

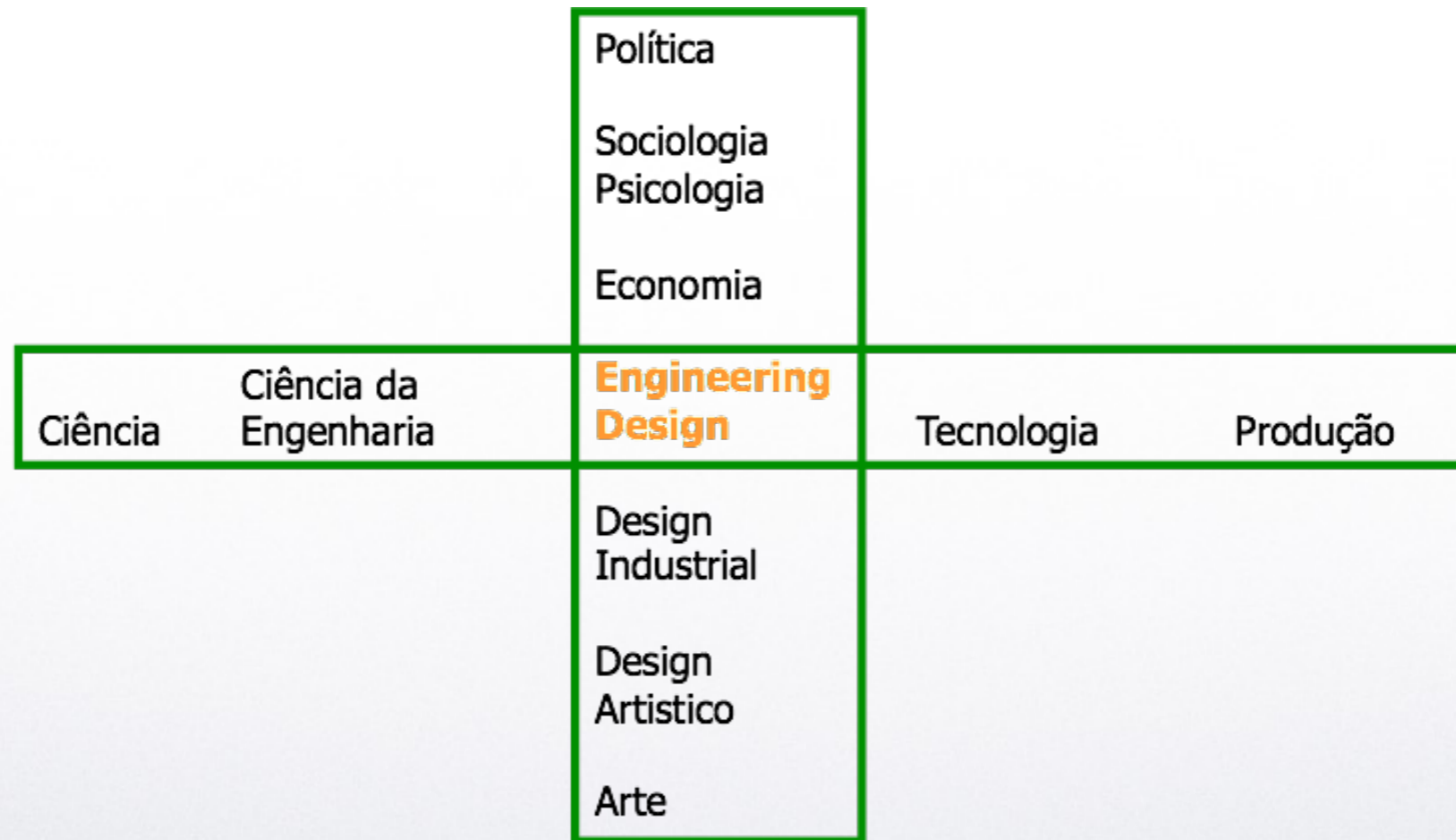
# ***PMR 3100***

## Uma breve introdução aos projetos de Engenharia (Mecatrônica)

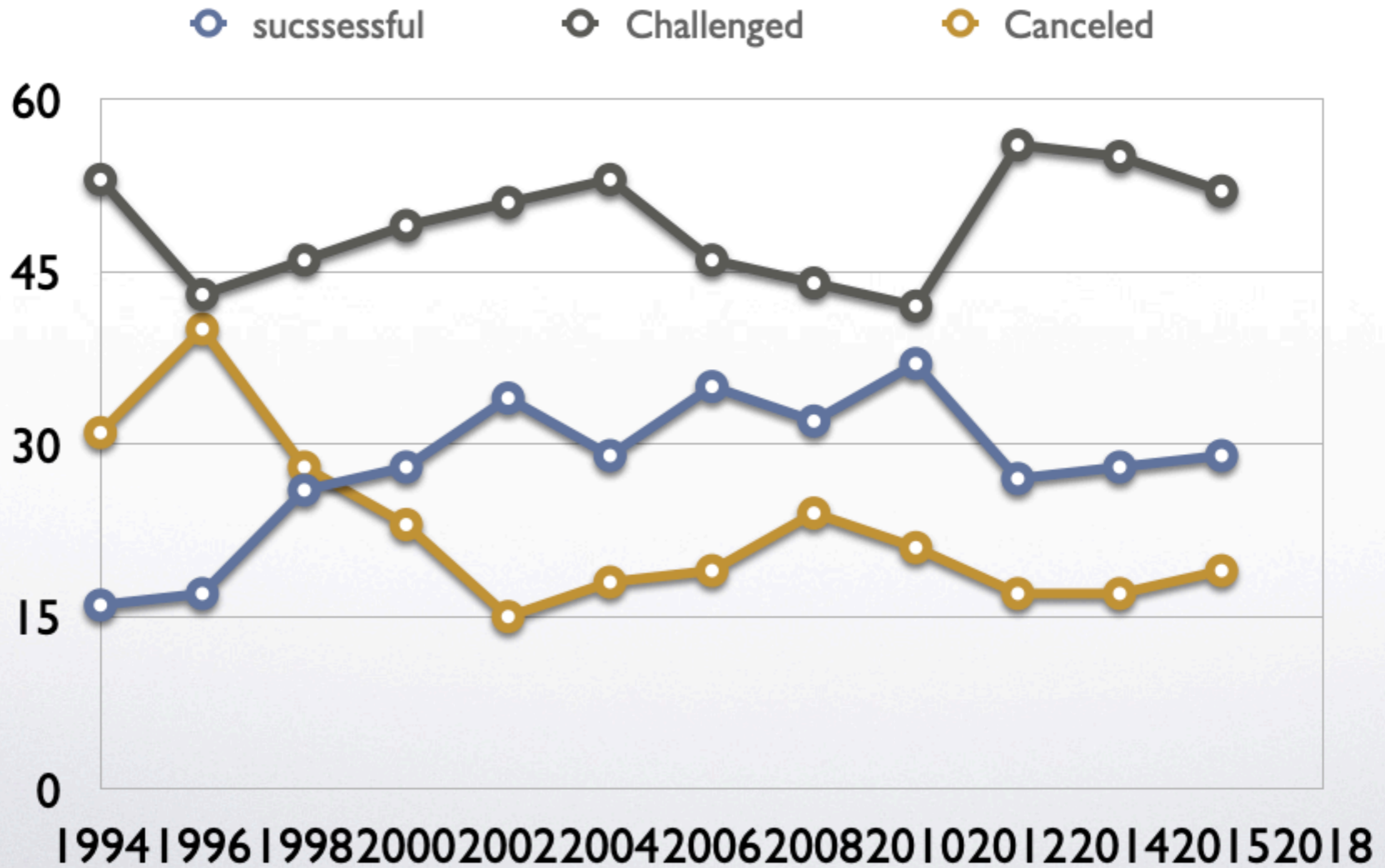
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Prof. Dr. José Reinaldo Silva  
[reinaldo@usp.br](mailto:reinaldo@usp.br)

## Projetando artefatos em Engenharia



Pahl, G., Beitz, W., Feldhusen, J., Grote, K-H., Projeto na Engenharia, Edgar Blucher, 2005



## Does anyone really waste millions aborting a project?



Scottish Parliament building: an aborted project (1999)

The Scottish Parliament project was **estimated in 40 million pounds** and planned to be ready in **two years**. It was ready (supposedly matching requirements) in **five years** and cost **400 million pounds**.

“Trabalhar em projetos é uma atividade básica da engenharia (em especial da Enga. Mecatrônica) e requer disciplina, ética, e conhecimento específico.

