Crafting interpretation in ambiguous contexts:
Entrepreneurial teams and the collective evolution of novel product concepts

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Agenda

• Introduction
  – Ambiguity, interpretation, and the product development context
• Research design
  – 6 cases of novel concept development
• Inducted perspective
  – Crafting and shifting interpretation through product concepts
  – The product concept as coordination totem
• Contribution, framing, and next steps
**Ambiguity in organizations**

- Ambiguity as an organizational challenge
  - Not only uncertain outcomes but unknown category of situation (March 1994)
  - Task-based systems of coordination and control often insufficient (Weick 1993; 1995)

- Product development as a study context
  - A context of shared interpretation with possible high uncertainty and ambiguity in “radical” settings (Dougherty 1992)
  - Physical boundary objects provide one means to negotiate ambiguity (Carlile 1997; Bechky 2003) but likely incomplete or insufficient at early stages

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**Coordination and interpretation in development**

- Good models exist for incremental development
  - A focus on planning and staged decision-making (Clark & Fujimoto 1991; Krishnan & Ulrich 2001; Brown & Eisenhardt 1995)

- Models emerging for radical development (Normann 1971)
  - Task perspectives illustrate practices such as more market scanning, stage overlap, less formal planning (Eisenhardt & Tabrizi 1995; MacCormack et al. 2001)
  - Political perspectives illustrate focus on project team and project-level reviews (Lewis et al. 2002; Cardinal 2002)
  - **Cognitive perspective**: know concept generation difficult, with 62% attrition of concepts (Cooper, 2001)
Product concepts: stability and change

- Concept stability can be important
  - Concept serves as decision-aid (Clark & Fujimoto 1991)
  - Concept stability seen important (O’Connor & Veryzer, 2001)
  - Integration issues while maintaining concept integrity challenging (Fujimoto, Iansiti & Clark 1996)

- Concept variation may be required
  - Cognitive factors critical during change (Tripsas & Gavetti 2000)
  - Commitment and communication aids outcomes (Burchill & Fine 1997; Lynn and Akgun 2001)
  - May vary over time (Fujimoto 1993) or among team members (Bacon et al. 1994)

- And novel concept development process unclear
  - Details need further research (Brown & Eisenhardt, 1995; Krishnan & Ulrich 2001)

Pilot study motivation

“Within a big company, new ideas sometimes can get lost in the hallways, but for some reason this thing just really stuck.”

- Senior designer, automotive firm
Research question

- Research question

  How do entrepreneurial teams craft and manage novel product concepts?

- Research context
  - Problem-driven, in both literature and practice
  - Process focus (Mohr 1982; Langley 1999), as opposed to variance focus (in tradition of other grounded-theory (e.g. Gersick 1988; Sutton 1987) and temporal bracketing (e.g. Barley 1986) studies)

Research design

- Inductive approach
  - Models of radical product development incomplete
  - Lack of theory of how concepts are crafted and managed

- Case studies for inductive research
  - Grounded theory building (Glaser & Strauss, 1967)
  - Comparative multiple case study (Eisenhardt, 1989; Yin, 1994)
  - Analysis at the level of the product development project:
    - concept management practices
    - concept components
    - design decisions and outcomes
Qualitative research

- Most appropriate for nascent fields
  (in this case, cognitive lens on radical innovation)

Comparative case study method

- Theoretical sampling
  - Chose cases likely to replicate and extend emergent theory
  - Goal is analytical (not statistical) generalization
  - Generalize to theoretical propositions instead of populations
- Six case studies selected
  - form "lab experiments" of concept generation
  - chosen to predict similar results (product launch) or demonstrate contrast for predictable reasons (based on conceptual practices or task routines)
  - access considerations

adopted from Edmondson & McManus AMJ 2007
Case selection

• Case criteria
  1. Concepts new to organization and to market
     • most “radical” innovation type (Song & Montoya-Weiss, 1998)
     • uses a “primary attribute of innovation” (Downs & Mohr 1976)
  2. Resulting product was launched to the market
     • process completed

