

Biomedical Marketing

How We Connect Our People
and Technologies to the Market

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Licensing Officer

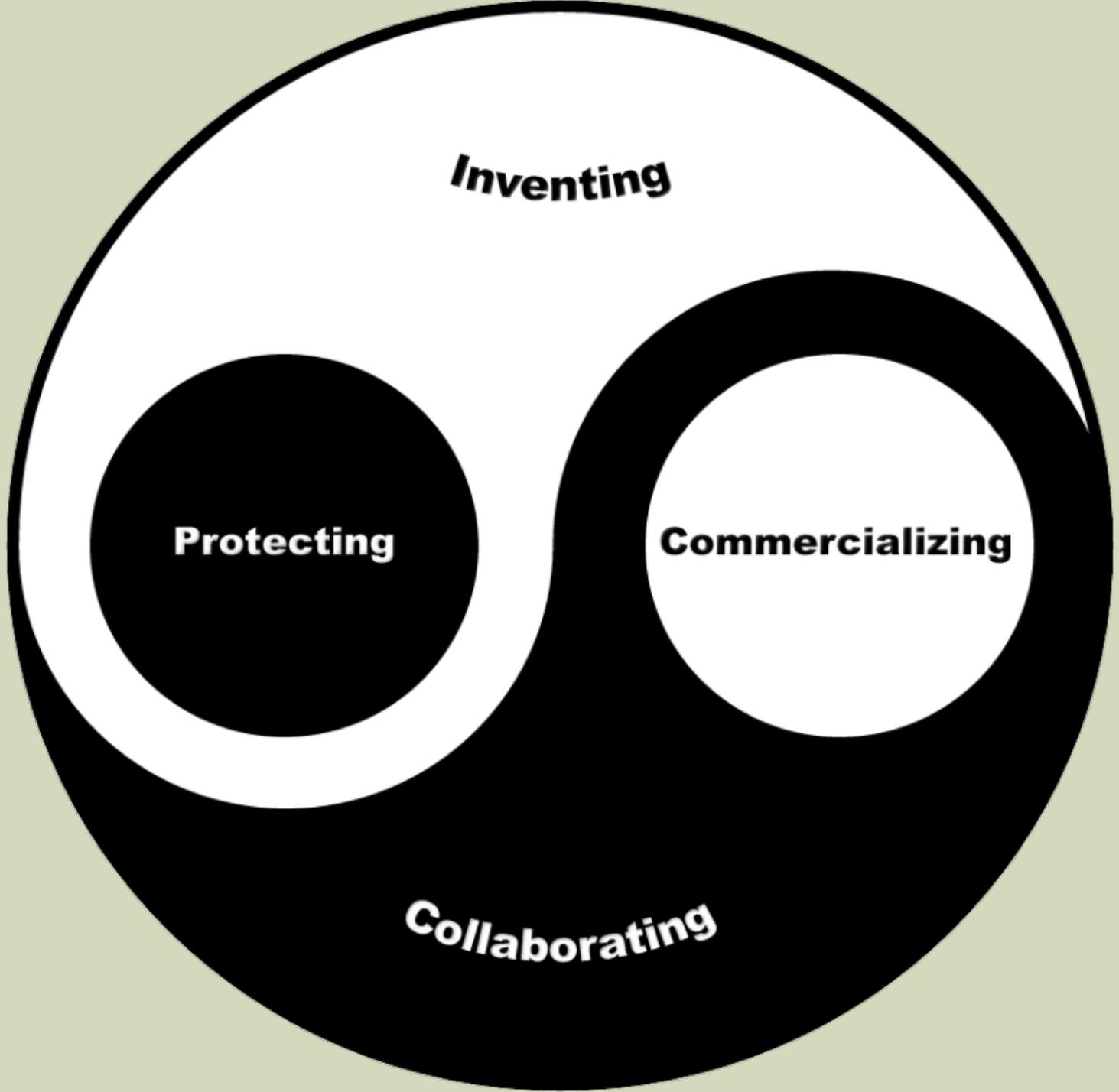
Office of Research and Technology Applications

