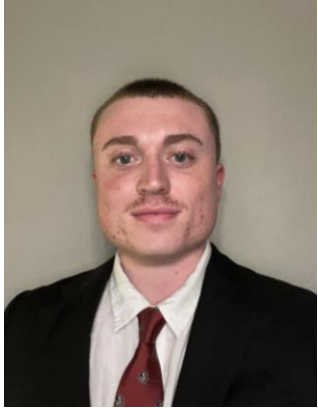


A 3D rendering of a human arm, showing the hand, forearm, and upper arm. The arm is colored in a gradient from blue to white. A red, glowing, cylindrical indenter is positioned against the forearm, with a white, glowing, cylindrical indenter positioned against the upper arm. The text "Human Bone Density Indenter" is overlaid on the arm in a white, bold, sans-serif font.

Human Bone Density Indenter

Team Introductions



Grant Giorgi
*Orthopedic
Bioengineer*



Erin Perkus
*Biomaterials and
Biopolymers
Engineer*



Timothy Surface
*Manufacturing
Engineer*



Abrea Green
*Clinical
Engineer*



Tessany Schou
*Materials
Engineer*



Nicholas Vastano
*Bioinstrumentation
Engineer*

Sponsor and Advisor



Project Sponsor

Tom Vanasse

Director of Engineering, Exactech



Academic Advisor

Stephen Arce, Ph.D.

Professor, FAMU-FSU Engineering

Tessany Schou

Objective

The objective of this project is to create a functional prototype and complete feasibility testing of a device that can quantitatively measure human bone density.

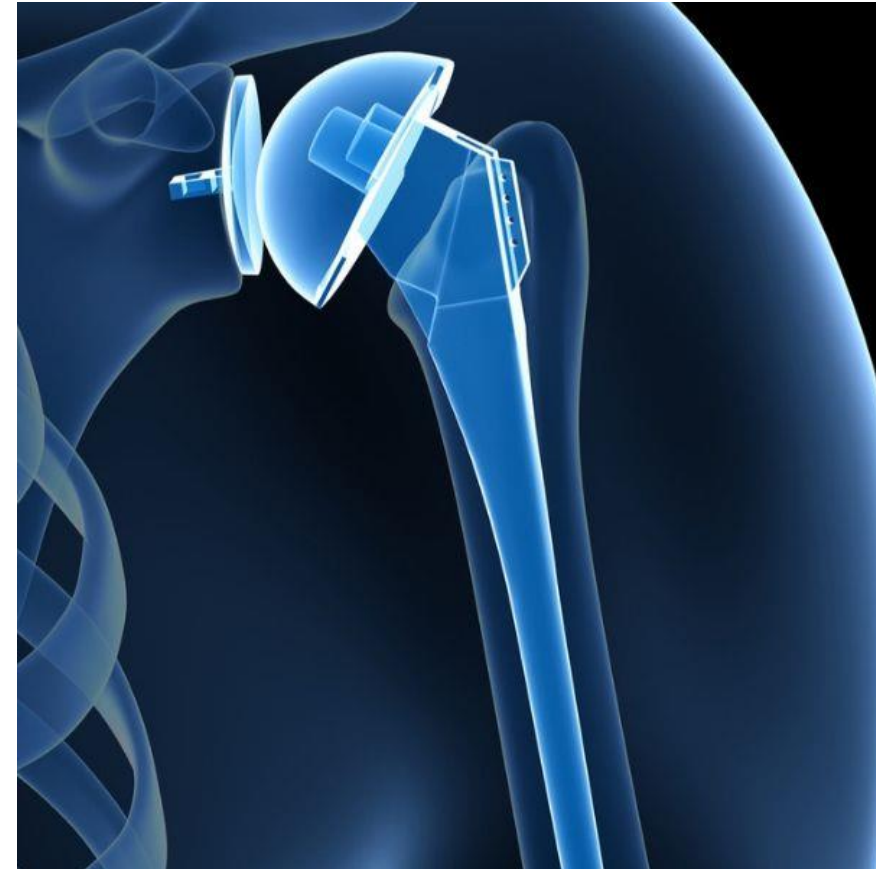
Tessany Schou



Total Shoulder Arthroplasty

Purpose

Eliminate source of pain and dysfunction by replacing shoulder joint with artificial components

