New Product Development
18th Jan 2023

STAGED PRODUCT MANAGEMENT

Product Launch

Will Customers Accept ? (Limited Features & Price)

How will it Work? (Usability & Desirability)

Can it be Done? (Technically Feasible?)

Production

MVP

Prototype Design

POC

Days — Weeks — Months — Years

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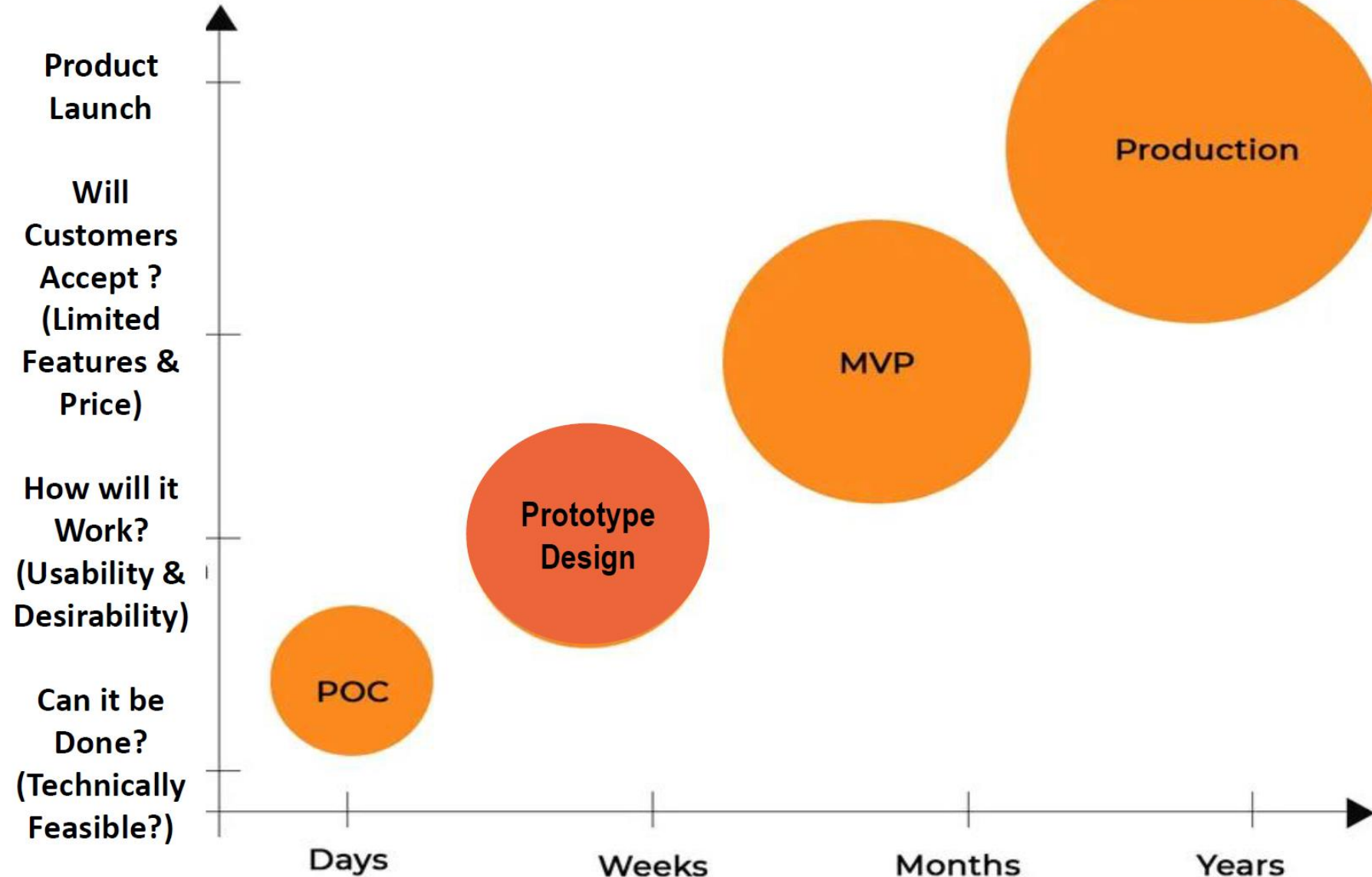
Medical Device Innovation – '4D' Framework

Define (Idea)	Develop (Invention)	Deliver (Innovation)	Deploy (Impact)
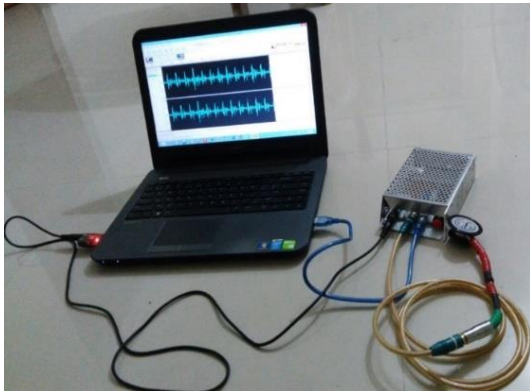
Proof-of-Concept		Prototype		Product		Practice
240	4:1	60	3:1	20	2:1	10

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Credit : Prof B Ravi, BETIC

- **Brief & clear statement** of unmet or unarticulated need of end-users in minimum words..

