Knowledge Translation
KT4TT
Technology Transfer

Technology Transfer for KT Practitioners

Jennifer L Flagg

Center on Knowledge Translation for Technology Transfer

University at Buffalo

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ACKNOWLEDGEMENT

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Learning Objectives

- Understand the activities involved in generating and translating/transferring knowledge to external parties.
- Identify the major phases of the new product development process.
- Describe various forms of intellectual property protection and when they would be used.
- Articulate how the Knowledge to Action model can be used to define TT activities.

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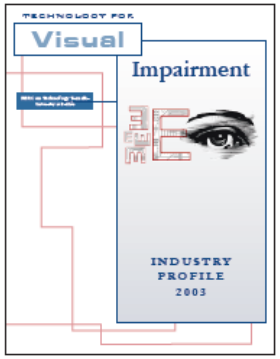
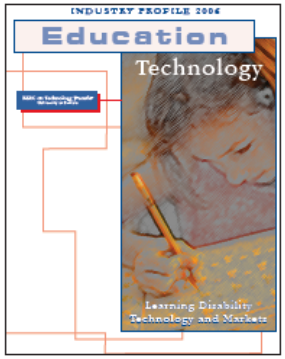
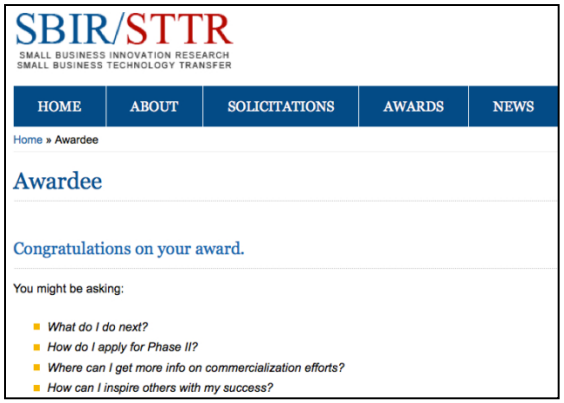
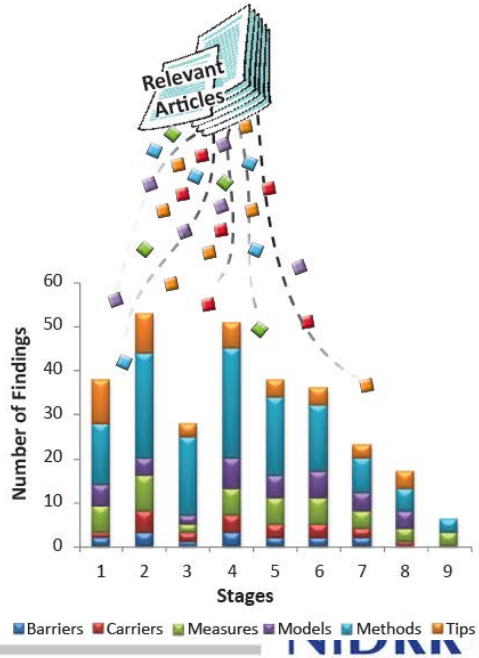
My Background









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Organizational History

- Tech Transfer Rehab Engineering Research Center
  - 1993-1998: Supply push (technology driven)
  - 1998- 2003: Demand pull (market driven)
  - 2003-2008: Corporate collaboration
- Center on Knowledge Translation for Tech Transfer
  - 2008-13: Generate models, methods, metrics
  - 2013-18: New! Tools and technical assistance

TT and its Relation to KT

Tech Transfer (TT) involves ***communicating information*** regarding a knowledge output to ***stakeholders who operate in unique contexts according to their particular values and incentives.***

As KT professionals, we ***can help knowledge producers to better communicate with knowledge users*** in all circumstances- including those where a device or service may eventually be produced.

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You are probably somewhat familiar with the Research Process…

Stage 3: Conduct Research and Generate Research-Based Findings

- Opportunity for KT: Identify expertise needs and assemble transdisciplinary research team (I.e. methodologist, statistician, etc.)
- Identify specific knowledge gaps- purpose of research phase.
- Select appropriate research design and develop research plan (action research, grounded theory, cooperative research, clinical research, etc).
- Secure funding.
- Conduct research.
- Monitor and track quality.
- Refine process and optimize quality of results.
- Results - integrate findings.
- Conclusion – evaluate discovery in light of solution.

Two Paths for Research Output

- Path 1 – Communicate Conceptual Knowledge through Publication.
- Path 2 – Transform Conceptual to Practical through further effort.
  - Development effort to create and test Prototype, followed by:
  - Production effort to create and launch Device/Service.

Evidence MILESTONES	RESEARCH Discovery	DEVELOPMENT Invention	PRODUCT Innovation
Project Output	Scholarly manuscript	Proof of Concept Prototype	Pre-Production Model
Output Disclosure	Discovery published in journal paper	Invention described in Patent issued by USPTO	Innovation announced via media
Outcome - Use of Output by Stakeholders	Literature citations of Discovery	Legal license of IP or infringement	Innovation Sale, Use, Review in marketplace
Establish Impact	Advance state of knowledge	Advance state of technology art	Advance state of practice & QoL

