Prioritize Your IP Portfolio

A where-to-start strategy

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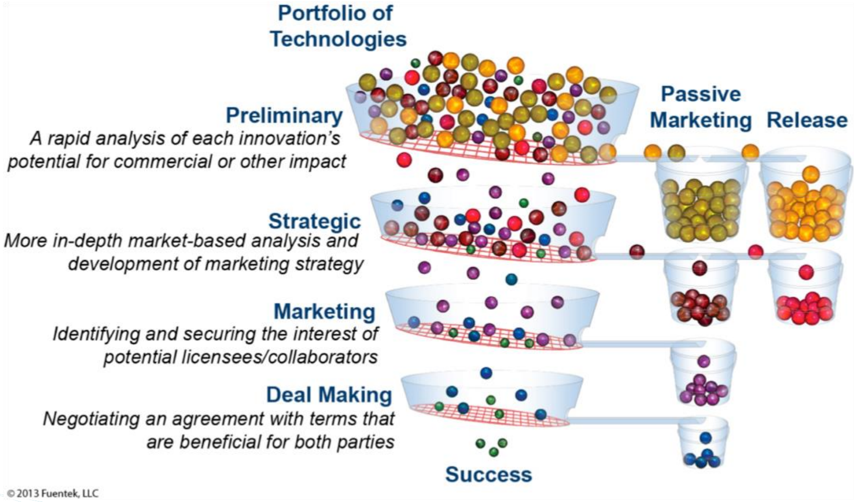
Proactively and Strategically Managing IP



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Portfolio Optimization

1 Identifies outdated tech and IP

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Portfolio Optimization

1. Identifies outdated tech and IP
2. Organizes cases for marketing and licensing

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Portfolio Optimization

1. Identifies outdated tech and IP
2. Organizes cases for marketing and licensing
3. Allows resources to focus on high value

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Portfolio Optimization

1. Identifies outdated tech and IP
2. Organizes cases for marketing and licensing
3. Allows resources to focus on high value
4. Reduces workload by removing low value

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Portfolio Optimization

1. Identifies outdated tech and IP
2. Organizes cases for marketing and licensing
3. Allows resources to focus on high value
4. Reduces workload by removing low value
5. Provides an action plan

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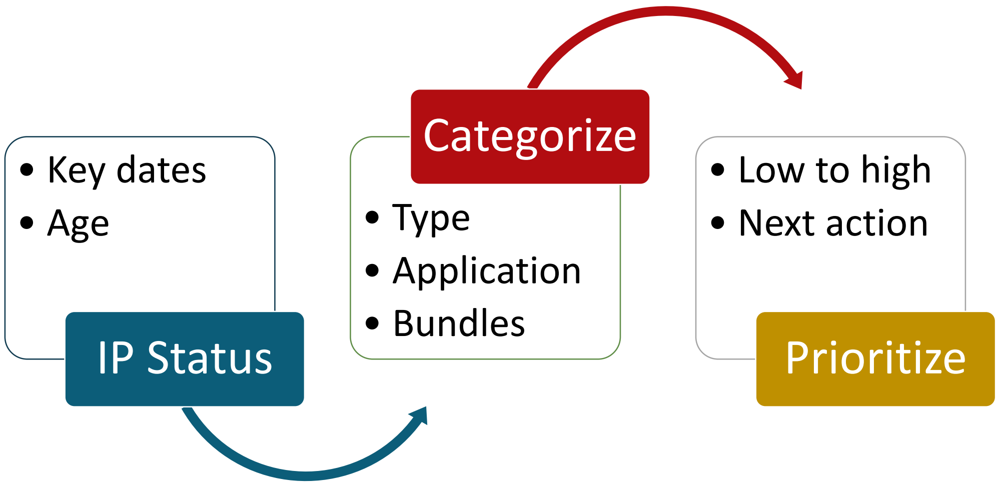
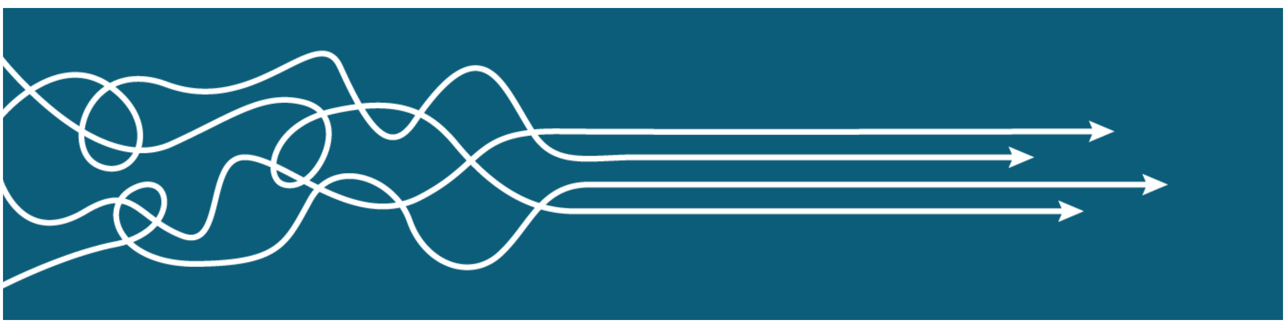
Understand and Organize