Medical Research and Materiel Command

United States Army

Fort Detrick, Maryland





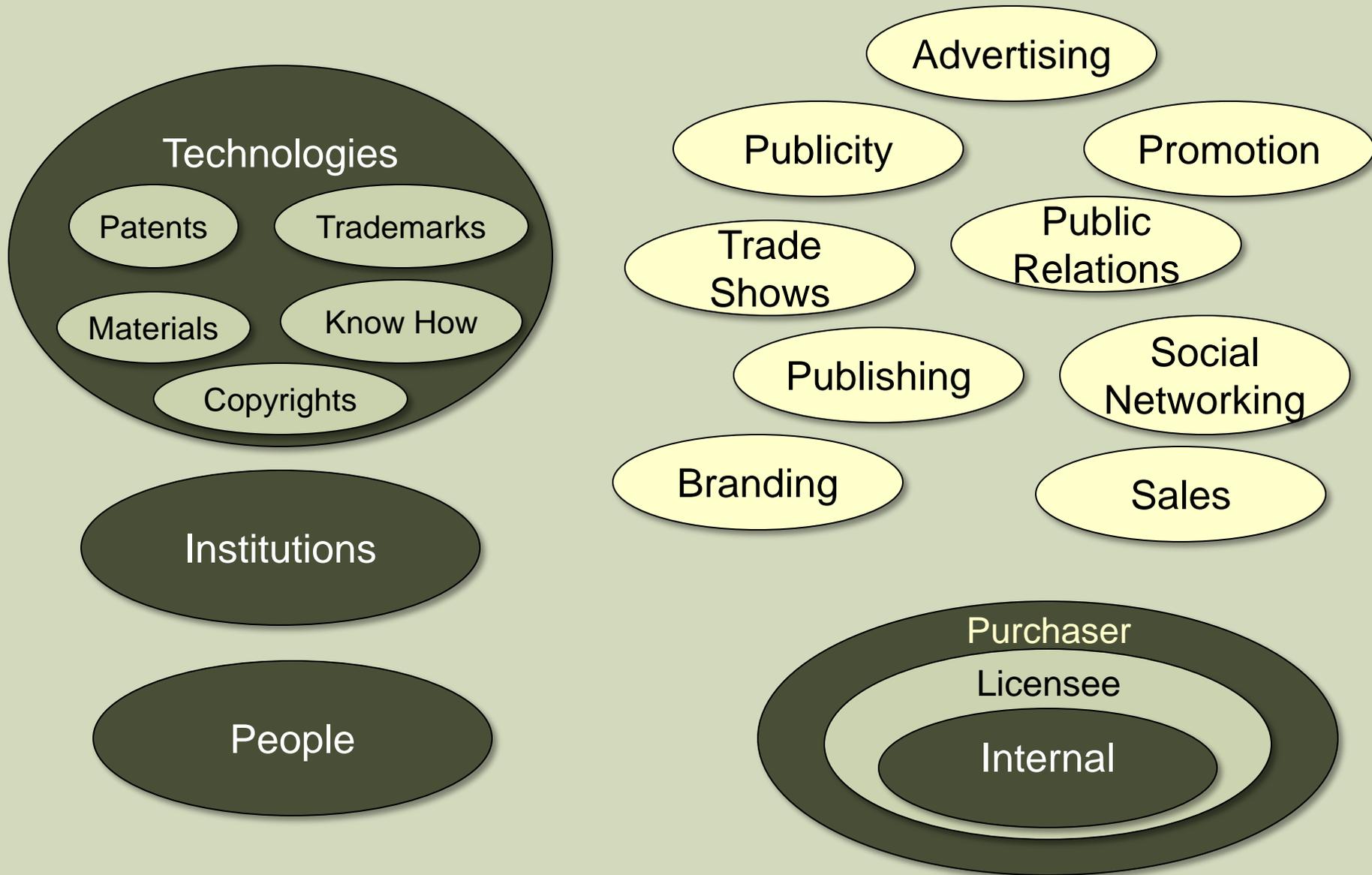
Inventing

Protecting

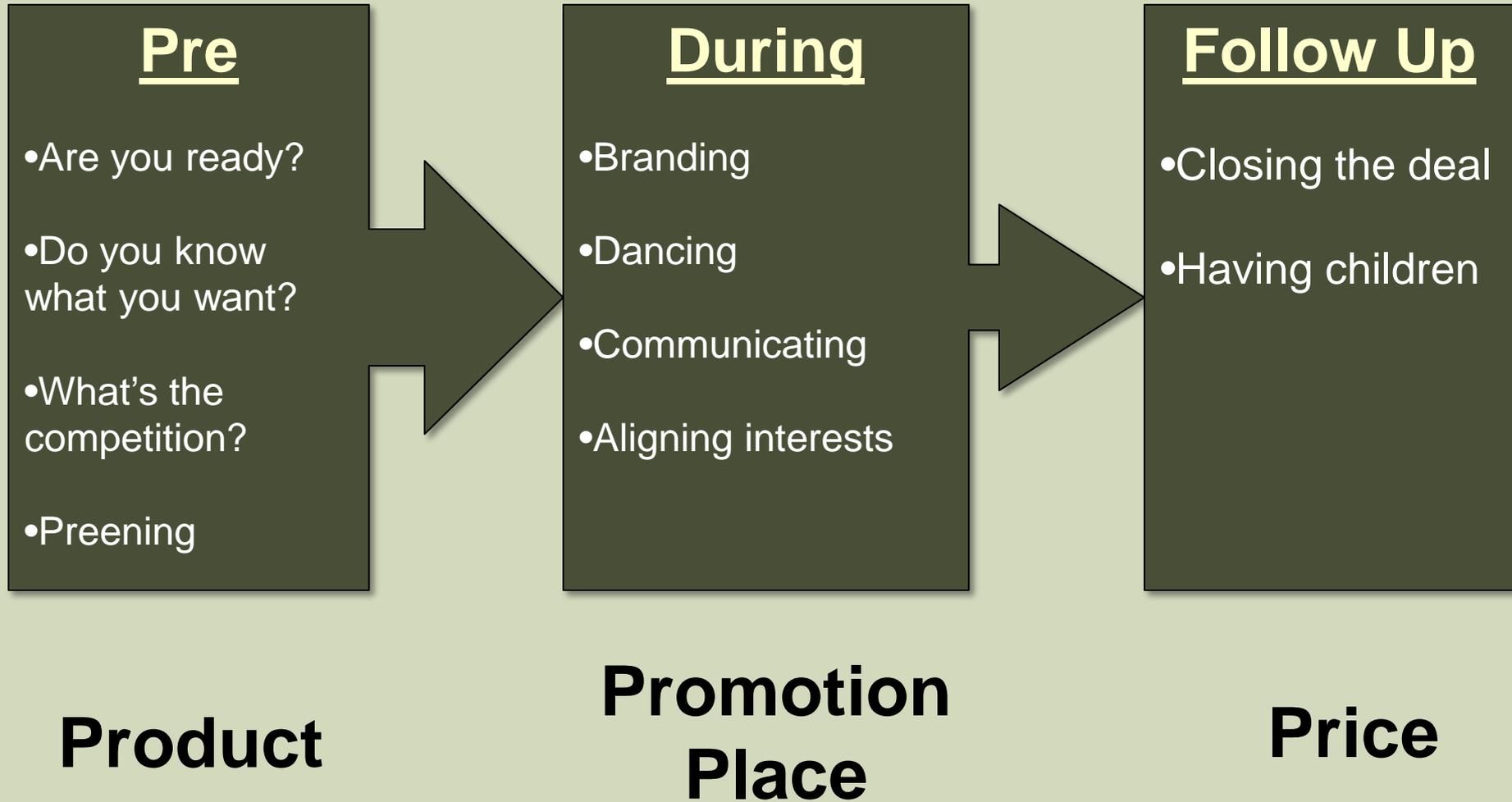
Commercializing

Collaborating

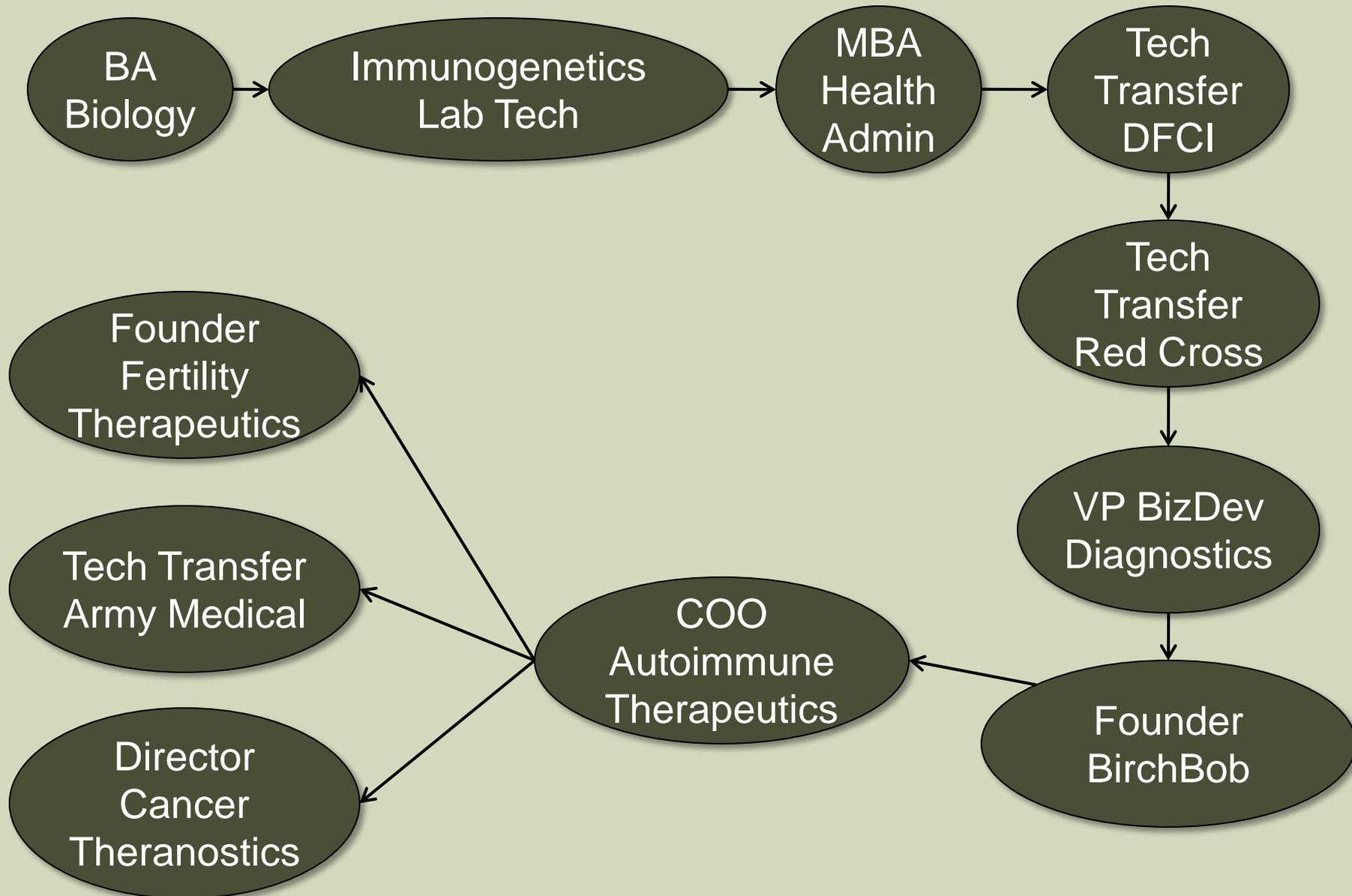
What Do We Market, To Whom and How?



Marketing BiomedTech is Like Dating...



My Career Path



PhD and Then What?

- Strong science background invaluable!!!!
- Marketing is inherent in all commercialization
- Branding is everywhere and critical but often overlooked

- Strongest skill: Learner
 - What do you read every week
 - Become a niche expert by presenting