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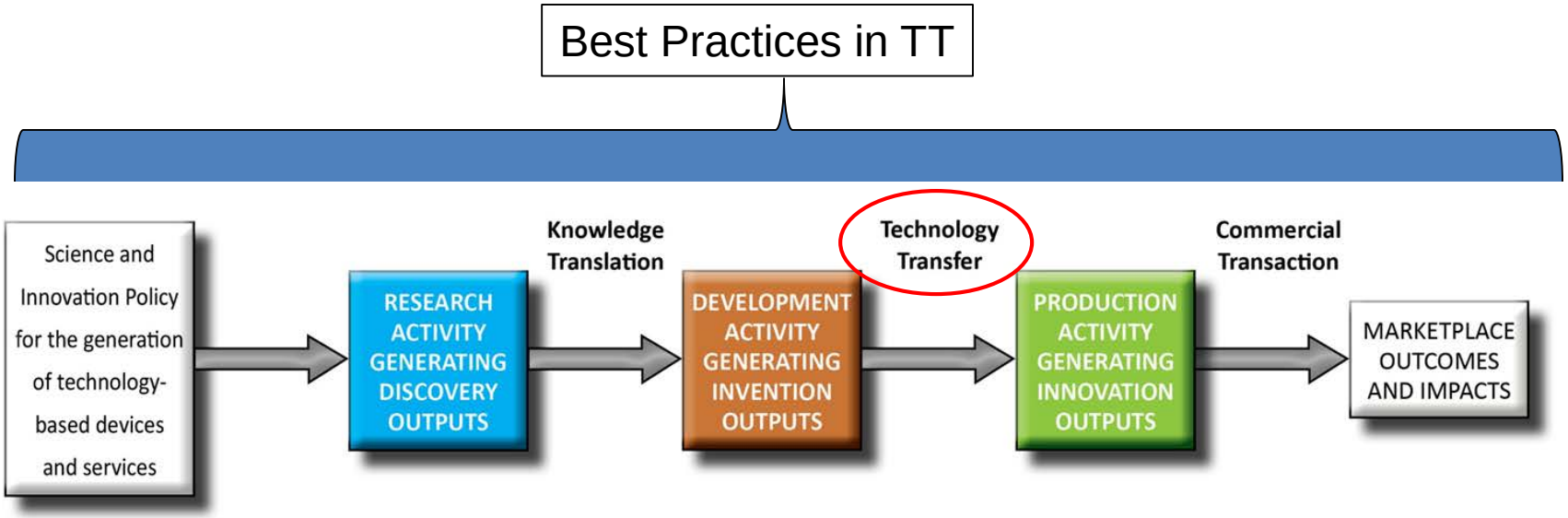
What is Technology Transfer?

The process of changing ownership and control over an invention, from the creator, to a party intending to generate a commercial product or service.

When does TT happen?



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A Closer Look at the Process

The Need to Knowledge Model

- Stage gate "best practices" model for generating and commercializing technology based innovations.
  - 3 phases (Research, Development, Production)
  - 9 stages/gates
  - 58 steps
  - 3 transitions between stakeholders
    - Knowledge Translation (KT)
    - Technology Transfer (TT)
    - Commercial Transaction (CT)

Knowledge Translation

Need to Knowledge (NtK) Model Outline

Phases	Stages and Gates
Discovery (Research)	Stage 1: Define Problem & Solution
	👍 👎 ?
	Stage 2: Scoping
	👍 👎 ?
	Stage 3: Conduct Research and Generate Discoveries → Discovery Output!
Invention (Development)	*Communicate Discovery State Knowledge* 👍 👎 ?
	Stage 4: Build Business Case and Plan for Development
	👍 👎 ?
	Stage 5: Implement Development Plan
	👍 👎 ?
	Stage 6: Testing and Validation → Invention Output!
Innovation (Production)	*Communicate Invention State Knowledge* 👍 👎 ?
	Stage 7: Plan and Prepare for Production
	👍 👎 ?
	Stage 8: Launch Device or Service → Innovation Output!
	Communicate Innovation State Knowledge 👍 👎 ?
	Stage 9: Life-Cycle Review / Terminate? 👍 👎 ?

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Screen Shot of NtK

Discovery Phase

Stage 1: Define Problem and Solution Pill crusher example 	• 1.1 Opportunity for KT: Assess needs for device or service with input from relevant stakeholders from the six knowledge user (KU) groups. • 1.2 Identify a problem (need). Identify audience for solution. Identify context for both. • 1.3 Propose plausible solution (goal) to problem in the form of a device or service. • 1.4 Determine scope of project (role); output as conceptual discovery, prototype invention or device/service innovation? • 1.5 Consider path to market.	• Limit disclosure of information regarding solution and document all original thinking related to solution). • Scope of project determines segments of KT4TT model involved with research generating discovery, development generating invention and production generating innovation level outputs. • Consider resources, timelines, and partners when defining path to market. • Opportunity for Universal Design (UD). Be mindful that the problem might be shared by others.
Gate 1: Idea Screen. PI decides to either terminate or move forward with project to develop solution to problem.		
Stage 2: Scoping (Initial screen to validate innovativeness and value to target markets) Caller connect example 	• 2.1 Define innovation opportunity.	• Delineate positioning strategy of future device/service.
	• 2.2 Opportunity for KT: Expanding on previously identified needs, perform preliminary valuability assessments (business, market and technical) on device/ service with input from stakeholders in the six KU groups. • 2.3 Identify potential barriers.	• Preliminary market assessment- Create potential value proposition including target price and performance parameters. Is concept novel and useful? Will prototype have value to intermediary stakeholders? Will device/service have value by the time it reaches the marketplace? Are there others who could also use this solution, thereby broadening the market? • Preliminary business assessment - For profit, cost recovery or freely distributed? Development and production phases internal or via stakeholders? Conduct SWOT analysis to identify barriers. Develop intellectual property strategy (e.g., NDA agreements), examine regulatory and reimbursement issues. Consider opportunity to achieve economies of scale for traditionally niche products, by expanding functional design to accommodate more user groups. • Preliminary technical assessment – Is it technically feasible and do capabilities exist internally or externally to develop and/or produce?
Gate 2: Feasibility Screen. PI must decide if envisioned project output and eventual device/service outcomes are still considered innovative in the light of results from assessments. PI decides if generation of new knowledge is required. If no, PI decides if project should move directly to invention phase or terminate. If yes, should they pursue external funding to conduct remainder of discovery phase?		
Stage 3: Conduct Research and Generate Conceptual Discoveries	• 3.1 Opportunity for KT: Identify expertise needs and assemble transdisciplinary research team (i.e. methodologist, statistician, etc.)	• Develop research problem/question.

