



Senior Design Team 519: Shoulder Pads

Paul Cunningham, Vivi Huynh, Sawyer O'Bryan,
Nicholas Palestrini, Morgan Sefcik

Vivi Huynh

Team Introduction



Morgan Sefcik
Project Manager



Paul Cunningham
*Design and Materials
Engineer*



Vivi Huynh
*Design and
Manufacturing
Engineer*



Sawyer O'Bryan
*Design and Materials
Engineer*



Nicholas Palestrini
*Product Development
and Data Engineer*
Vivi Huynh

Sponsor and Advisor



Sponsor
Mike Holloway
Survivor 30th Season Winner



Academic Advisor
Christian Hubicki, Ph.D.
Assistant Professor

Vivi Huynh

Project Description

The objective of this project is to reduce injuries of football players through the improvement of shoulder pads.

Vivi Huynh



Project Background

Vivi Huynh



Project Background



Riddell



Schutt Sports

Vivi Huynh

Sponsor Motivation



Personal history with American football



Innovation in football helmet technology

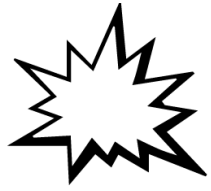


Lack of development on Shoulder Pads



Vivi Huynh

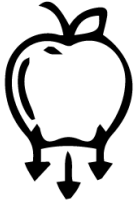
Assumptions



Focuses on blunt force trauma injuries



Not redesigning entire shoulder pad



Product is used on earth, under conditions such as gravity, temperature, and pressure



Not intended to be used underwater

Project Scope

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Key Goals

**Energy
Distribution**

**Lifespan and
Durability**

**Prevent
Restrictions
of
Movement**

Vivi Huynh

Markets



Companies that produce sports gear and sportswear



Producers of protective gear and safety equipment







Athletes



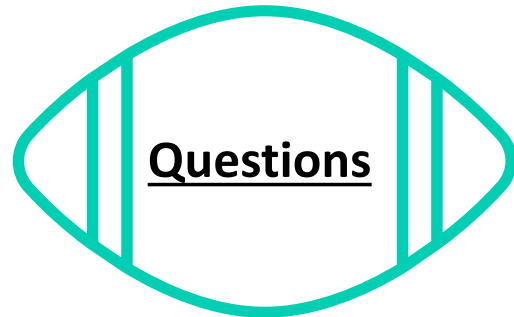
Parents of Young Athletes

Stakeholders

-  Mike Holloway: Sponsor
-  Dr. Christian Hubicki: Advisor
-  Dr. Shane McConomy: Professor
-  HPMI [High-Performance Materials Institute]: Research Aide
-  Florida State University Athletic Department: Research Aide

Vivi Huynh

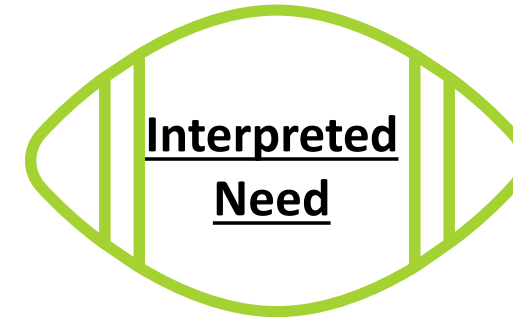
Customer Needs



**"What is
your motivation?"**



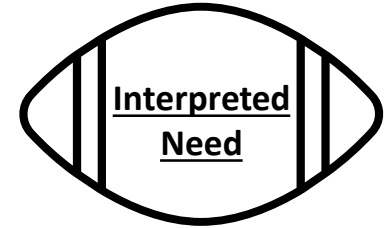
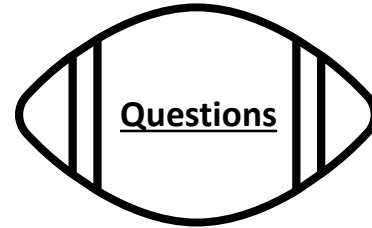
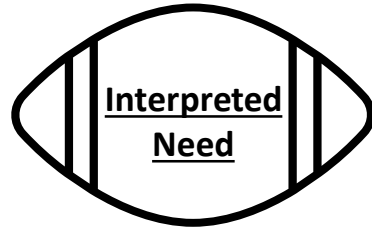
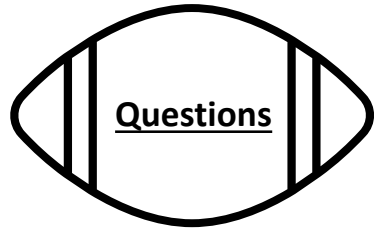
**"The experience
From playing
football drew him
to conceptualizing
The idea for
shoulder pads."**