- Acquired needs: legal, business, IT



Marketing Pieces

- Printed version
- Web version
- Market the inventors, collaborators, facilities, organization, in addition to the technology
- Move to include tutorial video clips, podcasts

Engagingly Asked Questions

Canista.PDF.com
 How do I license this technology?

Galaxy

- Authors
- Reviews (2012)

Press Coverage

- TechCrunch, Science Daily, Forbes, etc.
- Various other news outlets

Selected Publications

- 1. [Journal of Tissue Engineering and Regenerative Medicine](#), 2012
- 2. [Advanced Materials](#), 2012
- 3. [Tissue Engineering](#), 2012
- 4. [Journal of Biomedical Materials Research](#), 2012
- 5. [Journal of Cellular Biochemistry](#), 2012
- 6. [Journal of Biomedical Materials Research](#), 2012
- 7. [Journal of Biomedical Materials Research](#), 2012
- 8. [Journal of Biomedical Materials Research](#), 2012
- 9. [Journal of Biomedical Materials Research](#), 2012
- 10. [Journal of Biomedical Materials Research](#), 2012

Introduction:



Over 15 million people worldwide suffer from knee-joint failure each year due to the breakdown of surrounding cartilage in the joint and the inability of this cartilage to repair itself through the natural regenerative processes of healing in the body.

