines the players, or the users of the system.
- The “who” are such players as users, other systems, or devices—they are the actors that interact with the solution system.
- The ***what*** element represents the behavior of the users as they interact with the system as well as the behavior of the system as it interacts with the user.
- The ***how*** element provides descriptions of how this interaction happens, showing events, states, and state transitions.

- Storyboarding
- It's a series of key frames
 - Originally from film; used to get the idea of a scene
 - Snapshots of the interface at particular points in the interaction



- For interfaces it allows users to quickly evaluate the direction of the design

Storyboarding

THE HAPPY DUDE MENU
(PUSH BUTTON TO PLACE ORDER)

PLACE ORDER CANCEL ORDER

BURGERS		FRIES	BEVERAGES		
			LITTLE GIGGLE SIZED	MEDIUM CHUCKLE SIZED	GREAT GUFFAW SIZED
BASIC MERRY BURGER No. ORDERED \$1.50 EACH	SMIRKING SMALL FRIES No. ORDERED \$0.75 EACH	POP	PUSH TO ORDER No. ORDERED \$0.80 EACH	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.75 EACH
THE JOLLY BURGER No. ORDERED \$2.25 EACH	MEDIUM GRINNER FRIES No. ORDERED \$1.00 EACH	JUICE	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.50 EACH	PUSH TO ORDER No. ORDERED \$1.75 EACH
CLASSIC HAPPY BURGER No. ORDERED \$2.75 EACH	LARGE SMILEY FRIES No. ORDERED \$1.50 EACH	COFFEE	PUSH TO ORDER No. ORDERED \$0.75 EACH	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.25 EACH
THE ECSTATIC BURGER No. ORDERED \$3.50 EACH	SUPER LARGE SMILEY FRIES No. ORDERED \$1.75 EACH	TEA	PUSH TO ORDER No. ORDERED \$0.75 EACH	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.25 EACH



Initial order screen

Storyboarding (2)

THE HAPPY DUDE MENU
(PUSH BUTTON TO PLACE ORDER)

PLACE ORDER CANCEL ORDER

BURGERS		FRIES	BEVERAGES		
			LITTLE GIGGLE SIZED	MEDIUM CHUCKLE SIZED	GREAT GUFFAW SIZED
BASIC MERRY BURGER No. ORDERED \$1.50 EACH	SMIRKING SMALL FRIES No. ORDERED \$0.75 EACH	POP	PUSH TO ORDER No. ORDERED \$0.80 EACH	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.75 EACH
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Person orders an "Ecstatic Burger"

Storyboarding (3)

THE HAPPY DUDE MENU

(PUSH BUTTON TO PLACE ORDER)

PLACE ORDER

CANCEL ORDER

BURGERS

FRIES

BEVERAGES

			LITTLE GIGGLE SIZED	MEDIUM CHUCKLE SIZED	GREAT GUFFAW SIZED
BASIC MERRY BURGER No. ORDERED \$1.50 EACH	SMIRKING SMALL FRIES No. ORDERED \$0.75 EACH	POP	PUSH TO ORDER No. ORDERED \$0.80 EACH	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.75 EACH
THE JOLLY BURGER No. ORDERED \$2.25 EACH	MEDIUM GRINNER FRIES No. ORDERED \$1.00 EACH	JUICE	PUSH TO ORDER No. ORDERED \$1.00 EACH	PUSH TO ORDER No. ORDERED \$1.50 EACH	PUSH TO ORDER No. ORDERED \$1.75 EACH
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Order is placed

Storyboarding (4)

PAYMENT OPTIONS

Amount Due \$

Method of Payment

Cash \$ 3.50

Visa \$

MC \$

Debit \$

Amex \$

1	2	3
4	5	6
7	8	9
.	0	Next form of payment

Make Payment

MODIFY ORDER

Payment screen comes up

Storyboarding (5)

