

Commercializing your Invention

Presentation to APSC 381
“Fundamentals of Design Engineering”

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advancing discovery

Who are we?

- Not-for-profit organization established in 1987
- Technology transfer office of Queen's, KGH, RMC, and St. Lawrence College
- 20 employees
 - 3 patent agents
 - 10 commercial development managers/analysts
 - 7 admin & support staff
- Annual operating budget of approx. \$2.5 million
- Portfolio of 250+ technologies

Universities - a source of innovation!

| | |
|-------------|---------------------|
| Saccharin | Johns Hopkins, 1879 |
| Insulin | U of T 1921 |
| Plexiglas | McGill, 1930 |
| Laser | Columbia, 1960 |
| Fax machine | Iowa State, 1971 |
| Java | U Calgary, 1995 |
| Google | Stanford, 1998 |

What do we do?

- Help bring the benefits of scientific discovery to the public by working with researchers and the business and venture capital communities
 - Bridge the “Discovery-to-Product” gap
- Stimulate local, regional and national economies through licensing activities and by creating spin-offs
- Enhance and foster linkages between the research community and industry

How do we do it?

PARTEQ's approach:

- Add value to a discovery by securing IP
 - Absorb initial IP costs
- Focus on value-added development of IP
 - How to take it to next step?
 - Seek additional (e.g. proof-of-principle) funding
- Identify licensees and negotiate deals
- Use new venture creation to facilitate investment
- Manage the IP & commercialization process

What have we done?

- 37 spin-offs based on Licensed Technology
- Spin-offs employ over 500 people
- Over \$500 million invested in development of Licensed Technology
- PARTEQ operations generated over \$38 million in revenue since inception
- PARTEQ returned \$25 million to Queen's community

Yes, fine! But how can you help me?

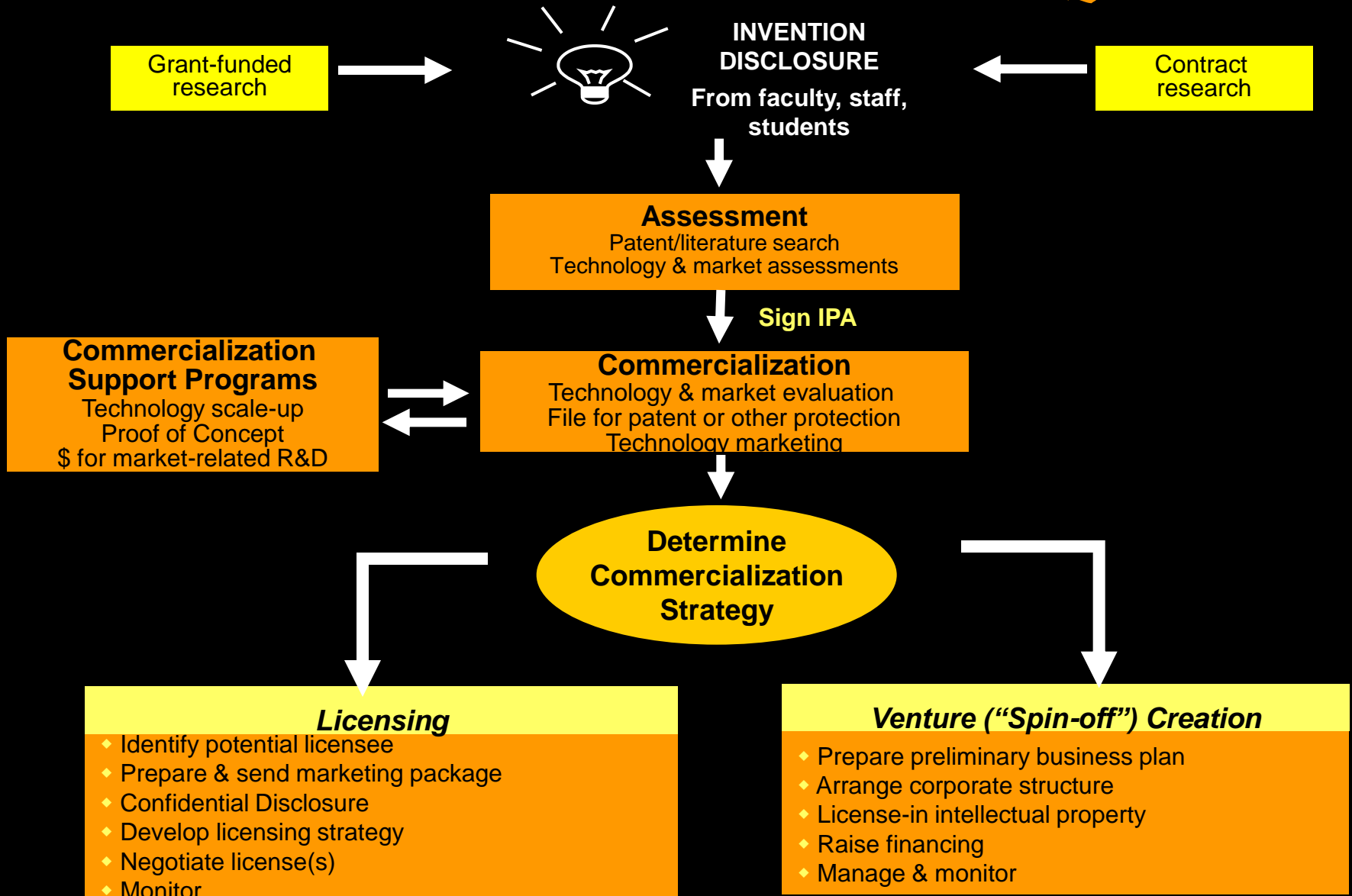
You've made a discovery that you think has commercial "legs". You bring it to PARTEQ.