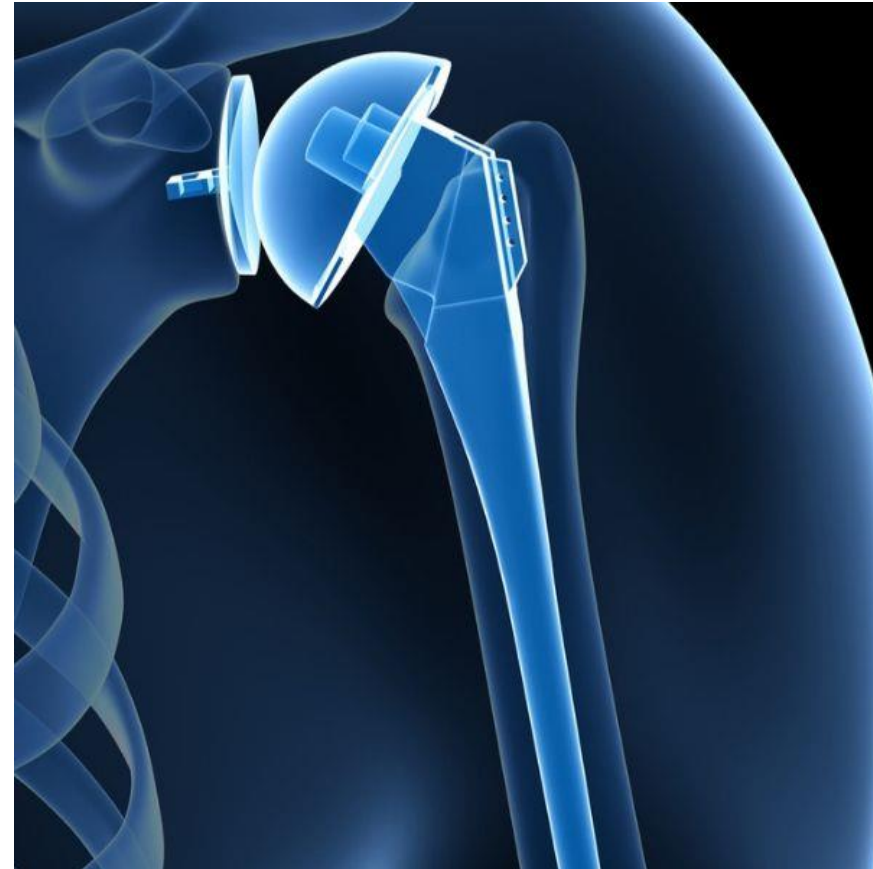


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Total Shoulder Arthroplasty

Common Reasons for Surgery

- Osteoarthritis
- Rotator cuff tear arthropathy
- Avascular necrosis
- Rheumatoid arthritis