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TT Best Practices

- NtK combines PDMA, KTA, and scientific research processes.
- Supporting evidence associated with each stage, step, and tip offer best practices as defined by academic and practice literature.
- Effective practices derived from real life case examples for each stage.

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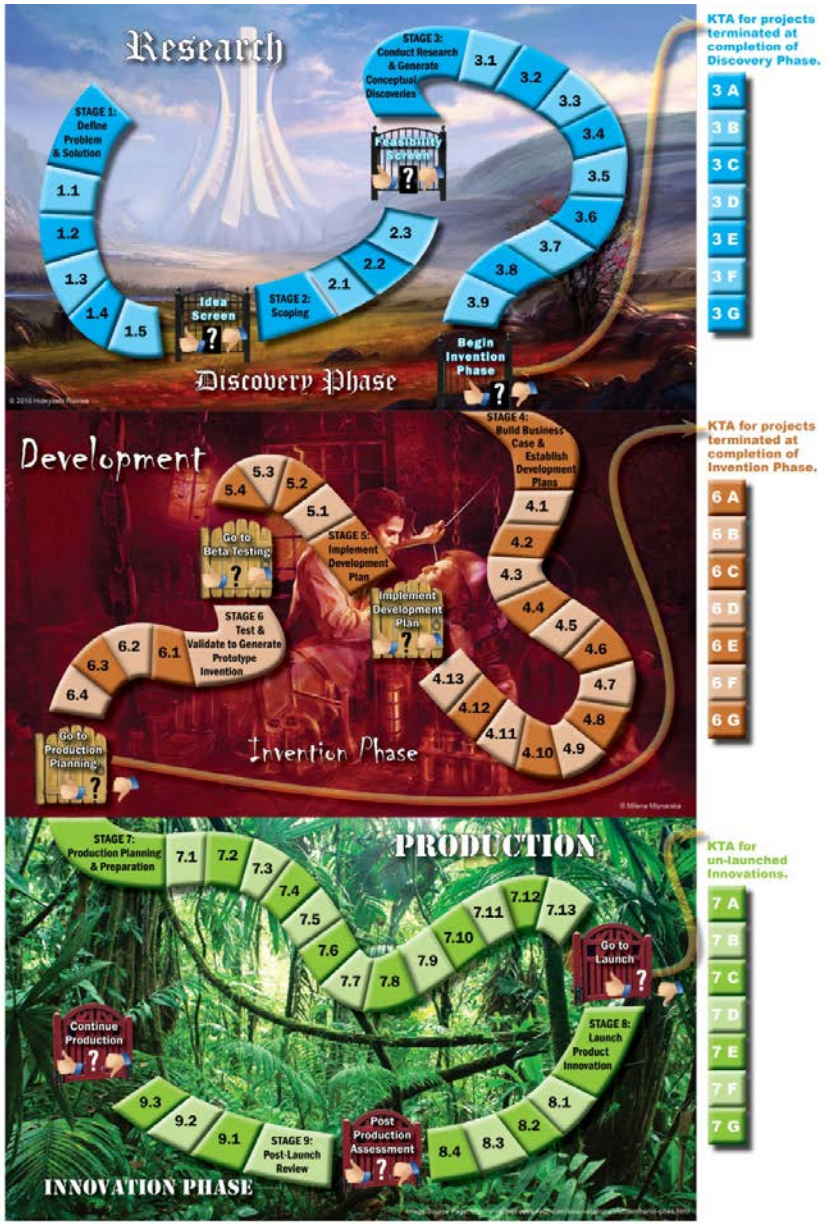
KT4TT in Action!

“Gamification” of Technological Innovation



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Intellectual Property

"Creations of the mind – creative works or ideas embodied in a form that can be shared or can enable others to recreate, emulate, or manufacture them" (USPTO)

- Four primary types of IP protection:
    1. Patent
    2. Copyright
    3. Trademark
    4. Trade Secret

Copyright

- Protection of original works of authorship including literary, dramatic, musical, and artistic works, such as poetry, novels, movies, songs, computer software, and architecture.
- Copyright does not protect facts, ideas, systems, or methods of operation, although it may protect the way these things are expressed.
- Copyright protection is automatically afforded to the author of the materials listed above upon creation.

U.S. Copyright Office: http://www.copyright.gov/help/faq/faq-general.html#what

Trademark

- A trademark- or service mark- includes any word, name, symbol, device, or any combination, used or intended to be used to identify and distinguish the goods/services of one seller or provider from those of others, and to indicate the source of the goods/services.

US Patent and Trademark Office:
http://www.uspto.gov/trademarks/basics/index.jsp

Patents

- Patents are property rights granted to an inventor to exclude others from:
  - Making
  - Using
  - Offering for sale

- Patents are granted for a limited time, and in exchange for public disclosure of the invention when the patent is granted.

Types of Patents

1. Utility Patents
   - Essentially protects how the invention works. New and useful processes, machine, article of mfg. or any new or useful improvement, thereof.
2. Design Patents
   - Granted to inventors that create a novel and nonobvious ornamental design for an article of manufacture.
   - Only protects how the invention looks, not how the invention works.
3. Plant Patents
   - Protects the development of new varieties of both sexually and asexually produced plants.

What a Patent Does Not Do!

- Patent does not ensure overall functional uniqueness of your device.
- Patent does not ensure marketability.
- Patent does not ensure someone won't steal your invention.
- Patent does not automatically cover ancillary products.