**The
product provides
better protection
than existing
shoulder pads.**

Vivi Huynh

Customer Needs, cont'd



"What is your final goal? "

"A full-blown prototype is not expected. I understand that this is theoretical. I want to know how plausible this product could be."

Getting farther in research and calculations with making this fabric incorporation more likely. A prototype is not expected.

"Do you have any personal ideas? "

"A type of fabric with air pockets that can easily distribute an outside force is the personal idea."

A constructed fabric or padding of some kind that is very efficient in distributing energy from an outside force.

"What is your ideal project timeline?"

"A theoretical construction or accessible material is best identified to fit this air pocket fabric."

Create own timeline but stay connected.

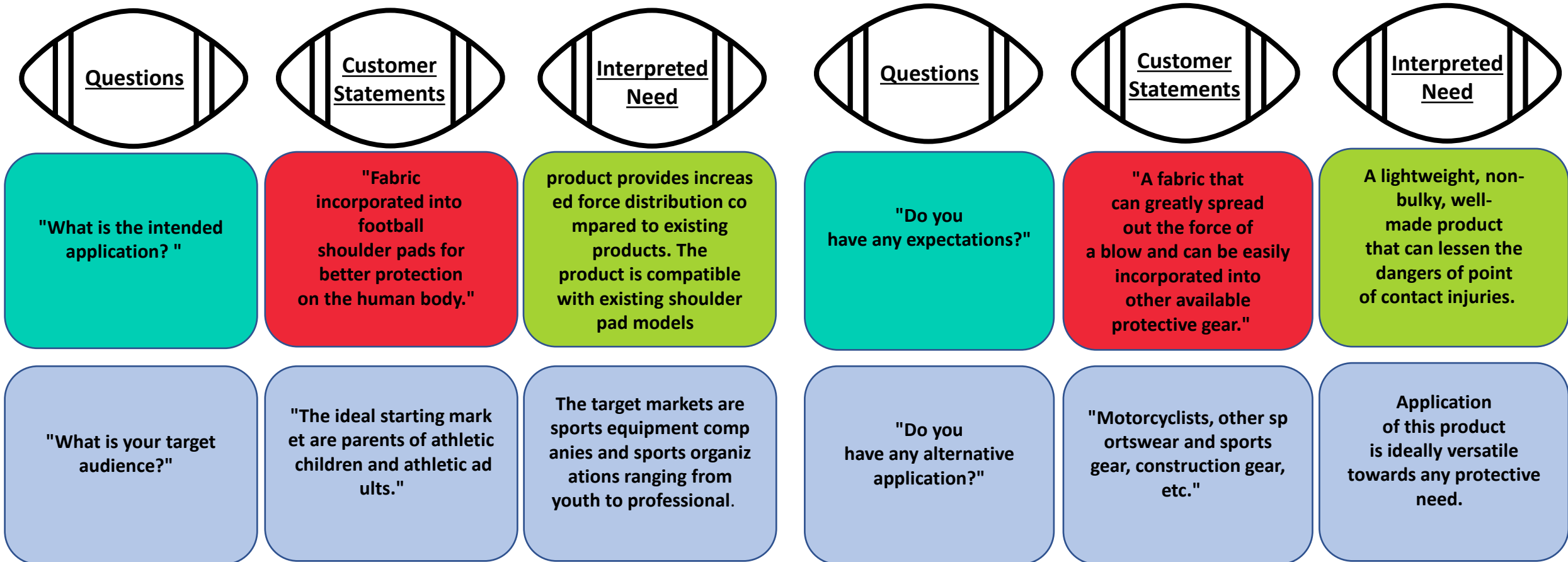
"Which injuries are of main concern?"

"Rib fractures and collarbone fractures are of main concern."