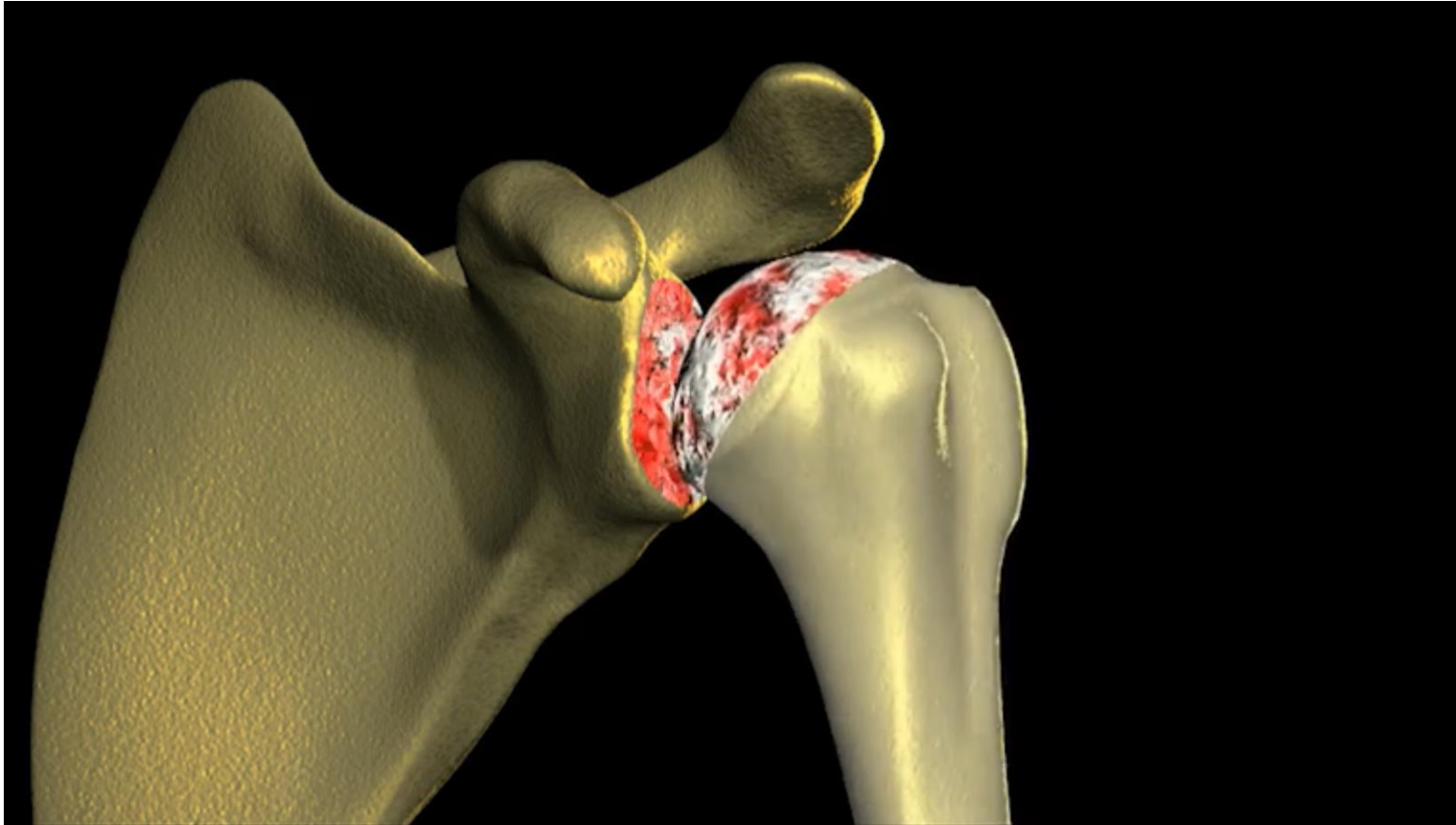
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Types of Implants