Patent Facts

- 50-65% of invention disclosures from U.S. universities are converted into U.S. patent applications. (AUTM 2008)
- 30-50% of U.S. Patent applications are converted into Utility patents. (AUTM 2008)
- 99.8% of inventions fail. Only 3,000 patents out of 1.5 million are commercially viable. (Richard Maulsby, Director of Public Affairs USPTO)

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Early Steps to Protect Ownership of An Invention

Non-disclosure Agreements

- Legal document that states the person signing the agreement will not disclose or use any of the information that is shared for any reason.
- Anyone who is not a co-inventor should sign a non-disclosure agreement before you share any information with them.
- If you are a university-based researcher, check with your University Technology Transfer office for approved agreements for you to use.
- If you are an independent inventor, you should contact an intellectual property attorney to have an agreement drafted for specifically for your invention and your situation.

Early Steps to Protect Ownership of An Invention

- Provisional Patent
  - Relatively low-cost way of postponing the cost and effort of drafting and filing a non-provisional patent application.
    - $250 is the application fee for large organizations and it's $125 for small entities or an individual.
  - Provides the applicant one-year to determine whether they wish to proceed with the non-provisional application.
  - The 20-year utility patent term also does not begin with the filing of a provisional application for patent.

What's it Worth?

Intellectual property protection is only valuable if you are able to enforce your rights.

Litigation is costly!

Where do KT Professionals Fit In to TT?

- Educate colleagues about best practices in TT.
- Define important stakeholder groups.
- Reconcile values and needs of different stakeholder groups.
- Help researchers consider how best to communicate with each group.

Communication Breakdown

Key Differences	Academia	Industry
Timeframes	Long- typically structured based on academic calendar	Short- three month window of opportunity
Critical Considerations	Generalizability of results and ability to replicate	Specificity of results and ability to protect
Methods	Small samples due to lack of resources	Large samples include mix of end users
Values	Tenure and promotion driven by publication	Longevity driven by market success
Consequences	No publication = No promotion	No sale = business failure and job loss

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Role Playing Exercise

- 4 stakeholder groups
  - Private sector product manufacturer
  - Academic inventor
  - Technology Transfer Office
  - KT Professional
- Let's see if we can come to agreeable terms…

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How Did It Go?

- Debrief on the role playing exercise and lessons learned.

Let's explore a few KT tools that can be used to help these stakeholder groups to better understand one another.

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KT for TT Tools

- ***Knowledge to Action Model***- offers a useful framework that can be modified to reflect the translation of invention and innovation outputs.
- ***KT Tables***- define what to share and how to share information with six stakeholder groups. Considers anticipated outcomes.
- ***Contextualized Knowledge Packages (CKP)***- provides a framework for putting information into a form that can be easily recognized and valued by a particular stakeholder group.