PAYMENT OPTIONS

Amount Due \$

Method of Payment

Cash \$ 3.50

Visa \$

MC \$

Debit \$

Amex \$

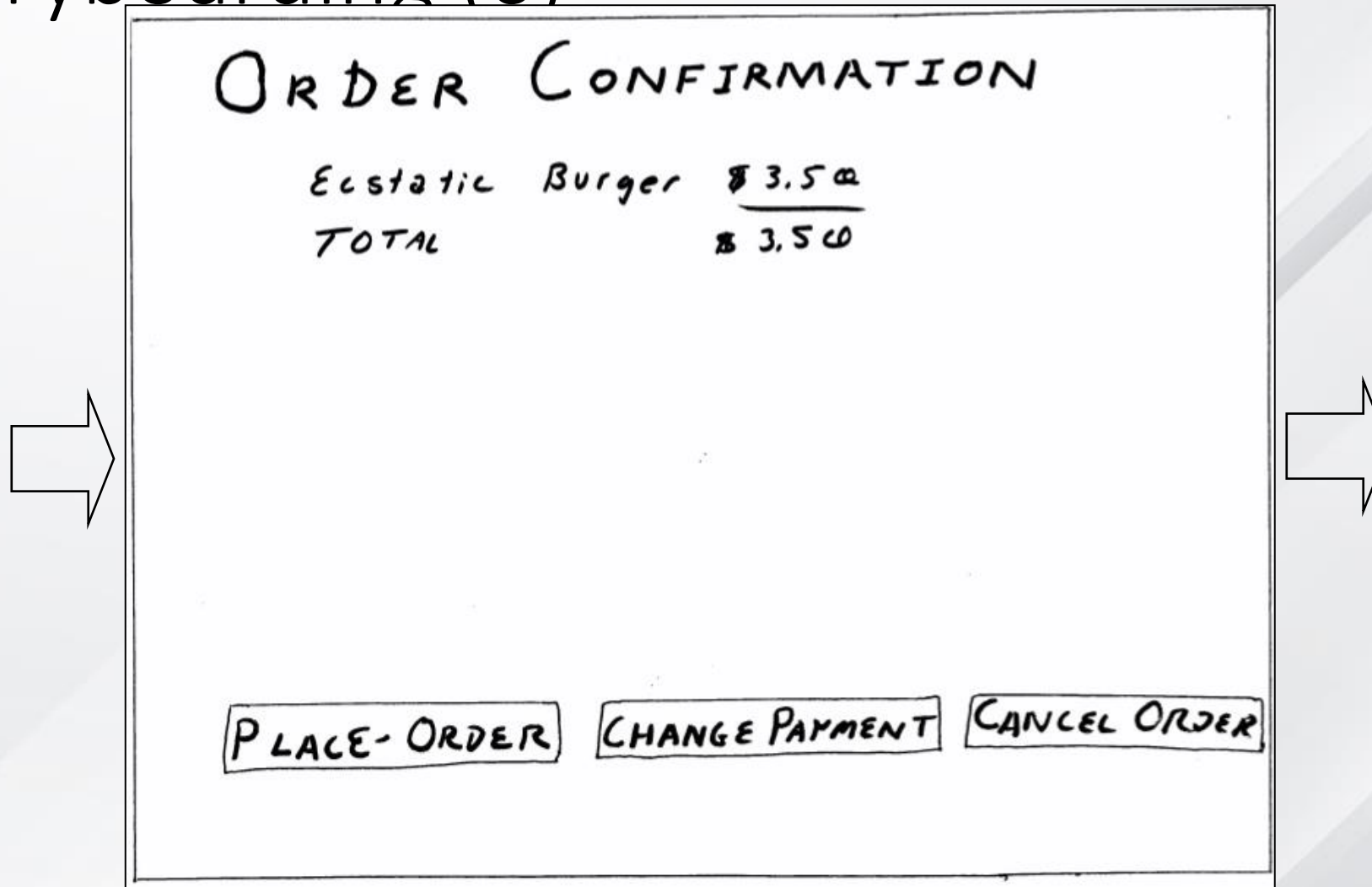
1	2	3
4	5	6
7	8	9
.	0	Next form of payment