• Case variation
  • automotive
  • consumer electronics
  • medical devices

Case studies

<table>
<thead>
<tr>
<th>Sector</th>
<th>eBook</th>
<th>PDAPhone</th>
<th>RodCross</th>
<th>FlexTruck</th>
<th>BodyCool</th>
<th>JointCool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Consumer</td>
<td>Consumer</td>
<td>Automotive</td>
<td>Automotive</td>
<td>Medical &amp;</td>
<td>Medical &amp;</td>
</tr>
<tr>
<td></td>
<td>electronics</td>
<td>electronics</td>
<td></td>
<td></td>
<td>sports devices</td>
<td>sports devices</td>
</tr>
<tr>
<td></td>
<td>Electronic</td>
<td>book reader</td>
<td>Cross-over</td>
<td>Flexible</td>
<td>cargo</td>
<td>Flexible cargo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mobile phone</td>
<td>vehicle</td>
<td>truck</td>
<td>truck</td>
<td>truck</td>
</tr>
<tr>
<td></td>
<td>Privately-held</td>
<td>start-up (&lt;400)</td>
<td>Medium-sized</td>
<td>Large firm</td>
<td>Large firm</td>
<td>University</td>
</tr>
<tr>
<td></td>
<td>start-up (&lt;400)</td>
<td></td>
<td>Large firm</td>
<td>Large firm</td>
<td></td>
<td>spin-out (&lt;25)</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>42</td>
<td>&gt;500</td>
<td>&gt;500</td>
<td>47</td>
<td>31</td>
</tr>
<tr>
<td>Time to market</td>
<td></td>
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<td></td>
<td>30</td>
<td>20</td>
<td>35</td>
<td>20</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Task system</td>
<td>Generally unstructured</td>
<td>Four-stage process</td>
<td>Four-stage process</td>
<td>Four-stage process</td>
<td>Six-stage process</td>
<td>Four-stage process</td>
</tr>
<tr>
<td>Core team size</td>
<td>30</td>
<td>20</td>
<td>35</td>
<td>20</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
# Product concept novelty (1)

<table>
<thead>
<tr>
<th>Case and type of novelty</th>
<th>Market indicators: Example press mentions and major innovation awards</th>
<th>Organizational indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>eBook</td>
<td>• Example press: <em>A New York Times</em> article near time of launch asks “Is this the end for books?”&lt;br&gt;• Awards: Two major design innovation awards.</td>
<td>“[We were trying to develop something new, and we wanted to make something that appealed to consumers – and we were making something that had never been made before, so it was hard to ask customers whether it suited their needs, because they had never seen one before” – eBook Executive Leader</td>
</tr>
<tr>
<td>PDAPhone</td>
<td>• Example press: Positive reviews in <em>The New York Times</em> citing it as one of first in category; major consumer magazine notes it is one in the “race to release the first PDA with fully integrated wireless voice and data capabilities.”&lt;br&gt;• Awards: Major annual design innovation award.</td>
<td>“[The emerging market] is defined as a combination of voice, data, and PDA. The platform together is just being defined, and so what we are doing now is we’re realizing we’re back in the education mode...” – PDAPhone Engineering Manager</td>
</tr>
</tbody>
</table>

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# Product concept novelty (2)

<table>
<thead>
<tr>
<th>Case and type of novelty</th>
<th>Market indicators: Example press mentions and major innovation awards</th>
<th>Organizational indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>RedCross</td>
<td>• Example press: <em>A New York Times</em> review notes it is “alone in a niche”&lt;br&gt;• Awards: Major consumer award for appeal of combination of interior design, comfort and convenience features</td>
<td>“It was a brand new type of vehicle that we had never done before, being this crossover type of vehicle...” – RedCross (Premium Version) Product Designer</td>
</tr>
<tr>
<td>FlexTruck</td>
<td>• Example press: <em>A New York Times</em> article notes the “clever idea” central to the concept; major consumer magazine notes the “innovative design” in awards&lt;br&gt;• Awards: Two major (and many minor) automotive magazine awards including one for “design &amp; engineering”</td>
<td>“When you are doing a very unique concept like what this truck is, you really would prefer not to have [negative issues]. There were lots of other challenges that we were working on besides the fact that this was the most unique truck around.” – FlexTruck Engineering Manager</td>
</tr>
</tbody>
</table>