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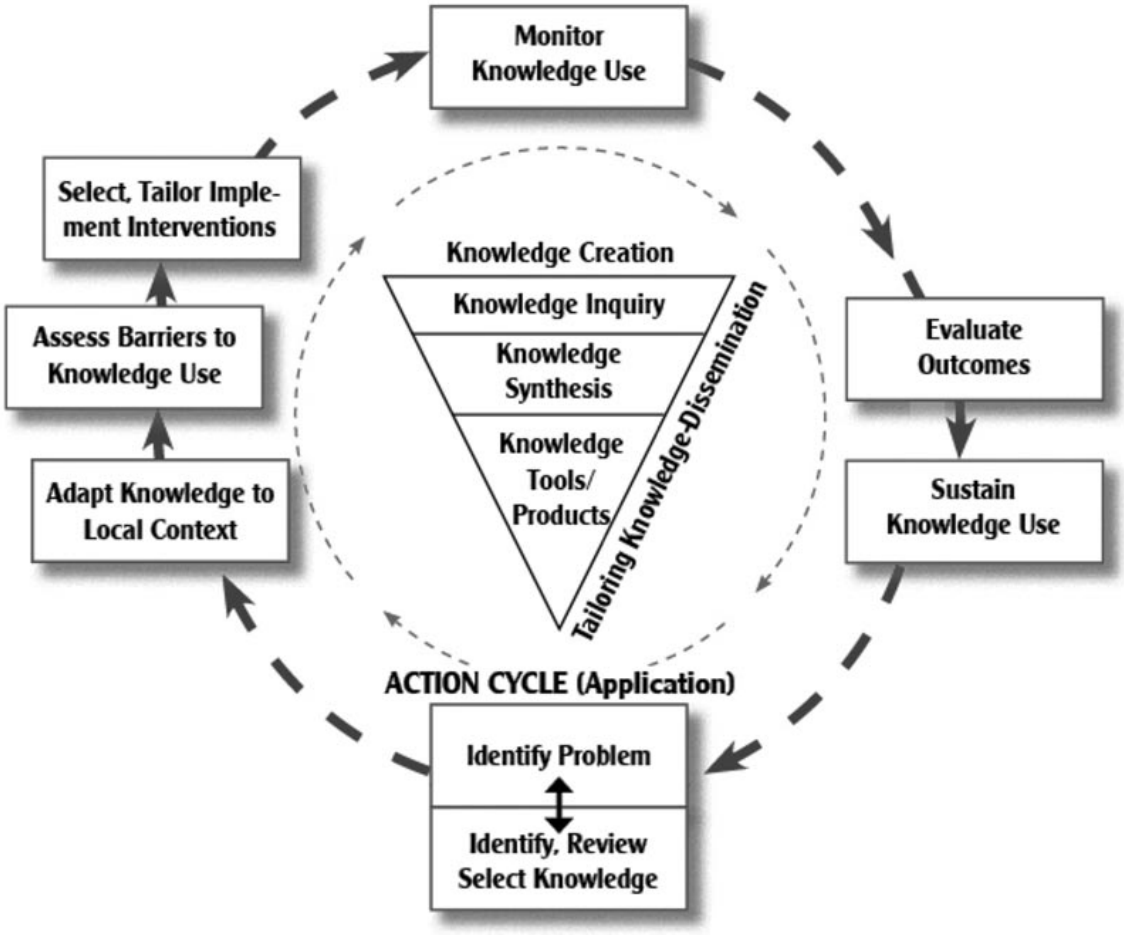
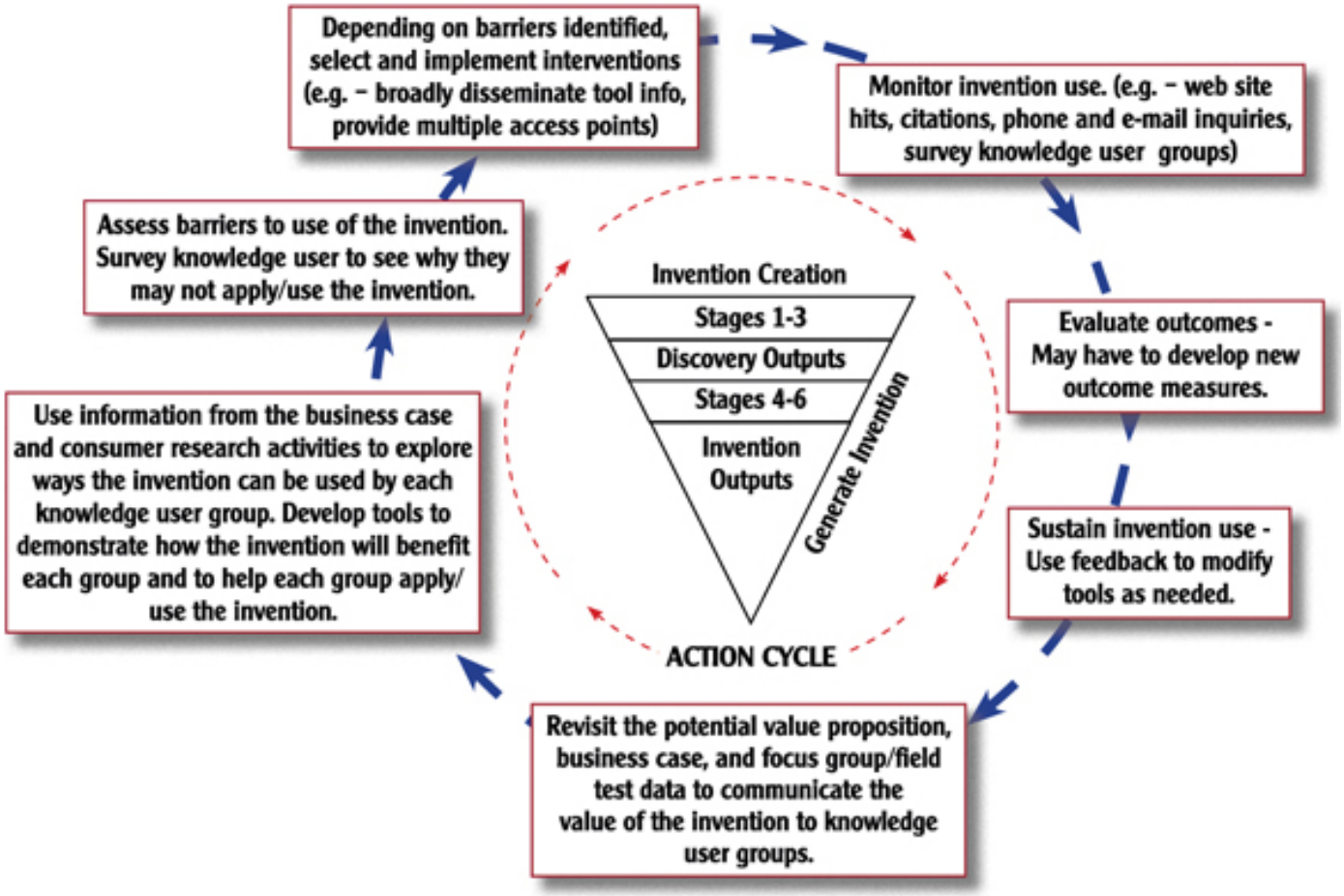
Graham's KTA Model



Translating Invention Outputs



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KT Tables

KU Group	Consumers	Clinicians	Policy Makers	Researchers	Brokers	Manufacturers
What to Share with Each KU Group	Strategic Use: Use business case and focus group/ field test results to develop talking points to demonstrate how prototype could lead to product development and improved QoL.	Strategic Use: Use business case and focus group/ field test results to demonstrate how prototype could lead to product development and improved QoL.	Strategic Use: Use business case and focus group results to develop talking points that demonstrate how a product based upon the prototype design could lead to improved QoL and cost savings.	Conceptual Use: Disseminate non-proprietary information regarding prototype to stimulate additional R.	Instrumental Use: Develop full commercialization package including information from initial need assessment, valuability assessments, value proposition, focus group/field test results, description of features and specifications, and technical details of prototype.	Instrumental Use: Develop full commercialization package including information from initial need assessment, valuability assessments, value proposition, focus group/field test results, description of features. and specifications, and technical details of prototype.
How to Reach Each KU Group	Network with consumer advocacy organizations (CIL, Cerebral Palsy Association, AARP, etc.) and ask them to publish an article in their newsletter or have them e-mail their constituents. Present at organizational meetings. Ask the organizations to have a link on their website to your website. Use fliers, e-mails, phone calls, and face to face meetings.	Present prototype/ findings at clinician oriented conferences (AOTA, APTA, CSUN, ISS, etc.). Use research papers, power point presentations, mailings, and e-mails.	Presentations communicated to program directors, reply to invitations for comments, or talk with elected officials. Use e-mail, calls, face to face meetings, and power point presentations.	Present findings at research oriented conferences (RESNA, etc). Use research papers, and power point presentations.	Face to face meetings with University TTO may be most effective. Commercialization package (soft or hard copies), and power point presentation.	Conduct face to face meetings with individual manufacturers at their home office, or at conferences/ tradeshows (Medtrade, ATIA, etc.) Commercialization package (soft or hard copies), power point presentation, and tailored e-mails.
Anticipated Knowledge Translation Outcomes	Consumers can use talking points to contact politicians to advocate for reimbursement of potential devices, or contact manufacturers and distributors to stimulate product demand.*	Clinicians can use talking points to contact politicians to advocate for reimbursement of potential devices, or contact manufacturers and distributors to stimulate product demand.*	Policy makers can use talking points as basis for introducing and supporting legislation to provide reimbursement for potential devices.*	Researchers can use findings as basis for additional research on related topics.*	Brokers can use commercialization package to demonstrate the value of a product to manufacturers, and encourage them to move to production.	Manufacturers can use a commercialization package to understand the value of a product, thereby encouraging them to move to production.