- **Include *what, why* and *who*** (need and target customer)

Example: *"Tumour knee prosthesis* to **reconstruct gap in bone** for **osteosarcoma patients."**

← *what* →   ← *why* →   ← *who* →

- **Requires clinical immersion, observation and discussion with end-users, clinicians and other stakeholders.**

Tumour

Prosthesis

Credit : Prof B Ravi, BETIC
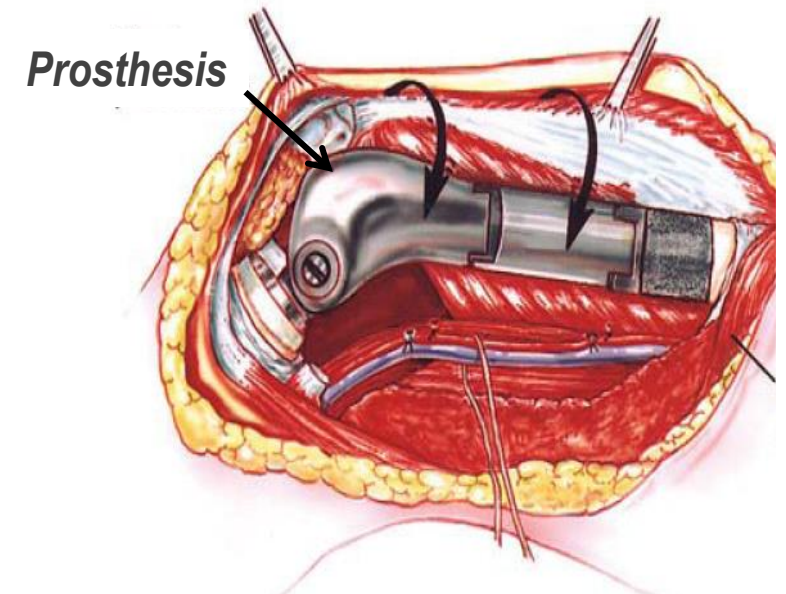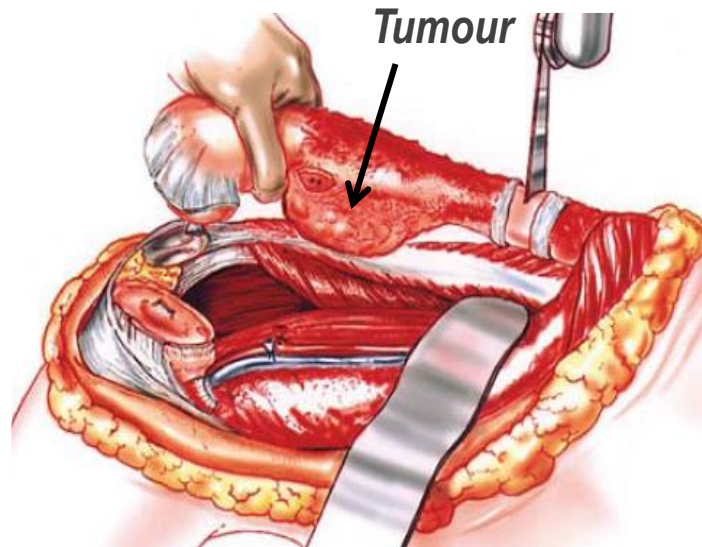
- Product embodiment and components

- Simulation of mechanism and stresses

- Manufacturability, maintenance and other lifecycle considerations.

- Rapid prototyping in plastic and metal

- Electronics, software and user interface

- Usability engineering: labels & manuals
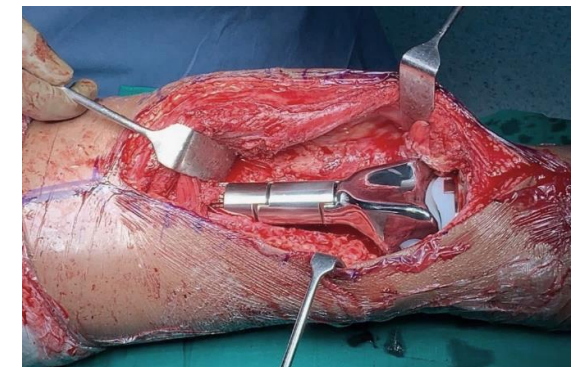
- Early feedback from clinicians.