Ideas and Case Studies



Chaos ❯ Strategic Use

Georgia Tech

OFFICE OF INDUSTRY ENGAGEMENT

GEORGIA TECH RESEARCH CORPORATION

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Marketing strategies: overview

- Portfolio Optimization/Packaging
- Industry Related Tips/Tactics
- Maximizing Impact with Collaborators
- Case Study: 3M
- Resources and Tools

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Portfolio Optimization/Packaging

- Know your portfolio and your market
  - Packaging by researcher, industry, or topic of interest
- Work with your team
  - Never underestimate the value of teamwork!
- Think broadly and strategically
  - Take a holistic perspective instead of ad hoc
  - Think of alternative applications (you're the expert!)

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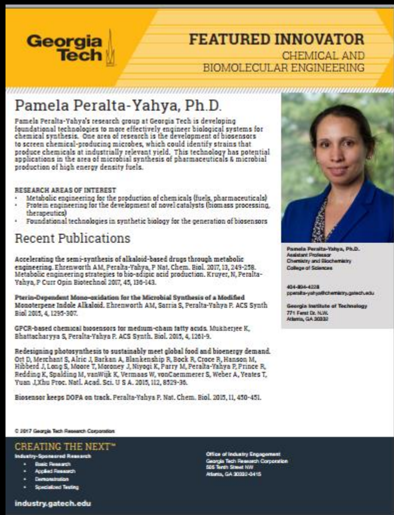
Example



FEATURED INNOVATOR
CHEMICAL AND BIOMOLECULAR ENGINEERING

Pamela Peralta-Yahya, Ph.D.

Pamela Peralta-Yahya's research group at Georgia Tech is developing foundational technologies to more effectively engineer biological systems for chemical synthesis. One area of research is the development of biosensors to screen chemical-producing microbes, which could identify strains that produce chemicals at industrially relevant yield. This technology has potential applications in the area of microbial synthesis of pharmaceuticals & microbial production of high energy density fuels.

RESEARCH AREAS OF INTEREST

- Metabolic engineering for the production of chemicals (fuels, pharmaceuticals)
- Protein engineering for the development of novel catalysts (biomass processing, therapeutics)
- Foundational technologies in synthetic biology for the generation of biosensors

Recent Publications

Accelerating the semi-synthesis of alkaloid-based drugs through metabolic engineering. Ehrenworth AM, Peralta-Yahya, P Nat. Chem. Biol. 2017, 13, 249-258.
Metabolic engineering strategies to bio-adipic acid production. Kruyer, N, Peralta-Yahya, P Curr Opin Biotechnol 2017, 45, 136-143.

Pterin-Dependent Mono-oxidation for the Microbial Synthesis of a Modified Monoterpene Indole Alkaloid. Ehrenworth AM, Sarria S, Peralta-Yahya P. ACS Synth Biol 2015, 4, 1295-307.

GPCR-based chemical biosensors for medium-chain fatty acids. Mukherjee K, Bhattacharyya S, Peralta-Yahya P. ACS Synth. Biol. 2015, 4, 1261-9.