*Carefully consider this option, as disclosure may have a negative impact if unprotected IP is disclosed.

Contextualized Knowledge Packages

- First and foremost a CKP is NOT a Business Plan.
- CKP is a tailored presentation of new research findings, a development output, or a new device or concept.
- Formulated to meet the specific context requirements of a particular audience or stakeholder group.
  - Different material needed to communicate with different stakeholder groups!
- Researcher translates features / functions of his / her research discovery or prototype invention into a vision for a marketable consumer product.

CKP Key Points

- Experience has shown that researchers only have 5 minutes of a key licensing individual's time for review of research findings.
- 5 Key elements of a Manufacturer CKP
  - Executive Summary
  - Background / Current Situation Section
  - Technical
  - Marketing Section including IP position
  - Consumer Involvement / Testing / Input

Putting It All Together

- Real life project to explore?
- Let's consider:
  - Who are the key stakeholders
  - What do they need to know
  - How should it be communicated
  - Who should do the communication
  - What outcomes do we expect to result from the communication

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Key Takeaways

- Best practices in TT (ideally) begin BEFORE a project is initiated.
- KT Practitioners can help to improve TT outcomes by:
  - Bridging communication gaps between academia and industry.
  - Helping researchers present the right information in the right format.
- Many tools are available to help!

Recap on Accessing the NtK Model and Tools

Visit: http://kt4tt.buffalo.edu/knowledgebase/index.php

- Click link for Informational (expanded) plain text version of model.
- Scroll down page to review stages, gates, steps and tips.
- Click magnifying glass icons for supporting evidence.
- Click toolbox icons for tools.
- Case example links found on left side of each stage.

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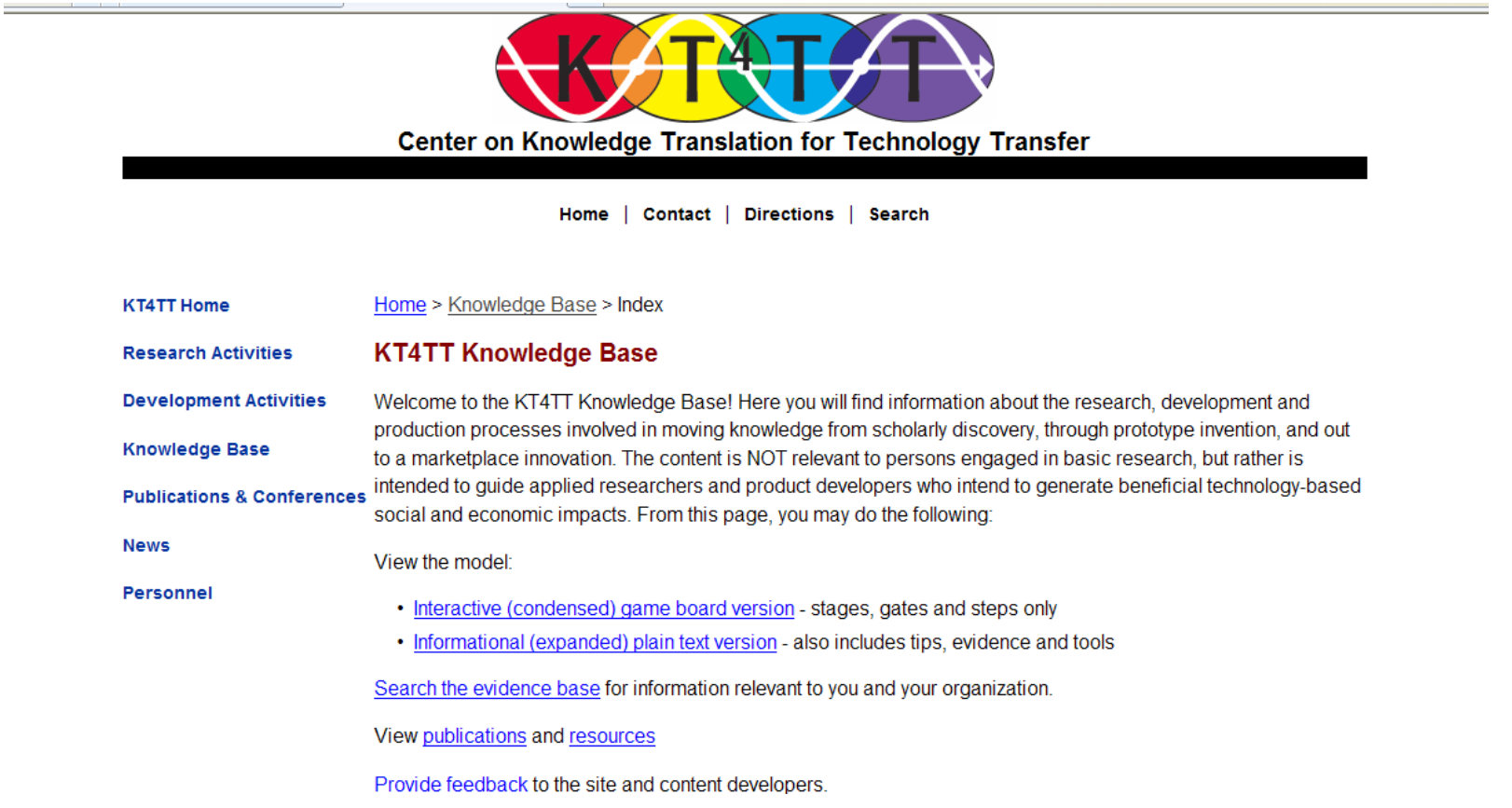
Accessing the NtK and Tools

