

University Interface for Innovation: Resources and Support

Gary K. Fedder

Institute for Complex Engineered Systems
Dept. of Electrical & Computer Engineering
The Robotics Institute

Carnegie Mellon University
Pittsburgh, PA 15213

fedder@cmu.edu

DoC Manufacturing America – September 27, 2010

University Resources for Innovation

- Collaborative Centers, Institutes...
- State and Federal Funding Programs
- Product Design Courses
- University Infrastructure
- Professional MS Programs

faculty



students



collaboration



Pennsylvania Smart Infrastructure Incubator (PSII)

*Helping Pennsylvania's Companies Lead
a Revolution in our Infrastructure*



Carnegie Mellon



BOMBARDIER



Pennsylvania Infrastructure Technology Alliance

A Commonwealth, University and Industry Partnership

- Create environment linking PA companies and agencies with students to increase creation and retention of high paying jobs.
- Conduct technology development projects with PA companies.
- Conduct technology development projects leading to new PA companies.
- Conduct educational outreach programs to benefit PA companies, agencies, and students.
- Seed research and technology development projects to attract funding from other sources.
- Enable world-class PA universities to remain at forefront of engineering research and education.

SBIR – Small Business Innovation Research Grants

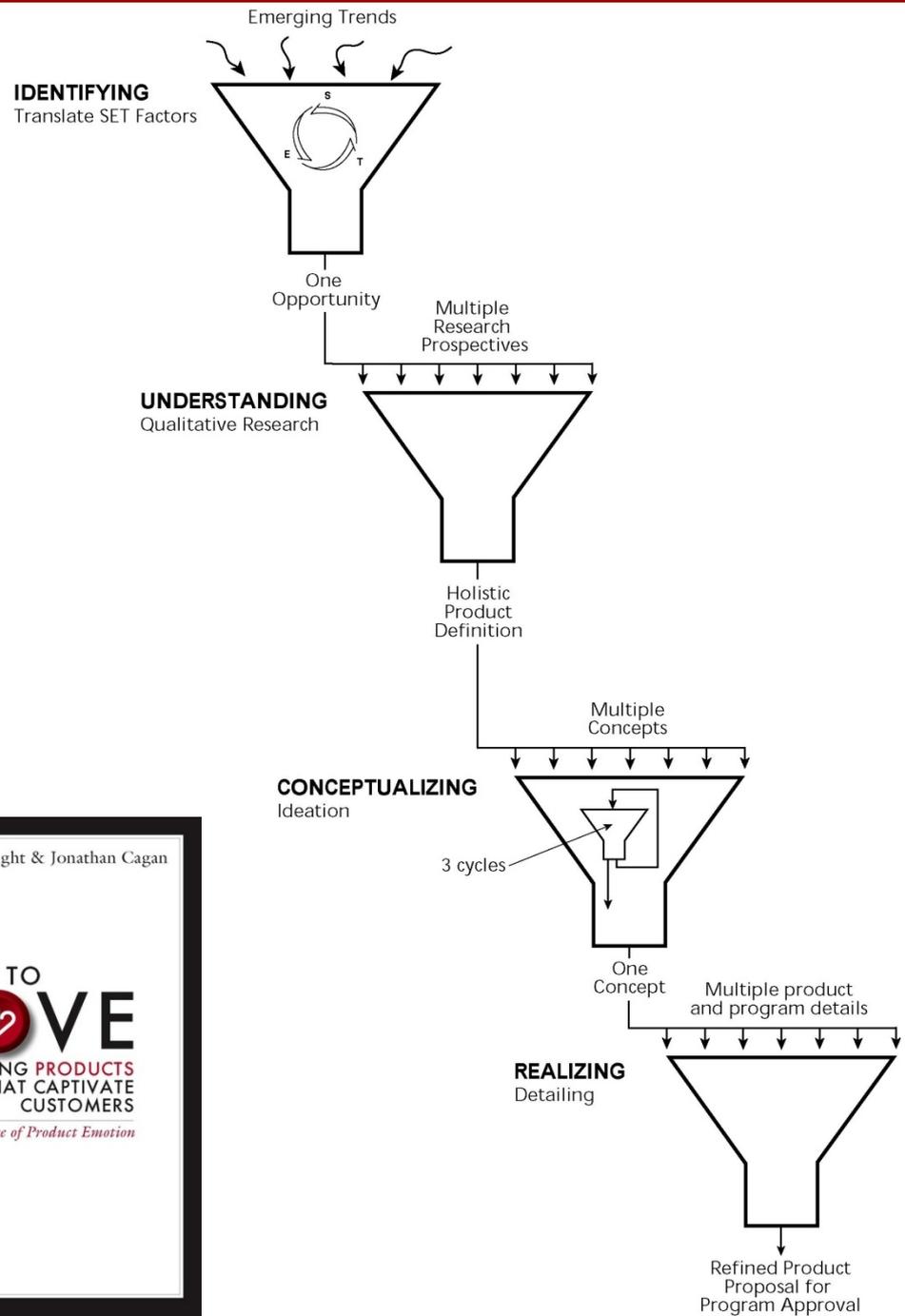
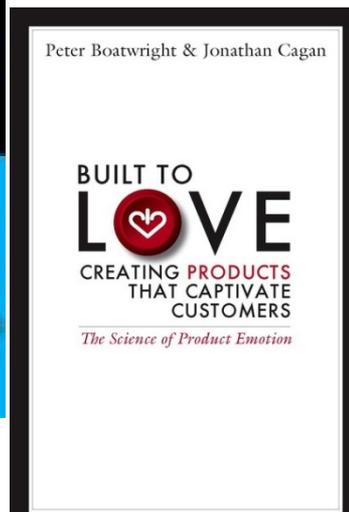
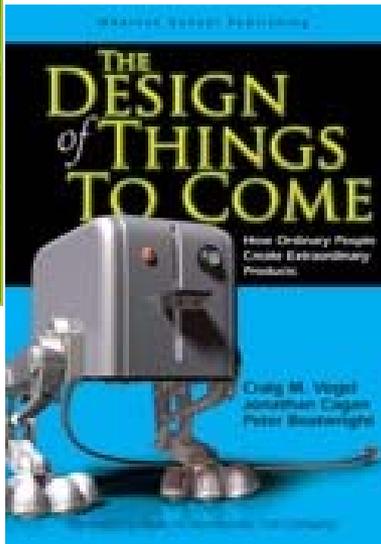
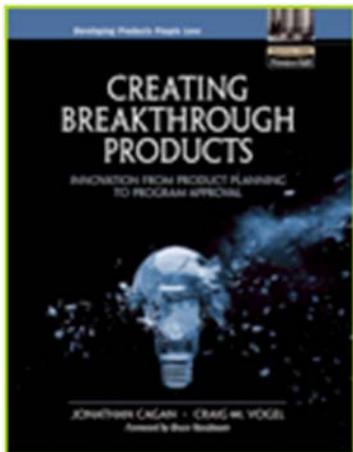
- www.sbir.gov
- Supported by most agencies:
 - NSF, NIH, NIST, DoD, NOAA, NASA, DoE, DHS, DoT, EPA
- Collaborations with Universities
 - Research subcontracts
 - Consulting agreements
 - Employment of faculty as senior personnel
 - Employment of graduate or undergraduate students as assistants by the small business
- ≤ \$150k budget (Phase 1)

Small Business Technology Transfer Research Program (STTR)

- DoD, DoE, NSF, NIH, DHS, NASA
- University researchers play “significant intellectual role”
 - E.g., used to spin off university technology
- Minimum of the research is 40% from industry and 30% from university
- Often RFPs are more constrained in technical areas
- \leq \$150k budget (Phase 1)