This product protects players or people from these injuries better than current options.

Vivi Huynh

Customer Needs, cont'd



Vivi Huynh

Athletic Trainer Survey

Key Question

1. What are the Biggest Complaints about Shoulder Pads?

Responses

6 – Pads do not fit properly

2 – Restricts Movement

1 – Old Equipment

1 – Smell

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Athletic Trainer Survey

Key Question

2. Most Common blunt force injury?

Responses

5-Shoulder Related

3-AC Sprains

2-Concussions

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Athletic Trainer Survey

Key Question

3. Are there any protective materials that can be used to prevent contact injuries?

Responses

4 – Dense Cell Foam

2 – Kevlar

1 – Shoulder Shocks

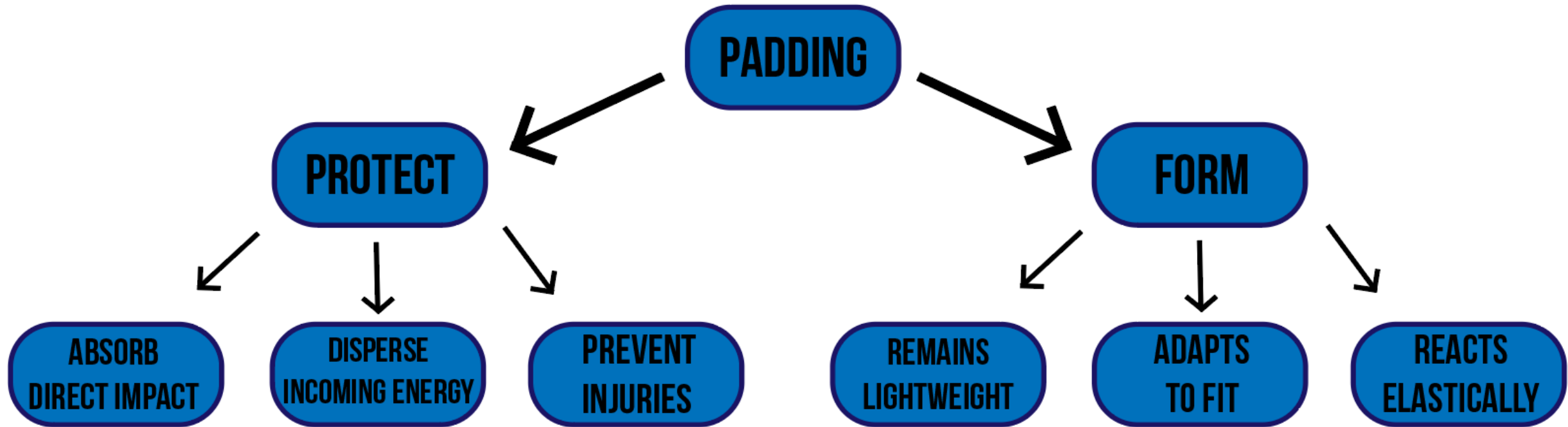
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Functional Decomposition

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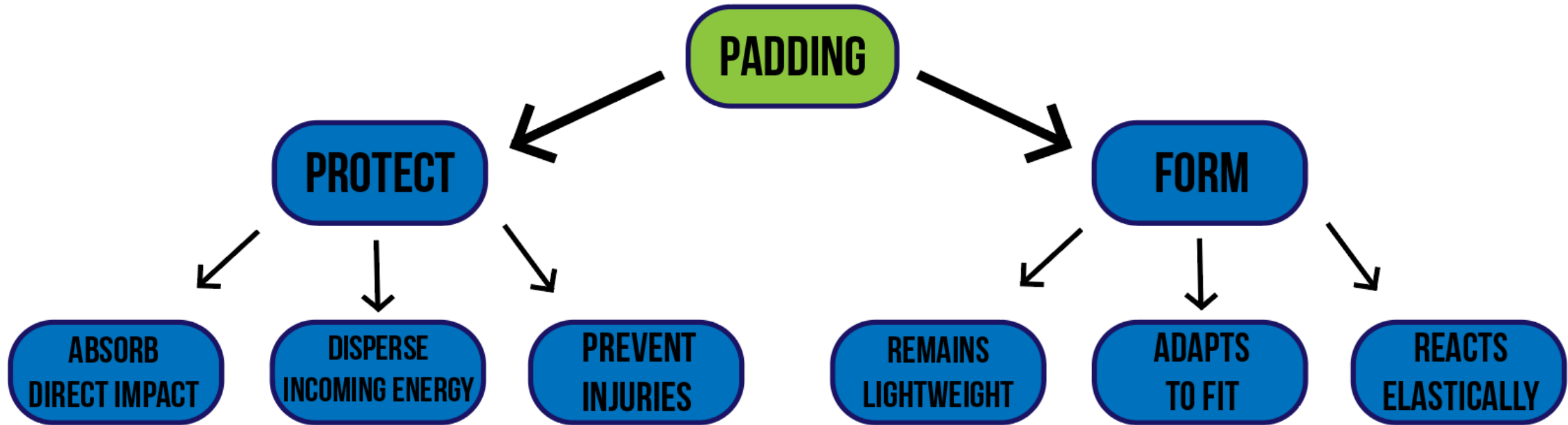