3D CAD model *Stress simulation* *Plastic prototype* *Metal prototype*

Credit : Prof B Ravi, BETIC
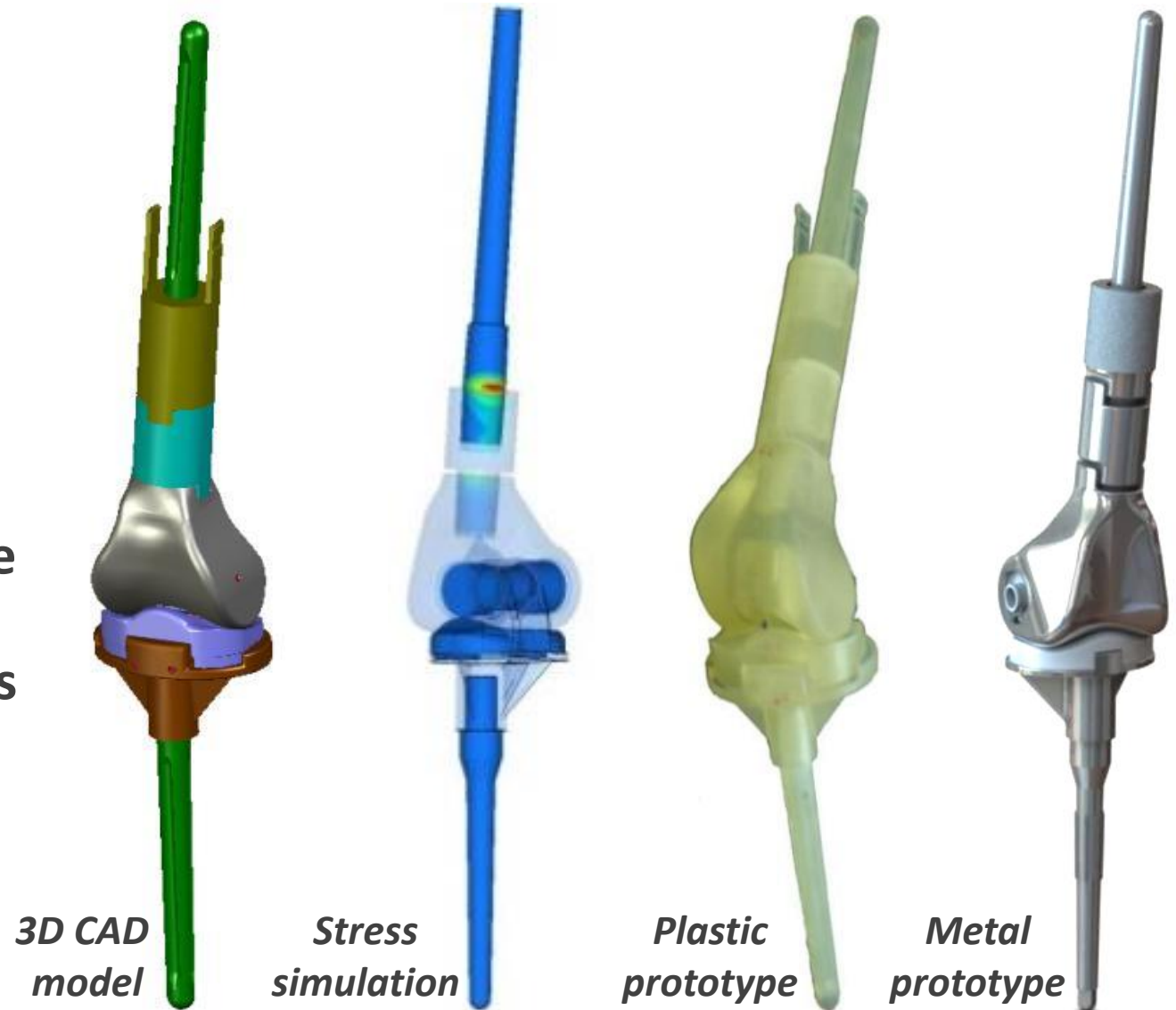
- **Medical-grade manufacturing** of pilot batch

  along with quality management system

- **Lab testing: Establish 'reasonable evidence of safety'**

  (biological, mechanical and electrical)

- **Human clinical trials: Prove device safety, efficacy,**

  accuracy (sensitivity, specificity)