Make Payment

MODIFY ORDER

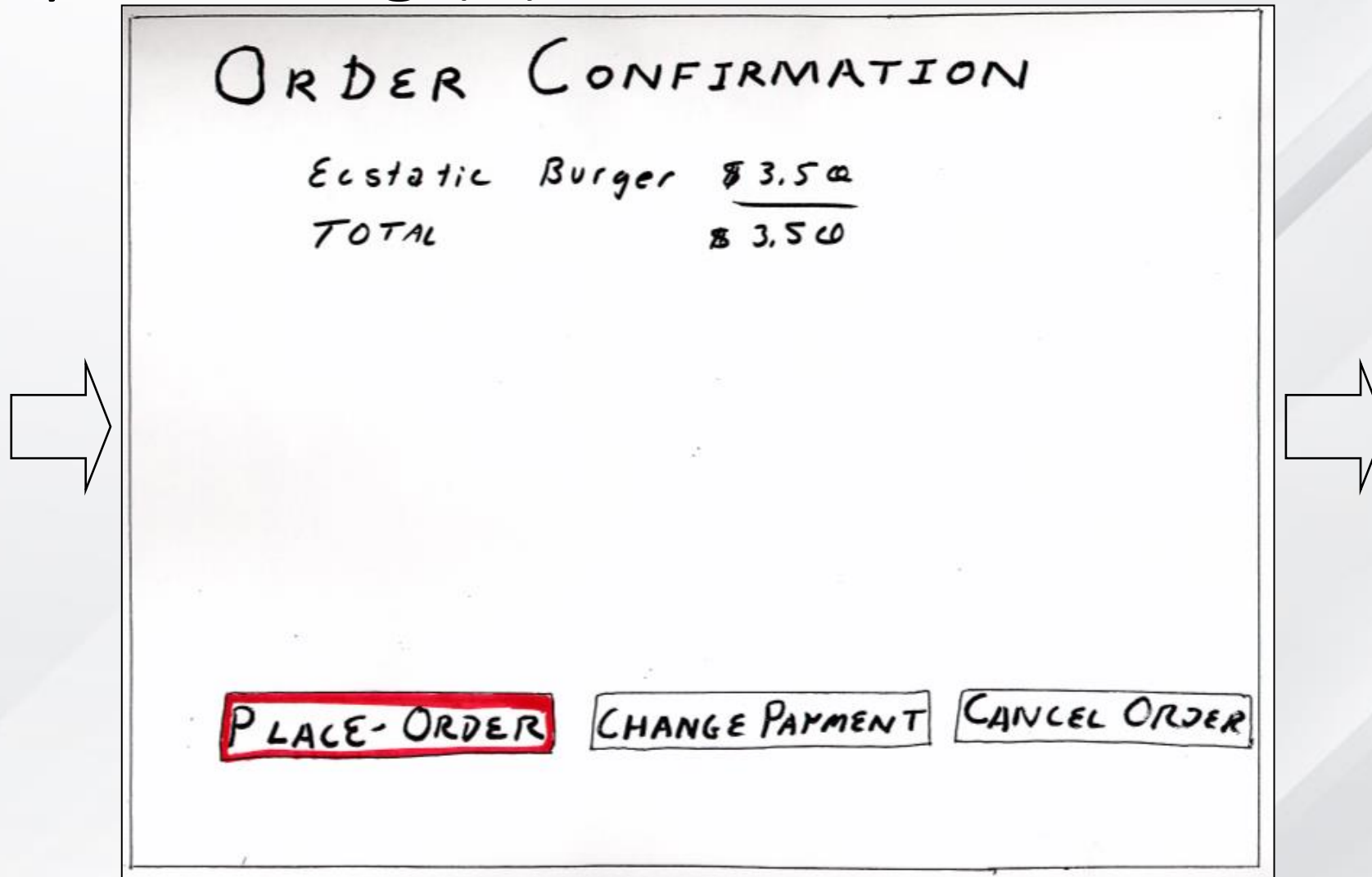
User pays with cash

Storyboarding (6)



Order confirmation screen comes up

Storyboarding (7)



A storyboard frame for an 'Order Confirmation' screen. The frame is a rectangle with a thin black border. Inside, the title 'ORDER CONFIRMATION' is at the top. Below it is a receipt-style summary: 'Ecstatic Burger' with a price of '\$3.50' and a 'TOTAL' of '\$3.50'. At the bottom, there are three buttons: 'PLACE-ORDER' (highlighted with a red border), 'CHANGE PAYMENT', and 'CANCEL ORDER'. Two large, hollow arrows point horizontally towards the frame from the left and right sides.