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### Product concept novelty (3)

<table>
<thead>
<tr>
<th>Case and type of novelty</th>
<th>Market indicators</th>
<th>Organizational indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BodyCool</strong>&lt;br&gt;Novel single function (body cooling technique)</td>
<td>- Example press: <em>A New York Times</em> article noted it as “a new cooling system.”&lt;br&gt;- Awards: Major award for “outstanding design innovation” bestowed by national medical charity</td>
<td>“...when you are dealing with a revolutionary device, the customer itself doesn’t know what they want.”—BodyCool Quality Manager</td>
</tr>
<tr>
<td><strong>JointCool</strong>&lt;br&gt;Novel functional combination (two physiological processes)</td>
<td>- Example press: <em>Wall Street Journal</em> covers novelty of approach and space science background; Inc2000 lists the company as providing innovative solutions to medical sports injuries</td>
<td>“People [who first try it] are like, ‘Wow, it’s different.’ This is what we were trying to convince [with the design]: this is something new; this is not something that you’ve tried before.”—JointCool Engineering Manager</td>
</tr>
</tbody>
</table>

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### Data sources

<table>
<thead>
<tr>
<th></th>
<th>eBook</th>
<th>FDAPhone</th>
<th>RadCures</th>
<th>FlexTrack</th>
<th>BodyCool</th>
<th>JointCool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership interviews</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
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<tr>
<td>Project Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
<td>Executive Leader</td>
</tr>
<tr>
<td>Other member interviews</td>
<td>Engineering Manager</td>
<td>Marketing Manager</td>
<td>Engineering Manager</td>
<td>Marketing Manager</td>
<td>Engineering Manager</td>
<td>Marketing Manager</td>
</tr>
<tr>
<td>Engineering Manager</td>
<td>Marketing Manager</td>
<td>Product Designers (5)</td>
<td>Engineering Manager</td>
<td>Product Designers (5)</td>
<td>Quality Manager</td>
<td>Engineer</td>
</tr>
<tr>
<td>Software Manager</td>
<td>Engineer</td>
<td>Engineers &amp; Product Designers (3)</td>
<td>Engineers &amp; other staff (9)</td>
<td>Engineers &amp; Product Designers (5)</td>
<td></td>
<td></td>
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<tr>
<td>Engineers &amp; Product Designers (3)</td>
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<tr>
<td>Interviews (total=31)</td>
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<td>5</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>8</td>
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<tr>
<td>Archival information</td>
<td>Internal reports</td>
<td>Press reports</td>
<td>Internal reports and drawings</td>
<td>Press reports</td>
<td>Internal reports and drawings</td>
<td>Press reports</td>
</tr>
<tr>
<td>Pages</td>
<td>659</td>
<td>130</td>
<td>500</td>
<td>226</td>
<td>93</td>
<td>82</td>
</tr>
</tbody>
</table>
Data analysis

- focus on practices and concepts that guided design decisions
- iterative case analysis
- within-case analysis
  - generalizable constructs on managing product concepts
- cross-case analysis
  - similarities across contexts; propositions

Concept and components

- Product concept
  - Description of the unique need, form, and technology (Crawford & Di Benedetto 2003)
    - *e.g. a paper-back sized electronic book for novels*
  - May be understood differently among different individuals (Bacon et al. 1994)
- Concept component
  - A lens of “conceptual modularity” drawing on design hierarchies (Clark 1985) and modular systems in product development (Sanchez & Mahoney 1996, Baldwin & Clark 2000)
  - Represents one aspect of the concept
  - Grounded in descriptions of leaders and team members
    - *e.g. has a cover like a paperback book*
Concept and components

Data analysis

Transcripts (10,276 paragraphs of interview text)

Analysis software (1,219 passages coded for themes)

6 Case Studies (45-76 pages each)

Cross-case analysis (5 tables of practices)
Primary research outputs

• Descriptive paper: “Concept shifting”
  – 2007 JPIM article on “Concept shifting and the radical product development process”
  – TIM audience; one practice; descriptive focus

• Process paper: “Crafting interpretation”*
  – 2007 working paper on overall process; concepts as coordination totems
  – AMJ/OS audience; org theory contribution

• Variance paper: “Concept shift versus drift”
  – AMJ/OS audience; org theory contribution

Things I would have done differently

• Had more matched successes and failures
  – e.g. 4 successes / 4 failures in consumer with varied task routine maturity

• Gathered more quantitative measures
  – e.g. development metrics rather than self-reports of process satisfaction; communication patterns (frequency, etc.) related to concept, etc.