Tissue engineering has emerged as a field to replace tissues and organs lost by disease, trauma, or congenital abnormalities. Attempts have been made to engineer many tissues including skin, cartilage, bone, nerve, cardiovascular valves and conduits, and liver. Dr. Jennifer Elisseeff and her colleagues have pioneered the regeneration of cartilage for the repair of joints such as the knee.

First, some background on the field.

About ten years ago, doctors in Sweden began to surgically remove samples of healthy articular cartilage from the knees of patients with cartilage defects and use it to grow new cartilage in tissue culture. Once they had enough material, they went back into the patient's knee, removed the damaged cartilage, and inserted the test tube cells, called chondrocytes, in its place. The results were promising.

Today, there are three main types of transplants:

- The **meniscal transplant** - the cartilage shock absorber in the knee joint. If for some reason that is torn, it has to be surgically removed and a donated cartilage disk is transplanted into the knee.
- **Articular cartilage** is laminated to the ends of the bones that we use the joints. There are a few different ways to transplant that kind of cartilage. One is to take plugs of bones and cartilage from a separate area of the patient's joint and plug it into the area that's missing the cartilage. That can also be done in the whole joint. A similar transplant procedure for articular cartilage involves removing cartilage and bone from a cadaveric donor and transplanting that into a patient's knee. There's minimal rejection problem because cartilage tends to be immunoprivileged, whereby the immune system has difficulty coming in direct contact with immunogenic cells.
- The third type of transplant is analogous to patching an automobile tire; a patient's healthy cartilage cells are removed and sent to a laboratory that grows and duplicates them in tissue culture. Six weeks later they return the cells to the damaged joint. The damaged cartilage is then excised from the patient's knee and the test tube cells, called chondrocytes, are inserted. Placing a piece of lining of a bone and sewing it over the area will protect the cartilage cells so they can continue to grow and bond.

Tissue engineers today utilize a variety of approaches to regenerate tissues. These approaches can be broadly characterized into three major groups. First, biomaterials, without additional cells, are used to carry biological signals to surrounding tissues to recruit cells and promote inherent regeneration. Second, cells alone may be used, without a biomaterial, to form tissues. Finally, cells may be used with a biomaterial scaffold that acts as a framework for developing tissues. The technology focuses on the latter technique, developing and using biomaterial scaffolds for tissue engineering. The development of an effective cartilage regeneration system and future improvements rely on the merger of skills and knowledge as shown below:



The **biomaterials engineering** laboratory has applied rigorous basic science and engineering principles to the development and understanding of tissue engineering systems. They:

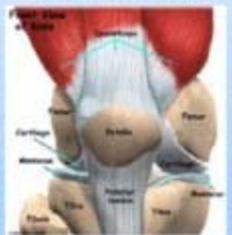
- developed novel hydrogels with enhanced microstructure for tissue engineering;
- designed minimally invasive systems for biomaterial scaffold implantation;
- modeled mechanisms of cellular response and tissue development in tissue engineering scaffolds; and
- engineered tissues with the complex cellular and matrix organization found naturally in vivo using biomaterials, cell, and developmental biology to understand and control mechanisms of the developing tissue.

Therapeutic Focus:

The **regenerative medicine** leverages the expertise of basic and clinical medicine, biomaterials, and engineering to provide an improved product with the following properties:

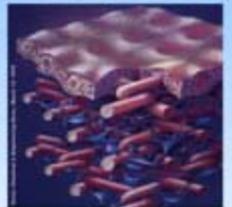
The Technology:

The knee joint is very complex. It is composed of four bones, the ligaments that hold them together, the articular and meniscal cartilage that protects the ends, and the surrounding bursa.



The **regenerative cartilage** regeneration technology encompasses a number of innovative components to replace damaged cartilage in the knee or in other joints or locations. **The technology provides a convenient and effective photopolymerization of a hydrogel that contains cells and growth factors necessary for the growth and integration of new cartilage in a damaged tissue.**

While cartilage is often considered a simple tissue with chondrocytes sparsely distributed throughout an extracellular matrix of type II collagen and aggrecan, it is a complex, heterogeneous tissue. On the cellular level, chondrocytes are organized into superficial, proliferating, prehypertrophic and hypertrophic chondrocytes. These different types of chondrocytes have different cell morphology and gene expression. The extracellular matrix around the chondrocytes is also highly organized and changes depending on the where it is located. The cellular and extracellular matrix organization is controlled by mechanical and biological signals during development and after. There is a large wealth of molecular and cell biology that has been applied to cartilage tissue engineering. This technology uses hydrogels for tissue engineering.