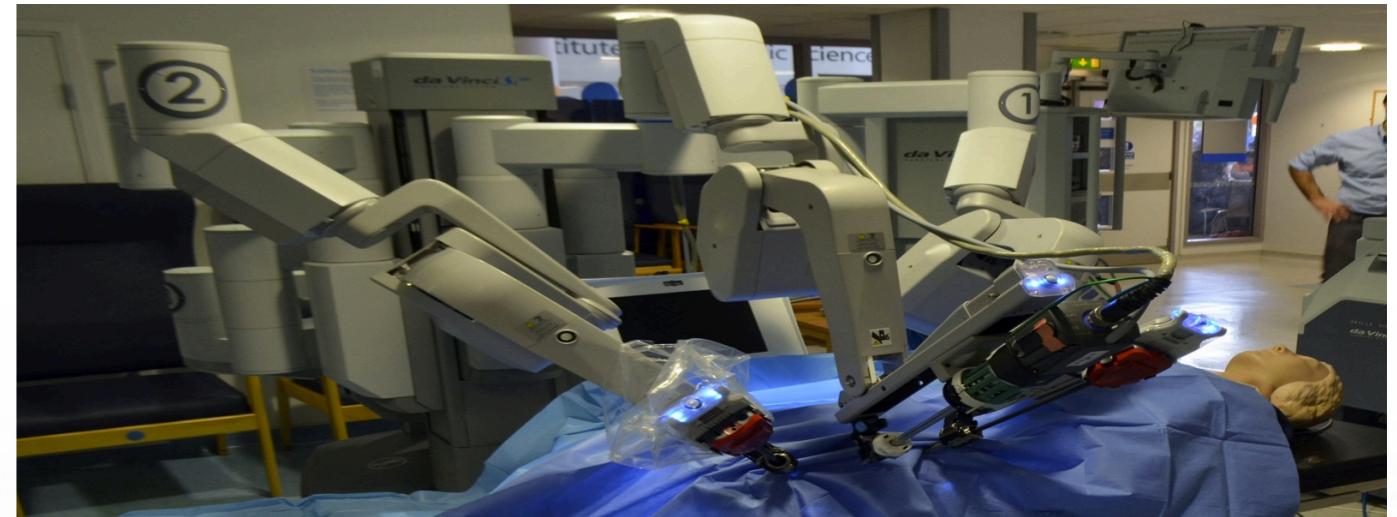


**E como se faz projetos?**

Vamos começar classificando os projetos...

# Existem os mega-projetos

*Tamanho não é documento...*



# Projetos e mega-projetos

## Classificação heurística dos projetos:

- Projetos de pequeno porte
- Projetos de porte moderado
- Projetos de porte médio
- Projetos de grande porte
- Projetos muito grandes
- mega-projetos

Qual é a métrica?

## ISO/IEC 29100

|  | Small project                | Medium project                 | Large project      |
|--|------------------------------|--------------------------------|--------------------|
| Duration of project                        | Less than 2 months           | Between 2 and 8 months         | More than 8 months |
| Size of team                               | Up to 4 people               | Between 4 and 8 people         | More than 8 people |
| Number of engineering specialties involved | One                          | More than one                  | Many               |
| Engineering fees                           | Between \$5,000 and \$70,000 | Between \$50,000 and \$350,000 | Over \$350,000     |

Complexidade  
Impacto Ambiental  
Risco e impacto social

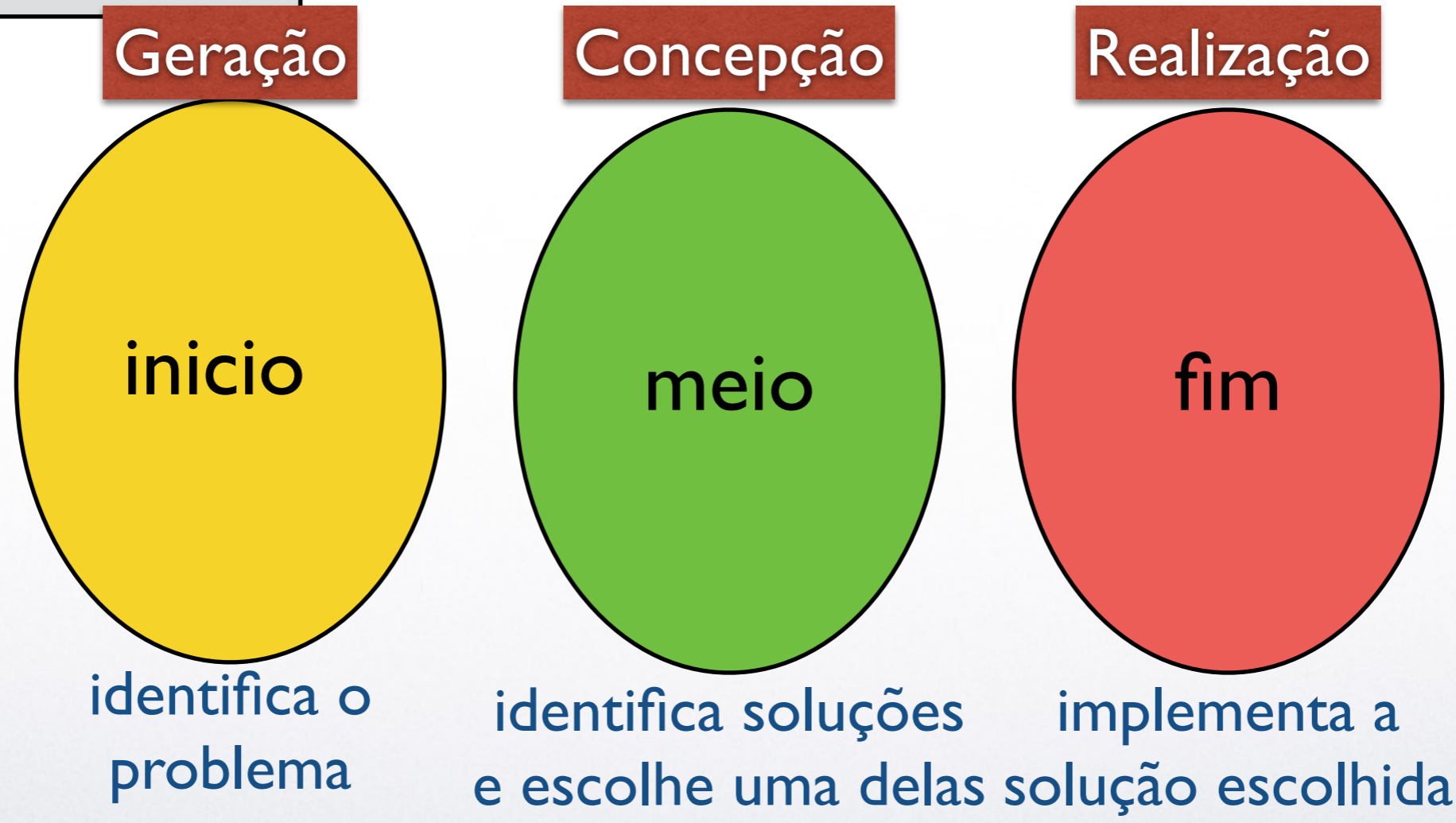


# A postura do Engenheiro

Qual é de fato o problema com os projetos (em geral, e como projetos mecatrônicos em particular) e com a postura dos engenheiros (além dos cuidados com a ética)?

O ciclo básico de projeto

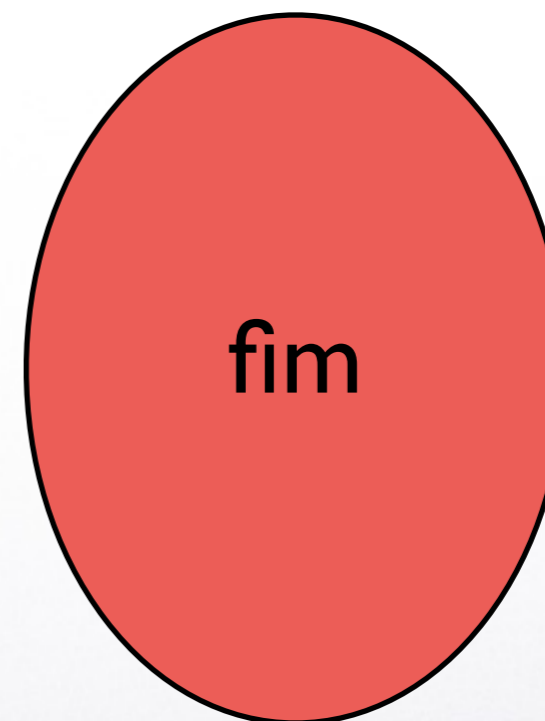
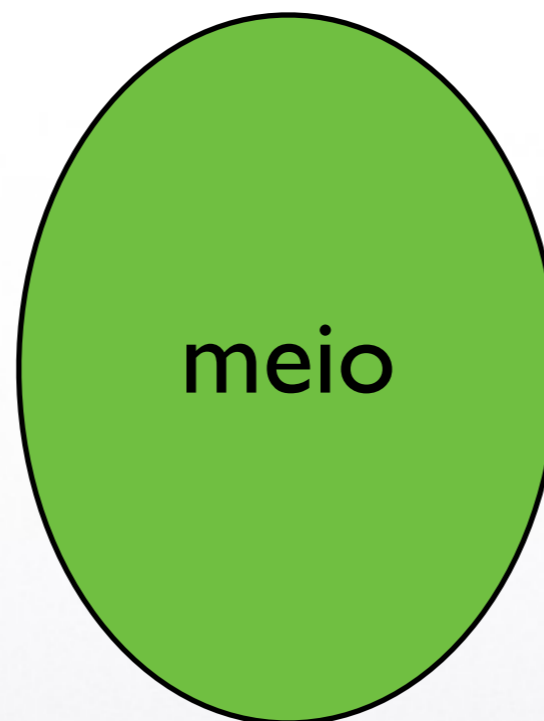
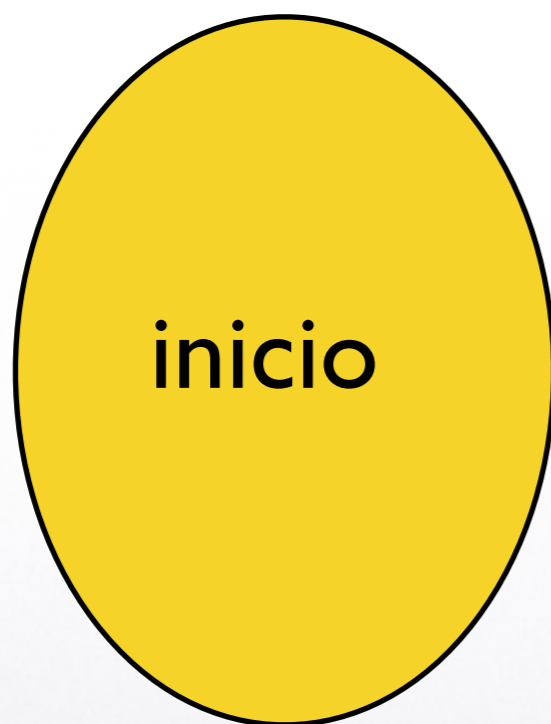
“na teoria”...