• Involved others in interviews and coding
  – e.g. fellow doctoral or masters students, to address any concerns of interviewer and coding bias

• Begun coding earlier
  – e.g. to help establish patterns; allow iteration

• Had one real-time study in parallel
  – e.g. one further project within existing case
Great qualitative examples


And, 2006 *AMJ special issue* of top papers of all time...

Inductive perspective

Common elements of novel concept development

1. Conceptual **system definition** phase
   - 6 practices specifying initial concept components and relationships
2. Concept **elaboration** phase
   - 3 practices testing fitness of new and existing concept components
3. Concept **shifting** phase
   - 4 practices replacing an initial component, maintaining dual systems
4. Concept **execution** phase
   - 2 practices holding concept fixed and producing product
Inductive perspective

Conceptual system definition

“But we were very much disciplined by the comment, "it's a book!" That's helped us from making a pen computer, or an organizer or a PDA. And there were so many opportunities to turn it into something else.”
—eBook project leader
Conceptual system definition: Practice overview

<table>
<thead>
<tr>
<th>Practice</th>
<th>Examples from entrepreneurial team leaders (Executive or Project Leader)</th>
<th>Examples from entrepreneurial team members (All others)</th>
<th>Interpretive function of practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A. Concept genesis story</td>
<td>&quot;flight to Hong Kong...&quot; - Exec mgr.</td>
<td>&quot;The original problem is: I heard it is hard to read anything on a tiny screen. You have a ton of paper. You can't carry it around. If you don't want to put it in a place...&quot; - eBook Executive Leader Design</td>
<td>Provides &quot;seed&quot; stories allowing multipliers to see very personally</td>
</tr>
<tr>
<td>1B. Initial vocabulary</td>
<td>&quot;pages not K-bytes of memory&quot; - Project leader</td>
<td>&quot;It's a book!&quot; metaphor - eBook Executive Leader Designer</td>
<td>Provides actual grammar for invention</td>
</tr>
<tr>
<td>1C. Initial form</td>
<td>&quot;. . . we showed them a model...&quot; - Exec mgr.</td>
<td>&quot;We're really trying to create a new category here, and that is a really tough thing to do. I've been doing this for 6 years or so, working with different teams. It's not very easy to create new categories.&quot; - eBook Marketing Manager</td>
<td>Comparison lends new conceptual systems to a feasible technical system; &quot;new company&quot; signals need for new organizational reviews</td>
</tr>
<tr>
<td>1D. Minimal documentation</td>
<td>simple overview</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: (*) Practice evidence from both leaders and other members; (**) Practice evidence from leaders (I) seen system initial practice

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Conceptual system definition: eBook example

1A. Concept genesis story
- "flight to Hong Kong..." - Exec mgr.

1B. Initial vocabulary
- "pages not K-bytes of memory" - Project leader
  C1: Airplane story
  C2: "It's a book!" metaphor
  C3: "pages" not k-bytes

1C. Initial form
- ". . . we showed them a model..." - Exec mgr.
  C4: Garden hose mockup
  C5: Hypercard demonstration

1D. Minimal documentation
- simple overview

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**Conceptual system definition: eBook example**

1E. Comparison to known
- compare to PC-based functions

1F. Establish category
- eBook (not PDA, browser)

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**Conceptual system definition: summary**

- Use of stories and vocabulary
  - Stories provide dynamic interpretive context (Boje 1991; Orr 1996; Traweek 1988) and new grammar and metaphor used in times of equivocality (Weick, 1979; Schon 1963)

- Prototyping and minimal documentation
  - Physical prototypes provide boundary object (Carlisle 2002; Henderson, 1995)
  - Minimal documentation symbolizes project begun (Pfeffer 1991) while deferring to verbal forms under uncertainty (Daft & Lengel 1984; Mintzberg 1971)