PARTEQ'S commercialization team will:

- Assess the technology, related IP & commercial potential
- Arrange for protection of the technology (i.e. patent)
- Market & "Sell" (i.e., license) the technology to existing companies
- Start a new venture
- Return proceeds to both the university & inventors



Commercialization @ PARTEQ



Technology assessment – key questions

- What is the problem being addressed?
- How is it currently approached?
- What are the limitations/drawbacks with this approach?
- What is your solution?
- What is thought to be novel?
- How can this be incorporated into a product or service?
- What data do you have that supports this?

Technology assessment – other considerations

Are there any FTO issues?

- Can we get some IP? How broad or narrow in scope?
- What is the market size? Is it growing?
- Are there significant product development, cost, or regulatory hurdles?
- Competing technologies? Advantages/disadvantages?
- What is our value proposition?
- Is the market ready?

Technology Opportunity Bulletin

Surface Guided Total Knee

Tech ID: 2007-070

Description:

Researchers at Queen's University have developed a fixed-bearing total knee system that employs an innovative bearing surface design to guide the motion of the joint in both flexion and extension and to attain normal kinematics in deep knee bending without the use of an intercondylar cam/post.

Possessing inherent stability, the design generates an external rotation and posterior roll-back of the femur consistent with that of the normal knee during deep knee flexion. As such, impingement caused by paradoxical motion is reduced and a high range of motion is possible.

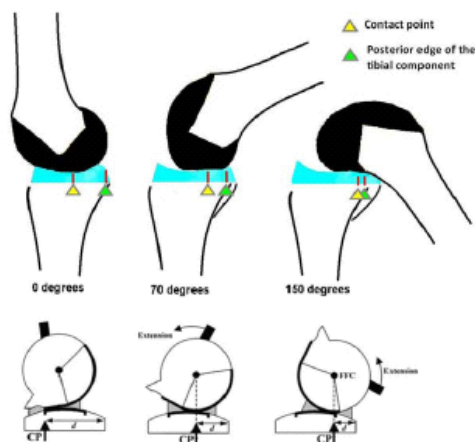
The design accommodates both PCL retaining and bi-cruciate retaining surgical approaches and permits normal patella mechanics over the entire range of motion.

Kinematics of the lateral femoral condyle

Top: Schematic of the articulation of the device when tested in a joint simulator under a compressive load. Femoral posterior roll-back of 23mm and external rotation of 20° are observed during flexion between 0° and 150°.

Bottom: Results from MRI studies of the kinematics of the lateral condyle in the normal knee joint. Posterior roll-back of 27±3mm and external rotation of 18±2° are observed during flexion.

Note: CP – Contact Point



Advantages:

Advantages of this novel design include:

1. Normal knee kinematics during deep knee flexion without the use of an intercondylar cam/post – 20° external rotation and 23mm posterior roll-back of the femur;
2. Impingement caused by paradoxical motion is reduced - a high range of motion is possible;
3. Accommodates both PCL retaining and bi-cruciate retaining surgical approaches;
4. Permits normal patella mechanics over the entire range of motion;
5. Motion is guided in both flexion and extension; and
6. Lower contact stresses during deep knee bending may result in reduced wear and improved long-term success.

Status of Development:

A proof-of-concept prototype has been made and its kinematics have been tested in a joint simulator under various compressive loads.

Status of Commercialization:

PARTEQ Innovations, the technology transfer office of Queen's University, is seeking industrial partners interested in further developing and/or licensing the intellectual property.