Redesigning photosynthesis to sustainably meet global food and bioenergy demand. Ort D, Merchant S, Alric J, Barkan A, Blankenship R, Bock R, Croce R, Hanson M, Hibberd J, Long S, Moore T, Moroney J, Niyogi K, Parry M, Peralta-Yahya P, Prince R, Redding K, Spalding M, vanWijk K, Vermaas W, vonCaemmerer S, Weber A, Yeates T, Yuan J,Xhu Proc. Natl. Acad. Sci. U S A. 2015, 112, 8529-36.

Biosensor keeps DOPA on track. Peralta-Yahya P. Nat. Chem. Biol. 2015, 11, 450-451.

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- Applied Research
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- Specialized Testing

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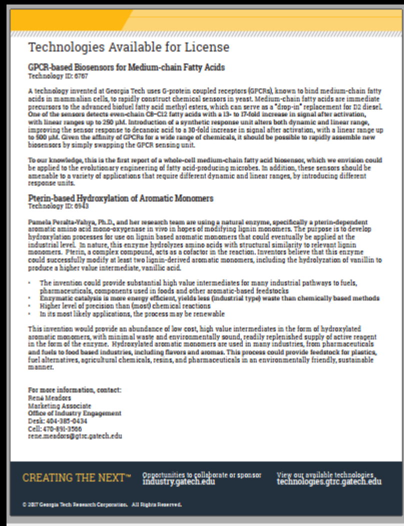

Technologies Available for License

GPCR-based Biosensors for Medium-chain Fatty Acids
Technology ID: 6767

A technology invented at Georgia Tech uses G-protein coupled receptors (GPCRs), known to bind medium-chain fatty acids in mammalian cells, to rapidly construct chemical sensors in yeast. Medium-chain fatty acids are immediate precursors to the advanced biofuel fatty acid methyl esters, which can serve as a "drop-in" replacement for D2 diesel. One of the sensors detects even-chain C8–C12 fatty acids with a 13- to 17-fold increase in signal after activation, with linear ranges up to 250 μM. Introduction of a synthetic response unit alters both dynamic and linear range, improving the sensor response to decanoic acid to a 30-fold increase in signal after activation, with a linear range up to 500 μM. Given the affinity of GPCRs for a wide range of chemicals, it should be possible to rapidly assemble new biosensors by simply swapping the GPCR sensing unit.

To our knowledge, this is the first report of a whole-cell medium-chain fatty acid biosensor, which we envision could be applied to the evolutionary engineering of fatty acid-producing microbes. In addition, these sensors should be amenable to a variety of applications that require different dynamic and linear ranges, by introducing different response units.

Pterin-based Hydroxylation of Aromatic Monomers
Technology ID: 6943

Pamela Peralta-Yahya, Ph.D., and her research team are using a natural enzyme, specifically a pterin-dependent aromatic amino acid mono-oxygenase in vivo in hopes of modifying lignin monomers. The purpose is to develop hydroxylation processes for use on lignin based aromatic monomers that could eventually be applied at the industrial level. In nature, this enzyme hydrolyzes amino acids with structural similarity to relevant lignin monomers. Pterin, a complex compound, acts as a cofactor in the reaction. Inventors believe that this enzyme could successfully modify at least two lignin-derived aromatic monomers, including the hydrolyzation of vanillin to produce a higher value intermediate, vanillic acid.

- The invention could provide substantial high value intermediates for many industrial pathways to fuels, pharmaceuticals, components used in foods and other aromatic-based feedstocks
- Enzymatic catalysis is more energy efficient, yields less (industrial type) waste than chemically based methods
- Higher level of precision than (most) chemical reactions
- In its most likely applications, the process may be renewable

This invention would provide an abundance of low cost, high value intermediates in the form of hydroxylated aromatic monomers, with minimal waste and environmentally sound, readily replenished supply of active reagent in the form of the enzyme. Hydroxylated aromatic monomers are used in many industries, from pharmaceuticals and fuels to food based industries, including flavors and aromas. This process could provide feedstock for plastics, fuel alternatives, agricultural chemicals, resins, and pharmaceuticals in an environmentally friendly, sustainable manner.