- Categorization
  - Comparison to existing solutions demonstrates engineering feasibility to “known operational principles” (Polanyi, 1962)
  - Assignment of new category relates to existing categories (Goldenberg et al. 2001; Rosa et al. 1999) and general relationships are linked to technical system (Orlikowski 1992)
# Concept elaboration: Practices overview

<table>
<thead>
<tr>
<th>Practice</th>
<th>Description</th>
<th>Examples from entrepreneurial team leaders</th>
<th>Examples from entrepreneurial team members</th>
<th>Interpretive function of practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A. Identification of concept tensions</td>
<td>“I could put my PDA functions on (er, you know?) I can look at spreadsheets... well, you could, but it’s not a computer, it’s a book.” —Ebook Project Leader speaking of decision to differentiate from PC devices</td>
<td>“As soon as you do email, you’re going to want to need your other features, and oh, you’re going to need a spreadsheet to read your Excel, and you won’t be a computer; certainly in the early days it was in conceptual on doing the ebook functionality.” —Ebook Software Manager</td>
<td>Defines boundary conditions by which to generate new components</td>
<td></td>
</tr>
<tr>
<td>1B. Introduction of new tensions or components</td>
<td>“...the user interaction model, description of how somebody would use the product, was something that I had documented in a bit.” —Ebook Project Leader on the introduction of the interaction model</td>
<td>“It’s certainly more product specifications that are written down.” —Ebook Software Manager describing use of intricate guidelines</td>
<td>Limits scope of future design decisions</td>
<td></td>
</tr>
<tr>
<td>1C. Allowance for concept “fitness” of new tensions or components</td>
<td>“...there is also a lot of uncertainty... different engineers had ideas and things they wanted to try out...” —Email Project Leader</td>
<td>“And being told not to...” —Ebook Software Manager about constraint to design ideas</td>
<td>Makes visible the emerging selection process</td>
<td></td>
</tr>
</tbody>
</table>

*Legend: (++) Practice evident from both leaders and other actors (+) Practice evident from leaders

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# Concept elaboration: eBook example

2A. Identification of tensions

- **eBook versus PDA**

  - **C1** “It’s a book!” metaphor

2B. New components

- **user interface screens**

  - **C1** “It’s a book!” metaphor
  - **C2** Simple user interface

2C. Fitness testing

- “...different engineers had ideas and things they wanted to try out...” —Ebook project leader

  - **C1** “It’s a book!” metaphor
  - **C2** Simple user interface
  - **C3** With e-mail function
Concept elaboration: summary

- Identification of concept tensions
  - Reinforces appropriate action (March, 1994)
  - Contrast to known categories
- New limiting and comparative components
  - Convergent thinking focuses attention (Gleitman, 1995)
  - Elaboration of core defines system further (Siggelkow, 2002)
- Concept fitness testing among components
  - Check consistency of elements (Kogut & Zander, 1996)
  - Questioning integral to design process (Eris, 2003)
- Overall
  - Instead of merely convergent process (Dym & Little, 2000); mapping through tensions, comparison, and testing

Shifting

...the company early on struggled with positioning itself partially as a consumer product and partially as an enterprise solution. And we did both, and focus is about doing one, [laughs] so that was a bit of a struggle.

—eBook software engineer
### Concept shifting: evidence overview

<table>
<thead>
<tr>
<th>Concept practices</th>
<th>Case example evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 3: Concept shifting practices</strong></td>
<td></td>
</tr>
<tr>
<td>3A. Identification of inconsistency</td>
<td>eBook: market exploration identified possible new routes when consumer content not available</td>
</tr>
<tr>
<td>3B. Freezing of selected components</td>
<td>PDAPhone: &quot;...the overall message is that it is still [the core concept of] a Facilitator,&quot;—project leader</td>
</tr>
<tr>
<td>3C. Substitution of components</td>
<td>FlexTruck: revised concept incorporated features of a '68 sports car</td>
</tr>
<tr>
<td>3D. Deferment of original concept</td>
<td>RadCross: deferment of all wheel drive and large tires</td>
</tr>
</tbody>
</table>

### Concept shifting: FlexTruck example

3A. Find lack of fitness
   - Electric change of flexible truck would not satisfy rules

3B. Freeze selected
   - Freeze two rules and "lock ten guys in a room..."

