New Models for Advanced R&D and Open Incubation for today's Modern Companies

Ikhlaq Sidhu
Chief Scientist & Founding Director, Center for Entrepreneurship & Technology
Faculty Director, Engineering Leadership Professional Program (ELPP)
IEOR Emerging Area Professor
UC Berkeley
Things have changed since the world famous Bell Labs Model

Transistor and Diode, Semiconductors, MOSFET
Error Correction Codes
Unix, C, and Operating Systems TDMA, CDMA, and Cellular Standards
WaveLan / Optical Fiber communications

August 28, 2008, Alcatel-Lucent announced it was pulling out of basic science

Bell Labs Model = Company Context + Fundamental Research + Monopoly on Talent
We have learned a lot about R&D over the past 50 years.

Science & Technology

Product & Service And Scale

User Centric * Business Models * Validation * Quality * Speed
R&D Process for Product Development is well understood.

Methods:
- Train schedules
- Platforms/Products
- Gates
- Funnels
- PRD
- Agile vs. Aggregate Planning

Measures:
- Cycle time
- Market Share
- Quality
- Fully Allocated Cost

"Adv. Work"

Keep Technology Risk in "Labs"

Commitment Point with Product Requirements
However, our understanding of Adv. Development is still less clear

- Long timeframes
- How to define project?
- How to measure?
- Bell Labs model does not work anymore?
- How do modern firms manage Advanced R&D today

All firms believe Advanced R&D is critical, but measures and processes differ widely.
And since then: Open Source Trend

Projects Inside the Company

OSI Amiates, June 18, 2012
And also since then: Regional and Corporate Incubators Trend

Corporate and Public Accelerators
So given this landscape:

• undefined long term projects
• open source
• incubation/venture as partners

How do modern firms organize and measure their advanced work?
## Sample Participants

<table>
<thead>
<tr>
<th>Company Name</th>
<th>HQ Location</th>
<th>Founding Date</th>
<th>Size</th>
<th>Revenue (2013)</th>
<th>Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware</td>
<td>Palo Alto, CA, USA</td>
<td>1998</td>
<td>14,300</td>
<td>$5.2B</td>
<td></td>
</tr>
<tr>
<td>Cisco</td>
<td>San Jose, CA, USA</td>
<td>1984</td>
<td>74,000</td>
<td>$48.6B</td>
<td></td>
</tr>
<tr>
<td>Ericsson</td>
<td>Stockholm, Sweden</td>
<td>1876</td>
<td>115,000</td>
<td>$39.5B</td>
<td>35,000+</td>
</tr>
<tr>
<td>Huawei</td>
<td>Shenzhen, China</td>
<td>1992</td>
<td>140,000+</td>
<td>$40B+</td>
<td>30,240+</td>
</tr>
<tr>
<td>Coca Cola</td>
<td>Atlanta, GA, USA</td>
<td>1886</td>
<td>700,000</td>
<td>$46.9B</td>
<td>NA</td>
</tr>
</tbody>
</table>

Information from company website and annual reports
Identifying R&D Models

Literature Review to Develop Questions and Points of Influence for R&D

Sample Questions for Data Analysis

Results Common to All

Differences and intentions lead to new Model Categories

• Common Results
• Basic Models
• Possibilities of Mixtures

Model 1

...
Results Common To All

Topics where all firms agree:

• All firms believe in similar Horizon Level allocations:
  
<table>
<thead>
<tr>
<th>Horizon Level</th>
<th>Allocation %</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Core</td>
<td>60-70%</td>
<td>(effectiveness)</td>
</tr>
<tr>
<td>H2: Adjacencies</td>
<td>25-30%</td>
<td>(learning)</td>
</tr>
<tr>
<td>H3: Shifts</td>
<td>5-10%</td>
<td>(learning)</td>
</tr>
</tbody>
</table>

• Soft skills and innovation culture matters

• University & networks:
  - both sensing (listening) and active (directing)
Observed Patterns:

Model 1
Roadmap Driven

Model 2
Transition Look Ahead

Model 3
Full Integration

Model 5
M&A Driven or Open

Model 4
Full-On Corp Research

Model 6
Intrinsic Needs Driven

External / Open Focus

Balanced Focus

Less Risk, More Predictable

Industry Leadership Role
Model 1: Roadmap-Driven
Example: Processor Roadmap

Features and Performance Target of 2018?