O que se faz em cada fase? e PORQUE?

O ciclo básico de projeto

“na prática”...



PORQUE?

# O problema da análise de requisitos

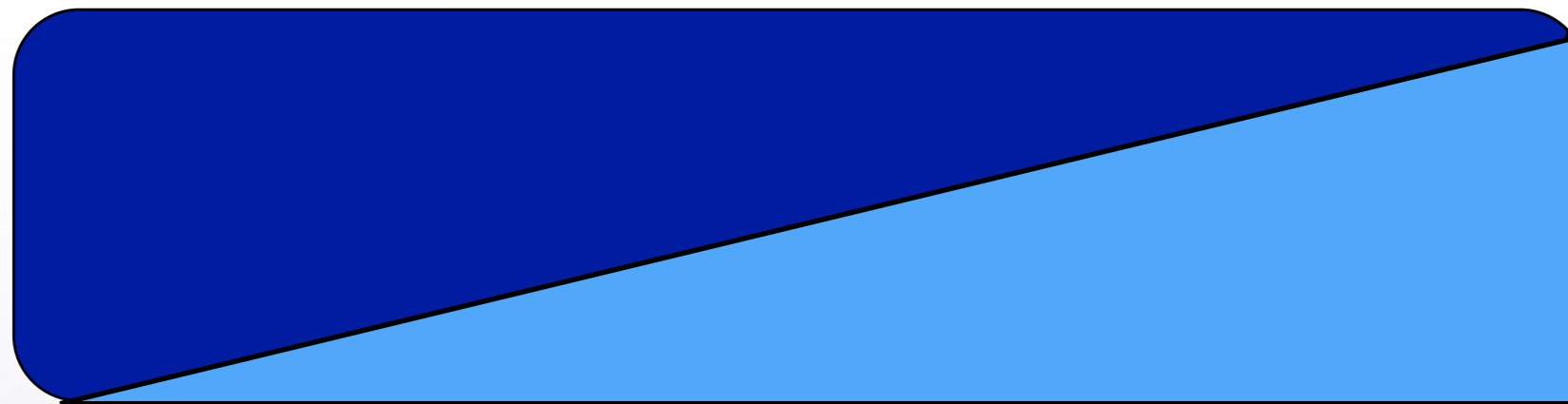


**ER = Eliciação + Modelagem + Análise**

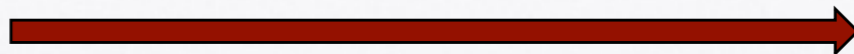
Eliciação (elicitation)



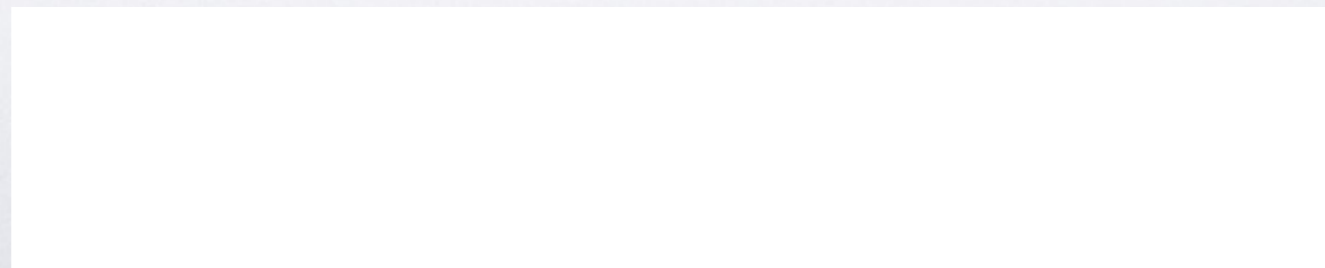
requisitos



especificações



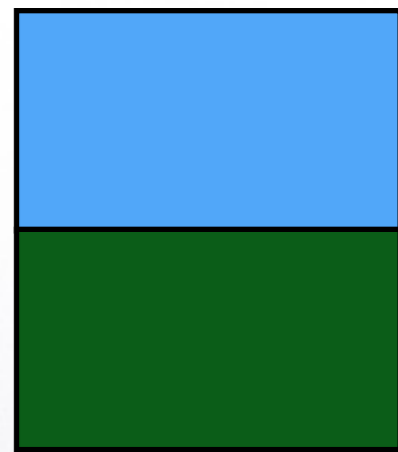
Capacidade de análise



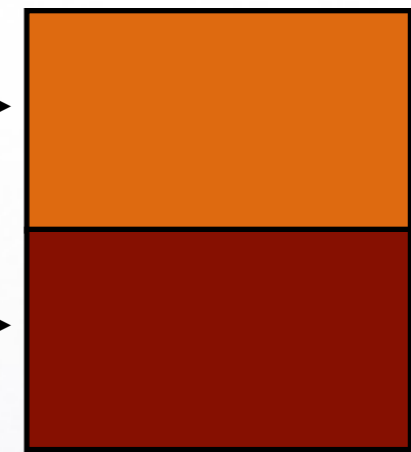
Qual a estratégia para “resolver um problema”?