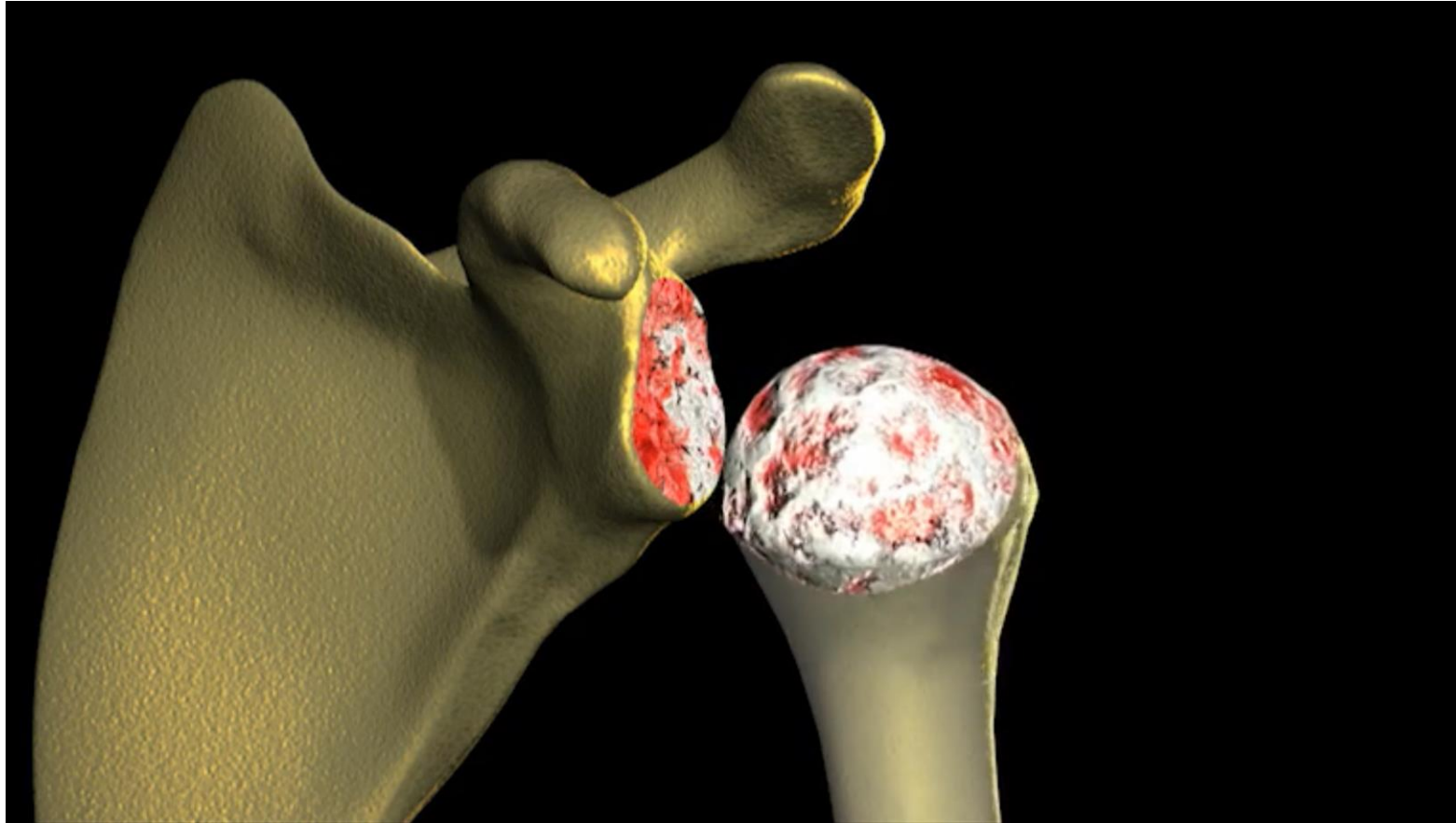
Tessany Schou

The “Thumb Test”



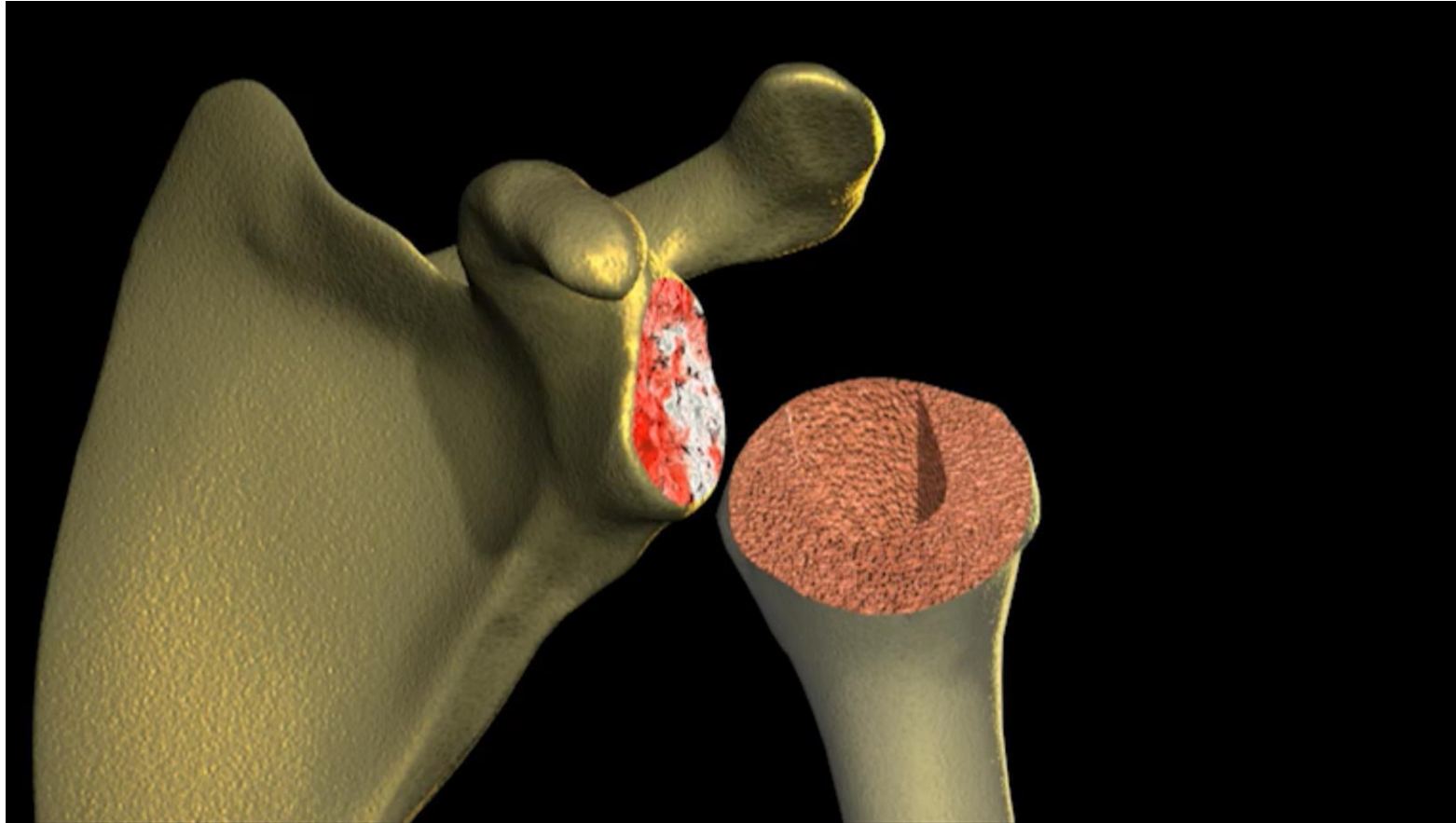
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The “Thumb Test”