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Opportunities to collaborate or sponsor
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example

Autonomous Robotic Blimp

- Mini autonomous blimp with sensors that can be used to for human-robot interaction exploration and environmental mapping
- Ability to follow a human and recognize gestures
- Can be used to "see"

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Industry: know your customer and Speak their Language

- Stay up to date on your customers
  - Needs
  - Strategic Initiatives
  - Prioritization
- Industry Buzzwords
  - Big Data, IoT, Cybersecurity, Health IT
- Speak their language!

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Maximizing Impact with Collaborators

- Improving internal communication improves external communication
- Increase effectiveness of marketing efforts
- Reduce duplicative efforts
- Understand what "success" looks like

Georgia Tech VentureLab

atdc GEORGIA TECH

Georgia Tech Office of Development

Georgia Tech Office of Industry Engagement

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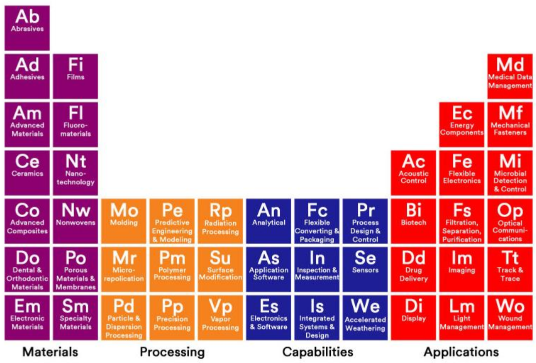
Case study: 3m campus visit

3M Technologies

Explore 3M's core technologies to see how our ideas live on, in connection with others, to help solve problems around the world.



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Case study: 3m campus visit

Prepared for 3M
July 14, 2017

Contents

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MATERIALS
INDUSTRY ENGAGEMENT AND COMMERCIALIZATION

Discovering, developing and improving materials that lead to technological advances

Georgia Tech researchers conduct basic and applied research to understand and develop innovative materials that hold great promise for improving daily living conditions around the world.

Interdisciplinary research teams balance synthesis and processing; materials theory and simulation; characterization; and property measurement to create, design, explore, advance, and exploit materials to address 21st century grand challenges. Our ability to combine Georgia Tech's strengths in engineering and the sciences has solidified our reputation as a leader in materials research.

Materials Research Portfolio

- Organic and inorganic photonics and electronics
- High-performance aerospace and automotive materials
- Sustainable infrastructure materials
- Nanomaterials, nanostructured materials and devices
- Materials for tissue engineering and biomanufacturing
- Materials in extreme environments
- Materials for energy harvesting, conversion, and storage
- Materials for health and human welfare

Highlights of Contributing Faculty Units

- Institute for Materials (IMat)
- Institute of Electronics and Nanotechnology (IEN)
- Georgia Tech Manufacturing Institute (GTMI)
- Renewable Bioproducts Institute (RBI)
- Strategic Energy Institute (SEI)
- College of Computing
- College of Engineering
- College of Sciences
- Georgia Tech Research Institute (GTRI)

Materials Characterization Facility

Available to academic, industry, and government users, the IEN/IMat Materials Characterization Facility (MCF) is the core facility for materials analysis at Georgia Tech. Its laboratories include the microanalysis suite in the Marcus Nanotechnology Building, one of the most advanced facilities of its kind in the nation. The MCF offers a wide variety of microscopy and characterization tools as well as skilled research staff to support your research needs.

Representative Sponsors in Materials Research at Georgia Tech

- National Science Foundation
- U.S. Navy, Office of Naval Research
- U.S. Army, Research Office
- U.S. Air Force, Office of Scientific Research
- U.S. Dept. of Veteran Affairs
- Airbus Group
- American Chemical Society
- The Boeing Company
- Chevron Corporation
- The Coca-Cola Company
- Corning, Inc.
- The Dow Chemical Company
- Duracell, Inc.
- Exxon Mobil Corporation
- Georgia Department of Natural Resources
- Lockheed Martin
- Mitsubishi Chemical Corporation
- National Textile Center
- Phillips 66 Company
- Pratt & Whitney
- Samsung Group
- Shell Oil Company

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Case study: 3m campus visit

Materials

Adhesives

3281 Contact Resistance Stabilization for Lead Free Surfaces (View)
5486 Highly Efficient Electrically Conductive Adhesives (View)
6924 Topologically and Mechanically Adaptive Reversible Attachment System (View)

