



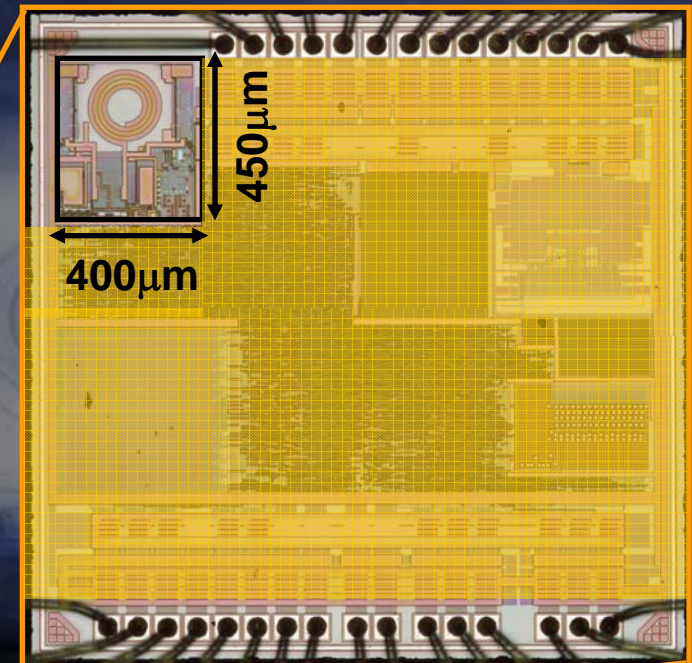
Building Entrepreneurial Engineering Leaders for the Global Environment



Michael S. McCorquodale, Ph.D.
Chief Technical Officer and Founder
NSF ERC 2006 Annual Meeting

Mobius' Core Technology

- Mobius is a fabless semiconductor component and IP company specializing in clock/timing products
- Flagship technology: All-Si clock generation capable of replacing quartz XTAL frequency references
- IP macro for USB-232 bridge ctrl. shown: shipping @ 200kU/month



- Mobius was the first company to build a USB-compliant all-Si clock
- 9 patents
- 0.18mm² in 0.35μm CMOS

- **Mobius' captive team (20 on staff)**
 - Design center in Detroit, MI (research from UMICH)
 - Management, M&S, and governance in Si Valley
- **Capital sources**
 - Seed: ~15 angels (MI, IL, OH) and 2 boutique VCs (MI)
 - Series A: 2 tier-1 VCs (Si Valley)
- **Partners**
 - Foundry partner in Taiwan (TSMC)
 - Die sorting in Taiwan (Winstek)
 - Packaging partner in Philippines (OSE)
 - Production test partner in Thailand (UTAC)
- **Customers**
 - Primary customer base in Asia (Taiwan, Korea, Japan)
 - End products sold worldwide (USA, EU, Asia, etc.)

- **Fundamental research and business development**
 - UMICH NSF ERC in WIMS: Brown and McCorquodale
 - Zell-Lurie Entrepreneurial Institute at UMICH
- **Founding (seed stage)**
 - \$2M equity financing for launch
 - Proved technology with IP business model
- **Early success**
 - Gained traction with 2 customers during seed stage
 - Governor's award for largest hi-tech growth potential ('05)
 - Technology Innovation of the Year in MI ('06)
- **Professional financing (series A)**
 - \$8.1M equity financing to build component business
- **Current status**
 - Developing discrete timing components

- **University**
 - Pursued fundamental research as Ph.D. fellow/candidate
 - Elected MBA courses in entrepreneurship (despite admin. challenges)
 - Recruited seed stage team from business school
 - Participated in related academic activities including business plan competitions (9 awards)
- **Seed stage**
 - Responsible for raising over \$2M from a network of angels and VCs
 - Acted as CEO and Chairman of the Board for 18 months
 - Acted as VP of Engineering and managed engineering programs
- **Series-A stage**
 - Developed new plan for discrete component business
 - Responsible for raising \$8.1M from tier-1 Si Valley VCs
 - Moved to CTO role; no direct reports in engineering
 - Maintained board seat

- **Education**
 - Most entrepreneurial education housed in business schools
 - Most engineers do not have access to business development resources
- **Founders**
 - Most hi-tech companies start from a reduction to practice
 - Most hi-tech companies started by technologists, not MBAs
 - Most successful companies were founded by young people
- **Financing**
 - Most hi-tech start-ups are capital intensive
 - Post-bubble capital moved to later stages; seed financing required
 - Most IT dollars going to software, not physical sciences
 - Large institutional round typically required eventually, but often not at first
- **Management**
 - Seed stage:
Founder must directly manage (difficult due to insufficient training)
 - Post institutional round:
Most management responsibilities transferred to “professional managers”
- **Global Component**
 - Partners and customers all over the world

- **Education**
 - Many institutions have a poor culture toward entrepreneurship
 - Poor business development resources/training for engineers
 - Poor educational resources in IP development for engineers
 - Tech. founders struggle due to lack of management training
 - Tech. founders have little management credibility post series-A
- **Extracurricular**
 - Professional networking is a critically missing component to most engineering programs
 - Engineering continues to look unattractive to many students without exposure to entrepreneurship (or similar opportunities)
- **Real world**
 - Hi-tech companies are started by technologists, not MBAs
 - Management, finance, etc. are not difficult
 - Engineers simply enter the market nearly completely untrained

- **Education**

- Develop entrepreneurial institutes and/or curricula in Colleges of Engineering (e.g. UC-Davis)
- Diversify graduate curriculum as most hi-tech start-ups with defensible IP develop from graduate research
- Offer IP development courses for engineers (e.g. U of Michigan)
- Develop positive culture toward entrepreneurship (e.g. Berkeley)
- Create academic and/or financial incentives for faculty and students to become involved in emerging business (e.g. U of Utah)

- **Extracurricular**

- Emphasize professional networking as part of career development
- Work with local resources (such as seed investors) to facilitate technology transfer

- **Hi-tech start-ups are founded by technologists**
- **Founding technologists require broad skills**
 - Engineering
 - IP development
 - Business development with global partners
 - Technical marketing
 - Fundraising and finance
 - Management
- **These requisite skills are underdeveloped if at all**
 - Limited academic resources; challenges electing available courses in other programs
 - Lack of extracurricular opportunities for development
- **The consequences**
 - Unnecessary early stage challenges for founders
 - Missed development opportunities as business grows