# Entre problemas e projetos

Enunciado



Projeto



Proposta de projeto

Requisitos

# Motivação financeira

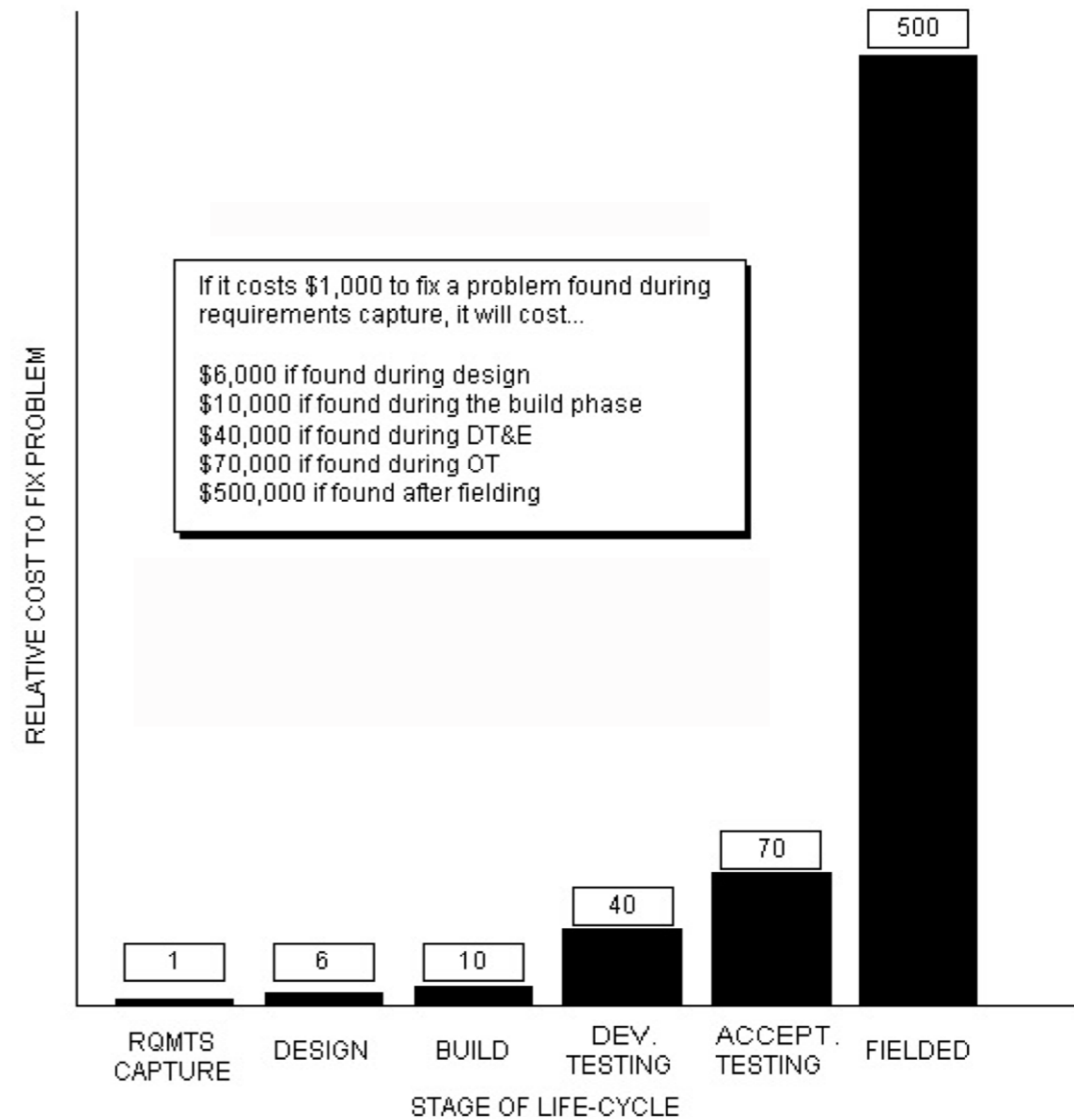
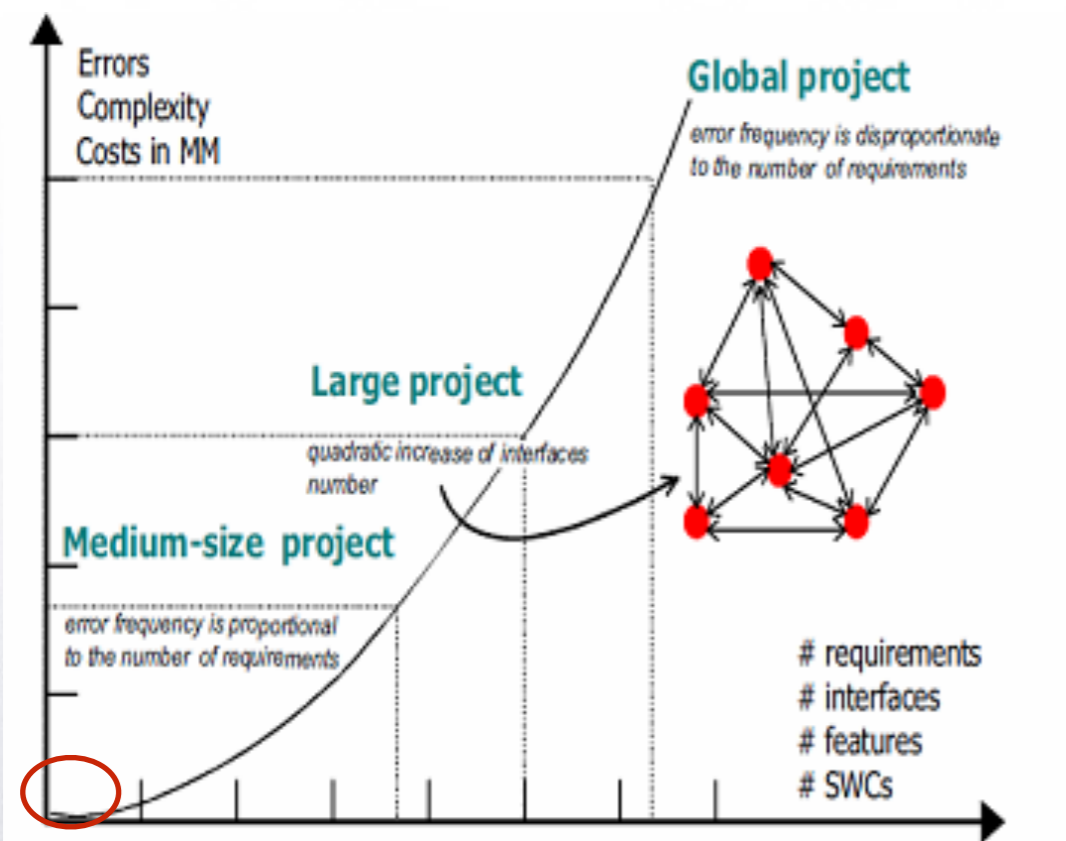
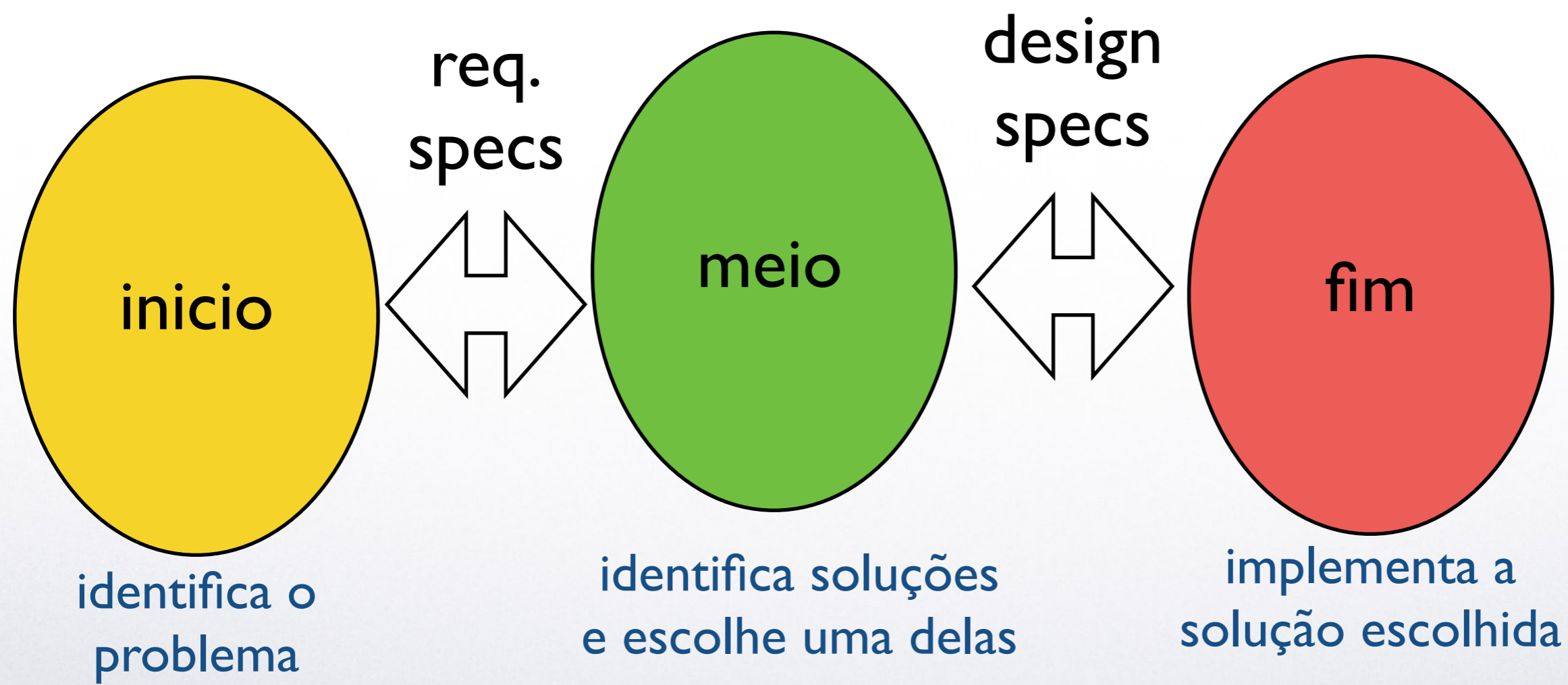


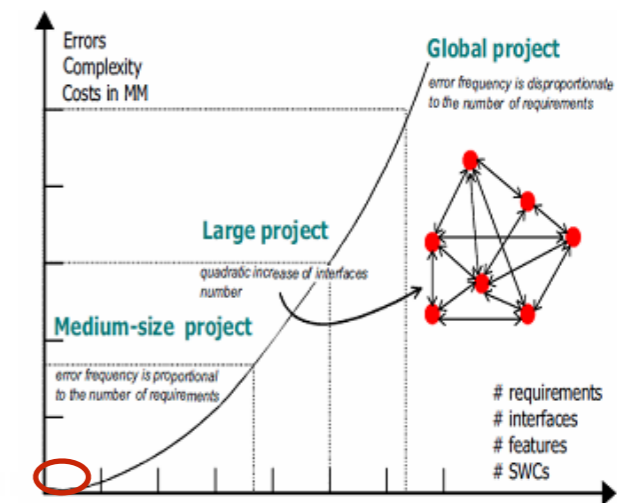
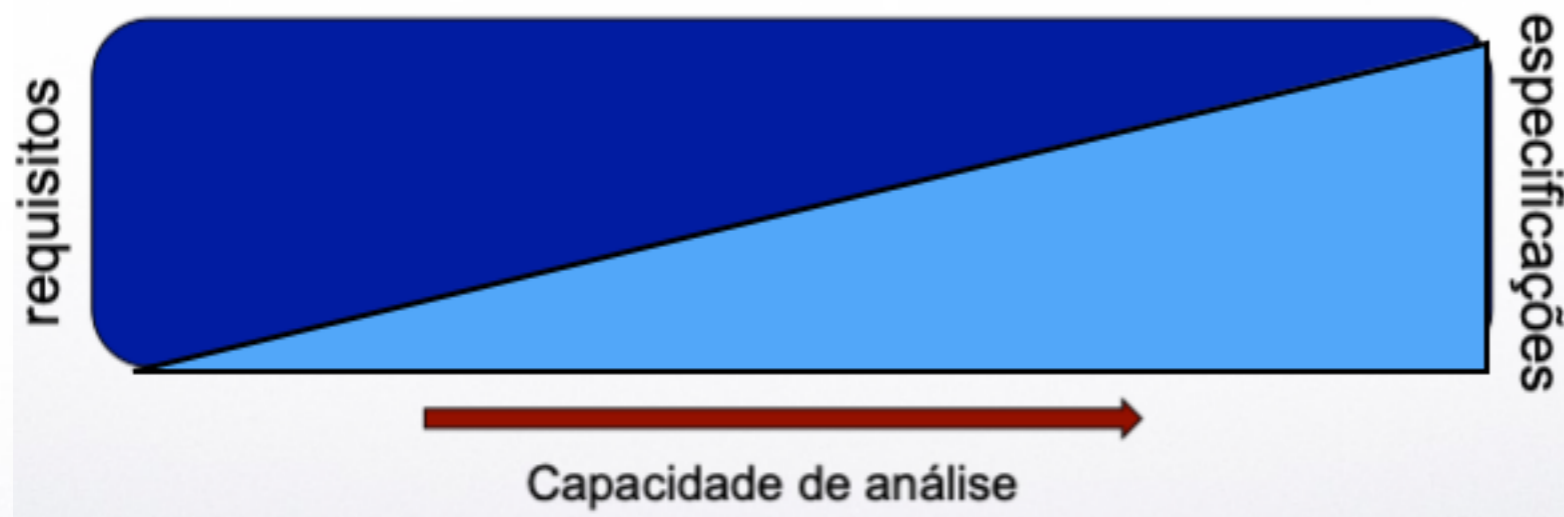
Figura 1: Custo para correção de erros no desenvolvimento de sistemas