Integrated Product Development

Jonathan Cagan,
Peter Boatwright



Integrated Product Development Course

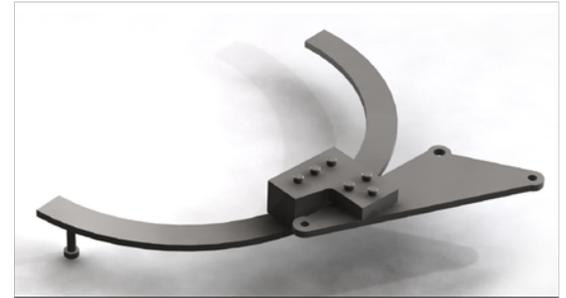
Jonathan Cagan, Peter Boatwright

- Teams of engineers, MBAs, designers
 - senior undergraduate and graduate students
 - Engineering, Marketing, Design, Master of Product Development
- 1 semester corporate sponsored project
 - 15 weeks start to finish
- Complete product solutions from open opportunity specification
- Evolved over 20 years
- Several dozen patents resulted from course
- Winner, ASME Curriculum Innovation Award, 2003

Engineering Design Projects Course

Jeff Hansen, ICES

- Students work in teams on real-world projects provided by industry sponsors. Recent sponsors have included:
 - Bombardier, PPG, Westinghouse, MEDRAD, Bayer
- Teams are designed to be multi-disciplinary
 - Course is open to students campus wide.
 - Typical mix is about 75% engineering and 25% non-engineering
 - Most common non-engineering students from Professional Writing and Industrial Design.
- Lecture content focuses on project management and design tools. Topics include:
 - Gantt Charts, Objective Trees, Function-Means Trees, Morphological Charts, Pugh Charts



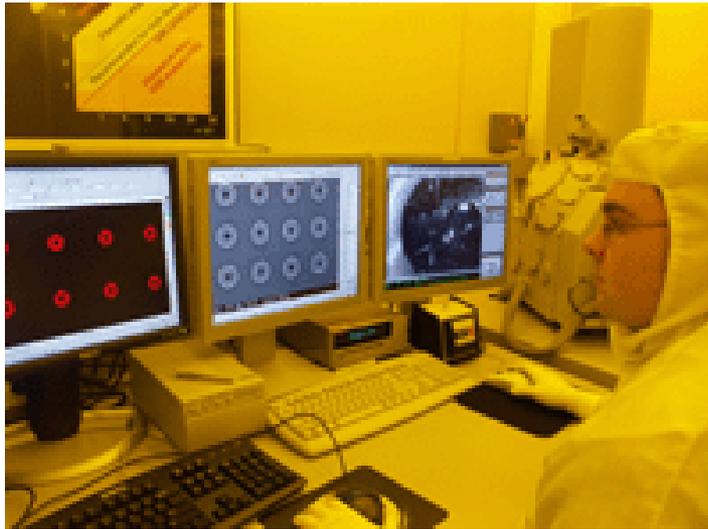
Friction damper to reduce vibration on Bombardier Automated People Mover



High precision injector for use in gene therapy designed with electro-active polymers for MEDRAD

University Infrastructure

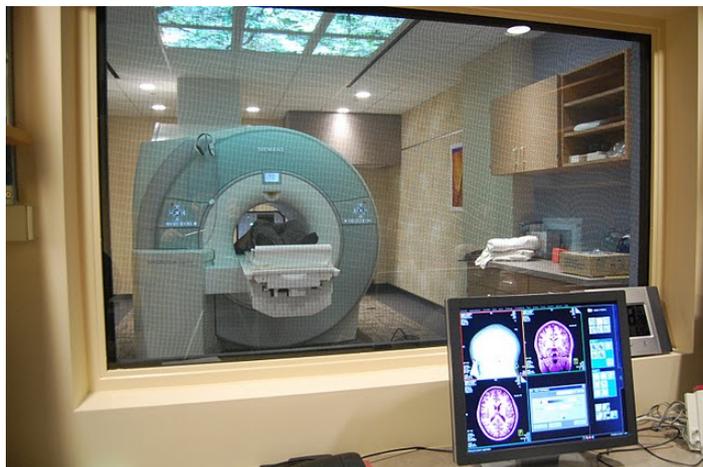
Nanofabrication Facility



*Materials
Characterization
Facility*



Brain Imaging Center



Collaborative Machining Center



Engineering & Technology **Innovation** Management

E&T!M



**An interdisciplinary MS from
CMU engineering**

**To equip technical professionals
to lead innovation and manage
value creation, building on a
strong engineering and
technology foundation.**

E&TIM Program Elements and Industrial Contacts