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The “Thumb Test”



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Levels of Bone Density/Quality



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Project Scope

Design



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Project Scope

Key Goals



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Project Scope

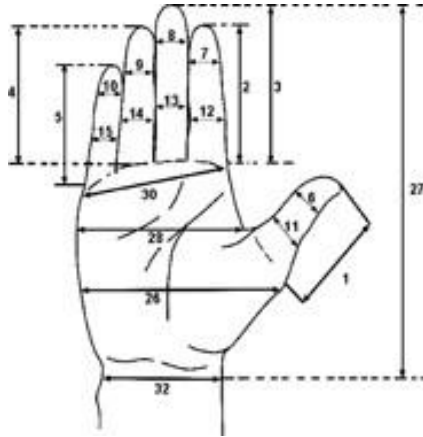
Markets



Timothy Surface

Project Scope

Assumptions



Phenolics

- Cresol
- Lysol
- 2-Phenylphenol
- Xylenol

Alcohols

- Ethanol
- Isopropanol

Aldehydes

- Formaldehyde
- Glutaraldehyde

Halogens

- Iodine: Tincture of iodine, Povidone-iodine
- Chlorine: Sodium hypochlorite (Household bleach)

CHEMICAL DISINFECTANTS

microbeonline



Timothy Surface

Project Scope

Stakeholders



Tom Vanasse



Dr. Arce



FAMU-FSU
Engineering



Timothy Surface



Customer Needs

The device is compliant with FDA regulations

The device measures the PCF of the bone

The device is mechanically operated

The device is compatible with standard sterilization practices

The device is handheld and can be reused

The device is made from non-toxic materials

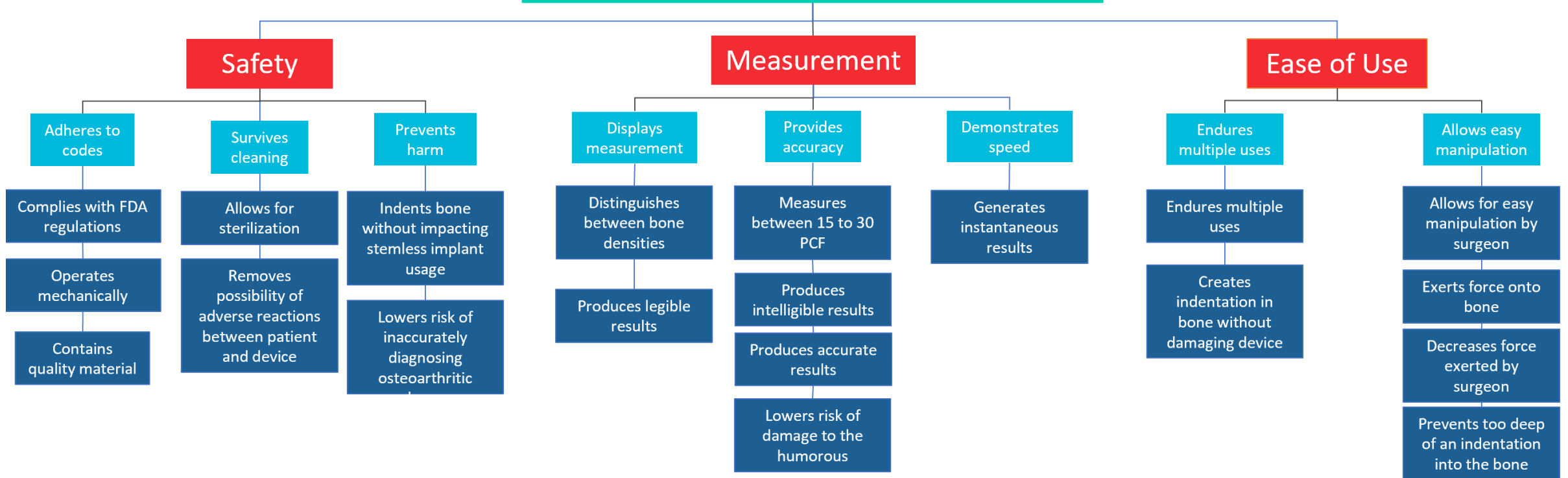
The device recognizes osteoarthritic bone