Advanced Composites

6201 Electrochemical Supercapacitors Based on Polyacrylonitrile-Carbon Nanotube Composites (View)
6730 Syntactic Foam With Residual Internal Pressurization (View)
7349 Screen Printing Generation of Microcircuits in Graphene-Based Composites and Textiles (View)

Advanced Materials

3409 Recyclable and Reusable Co-Salen Complexes for Catalytic Use (View)
5794 Method for Increasing the Molecular Weight of Lignin from Pine via Ultrasonication (View)
6222 Superomniphobic Paper (View)
7102 Using Capillary Foams to Improve Mobility and Conformance Control in Enhanced Oil Recovery (View)
7159 Silane Grafted Polymeric Membranes for Natural Gas Separation and CO2 Capture (View)
7177 Mixed Quantum Dots for HD Displays (View)

Electronic Materials

5187 100x Mobility Improvement for Organic Field Effect Transistors (OFETs) (View)
5459 Eliminating Phase Separation Issues in Growing Group-III Nitride Alloys (View)
6069 Base Layer Epitaxial Structure for High Lateral Conductivity (View)
6451 Polyaniline Electrodes Containing Tri-Atomic Au/Pd Clusters (View)
6668 Case-Encapsulated Triboelectric Nanogenerator for Harvesting Energy from Reciprocating Sliding Motion (View)
7053 Bidirectional Ultra-Compact Low-Power THz Radio with Multi-Feed On-Chip Antenna (View)
5645 Low Work-Function Electrodes to Enable Better Flexible Electronics (View)

Films

3214 Improvements in Thin-Film Membranes for Fuel Cells (View)
6076 Positive-Tone, Chemically-Amplified, Aqueous-Developable, Permanent Dielectric (View)
6194 Hybrid Extrusion and Coating Technology (View)
6948 One-dimensional, single channel epitaxial Graphene nanoribbon (View)
6993 Sol-Gel Films and High Energy Capacitor Device (View)

Nanotechnology

4419 Chemical Anchoring of Carbon Nanotube Structures (View)
4791 Patterned, Horizontal ZnO Nanowire Arrays (View)
4843 Etching Controllable, Nano-sized Features into Silicon with Metal-assisted Chemical Etching Using Catalyst Nanostructures Deposited Using Electron beam Chemical Vaport Deposition (View)
5110 Growth and Transfer of Monolithic Horizontal ZnO Nanowire Structures to Flexible Substrates (View)
5114 Position Controlled ZnO Nanowire Arrays on p-GaN Thin Film Substrates for Blue LEDs (View)
5116 Bench Top Production of Graphene Sheets and Features via Laser Rastering and Photoprocessing of Graphite Oxide (View)
5132 Surface Modification Under Controlled Oxidative Environment (View)
5245 Large Area Site Selective Growth of Nano-wires through Laser Interface Patterning (View)

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Tools and resources

- Contact Forms
- SalesForce
- InDesign
- BOLOs (Be on the lookout!)
- Internship Program

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CLEANING THE TECH TRANSFER CLOSET

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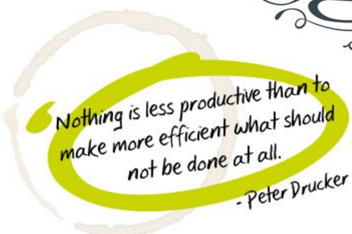
Beginning the Process



- Office efficiency
- Helps leadership and licensing team members
- Accountability to clients
- Customer service
- Cost savings