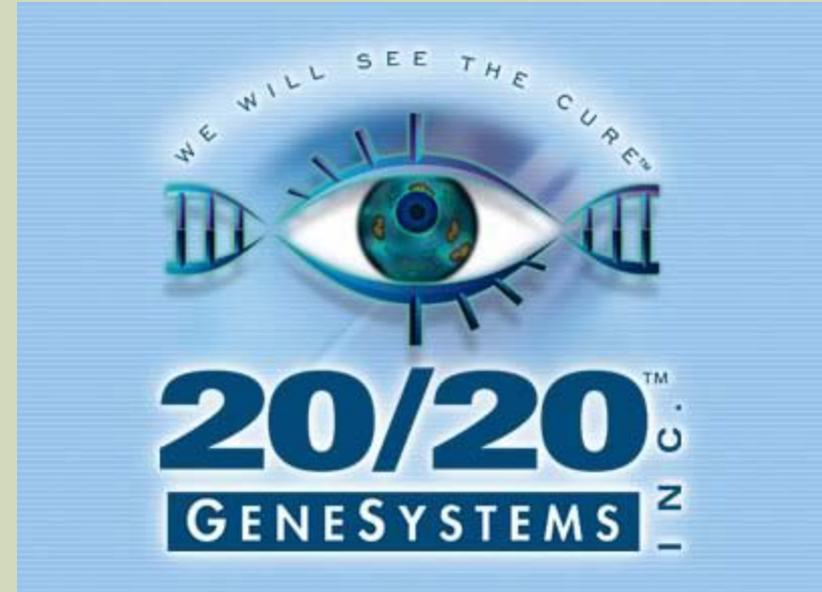


Hydrogels encapsulate cells and absorb a large volume of liquid for nutrient and waste transport. The poly(ethylene oxide)-based photopolymerizing polymers can incorporate, through physical interactions or covalent bonds, extracellular matrix derived gels and proteins. The composite hydrogel has a synthetic portion where physical properties can be easily manipulated and a biological portion where cell response and tissue development can be manipulated.

Integration of a biomaterial with surrounding tissue is critical to long-term survival and function. Particularly in the case of hard tissues such as cartilage in the musculoskeletal system, integration of an implant is difficult due to the dense nature of the extracellular matrix and large mechanical forces to which these tissues are often subjected. We have designed a method to direct covalent attachment of methacrylated polymers to collagen proteins. Collagen is ubiquitous so that this method for implantation may be applied throughout. Covalent integration of hydrogel biomaterials significantly improves the mechanical integrity of the tissue-biomaterial interface in challenging applications such as cartilage.

Photopolymerization is used as a method to encapsulate cells to drug delivery and tissue engineering applications in our minimally invasive implantation systems. Most tissues in the body are avascular. Vascularized tissues can be accessed in some dr.

You Know Good Branding When You See It!



Career Paths in Marketing

- **Technology Transfer Marketing**
 - Foot in door activities (internships, free work, consulting, social networking)
 - Assistant/Associate/Director level opportunities
- **Private Biomed Marketing**
 - Multi-skill requirement
 - Bring something else to the table
 - Grant writing
 - Patent writing

Challenging Duties For New Marketers

Message Tuning – Hard to quickly know diverse customer needs
Budgets and Resources – Always; time
Team Integration – Group vs Solo models



Common Questions

- **MBA advantageous** – Yes, yes and yes
- **Salary**
 - 50-75K assistant,
 - 75-125K associate,
 - 125-160K director
 - Industry: add 25-75K
- **Differences** for larger vs smaller offices vs government
 - Case load
 - External resources
 - Expectations
 - Yet similarities abound



Where Are We Headed in Marketing?

- Personalized
 - Need to constantly alter volume, level, perspective
- Mobile – information when and where
- Socially networked – do you have wuffie?
- CRM pre and post sale
- Permalinks to customers – what it takes
- Externalized activities – ever changing



Technology Transfer Infoweb

Research ↔ Invention ↔ Intellectual Property ↔ Partnerships ↔ Commercial Development



Where is your personal brand?

Licensee,
Answer me,
Please!!!!



Which came first, the Licensor or Licensee?



Contact Information



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