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Licensing

- Begins with negotiating a non-binding term sheet
- Ends with a definitive license agreement
- Knowing what you want out of the deal is critical to success
- Understand the industry and what your technology is worth
 - Inventors greatly over estimate the value of a technology
- Ask questions and ***listen*** to the answers! Try to understand your industry partner's needs & explain yours
- Look for creative solutions when negotiations stall
- Clear & effective communication is critical

New ventures

- PARTEQ uses new ventures as mechanism for financing
- First step is to develop business plan
 - Identify market opportunity, business model, money required, management team, etc.
 - Use many different resources to identify market size and expected penetration – better to be conservative
 - Identify competitive technologies and your IP position
 - Update frequently – it's a living document
- Then raise hit the road to raise the required \$\$\$
 - Angels, VCs, Government (i.e., BDC), etc



Queen's-generated products

- Antifreeze Proteins
- Anesthetic Bone Cement
- Access RX™ Wait List Management Tool
- Colonic Cleansing
- Differential O2 Gas Analyzer
- GeneLinker™ Gene Expression Analysis Software
- Hyperspace Helmet™
- Jolly Giant Software
- Kinarm™
- Levulan™ Photodynamic Therapy
- Micro machined Air-Coupled Capacitance Transducer
- Multidrug Resistance Protein – Antibodies and Products
- Nanoplate™
- Nial Tools
- Refiner Force Sensor
- Solar Domestic Hot Water Heater
- Sorbie-Questor® Total Elbow System
- Tangerine Fragment Display
- Uprima™
- RFEC/TC Water Pipe Inspection System
- Q'straint™ wheelchair and occupant restraint systems



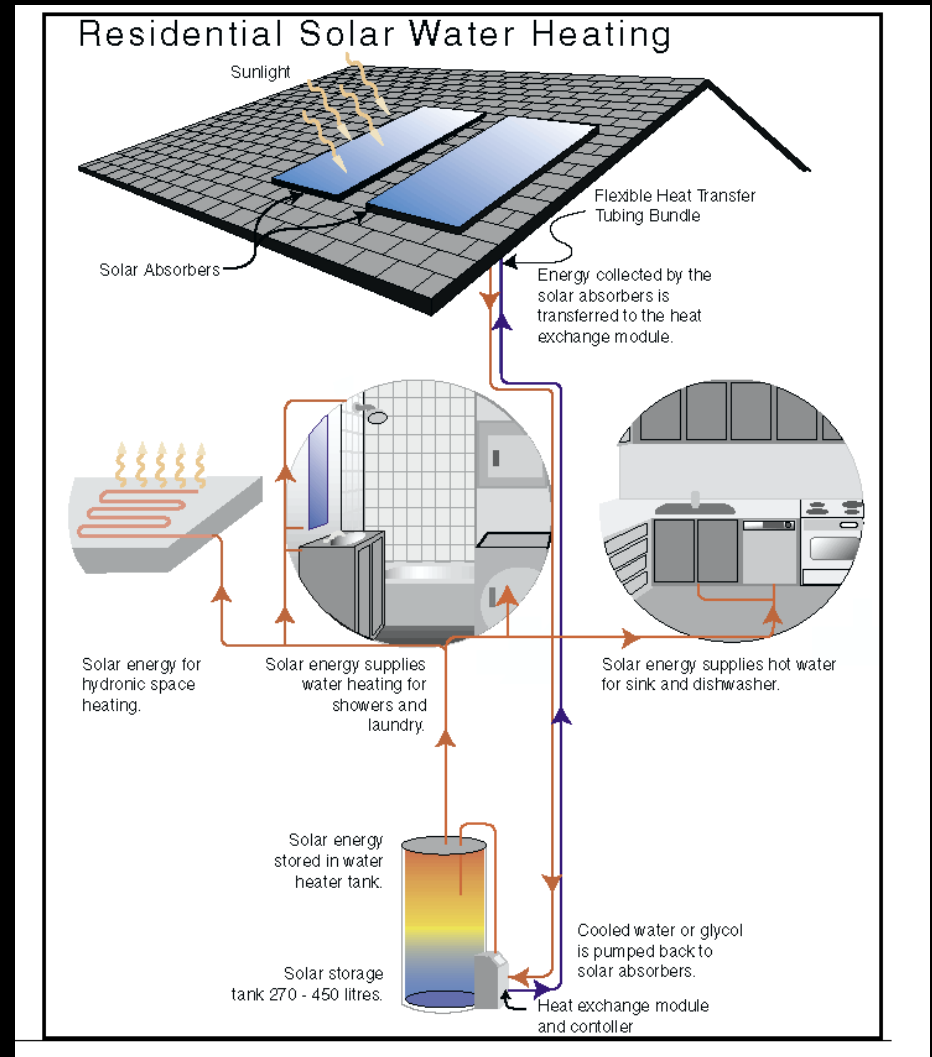
Patient-Specific Surgical Guide

- Generated from CT data
- Conforms to patient anatomy in only one orientation
- Used as guide for performing surgical procedures (hip resurfacing, knee replacement, etc.)
- Late stage development (i.e., clinical cases) = high value



EnerWorks Inc.