Visit http://kt4tt.buffalo.edu/knowledgebase



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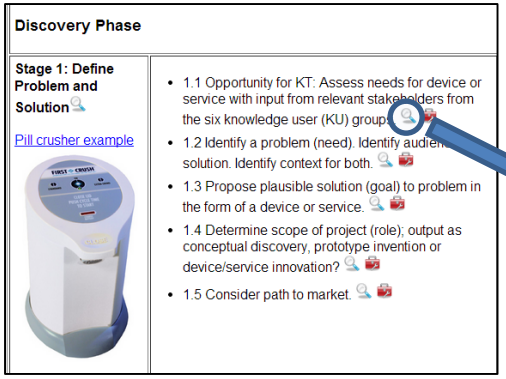
Supporting Evidence

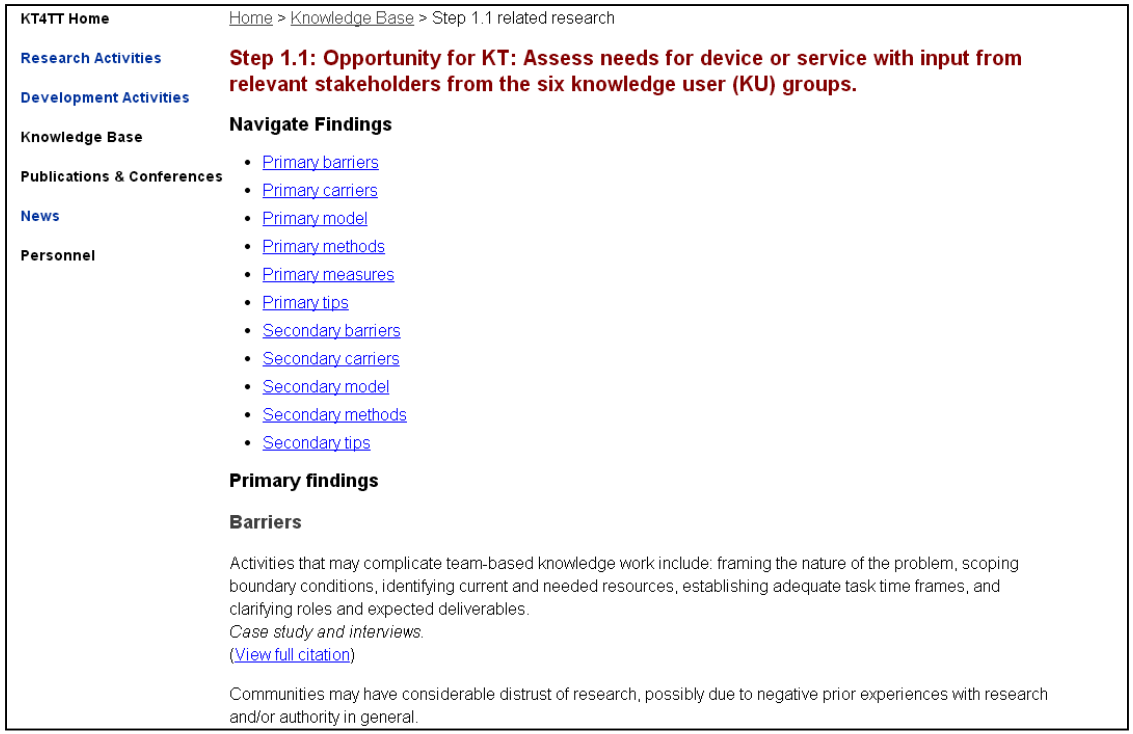


Discovery Phase

Stage 1: Define Problem and Solution

Pill crusher example

- 1.1 Opportunity for KT: Assess needs for device or service with input from relevant stakeholders from the six knowledge user (KU) groups.
- 1.2 Identify a problem (need). Identify audien… solution. Identify context for both.
- 1.3 Propose plausible solution (goal) to problem in the form of a device or service.
- 1.4 Determine scope of project (role); output as conceptual discovery, prototype invention or device/service innovation?
- 1.5 Consider path to market.



KT4TT Home

Research Activities

Development Activities

Knowledge Base

Publications & Conferences

News

Personnel

Home > Knowledge Base > Step 1.1 related research

Step 1.1: Opportunity for KT: Assess needs for device or service with input from relevant stakeholders from the six knowledge user (KU) groups.

Navigate Findings

- Primary barriers
- Primary carriers
- Primary model
- Primary methods
- Primary measures
- Primary tips
- Secondary barriers
- Secondary carriers
- Secondary model
- Secondary methods
- Secondary tips

Primary findings

Barriers

Activities that may complicate team-based knowledge work include: framing the nature of the problem, scoping boundary conditions, identifying current and needed resources, establishing adequate task time frames, and clarifying roles and expected deliverables.
Case study and interviews.
(View full citation)

Communities may have considerable distrust of research, possibly due to negative prior experiences with research and/or authority in general.