Docket Backlogs

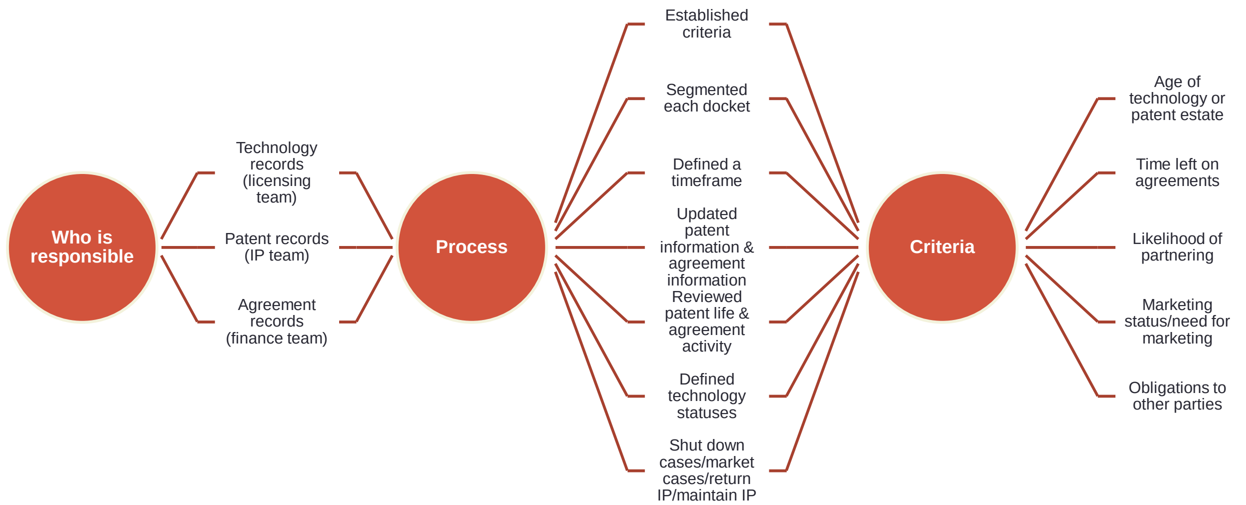
Without consistent pruning, dockets balloon

- May be inherited
- May be busy
- May not have systems in place

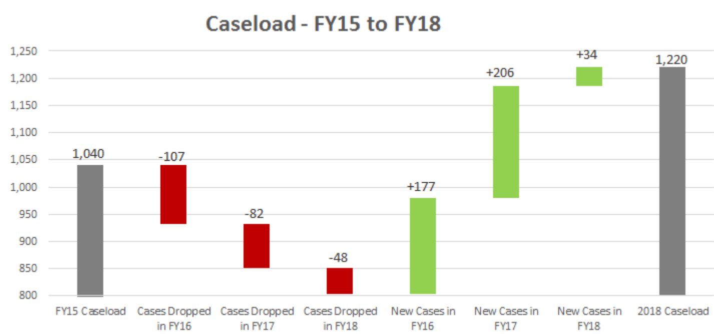
Important factors

- Clean data
- Clarity on expectations
- Team approach
- Set targets

Our Approach



The Outcome



Dropped Patents by Phase of Development			
Phase of Development	Number of Patents Dropped	Savings Per Patent	Overall Savings
Not Filed	128	$25,000	$3,200,000
Provisional	24	$21,000	$504,000
US	27	$10,000	$270,000
PCT	20	$10,000	$200,000
Nationalized	30	$10,000	$300,000
Copyright	8	$0	$0
Total	237		$4,474,000

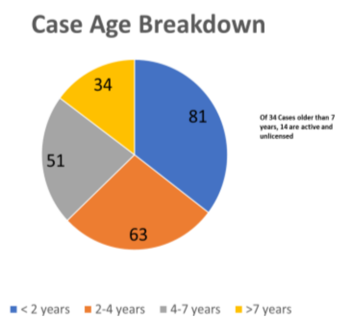
Where we are now

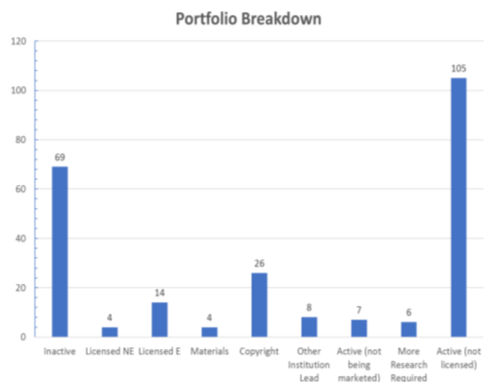
- Associate director gets regular updates
- Weekly “deals” meeting
  - Each licensing team member presents approximately bimonthly
  - Whole docket perspective
- Licensing member receives a snapshot from analytics on:
  - Case load
  - Tech status
  - Marketing progress
  - Outstanding patent costs
  - Outstanding license fees
- Monitor cases “out” vs. cases “in”
- Working on defining absolute timeframes for keeping unlicensed IP