Timothy Surface

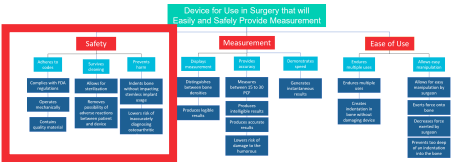
Functional Decomposition

Device for Use in Surgery that will Easily and Safely Provide Measurement



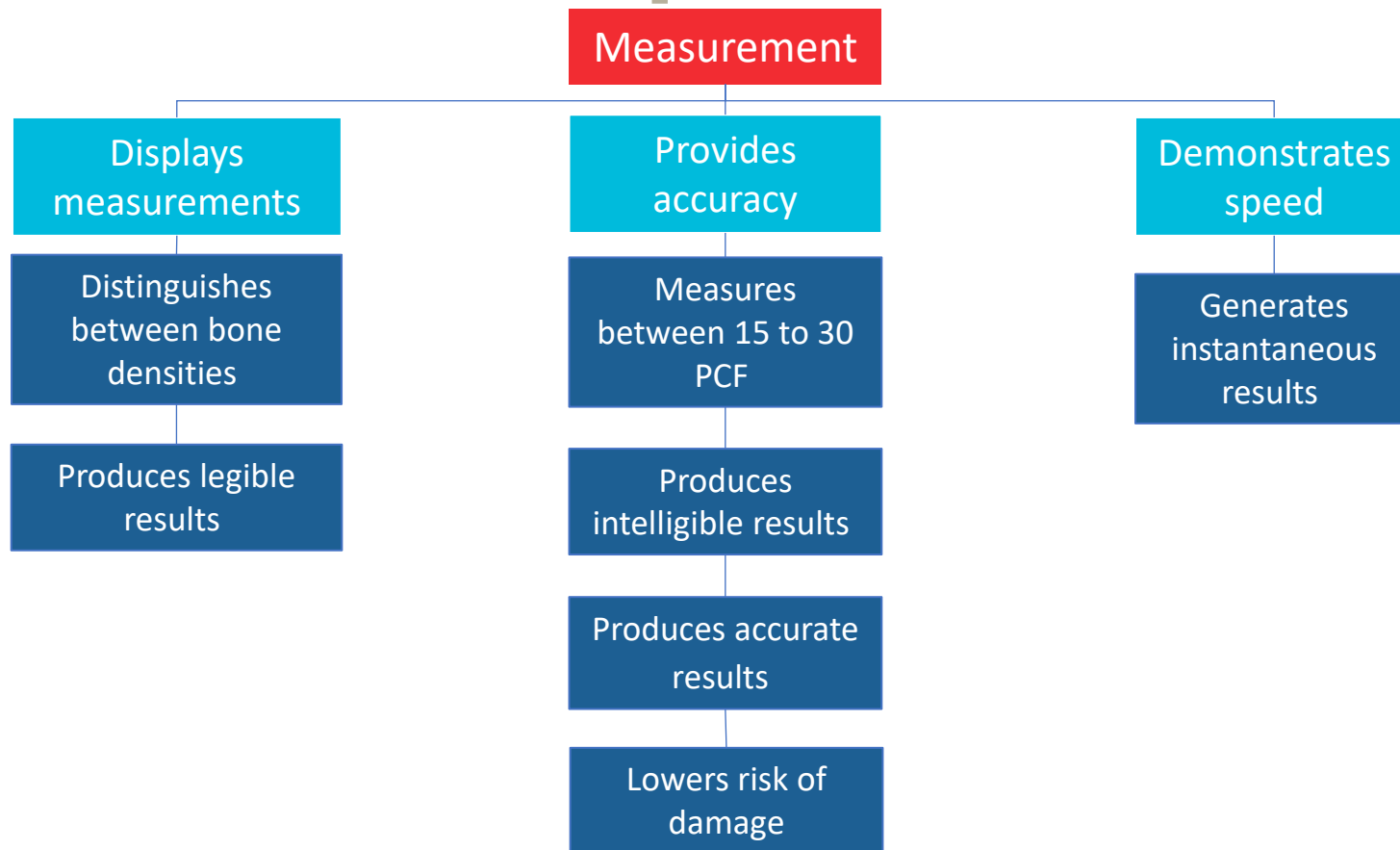
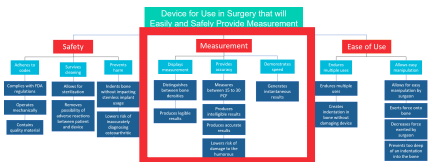
Timothy Surface