O ciclo básico de projeto





# Modelo de documentação

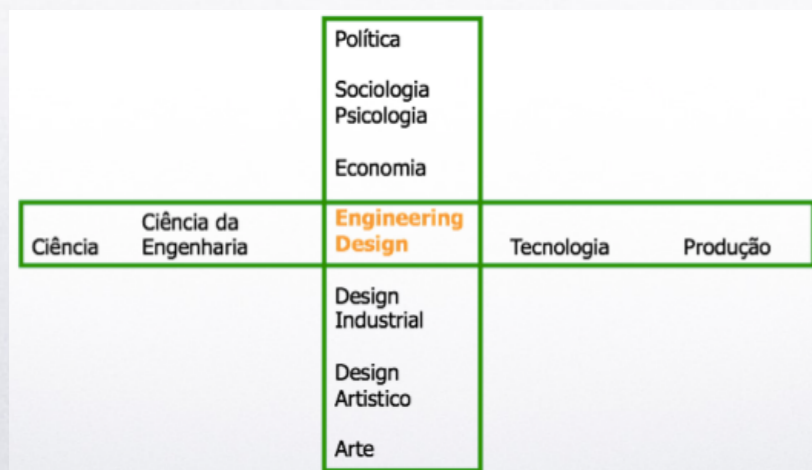


O modelo de documento adequado varia com o tipo (e classificação) do projeto. No caso de mini-projetos precisamos de comunicação ágil e inclusiva.

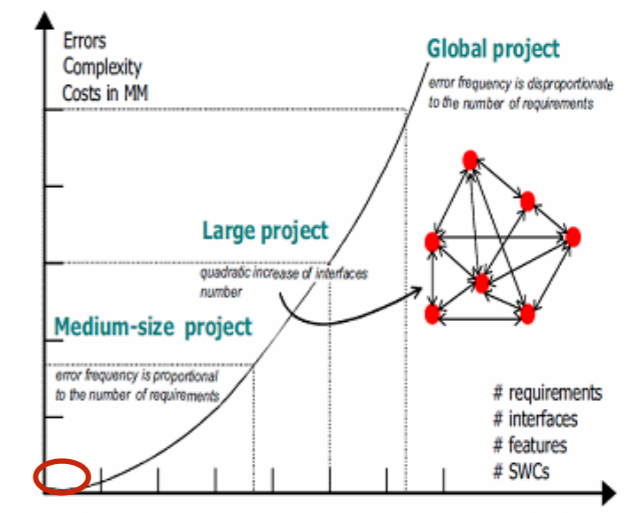
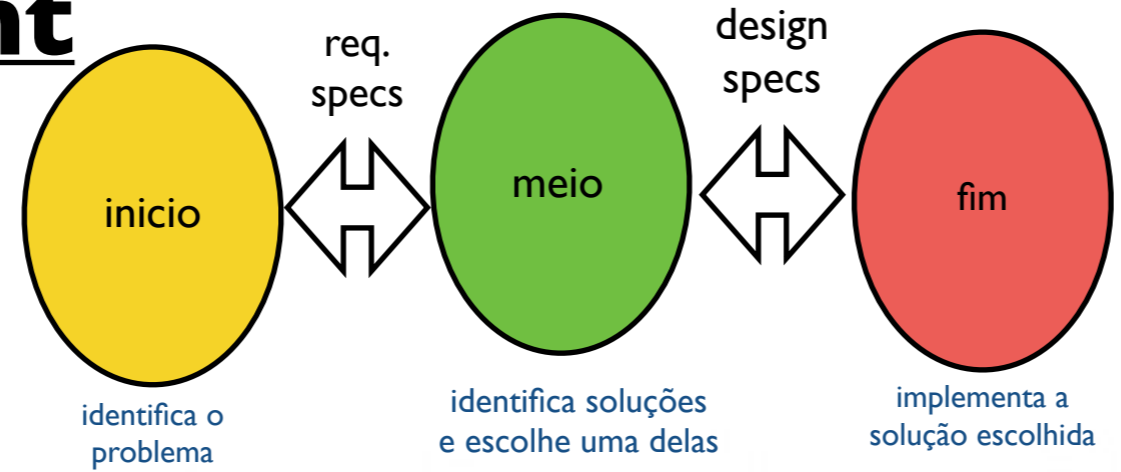
Começamos identificando o problema (proposta de projeto)...

... e como se “identifica o problema?”

Entendendo o que deve ser feito e o que os usuários esperam!



# Design Sprint



O Design Sprint foi criado em 2010 por Jack Knapp e refinado com o time da Google (Chrome, etc) até se tornar o que é hoje, que foi lançado em 2012 no Google Ventures.

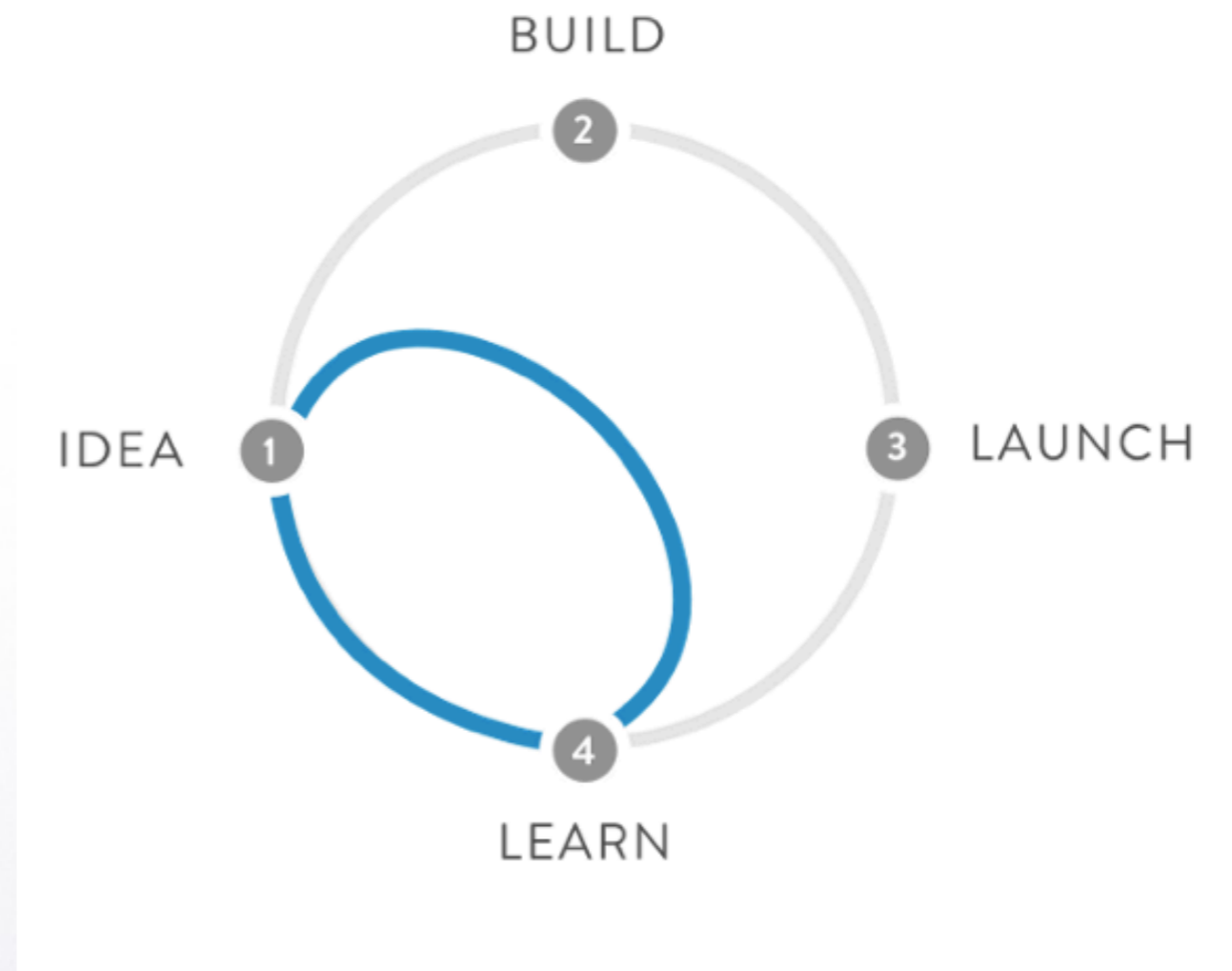
<https://www.thesprintbook.com/the-design-sprint>