- Solar thermal appliances for residential and industrial use
- Key accomplishments:
 - Anti-Fouling
 - Longevity
- Funded by Queen's fund
- High demand for product



Levulan™

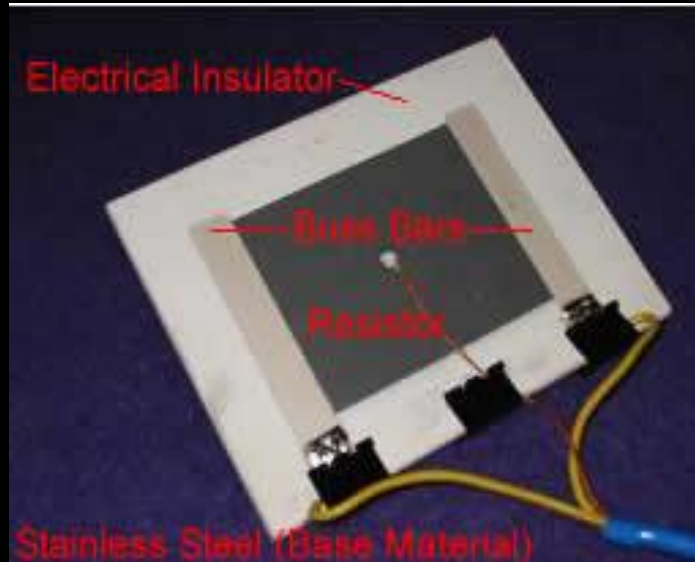


- Photodynamic therapy to treat various forms of skin conditions, cancers and other diseases
- FDA approved, launched in 2000 for the treatment of actinic keratosis
- Clinical studies underway for treatment of acne, nail fungus, warts and Barrett's esophagus
- Licensed to Dusa Pharmaceuticals
 - Created based on PARTEQ-licensed technology
 - Raised over \$120 million to date

Datec Coating Corp.



Mica
space
heater

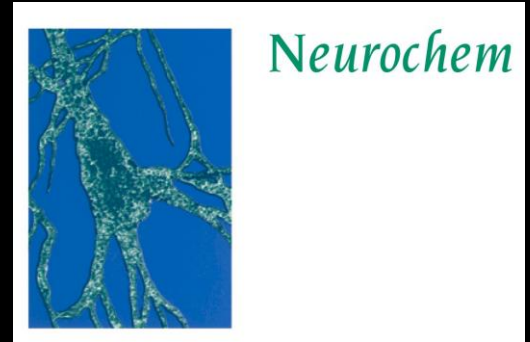


Cook tops

- Novel sol-gel process
- PARTEQ formed company
- Large markets for cook tops & space heaters
- Funded by Queen's fund

Neurochem Inc.

- Founded 1993
- Bundled and protected IP
- Developed business plan, raised financing, incubated company, provided initial management
- Now 180 employees
- \$160 million in investment
- Focus on amyloid-related diseases e.g. Alzheimer's, AA Amyloidosis



Take-Away...

- PARTEQ can help you realize the commercial potential of your ideas
- Never underestimate the value of what you've got – give us a call to discuss
- Basic research is a prime source of inventions
- You don't have to choose between patenting & publishing
- Keep accurate records and talk to us sooner rather than later



Thank you



advancing discovery

Tech Transfer Industry: A High-Growth Profession

Do you have:

- A background in science or engineering?
- An entrepreneurial mindset?
- Business development experience?
- Initiative, energy and enthusiasm?

Trends in Commercialization of University Research

- Increased spending on research
- More universities commercializing discoveries
- Venture capital wants qualified opportunity
- Consolidation and thinning of receptor capacity
- Emphasis on economic development
- More entrepreneurial faculty
- Move to value-added development

Role of Intellectual Property Protection

- Products derived from university research take time and \$\$ to develop
- Valuation at time of investment and sale is highly dependent on value of intellectual property
- Every valuable products attracts a lawsuit
- A single patent does not normally provide adequate protection
- Intellectual property (IP) strategy and position needs to be managed

What Is Needed?

- Pipeline of discovery
- Experienced managers
 - Technical, business, legal, finance, communications
- Workable structure
- Entrepreneurial and positive climate
- Risk capacity
- Operational stability
- Access to network of business, legal and scientific/clinical experts, investors



Patent Agents: In Short Supply!

- Technical background and good writing skills
 - typically have scientific expertise, higher degree

Role:

- Assess inventions
- Draft patent specification
- Prosecute the application => issued patent
- Support litigation of patent disputes

Not necessarily a lawyer but some are