ORDER CONFIRMATION

Ecstatic Burger \$3.50

TOTAL \$3.50

PLACE-ORDER CHANGE PAYMENT CANCEL ORDER

Order is placed

Storyboarding (8)



Order confirmation is shown

Storyboarding (9)

- Showing key points in the interaction makes it easy to figure out how the system works.
- Showing an alternative interaction requires a whole new series of panels to be made.

Tips for Storyboarding

- Don't invest too much in a storyboard. Customers will be intimidated about making changes if it looks like a real work product or they think they might insult you.
- If you don't change anything, you don't learn anything. Make the storyboard easy to modify.
- Don't make the storyboard too functional. If you do, some stakeholders may want you to "ship it."
- Whenever possible, make the storyboard interactive. The customer's experience of use will generate more feedback and will elicit more new requirements than a passive storyboard will.

Throw-Away Prototypes

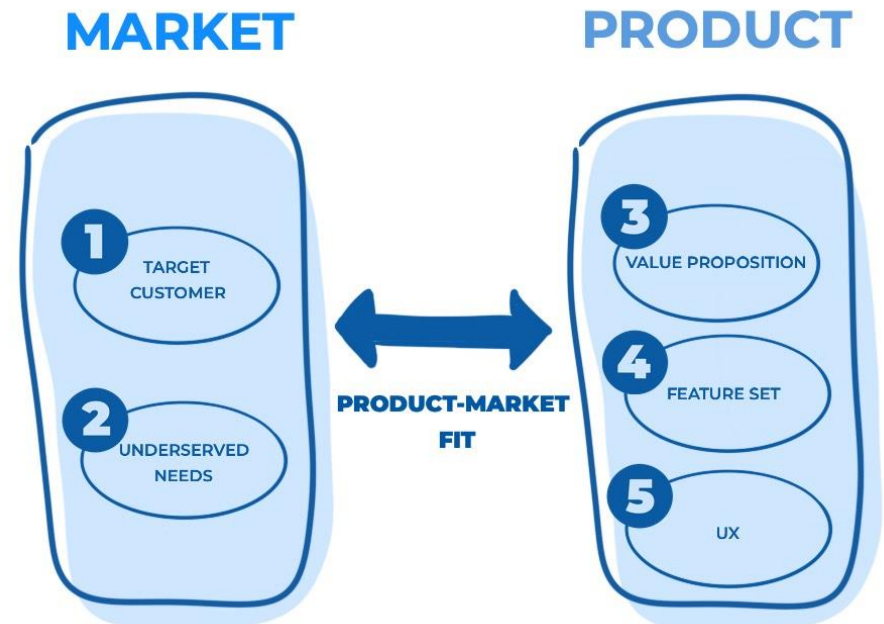
- Prototyping for requirements gathering are throw-away prototypes
 - Intended to help elicit and develop the system requirements
 - Build the prototype to help capture requirements;
 - Discard prototype later and build production quality system;
 - Derive specs from prototype -- use for final, conventional software process model

Perceptions of Prototyping

- Main argument against prototyping is that the cost is too large a percentage of the total cost;
- May be cheaper to modify finished product to get requirements right than to allow user to get requirements right and refine them with prototype before final system.
- This may be true for some systems, but prototyping increases software quality and decreases costs overall;
- “Build cheap and fix later” can be more expensive in the long run.

What is product-market fit?

Product-market fit is when your product addresses and solves the needs of your buyer personas in correlating market segments and channels. Using this framework can potentially result in more business success than without proper alignment.