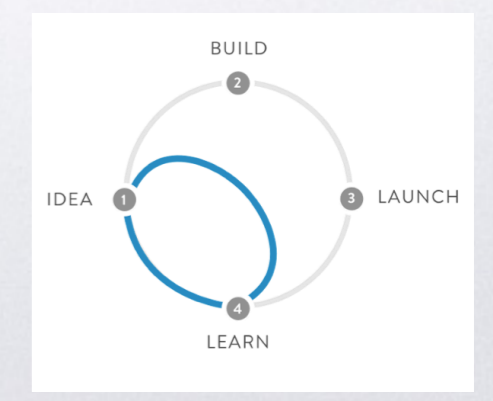
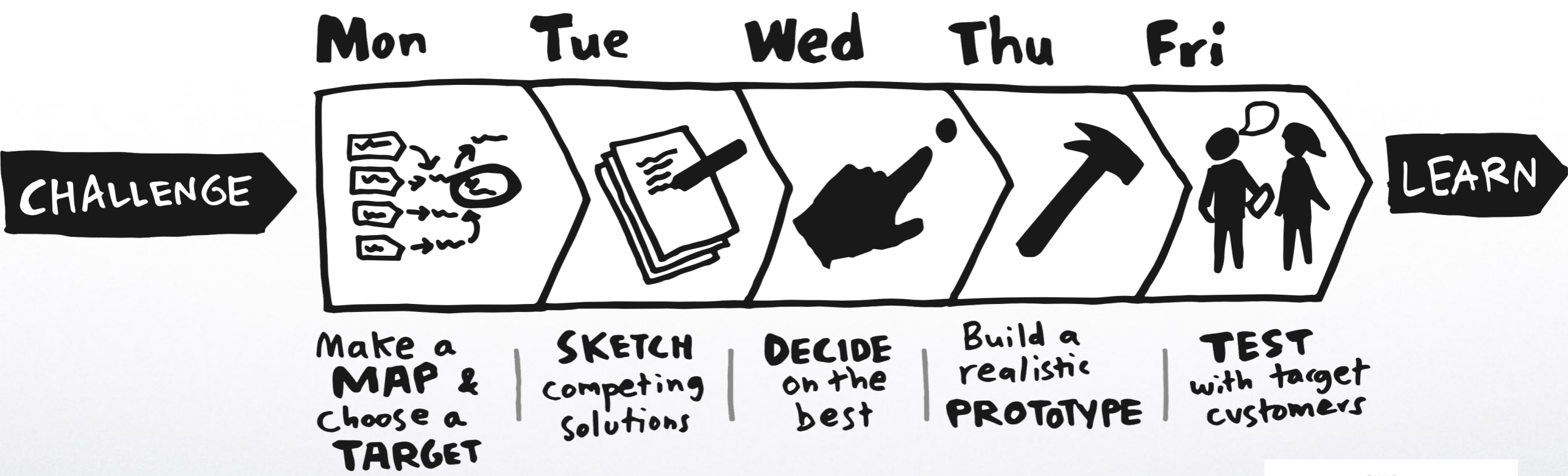
**Fabricio Teixeira**

Designer at Work & Co,  
Founder of UX Collective —  
<http://twitter.com/fabriciot>

A principal vantagem desse processo de 5 dias em relação a tantas outras metodologias que existem por aí é que ele pega um atalho bastante vantajoso: ao invés de esperar para lançar um MVP (Minimum Viable Product) para descobrir se a ideia é boa ou não, processo esse que pode tomar vários meses, o Design Sprint foca especificamente na validação da ideia com usuários e encurta o processo para 40 horas de trabalho.



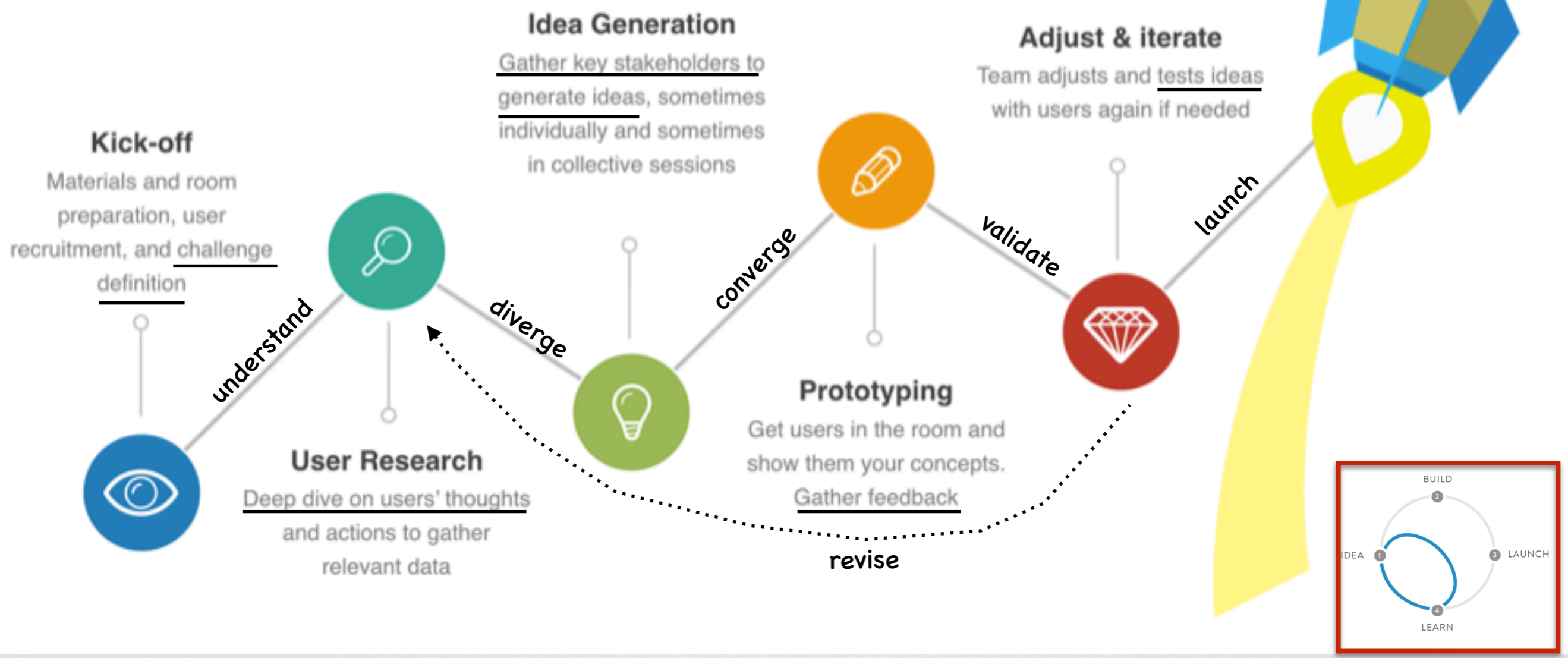
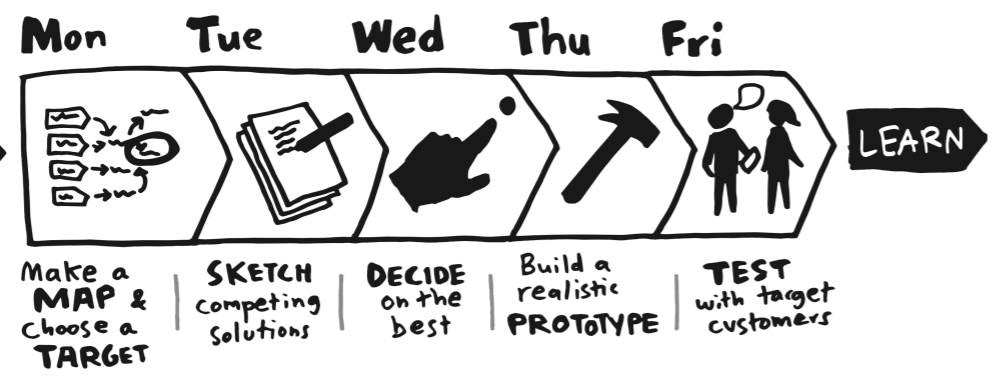
<https://brasil.uxdesign.cc/google-design-sprint-como-funciona-e-como-aplicar-no-seu-projeto-279107363659>

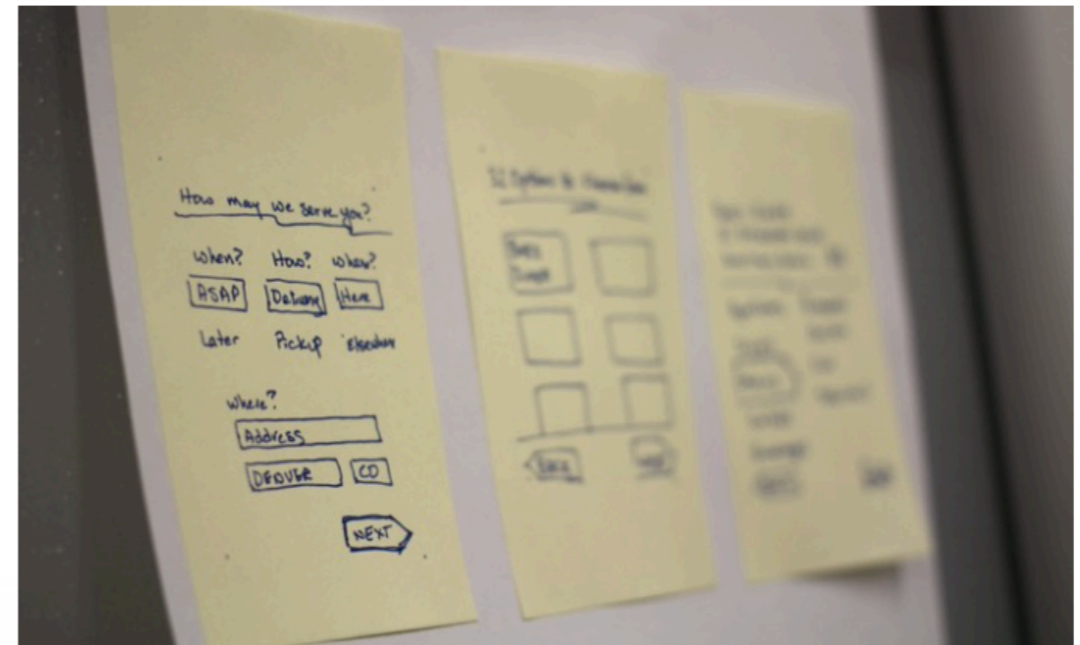
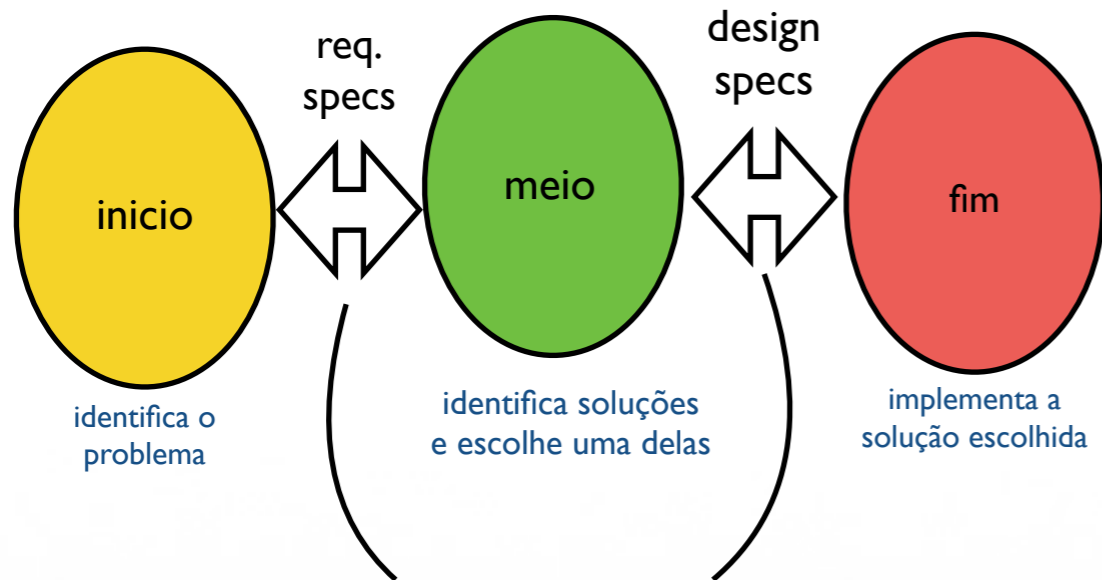