3C. Substitution
   - Find solution and indicate similar to '68 sports car

3D. Dual conceptual systems
   - Maintain that electric changeover will happen on future version
Concept shifting across cases

<table>
<thead>
<tr>
<th>Total Shifts</th>
<th>Main Concept Shift Event</th>
<th>Initial Concept Component</th>
<th>Replacement Component</th>
<th>Dual Concepts Maintained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>eBook</td>
<td>From consumer to business product</td>
<td>Verbal story: Story of 18-hour flight and desire for eBook to read</td>
<td>Verbal story: Story of delivery driver and need for route information</td>
<td>Yes, with later shift back to original</td>
</tr>
<tr>
<td>PDA/Phone Combo PDA phone</td>
<td>From old input technology to new system</td>
<td>Physical prototype: Early wooden mock-up</td>
<td>Physical prototype: New input design model</td>
<td>Yes, and both produced</td>
</tr>
<tr>
<td>RaceCar New cross-over vehicle</td>
<td>From car-based to van-based vehicle</td>
<td>Verbal metaphor: “A sports car and an SUV in a blender”</td>
<td>Verbal metaphor: “an SUV that isn’t really an SUV”</td>
<td>Yes, though mixed understanding</td>
</tr>
<tr>
<td>He/Truck Flexible cargo truck</td>
<td>From electric change-over to manual system</td>
<td>Physical prototype: Initial customer data, model</td>
<td>Physical prototype: 1988 sports car window model</td>
<td>Yes</td>
</tr>
<tr>
<td>BodyCool Novel body-cooling device</td>
<td>From medical to sport device</td>
<td>Verbal story: Need for warming medical patients</td>
<td>Verbal story: Need for warming student athlete</td>
<td>Yes</td>
</tr>
<tr>
<td>AutoCool Novel joint-cooling device</td>
<td>From medical to sport device</td>
<td>Physical prototype: Black “sneaker” model</td>
<td>Physical prototype: Red “sports” model</td>
<td>Yes</td>
</tr>
</tbody>
</table>


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Concept shifting: summary

- Identification of lack of fitness
  - Action is result of lack of consistency (Weick, 1998)
- Freezing and substitution of components
  - Follows freeze-change-refreeze pattern (Lewin, 1951)
  - Anchoring off a known base (Kahneman & Tversky, 1974)
- Management of dual conceptual systems
  - Organizational identity invested (Kogut & Zander, 1996)
  - Commitment to course of action (Staw & Ross, 1987)
- Overall
  - Contrasts to commit / withdraw models (Staw & Ross, 1987)
  - Contrasts to fully-iterative decisions (Bhattacharya et al., 1998)

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Concept execution: evidence overview

<table>
<thead>
<tr>
<th>Concept practices</th>
<th>Case example evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 4: Concept execution practices</td>
<td></td>
</tr>
<tr>
<td>4A. Freezing of concepts and limitation of features</td>
<td>PDAPhone: management of software feature creep; selected deferment of options</td>
</tr>
<tr>
<td>4B. Production of product for sale</td>
<td>RadCross: Extensive press mention of this version of a &quot;crossover&quot; vehicle</td>
</tr>
</tbody>
</table>

Concept execution: eBook example

- 4A. Freeze / Limit components
  - e.g. "Pushing back on creeping elegance" memo

  "It's a book!"
  w/ address book

  X C3 No Photo album

- 4B. Produce for sale
  - concept embodied in technical system

  =

**Concept execution: summary**

- **Freeze components and defer new ideas**
  - Allows focus of attention (March & Simon 1958)
  - Enables detail work required for execution (Dym & Little 2000)

- **Produce product for sale**
  - Concept embodied in technical system
  - Product as new reference in next innovation cycle

**Summary of process**

<table>
<thead>
<tr>
<th>Original Conceptual System</th>
<th>Conceptual System Definition</th>
<th>Concept elaboration</th>
<th>Revised Conceptual System</th>
<th>Concept execution</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