Functional Decomposition



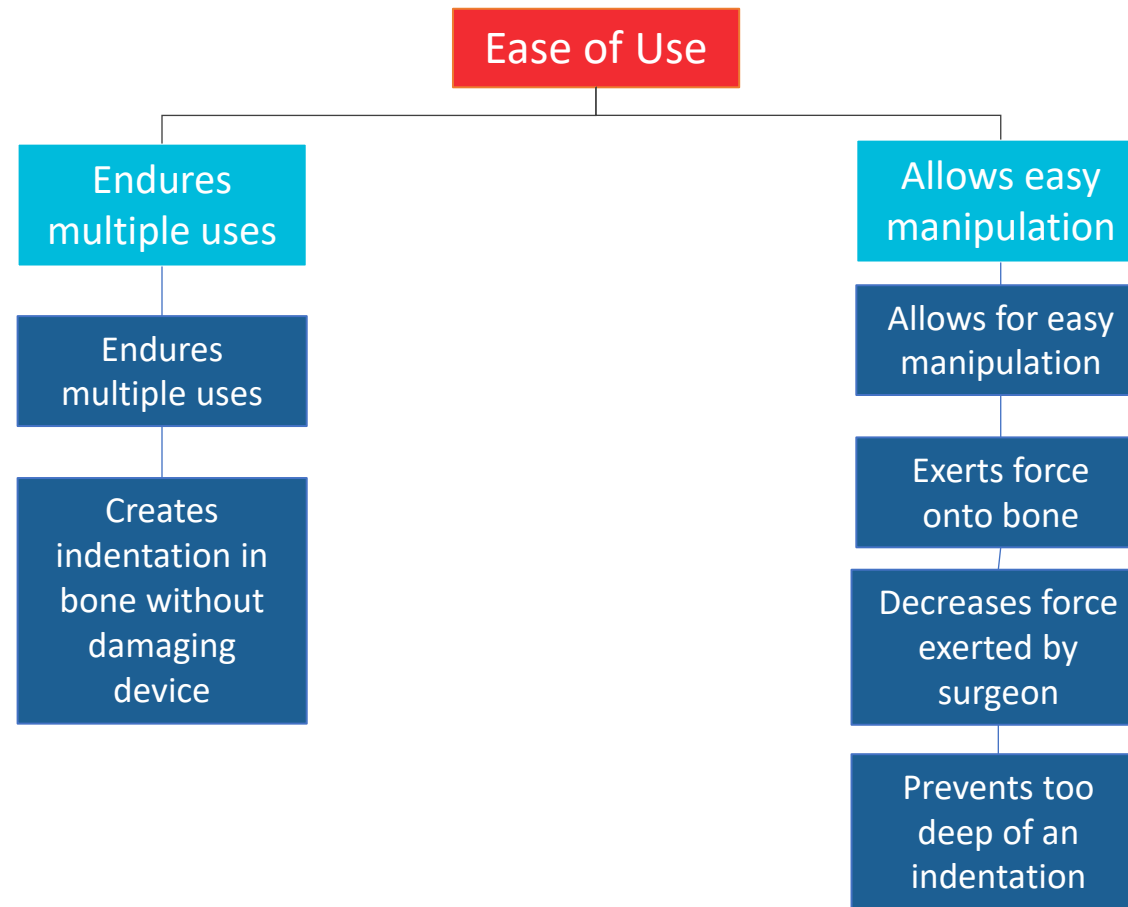
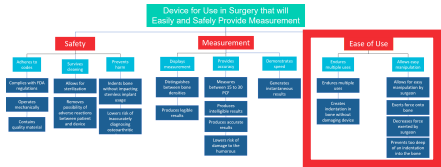
Timothy Surface