- **Device certification for mass production & marketing,**

  based on risk class of device (low, medium, high)

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Credit : Prof B Ravi, BETIC

DEPLOY – IPR and Commercialization

Product Dossier

- **Design** — **Drawings,** *materials, simulation, analysis*
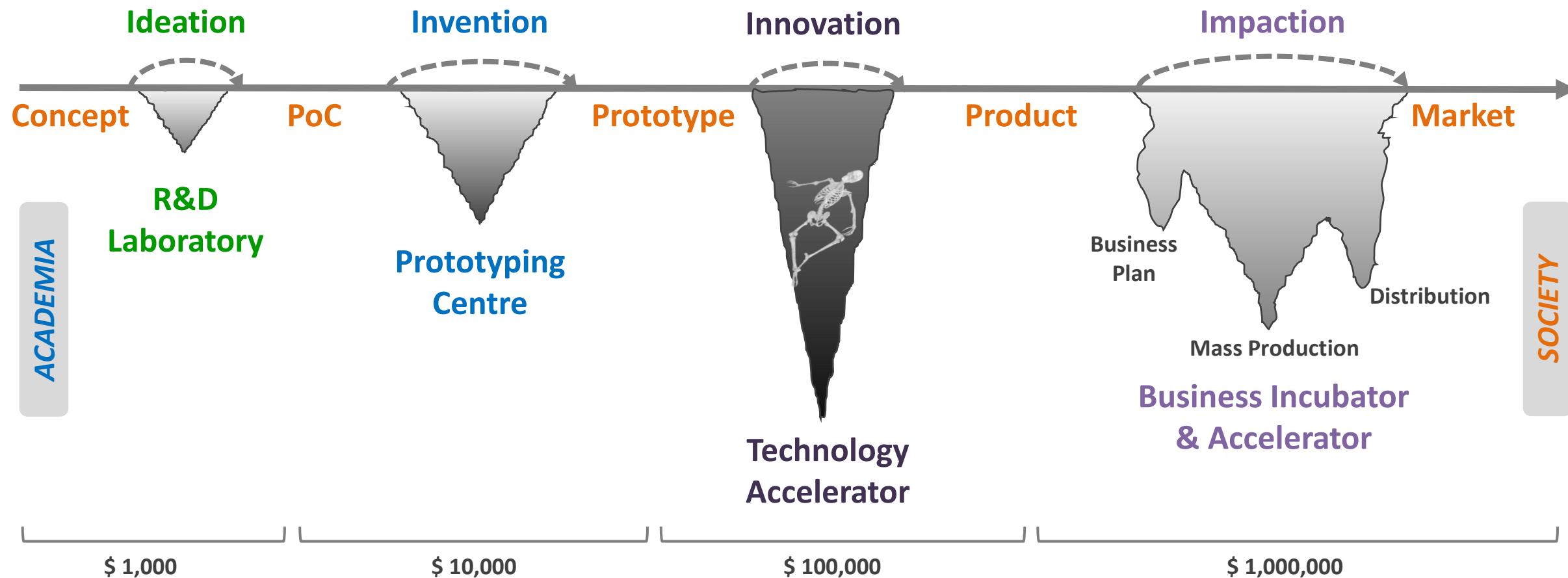- **Manufacture** — **Process steps,** *quality checks, ISO 13485*
- **Validation** — **Results** *of lab tests and clinical studies*

Intellectual Property

- **Patenting** — **Inventors** *and organization (ownership)*
- **Valuation** — **Cost** *of development and* **benefit** *to users*
- **Revenue** — **Shared** *among inventors and organization*

Technology Licensing

- **Start-ups** — **Incubated** *by innovators & their partners*
- **Industry** — **Local companies** *(capable and committed)*
- **NGOs** — **Non-profit** *non-government organizations*

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Credit : Prof B Ravi, BETIC

Product Innovation – Process Depiction I

I. Define (Customer Discovery)	Team Building	Clinical Immersion
	Problem Definition	Concept & Feasibility

II. Develop (Design Thinking)	Detailed Design	Virtual Prototype
	Rapid Prototype	Functional Prototype

III. Deliver (Production & Scale-up)	Pilot Manufacturing	Initial Testing
	Advanced Testing	Device Certification

IV. Deploy (Market)	IPR Management	Business Model
	Product Distribution	Scaling & Sustaining

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Medical Device Innovation – 'Valleys of Death'