- **Definition practices**
  1. Genesis story
  2. Vocabulary
  3. Initial form
  4. Minimum docs
  5. Comparisons
  6. New category

- **Elaboration practices**
  1. Identify tensions
  2. Introduce new
  3. Allow fitness tests

- **Shift practices**
  1. Identify incons.
  2. Freeze selected
  3. Substitute
  4. Defer original

- **Execution practices**
  1. Freeze concept
  2. Produce for sale

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Comparisons

**Task perspective**
- Identify problem then search for range of concepts
- Initial concepts list need, form, and technology
- Initiate detailed concept specification
- Rationally select among whole concepts
- Keep stable concept vision
- Iterate to early stages if problem

**Concept perspective**
- Combine problem and solution during definition
- Initial concept has story, vocabulary, and prototype
- Develop only minimal documentation to start
- Progressively test & select individual components
- Dual visions are common
- Shift components when needed

Component functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision-logic</strong></td>
<td>Limiting type: provide fewer design options (convergent)</td>
<td>eBook: “Mini-me” metaphor for next generation</td>
</tr>
<tr>
<td></td>
<td>Expanding type: provide increased design options (divergent)</td>
<td>eBook: airplane story describing need for eBook</td>
</tr>
<tr>
<td></td>
<td>Comparative type: provides reference for decision discussion</td>
<td>eBook: “not a PDA” category</td>
</tr>
<tr>
<td><strong>Constraint</strong></td>
<td>Represents decisions made through other means (task, political)</td>
<td>JointCool: Story of need for product by CEO</td>
</tr>
<tr>
<td><strong>Identity</strong></td>
<td>Provides identity to those making design decisions</td>
<td>JointCool: Use of space program technology</td>
</tr>
<tr>
<td><strong>Temporal marker</strong></td>
<td>Marks stage of process</td>
<td>eBook: Physical prototype indicated commencement possible</td>
</tr>
</tbody>
</table>
Concept as coordination totem

- Totems serve as emblem of a social system and represent an actual object (Levi-Strauss 1964)
- Concept as coordination totem provides means for debate, highlighting fit or lack of consistency
- Totem metaphor highlights social nature, object representation, and shared meaning

JointCool example:

- C1: Provides “cooling and compression” (decision-logic)
- C2: Targeted to athletes (decision-logic, updated after shift)
- C3: Uses low cost manufacturing (symbolic)
- C4: Space technology (identity)

Concept as coordination totem

- Components with multiple interpretive functions
  - An interpretive system linking ambiguous data to action (Daft & Weick 1984)

- Concept as coordination totem
  - As decision-aid frames interpretation for action (Huff 1990; Kahneman & Tversky 1984)
  - As symbol reflects decisions made through political or task systems (Pfeffer 1991)
  - As identity provides secondary coordination (Albert & Whetten 1985; Dutton & Dukerich 1991)
  - As temporal marker provides reference for appropriate action (March 1994)
Modes through process and constrained deviance

<table>
<thead>
<tr>
<th>Study</th>
<th>FDAPlaner</th>
<th>FlexTrack</th>
<th>JointCost</th>
<th>eBook</th>
<th>RealCost</th>
<th>BodyCost</th>
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<td>Overall product</td>
<td>Good formed base</td>
<td>Good formed base</td>
<td>Good formed base</td>
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<td>of category</td>
<td>of category</td>
<td>sales in first year</td>
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</tbody>
</table>

* less revenue with significantly different design met organizational goals

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Study summary

- Provides cognitive detail of innovation
  - supplements task and political perspectives; provides the
cognitive detail of iteration through shifting
  - supplements org-level brokering approaches of actual
technologies
- Details the crafting of a “virtual boundary object”
  - Common practices across domains
  - A surprising finding on change in escalation situations:
  concept shifting and concept deferment
- Describes how concepts are used in practice
  - Concept not only as goal but as a broader coordination
totem
Framing of study

- New product development / innovation study
  - Providing cognitive detail
- Organizational interpretation study
  - Crafting a collective interpretation system
- Boundary object extension study
  - "coordination totem" idea as distinct (built, changing) but related
- Modularity of interpretive systems study
  - Relating the conceptual to technical systems of modularity

Thank you.

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