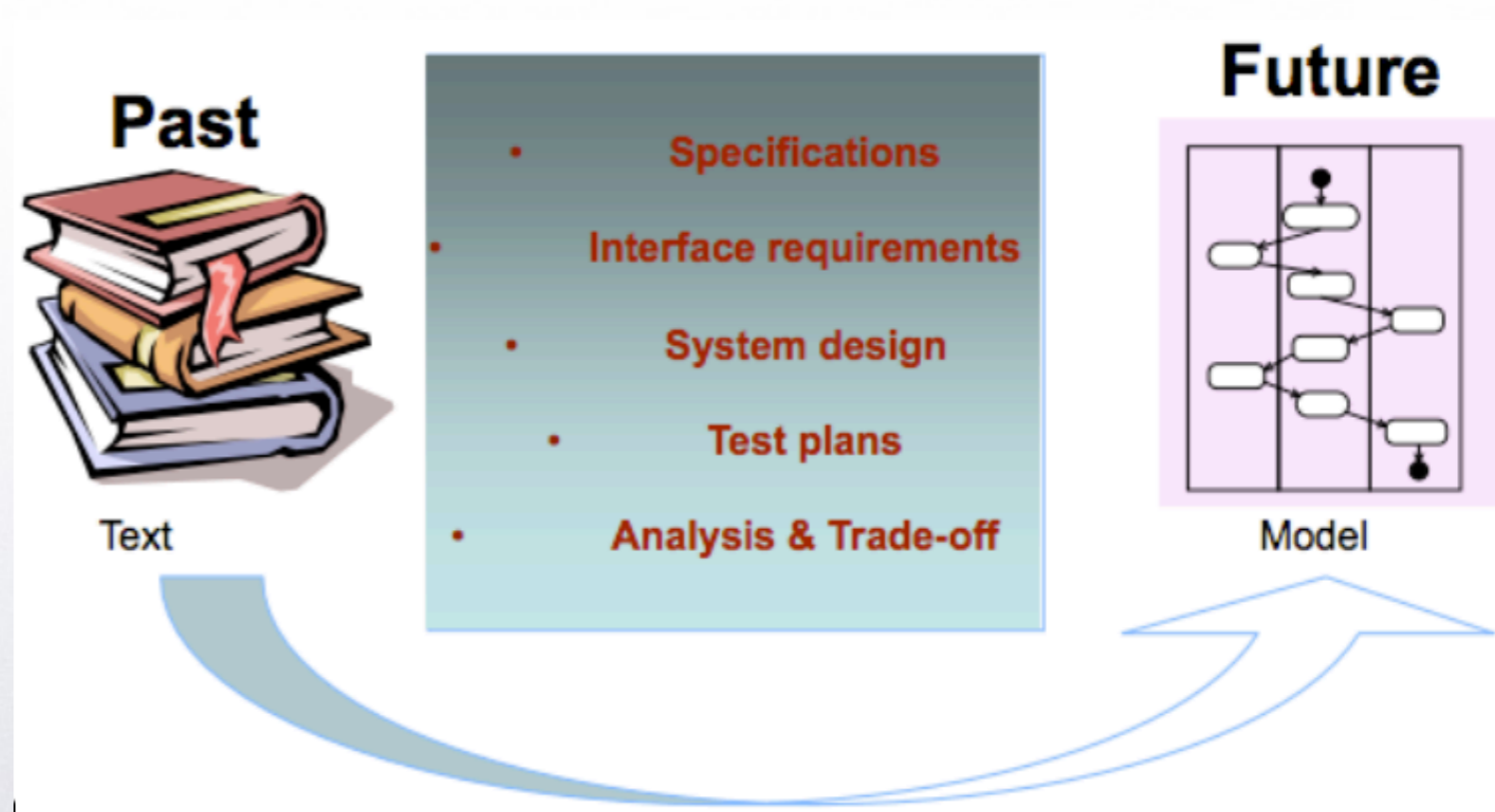
# In Summary

1. Decide and focus on the problem
2. Sketch solutions
3. Decide on approach
4. Prototype
5. Test with users





# Documentação





|  |   |   |
|--|---|---|
| <b>Company name: Bull's Eye Solutions</b>  |   |   |
| <b>Team members</b><br>Brad G.<br>Maria F.<br>Joaquin J.   | <b>Solution</b><br>Bull's Eye Solutions offers brand building services to start-ups and small businesses.   |   |
| <b>Question</b><br>Bull's Eye Solutions is a branding company. We stand for bringing humanity and purpose to small brands. | <b>Viability</b><br>It's clear that purpose-driven brands are the most successful in their categories. Smaller businesses struggle to have the means and resources to define their brand and compete with larger competitors. Bull's Eye offers brand building for an affordable rate to help them compete. |   |
| <b>Existing alternatives</b><br>Gore Studios Branding<br>Fival Goes Best Brand Studio                                      | <b>Target group</b><br>Small business owners  | <b>Goals</b><br>Increase leads by 20% this quarter.                       |
| <b>Discards</b><br>Expensive agencies and studios.   | <b>Success factors</b><br>Building strong client relationships for word of mouth. Increasing new client leads by 20% every quarter.   | <b>MVP</b><br>An affordable brands studio to help the little guy succeed. |
| <b>User acquisition</b><br>Local ads<br>Tradeshows<br>Organic search (SEO)   | <b>Value</b><br>An affordable way to build a purposeful brand so they can attract the right customers.  | <b>Vision</b><br>Increase our client base and expand to another city.     |

Source: [methodkit.com](http://methodkit.com)