Hierarchy Chart



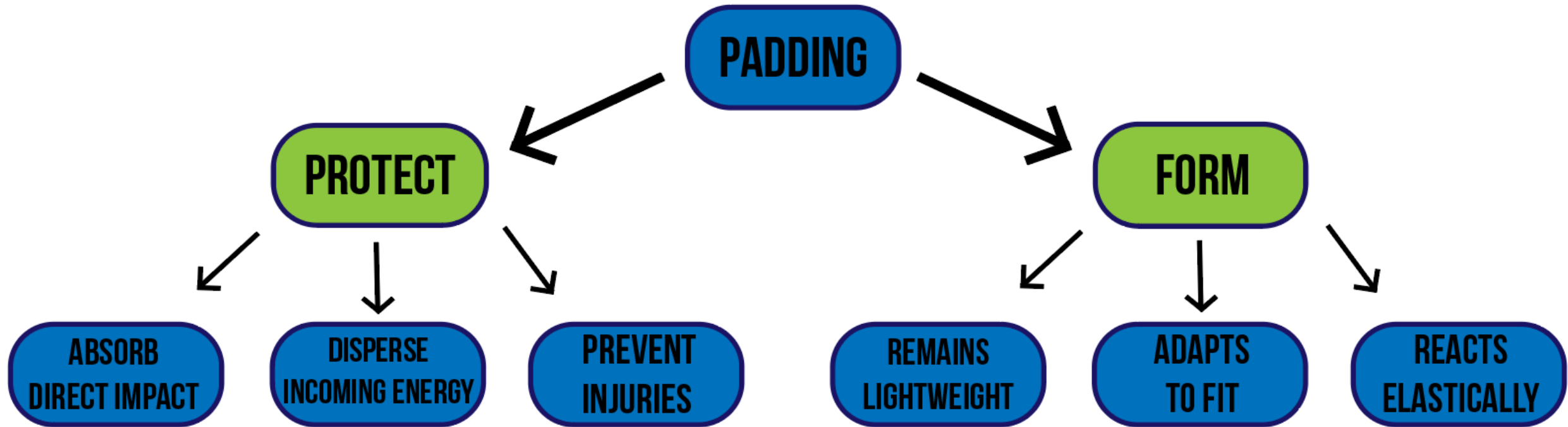
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Hierarchy Chart