How To Measure Product-Market Fit

The most tangible way to assess your product-market fit and understand how consumers view your products is by sending them **surveys**. The questions in these surveys are pointed and ask customers if they think your product is a must-have and if they would miss it if it were gone.

1. Multiple Choice Questions

aid in better understanding the buyer persona that looks for your business. This can range from asking for information on their location, demographic, career aspirations, or current priorities to better envision the target market your product is going to serve

2. Open-Ended Questions

The following questions are open-ended and can help you understand how well your product fits into the market based on your consumers' individual experiences.

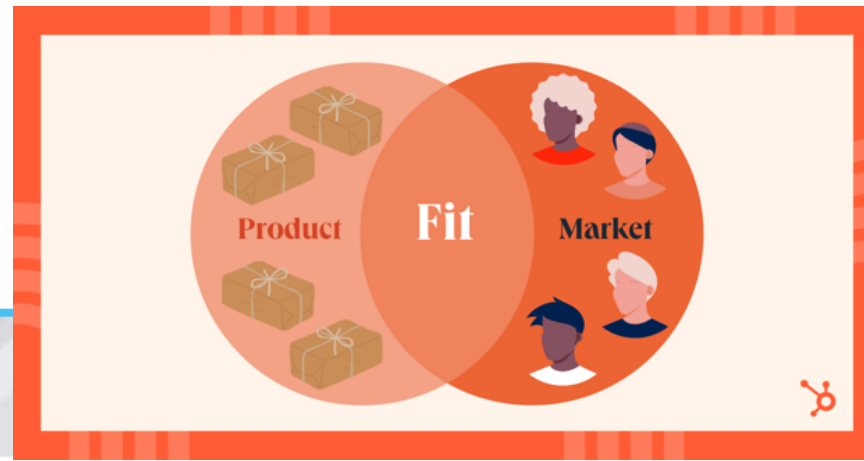
- “What is the main benefit that you get from using [your product name]?”
- “What type of person would benefit most from [your product name]?”
- “How can we improve [your product name] to best meet your needs?”
- “What motivated you to use our product?”
- “Why are you using our product as opposed to other solutions?”
- “What makes our product a must-have product?”

Pro Tip: The 40% rule is a popular metric for understanding product-market fit survey results. It states that if at least 40% of customers say they would be “very disappointed” if they no longer have access to your product or service or consider it a “must-have” (wouldn’t use an alternative), you’ve created a product that fits into the market

Many startups fail because they waste money on products that no one wants to buy.

Startups should prioritize product-market fit above all other goals because those that find it will dramatically increase their odds of success.

To avoid this fate, ensure you understand the pain points your product solves, and your customers seek to solve. You can do this by focusing on six primary areas



Product-Market Fit Goals for Startups

1. Determine your target customer.

Work to identify the target customer who represents the users that will most likely benefit from your product. Use market segments to define your ideal customer, and develop buyer personas for those customers, so your team will clearly understand whom it's building toward

- 1-Analyzing your product or service
- 2-Familiarizing yourself with your competition
- 3-Choosing segment criteria
- 4-Performing research

2. Gather information

Talk to your customers to determine their pain points and how much they would consider paying for a solution to those challenges. (your sales and marketing teams - meaningful feedback-face-to-face conversations -online surveys)

Product-Market Fit Goals for Startups

3. Focus on a single vertical.

Startups have small budgets, which means that trying to sell your products to everyone will likely result in disaster. Begin with a narrow focus and dive deep into that industry. Establish yourself as the industry expert in a single domain to stimulate a viral spread

4. Specify your value proposition.

Determine which customer needs you can best address with your product or service. Figure out how you can outperform your competitors and surprise your customers. Don't lose sight of your product roadmap when determining which challenges you'll address; not every problem will fit into yours

Product-Market Fit Goals for Startups

5. Measure your product-market fit



"Ask your customers if they want or need this product, send out surveys and conduct interviews, these are a part of the product validation process

6. Avoid complacency.

If you manage to achieve product-market fit, don't assume you'll always have it. Your customers' needs will change over time, and you must constantly re-evaluate market conditions to continue meeting those needs.