Startup Canvas  
Miro.com



# About the Startup Canvas Template



OUR DESIGN SPRINT TEMPLATE IS NOW AVAILABLE ON MURAL, MIRO AND INVISION FREEHAND

MURAL

miro

inVISION



Use this template on Mural

Use this template on Miro

Use on Invision Freehand

<https://miro.com/online-canvas-for-design/>

miro

Product ↓ By Use Case ↓ By Team ↓ Pricing Enterprise

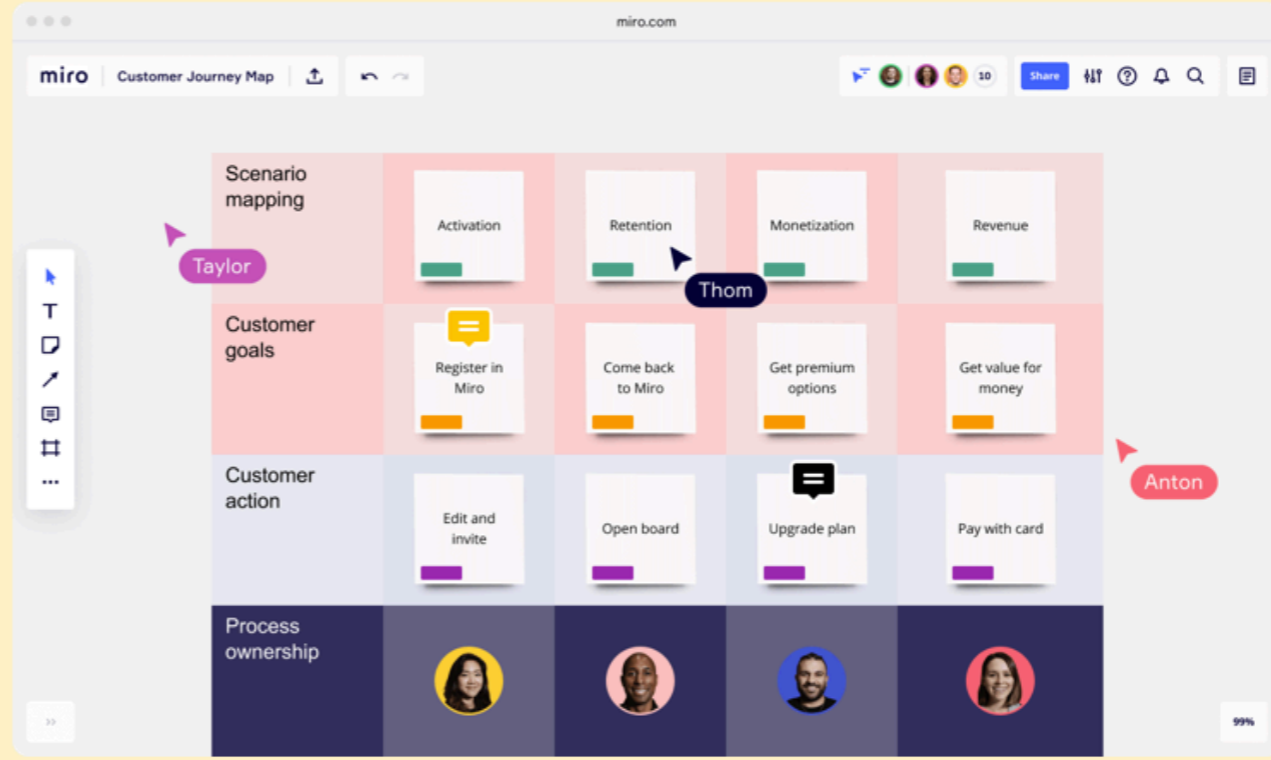
Contact Sales

Go to the Dashboard

# The Ultimate Design Thinking Canvas

Think like a designer and collaborate on design sprints, customer journeys maps, wireframes, and more. Generate ideas, uncover insights, and transform the way your team builds products.

Sign up free →

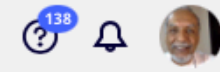


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PMR3100

All boards  
Starred boards

Projects + Add

Upload from backup

Join the webinar →  
Join our Getting started with Miro webinar this Thursday at 8 am PT!

[Join now](#) No, thanks

### Create a board

- New board
- + Mind Map**
- + Kanban Framework
- + Quick Retrospective
- + Customer Journey ...
- + User Story Map Fra...
- + Flowchart
- + Brainwriting
- Show all templates

### All boards

Design sprint kit

Owned by anyone Last opened



miro | Design sprint kit ☆ | Sprint Kit

The Miro board contains several diagrams:

- Agenda:** A vertical list of sticky notes on the left side.
- UXP Chores (Monday):** A horizontal row of sticky notes.
- User Journey Map (Monday):** A diagram with a horizontal timeline and sticky notes.
- Storyboard (Monday):** A 3x3 grid of storyboard frames.
- Art Gallery (Wednesday):** A 3x8 grid of storyboard frames, with the top-left frame containing a handwritten note.
- User Journey Map (Wednesday):** A diagram with a horizontal timeline and sticky notes.

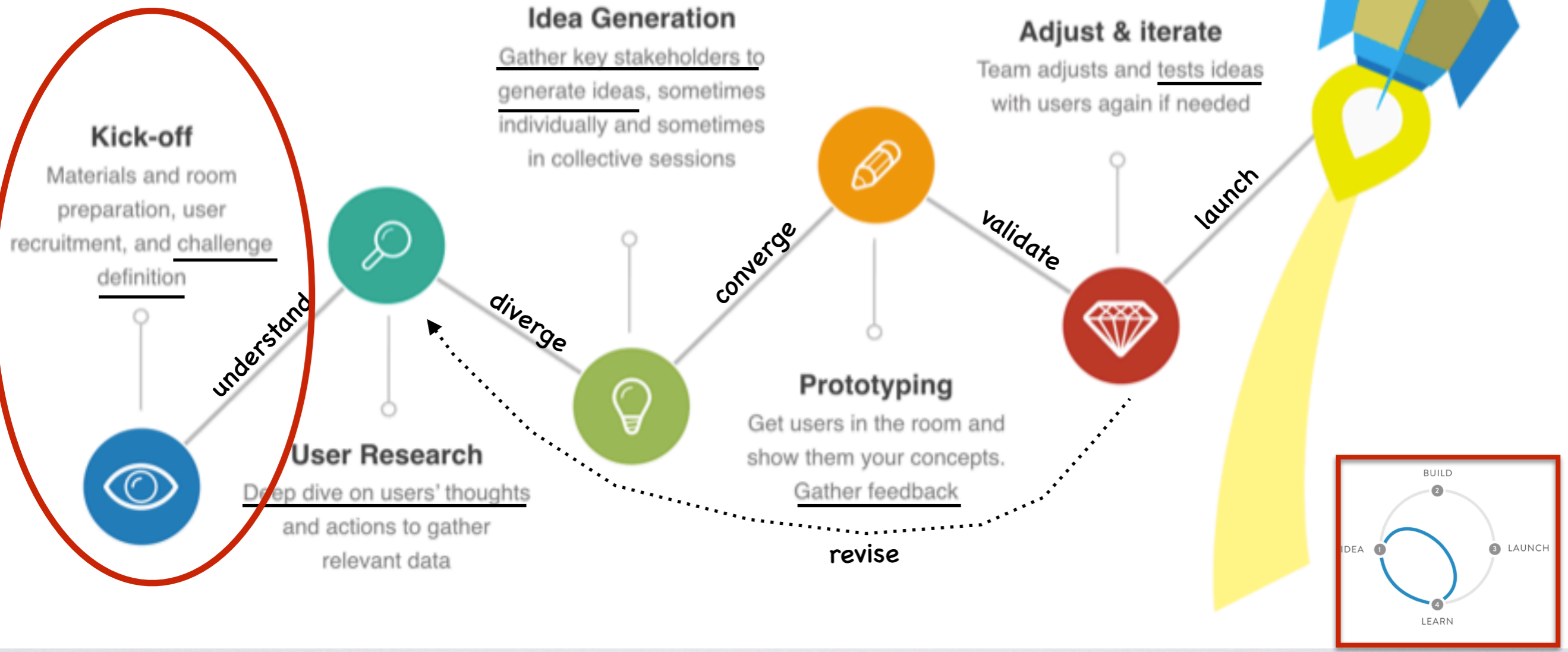
miro | Design sprint kit ☆ | Share | ? | 🔔 | 🔍 | ☰

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🔍 | 🗑️ | 📄 | 📑 | 🗨️ | 📎 | 🖱️ | ⌂ | ⌕ | 🔍 | ⌂



# Dinâmica de grupo (50 min)



# Hands on...

Acessem o canvas e se familiarizem com o seu uso montando um grupo de trabalho que compartilham o mesmo canvas (vocês agora irão para salas temáticas para interagir somente com o grupo):

<https://miro.com/templates/design-sprint-kit/>

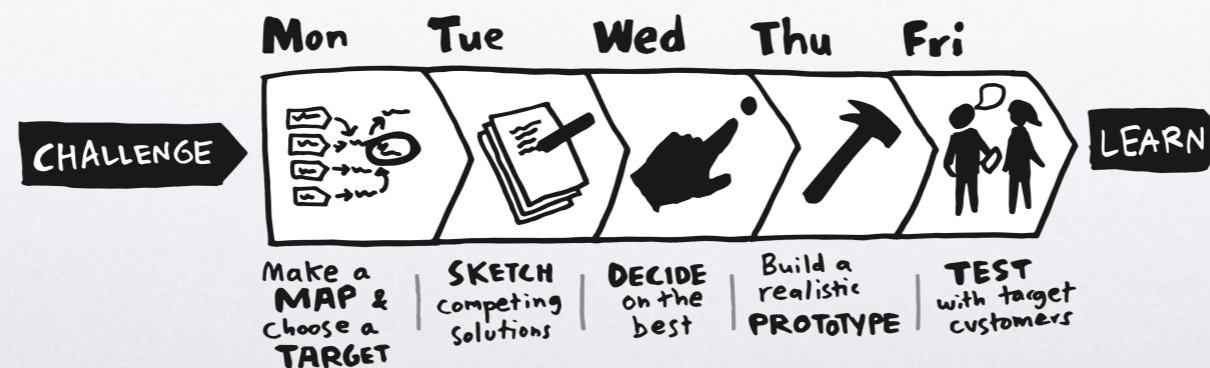
Definam um challenge no seguinte escopo: que ferramenta simples você gostaria de ter como aluno da Poli para usar no seu dia-a-dia? Lembre-se, você tem uma equipe de cinco a seis pessoas, não pode pensar em um projeto que não seja um mini-projeto (isso faz parte do exercício, claro!)

|   | Small project                | Medium project                 | Large project      |
|---|------------------------------|--------------------------------|--------------------|
| <b>Duration of project</b>                        | Less than 2 months           | Between 2 and 8 months         | More than 8 months |
| <b>Size of team</b>                               | Up to 4 people               | Between 4 and 8 people         | More than 8 people |
| <b>Number of engineering specialties involved</b> | One                          | More than one                  | Many               |
| <b>Engineering fees</b>                           | Between \$5,000 and \$70,000 | Between \$50,000 and \$350,000 | Over \$350,000     |

Vocês retornarão para esta sala dez minutos antes de terminar a aula para perguntas e para que possamos programar a aula que vem.



Na próxima aula vamos praticar mais com o canvas, e vocês irão dar o passo seguinte (em equipe), isto é, entender mais sobre o "challenge" que propuseram (mesmo sem poder consultar os usuários em potencial), e montar a fase seguinte da documentação no canvas. Vamos discutir também como, em paralelo, ter um documento de requisitos que receberá o resultado da fase de definição do problema.





Até a próxima aula