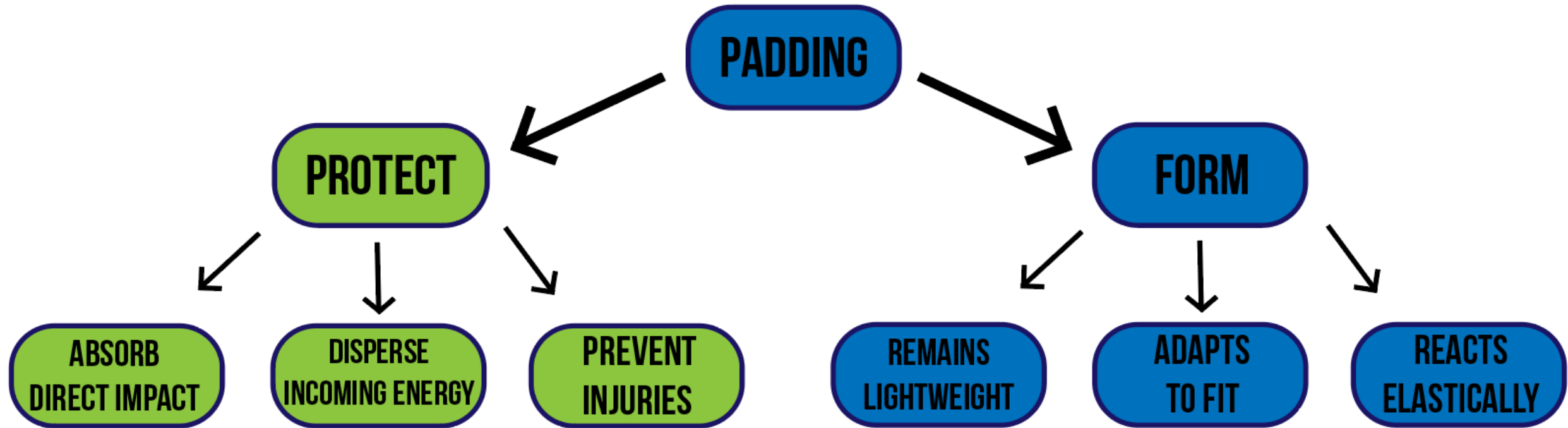
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Hierarchy Chart



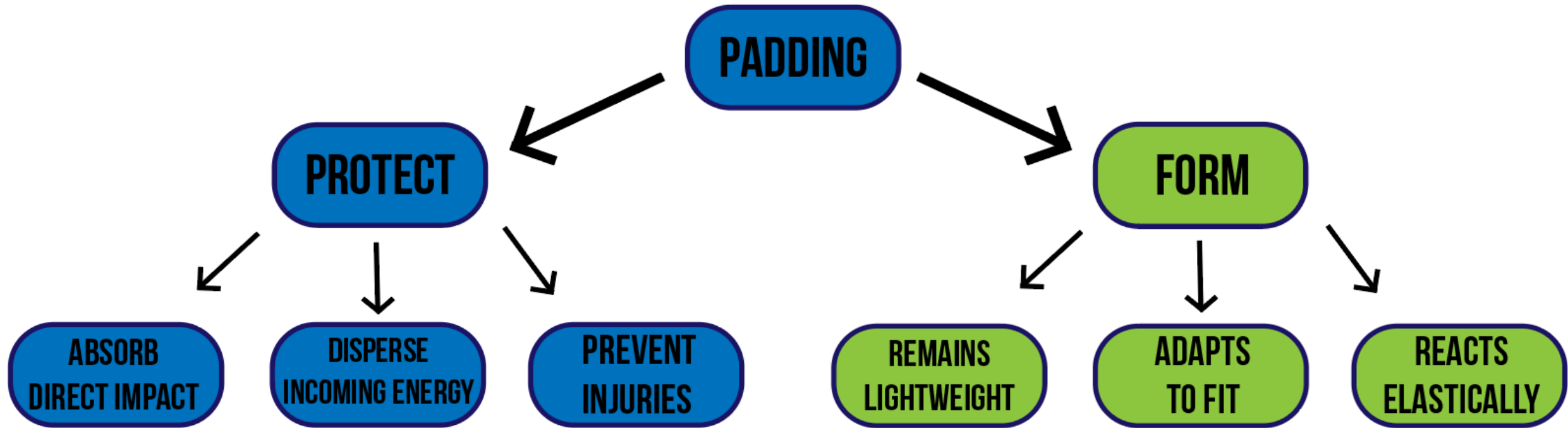
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Hierarchy Chart



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Hierarchy Chart



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Cross-Reference Table

| | Protect | Form |
|--------------------------|---------|------|
| Absorb Direct Impact | X | X |
| Disperse Incoming Energy | X | X |
| Prevent Injuries | X | |
| Remains Lightweight | | X |
| Adapts to Fit | | X |
| Reacts Elastically | X | X |

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Future Work

- Targets and Metrics
- Continuing Research
- Assessing available products
- Concept Generation and Selection

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Questions



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