TRL

Ideation

Invention

Innovation

Impaction

Concept   PoC   Prototype   Product   Market

R&D Laboratory

Prototyping Centre

Business Plan

Distribution

Mass Production

Technology Accelerator

Business Incubator & Accelerator

ACADEMIA

SOCIETY

$ 1,000 $ 10,000 $ 100,000 $ 1,000,000

Critical Gap: Translation of research prototypes into marketable products

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Credit : Prof B Rav, BETIC

Digital Product Innovation – Process Depiction II

Revenue

Optimization is done here

Optimization
needs to be done

Market
Opportunity
Identification

Early Idea
Screening

Feature
Prioritization

Pricing and
Packaging

Launch
Testing

Product
Launch

Performance
Traction

Time

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Slide: Milind Kopikare
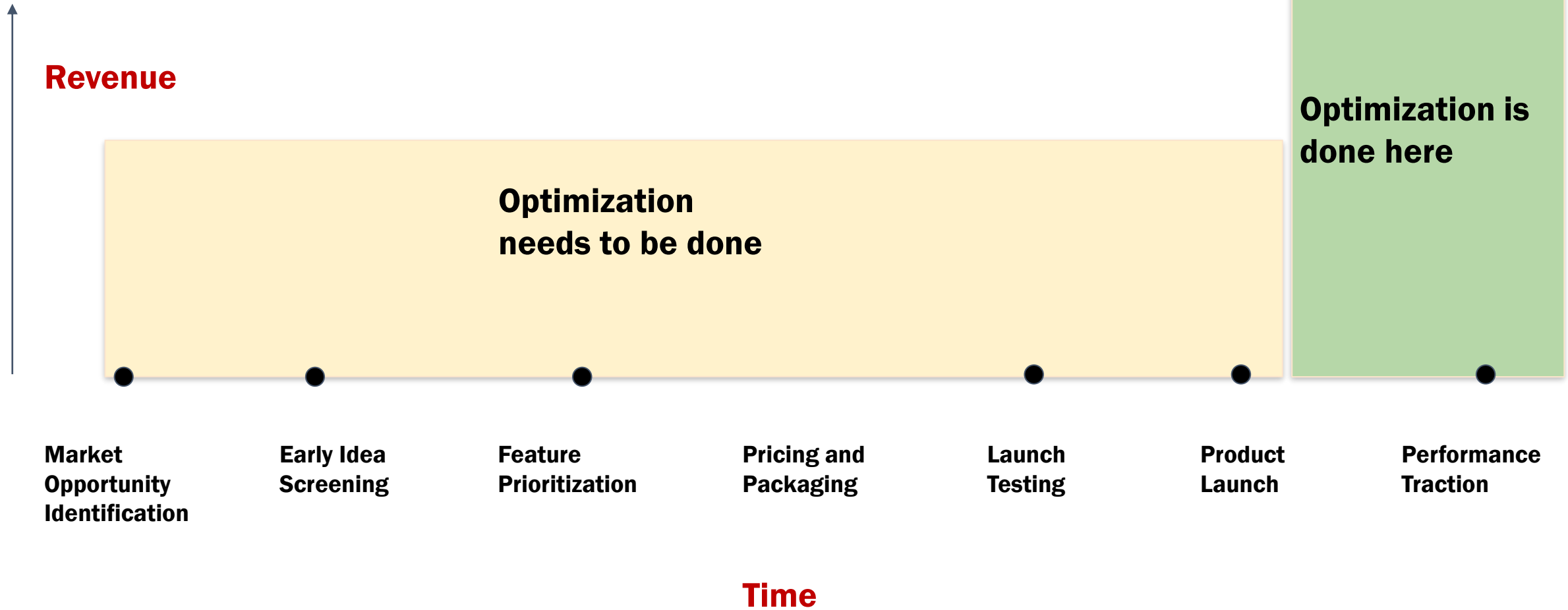
Product Strategy Framework

Market Segment: Who is your market?

Customer Need: What is the job the customer is trying to do?

Market Trend: What has changed in the market that will disrupt the status quo?

Value Proposition: How will this product address the customer's need?

Differentiation: What is your moat?

Competition: What are the alternatives in the market today?

Go to market Strategy: How will you build awareness ? How will you sell ?