Maintaining - Example

Licensing Team Meeting Agenda

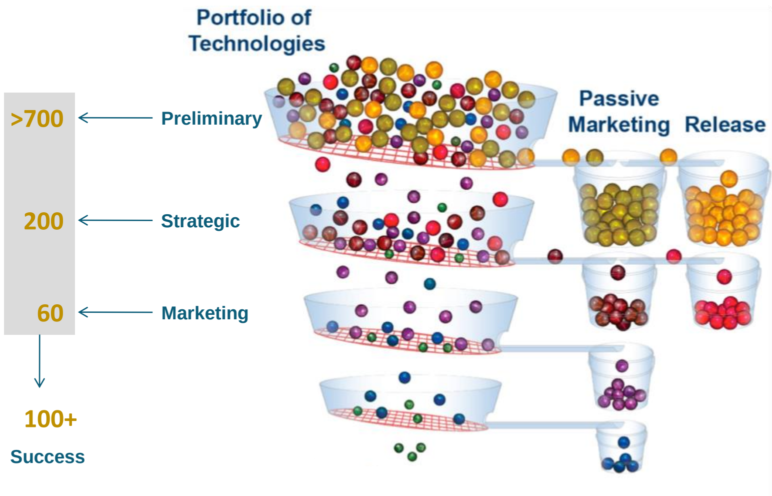
- Portfolio Statistics
- Licensing/Marketing Activities
  - Top 5 technologies
  - Tech up for conversion
  - Update on recent marketing
- Culling Patent Portfolio
- Deal Flow
- Licensees Update
- New Technology Snapshot





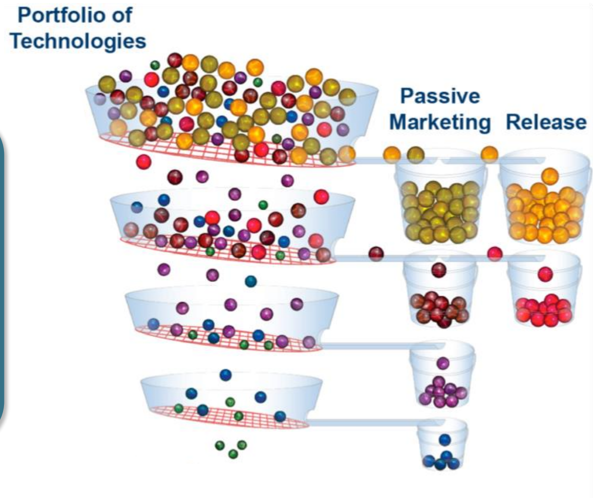
Backlog Case Study

Case Study: From Reactive to Proactive



Case Study: Short-Term Impact

- ✓ $6.6 million savings (330 low-potential inventions unpatented)
- ✓ $200,000 savings (75 patents to abandon at next maint. fee)
- ✓ Improved relations with faculty



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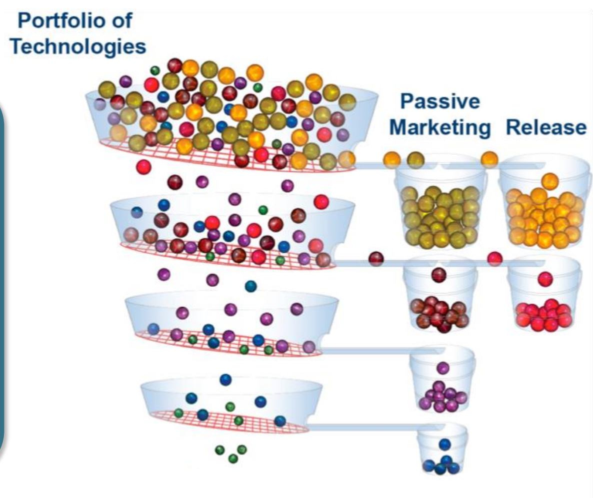
Case Study: Long-Term Impact

- ↑ 70% in disclosures (over 3 years)
- ↑ 47% in patent filings
- ↑ 100% in patents issued
- ↑ 30% in licenses and options
- ↑ 50% in startup companies formed



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Q What more do you want to know?