An example of complacency can be seen in the market of online communication services is **Skype**. In 2020 when remote business and learning skyrocketed due to unprecedented change across the world, people were scrambling to use and share easy-to-use, **Zoom** fulfilled the product-market need quickly and now, almost half of the working adult population regularly uses Zoom over Skype, Microsoft Teams, and many more services in that industry

Design Thinking in the Age of AI

Design Thinking in 2025: From Human-Centered to Human + AI-Centered

- Design is no longer only human-centered → now Human + AI collaboration
- Prototyping is faster with AI tools (UI, content, ideas)
- AI helps simulate users before real testing
- Decisions are supported by real-time data, not assumptions
- Designers focus more on: Problem framing, Ethics, Experience quality

Key Insight: “AI accelerates design, but human empathy defines it.”

Design Thinking in the Age of AI

From Prototype → Product-Market Fit → Impact

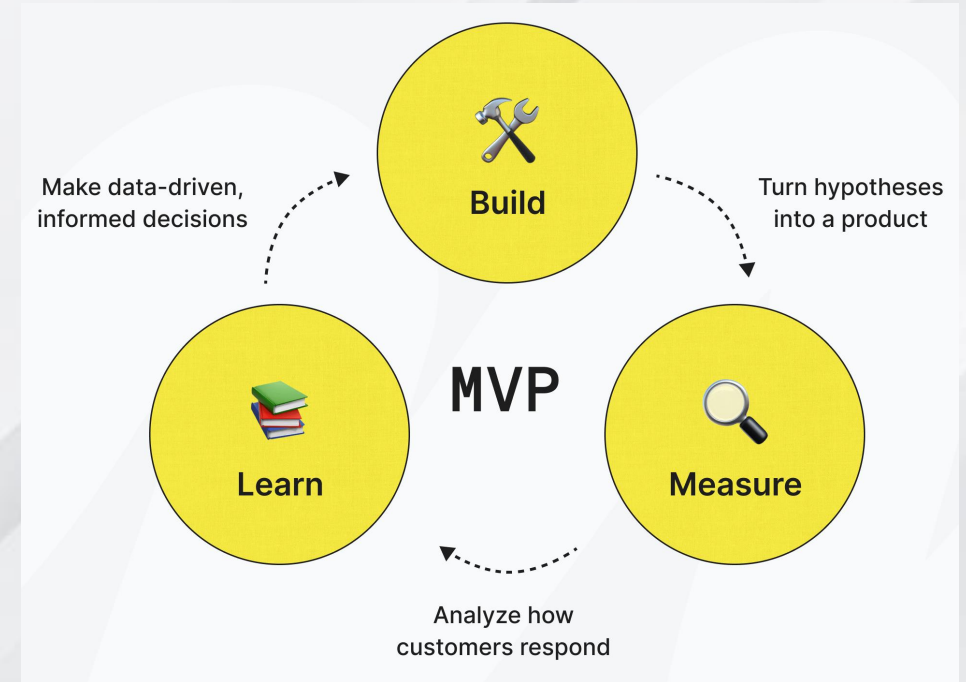
A prototype is not the goal → learning is the goal

- Success comes from continuous iteration, not one solution

- Modern PMF Metrics:

- ☐ Activation rateDid users start?
- ☐ Retention rate Did they stay?
- ☐ Engagement (DAU/MAU) ...Do they use it often/love it?
- ☐ Net Promoter Score (NPS) ...Do they recommend it?
- ☐ Cohort analysis...Is the product improving over time?

- Key Insight: “The best ideas don’t win — the best tested ideas do.”



Conclusion:

Find the Right Fit for Your Product

When you achieve product-market fit, your job will become much easier because your customers and other interested parties will become a significant part of your marketing effort. They might even share their own stories with others so you can focus on the work of creating the same great experience for everyone who interacts with your company.

- Prototyping
- Benefits of prototyping
 - Prototyping techniques
 - Storyboards
 - Types of storyboards
 - Product - Market fit

Prototyping

Storyboard

Product-market fit



Thank You