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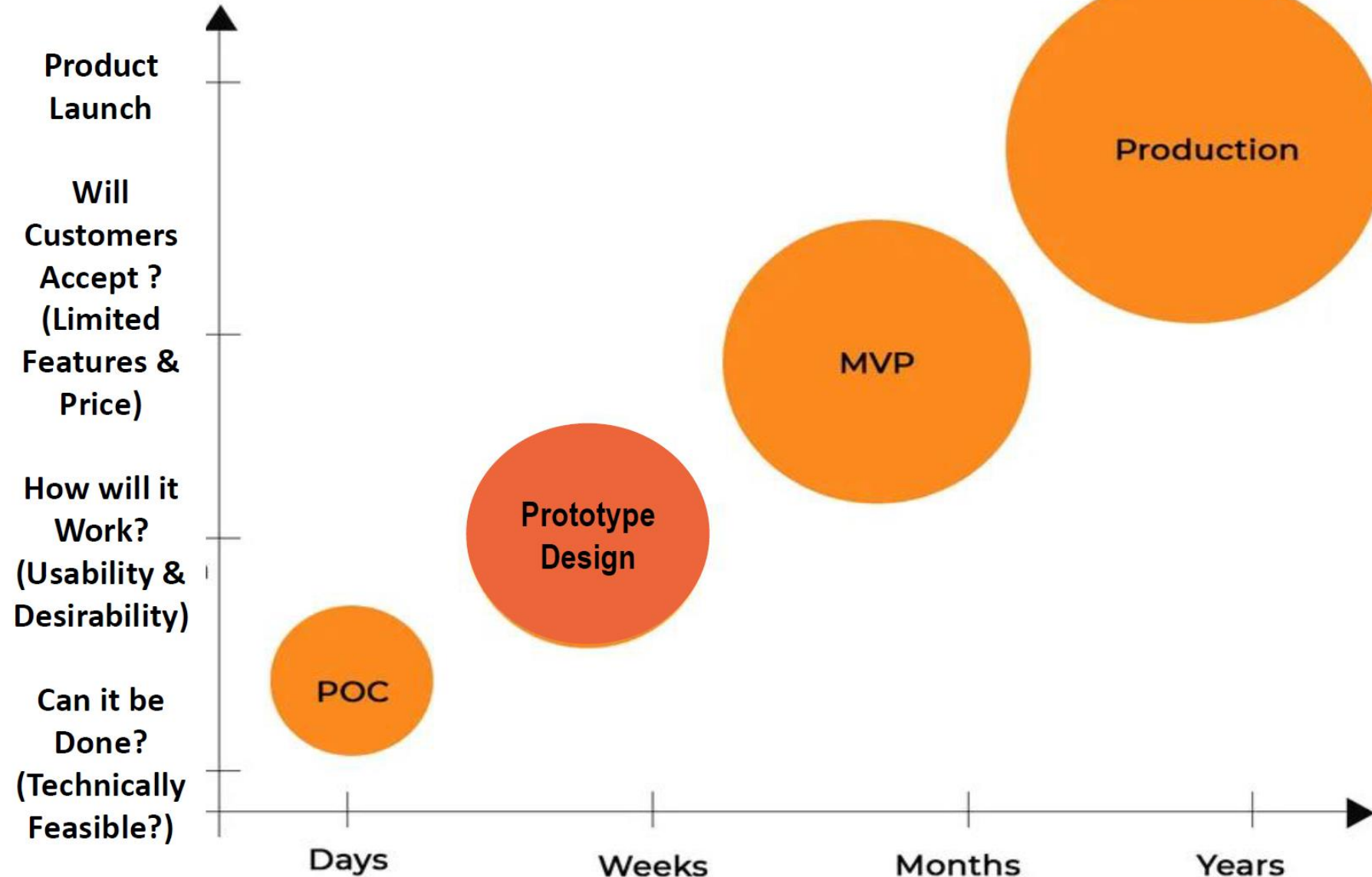
Minimum Viable Product is that version of a new product which allows a team to collect the maximum amount of validated learning about customers with minimal amount of effort

- **Eric Ries.**

Scrappiest version of the product that your customers can use

- **Milind Kopikare**

During its initial days, Travis used a Web based basic transportation application. The first version had a few features. It was developed on PHP, which used to allow customers to 'hire' a car, one and only car owned by him at the time.

The mobile application simply displayed the location of the car.

At the beginning of the organization, Travis and his friends alone used the mobile app. Those, who wanted to join the app, were supposed to send an email to Travis, who used to provide the applicants with code giving access.

Then, he called 10 car drivers and explained them his business concept. Three out of ten drivers showed interest immediately in his business proposal. The rest is history.