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Tools

Stage 1: Define Problem and Solution	• 1.1 Opportunity for KT: Assess needs for device or service with input from relevant stakeholders from the six knowledge user (KU) groups. • 1.2 Identify a problem (need). Identify audience for solution. Identify context for both. • 1.3 Propose plausible solution (goal) to p[illegible] in the form of a device or service. • 1.4 Determine scope of project (role); output as conceptual discovery, prototype invention or device/service innovation? • 1.5 Consider path to market.
Pill crusher example 	
Gate 1: Idea Screen. PI decides to either terminate or move forward with project t[illegible]	

Home > Knowledge Base > Toolbox results for Step 1.2

Toolbox entries for Step 1.2: Identify a problem (need). Identify audience for solution. Identify context for both.

Business Tools

- Affinity Diagrams
- Brainstorming
- Customer Idealized Design
- Delphi Method
- Ethnography
- Focus Groups
- Internal Idea Capture System
- Lead User Analysis
- Market Structure Maps
- Netnography
- One on One Interviews (customer visit teams)
- Open Innovation
- Patent Mapping

Universal Design Tools

- Anthropometry (Human size)
- SWIFT 9:2013 Universal Design for Energy Suppliers
- Universal Design Product Evaluation Tools

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Detailed Tool Listing

Anthropometry (Human size)

Competency group: Universal Design

Type: Design

Description: Anthropometric data sets represent a range of physical sizes of people (and their body segments) in a measured population. They show size dimensions for people according to age and gender. Size information about people is very useful in design as it gives target dimensions for a potential user base.

Citation for Description: Described by Authors

Units: Quantitative data for design applications

Advantages: After user group has been identified design specifications can be taken directly from the database.

Limitations: If the group is very specialized with very specific needs - some of this information can be misleading.

Target Audience: Marketing, Engineering, R & D

Relevant to Universal Design: Yes

Stages and Steps:

1.2
2.1, 2.2
4.2, 4.3, 4.11
5.1

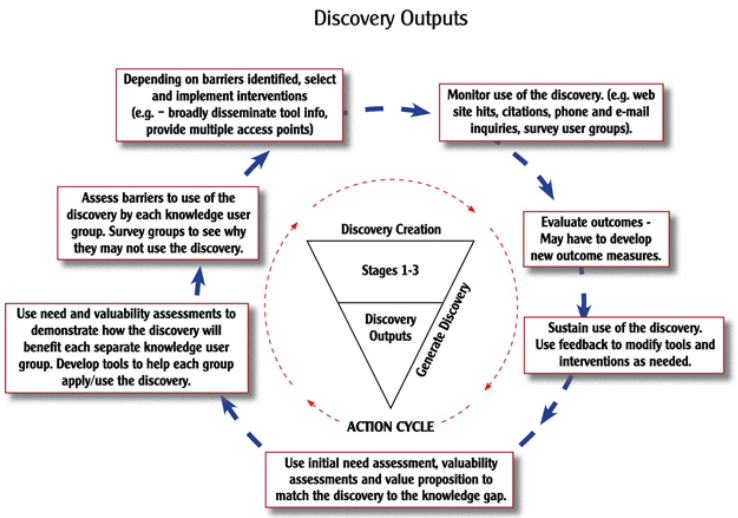
Free Resource: My Anthro Itunes application (app) http://itunes.apple.com/us/app/myanthro-basic/id303465843?mt=8

Purchase Resource: Open Ergonomics. (n.d.). Visual Anthropometry Software. Retrieved from http://www.openerg.com/index.htm

Purchase Resource: Sammie CAD.(n.d.). HADRIAN (Human Anthropometric Data Requirements Investigation and ANalysis). Retrieved from http://www.lboro.ac.uk/microsites/lds/sammie/reshad.htm

KTA and KT Tables

If role ends at completion of discovery phase, conduct knowledge translation activities to ensure that others will continue to work towards commercialization of the new device or service. For more detail on ways to reach each knowledge user group, see KTA Table for Discovery Outputs (new window). If role continues, the following knowledge translation activities are not yet necessary- go to Gate 3.



Gate 3: Begin Invention Phase? Does the discovery have merit on its face? If no, terminate and go to KTA for projects terminated at completion of discovery phase. If yes, conduct stage 4 to validate merit and worth.

- KTA Diagrams and accompanying KT Tables are available for each type of output (discoveries, inventions, and innovations)

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Resources

- Need to Knowledge Model: http://kt4tt.buffalo.edu/knowledgebase/model.php
- Publications Page on Website: http://kt4tt.buffalo.edu/publications
- Website Resources: http://kt4tt.buffalo.edu/publications/ResourceMaterials/index.php
  - Primary Market Research Training Module
  - Intellectual Property Training Module
  - Inventor's Guide
  - Evaluation Resource Guide
- Focus Technical Briefs
  - KTDRR's KT Library- Technology Transfer section: http://www.ktdrr.org/ktlibrary/articles_pubs/tt.html

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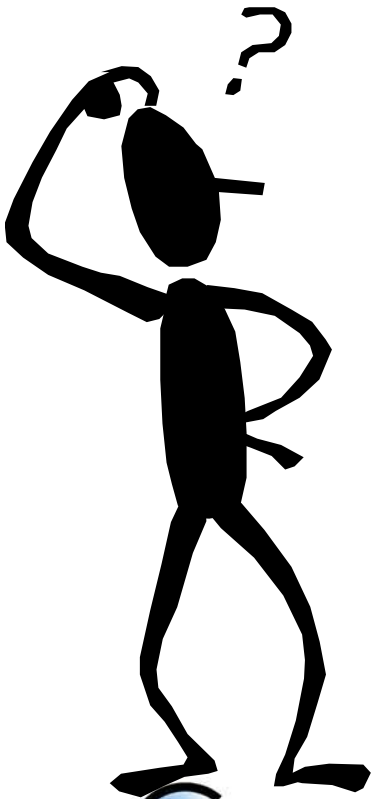
Thank you!

Any Questions?



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