- Process
- Requirements
- Advance problems
- Tools
Model 1: Roadmap-driven Adv. R&D

Example:

Characteristics / Quotes:
Focus on existing roadmaps
Success is to “use” in next generation product
Achieve “better performance” or other key purchase criteria

Main Points of Influence on firm:
M&A
Customer Story Narration
IP Assets
Advanced Design
Standards,
External Industry Leadership,
Moonshots

Competence: Predictable Product Line
Model 2: What if the next market transition is not on directly on the roadmap?

Desktop → Mobile of 2018?
Model 2: Market Transitions and Blindside Avoidance

Examples:

- Model 1: Roadmap Driven
- Model 2: Transition Look Ahead
- Model 3: Full Integration
- Model 4: Full-On Corp Research
- Model 5: M&A Driven or Open
- Model 6: Intrinsic Needs Driven

Characteristics / Quotes:
Groups decide their own projects with signals from:
- Pilot studies
- BU or CTO priorities
- External: start-ups and academic
- Demo days or open interfaces to suppliers, customers, universities

Projects must be relevant to core competencies.

Success is to external awareness, market perception including Business week, Forbes.

Main Points of Influence on firm:
- M&A
- Customer Story Narration
- IP Assets
- Advanced Design Standards
- External Industry Leadership
- Moonshots
Model 3: What about developing Integrated Products/Services
Model 3: Fully Integrated Adv. R&D

Example: Google Mainstream R&D, Apple, many modern market leaders

Characteristics / Quotes:
R&D Groups have lots of freedom:

Managers each choose own portfolio, 1-2 of 5 should have higher risk.
* “a team can do what it wants”
* “multiple teams need buy-in”
* “must have some failures”

Success:
a) some must fail,
b) people say “wow”, we did not know that was possible,
c) absence of complaints, and
d) no competitors.

Main Points of Influence on firm:
M&A
Customer Story Narration
IP Assets
Advanced Design
Standards
External Industry Leadership
Moonshots
Model 4: A Focus on 10X

Mainstream Google Product Development

Google X
Model 4: Full-On Corporate Research

Example Google Research: Separate from mainstream R&D.

Characteristics / Quotes:

- Complete independence. No accountability. Project should stay away from R&D.
- “If you can not afford it, don’t do it”
- “Only for true market leaders (who can not be followers of other players)”
- “Projects are 10X game changers”

Success: 10X impacts, others reference you, consider big changes.

Main Points of Influence on firm:
- M&A
- Customer Story Narration
- IP Assets
- Advanced Design Standards
- External Industry Leadership
- Moonshots
Model 5: M&A Focused

CTO Organization Owns Corporate Development

Supplemented with:
• Fellows (freedom for Skunkworks)
• Corp. Tech. Development (100 people)

Why:
* Market Transitions
* Performance
* Replenish Talent
Model 5: M&A-Driven Adv. R&D and Open Models

Example: Cisco. Also applied to open models like Proctor & Gamble’s C&D

Characteristics / Quotes:
- High Focus on M&A
- Supplemented with:
  - Engineering Fellows (Skunkworks in BUs)
  - Parallel Advanced Development
- Allow Spin-Ins.

Success: Market share and ease of entry in new markets.

Main Points of Influence on firm:
- M&A
- Customer Story Narration
- IP Assets
- Advanced Design Standards
- External Industry Leadership Moonshots
Model 6: Intrinsic Need-Driven Adv. R&D

Syrup, Bottling, Distribution, Vending Machines,

Top List of “Intrinsic Needs” at top of business level
- Health
- Environment
- Clean shirts

Informs Advanced R&D Projects:
- Product
- Packaging
- IT

Effects Supplier Networks, Licensing, and M/A
Model 6: Intrinsic Need-Driven Adv. R&D
Example: Coca-Cola, other global firms with strong brands

Characteristics / Quotes:
- Starts with intrinsic needs of customers and society.
- Goal is a) increased volume of sales, next product, localize in new markets.
- Yearly planning cycle based on intrinsic needs and focus groups with customers. Leads to product, package, and IT solutions.
- Experiment, customer test stabilize.