Steps to an MVP

Identify Assumptions

Write down all assumptions

Think Science Experiment

In order for this being successful, the following need to be true

- **Customers have x, y, z problem**
- **____ matters to my customers**
- **_____ will pay for my product/service**
- **No satisfactory substitutes**

Product Design

- **Customer discovery / User experiences**
  - Tangible expectations (Functional)
  - Intangible expectations (Cognitive)
  - Business Goals / Purpose
  - Market / Societal Context

- **Customer Discovery/ Market Research**
    - Surveys
  - Personal interviews
  - Customer segmentation
  - Persona categorization

- **Product design**
  - Mechanical / Structural aspects
  - Functionally purposeful
  - Practical & Ergonomic
  - Aesthetically beautiful

- **Product characteristics/brief**
  - What problem? Why solve it?
  - Context (E.g. Use cases, Metrics)
  - Tech specs
  - Competitors, timeline

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Product Design

- Soft product design
  - Look, content, colours
  - Efficient, Intuitive, Compatible
  - Easy to navigate
  - Real-life simulatory
  - Engaging the user

- Hard product design
  - Material design
  - Mechanical / Structural design
  - Electronic design
  - Software design
  - Efficient, intuitive & appealing

Product Design – MVP

Minimum Viable Product (MVP) = Material + Mechanical / Structural + Electronic + Software design

- **Material**
  - Physical, chemical
  - Functional, Reliable
  - Lightweight, Handleable

- **Mechanical / Structural**
  - Simple, Efficient (System)
  - Ergonomic, Portable
  - Strong, Durable

- **Electronic**
  - Efficient, Fast
  - Simple, Reliable
  - Seamless, Affordable

- **Software**
  - Light, Intuitive
  - Fast, Easy to learn
  - Error-free, Secure