Functional Decomposition



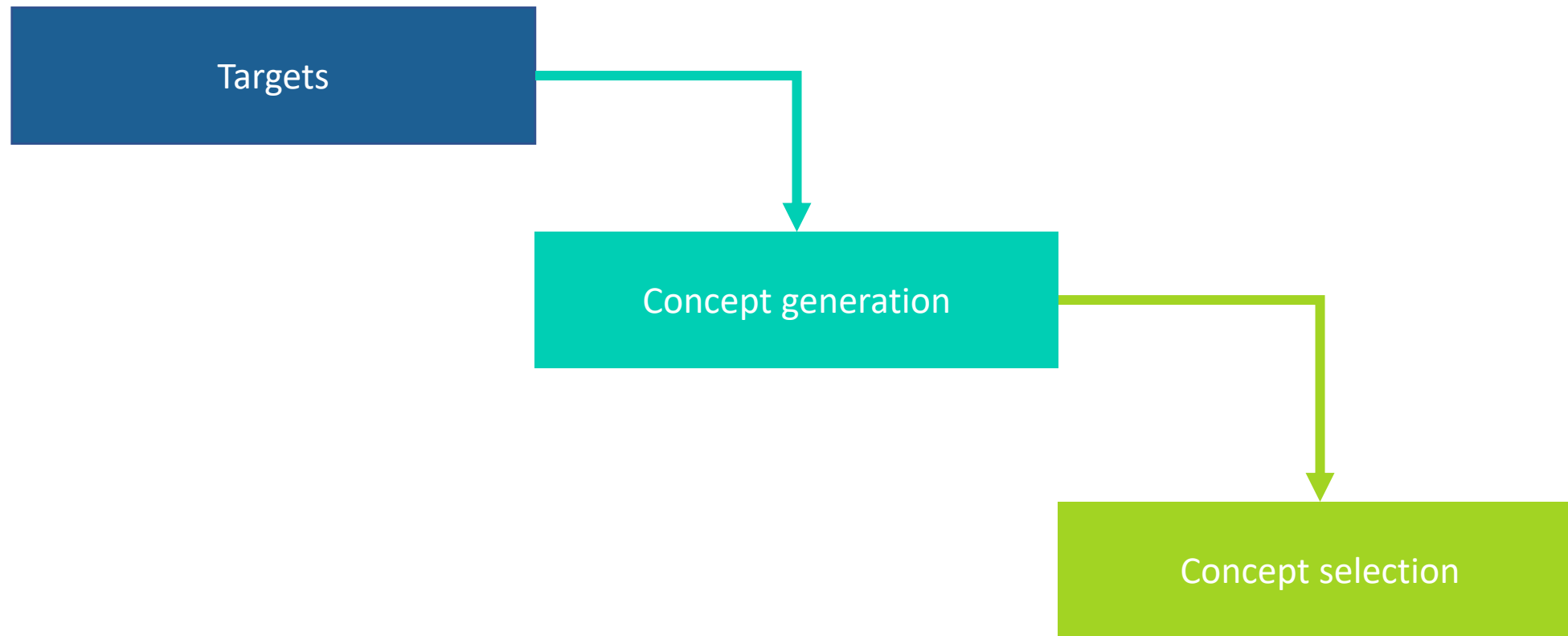
Timothy Surface

Functional Decomposition



Timothy Surface

Looking Ahead



Timothy Surface

4 Most Important Points

1. Project is to develop a device to measure bone density.
2. The customer's needs were discovered.
3. These needs were transformed into functions.
4. Looking forward the functions will be used to create targets.

Timothy Surface

Reference

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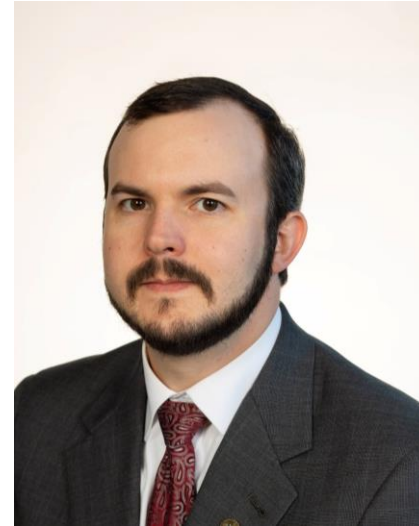
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Timothy Surface

Contact the Team



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Timothy Surface