Success: Business unit adoption

Main Points of Influence on firm:
- M&A
- Customer Story Narration
- IP Assets
- Advanced Design
- Standards
- External Industry Leadership
- Moonshots
Leaders vs. Competitors

**Competitor in Pack**
- Fast follower
- Fast cycle times
- Prioritized features
- Leverage cost advantage

**Leader**
- No one to follow / copy
- Target on back, other copy
- Expectations of being a global citizen
- Must disrupt status quo and/or disrupt self
Observed Pattern of 6 Adv. R&D Models

1. Which do you have now? 2. What would be ideal?
### Summary of Advanced R&D Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Characteristics</th>
<th>Budgeting/Prioritization</th>
<th>Metrics/Success Measures</th>
</tr>
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<tbody>
<tr>
<td><strong>Model 1 – Roadmap Driven</strong></td>
<td>• Focus on IP and Advanced Design of H1 Areas</td>
<td>• Business units own/manage budgets</td>
<td>• Measures: Number of Patents, Adoption in Next Product, Performance/Differentiation</td>
</tr>
<tr>
<td><strong>Model 2 – Market Transitions/Blindspot Avoidance</strong></td>
<td>• Focus on Customer Story Narration, Standards, Demonstrating Industry Leadership and push to H2</td>
<td>• Adv. R&amp;D uses central budget.  • Adv. R&amp;D sets own direction with signals from CTO, Bus, and many external sources.  • Quarterly review cycle, central CTO coordinates with BUs CTOs</td>
<td>• Measures: Standards body influence, Number of customer meetings and public (business) articles. External awareness, customer perception of technical leadership, and awareness of market transitions.</td>
</tr>
<tr>
<td><strong>Model 3 – Fully Integrated</strong></td>
<td>• H1, H2, and even some H3 within each R&amp;D group. Focus on IP, Advanced Design, and some Moonshots.</td>
<td>• Central CTO and executives set R&amp;D budgets.  • R&amp;D Groups have lots of freedom. Mix of low risk with high risk projects within each group.</td>
<td>• Measures: Adoption in Next Product, Demonstrate competitive differentiation, Number of Patents.  “Wow”, we did not know that was possible. Some projects must fail.</td>
</tr>
<tr>
<td><strong>Model 4 – Full On Corporate Research</strong></td>
<td>• IP Assets, External Industry Leadership, Moonshot. For industry leadership, H3 Focus</td>
<td>• Complete independence.  • CEO / Central CTO with centrally allocated budgets  • “If you can not afford it, don’t do it”</td>
<td>• Projects have 10X game changing potential, Number of Patents, External awareness. Progress towards achievable game changers.</td>
</tr>
<tr>
<td><strong>Model 5 – M&amp;A Driven/Open</strong></td>
<td>• M&amp;A focus with Market Transition Focus, IP Assets, Moonshots.  • Need strong channels and effective acquisition process</td>
<td>• CTO also leads Corp Development, BUs all have CTOs  • Centralized budgeting, influenced by Engineering Fellows (Skunkworks in BUs)  • Parallel Advanced Development (Corp)  • Spin-Ins.</td>
<td>• Market share, Ease of entry in new markets., Number of Patents, Success/speed in acquisition integration.</td>
</tr>
<tr>
<td><strong>Model 6 – Intrinsic Needs Driven</strong></td>
<td>• Brand driven and intrinsic need driven. For industry leadership  • IP Assets, Advanced Design, External Industry Leadership,</td>
<td>• Yearly planning cycle rooted in intrinsic needs and focus groups with customers. Leads to product, package, and IT solutions.</td>
<td>• Measures: Business Unit Adoption, Next Product, Performance/Differentiation, Effect on brand perception. IP or trade secret generation.</td>
</tr>
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</table>
Evolution of Corporate Incubation and Acceleration

- No Money
- ATT: Inside problems
- Coke: Branding and Connections to suppliers/customers
- Big Lifts: Spotify, Call Drops, Video Bills
- Rewards to firms:
  - More happy customers,
  - Better product/services,
  - and maybe a few $$$
New: Adv. R&D is Blending into Corporate Incubation

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Looking ahead at Corporate Adv. R&D:

- Follower versus Leader considerations
- Open Innovation Considerations
- Role of Incubation and Corporate Synergy
- Where do you want to place bets (models)?
- Do the measures and funding structures match?
Thank You

Ikhlaq Sidhu
Founding Director and Chief Scientist, Center for Entrepreneurship & Technology
Faculty Director, Engineering Leadership Professional Program
IEOR Emerging Area Professor
sidhu@berkeley.edu

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