Digital Products

Verify & Validate

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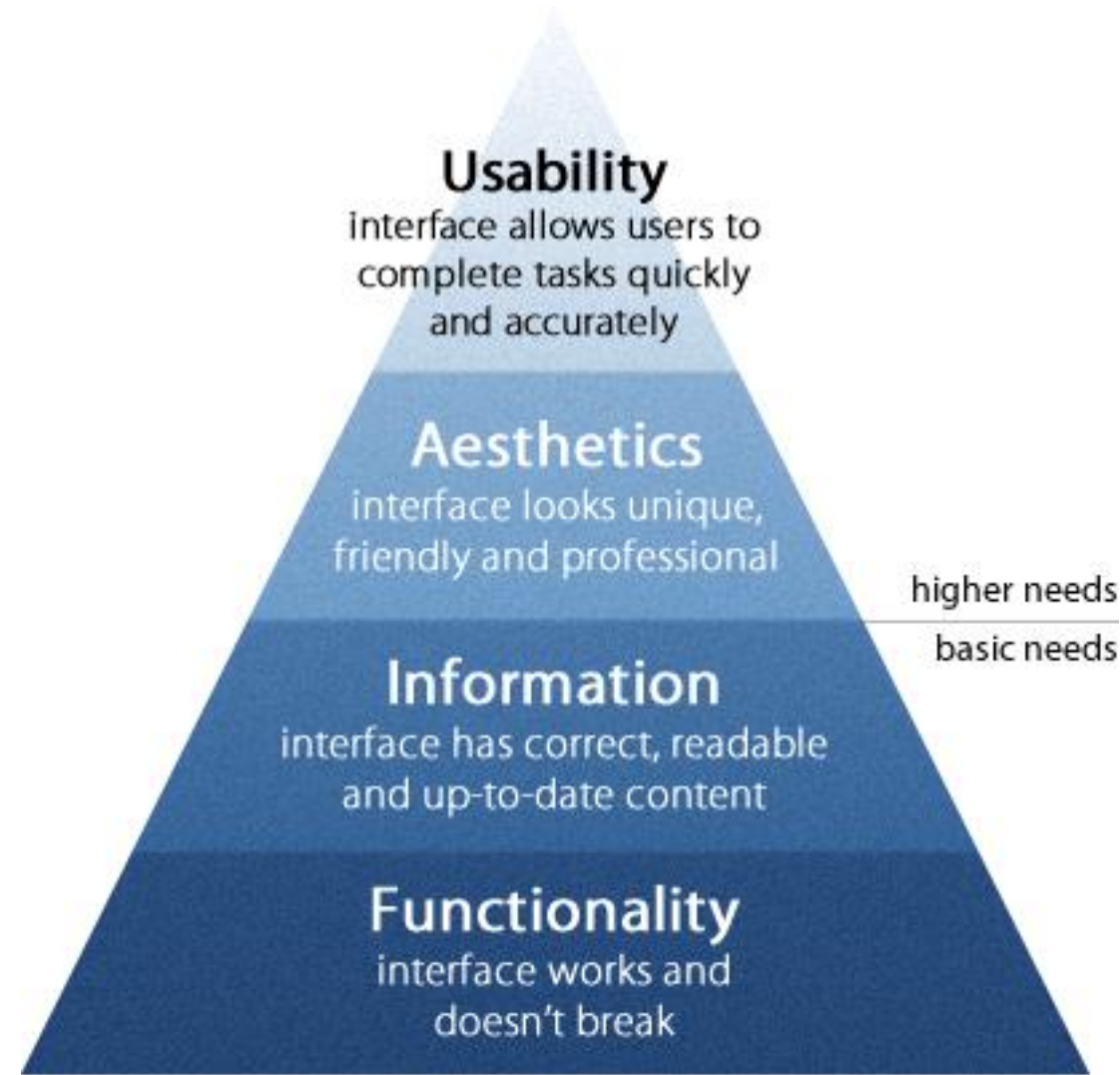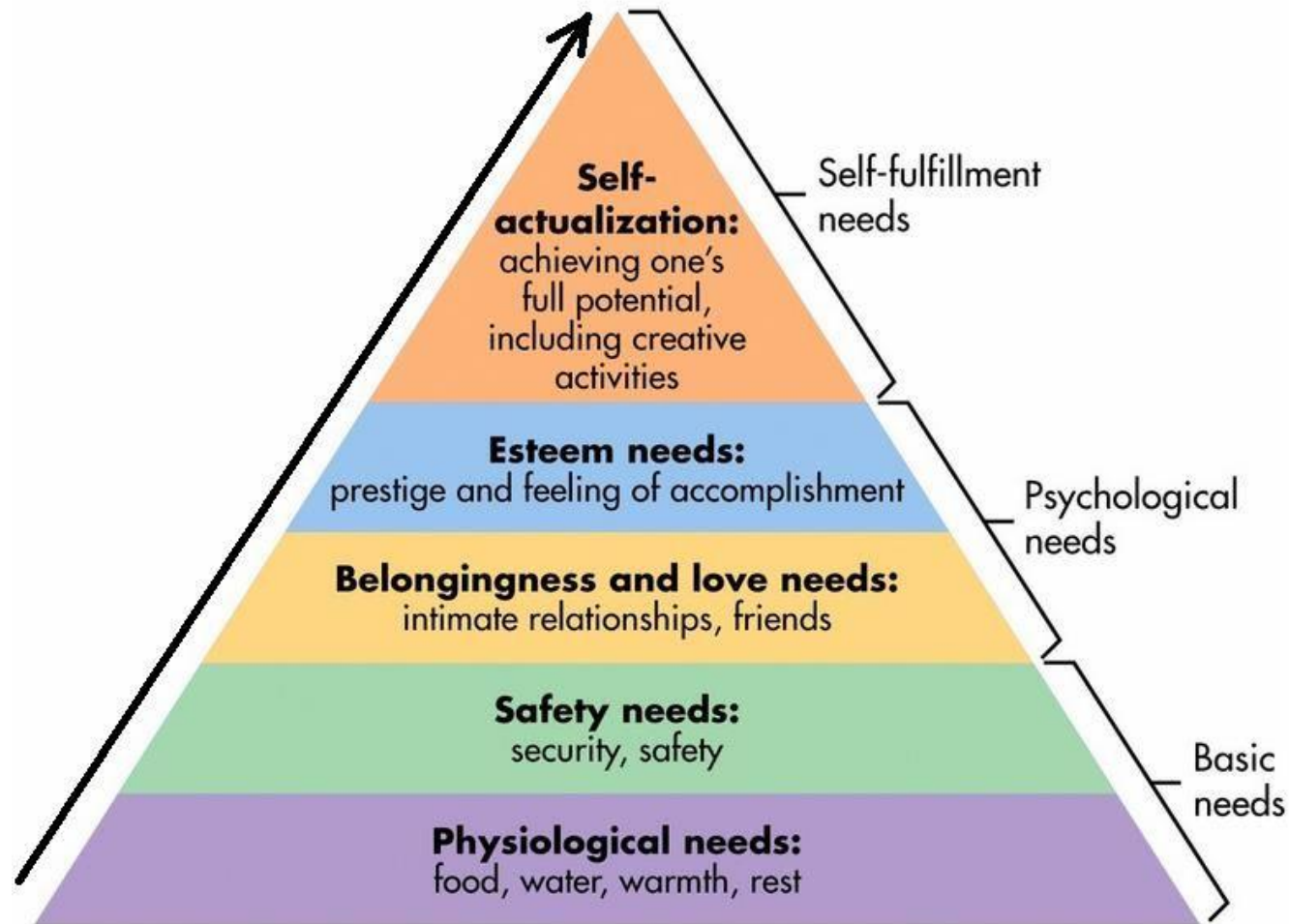
User Experience Hierarchy of Needs

Concept to Prototyping

https://youtu.be/i8C_de8EZY0

Prototyping to Manufacturing

https://www.youtube.com/watch?v=WFL1Kk21EBE