

Appendix A: Notes and Additional Methodological Details

Sampling: After gathering data, we discovered that we had been wrong in our forecasts of costs and benefits of original outcomes for some cases. In some cases, benefit or cost of original outcomes was higher or lower than we expected. In Case 7, for example, we were largely correct about cost, but not as correct about the benefits of originality. Because we anticipated making at least a few such errors, however, we chose enough cases to span extremes of all HIGH, LOW benefit and cost combinations; and despite some errors in our forecasts, our sample did in the end include all possible combinations.

Sampling: When we selected cases we took care in defining the specific process scope. Differences in process scope could, by changing the focus of a case, cause changes in estimates and assessment of the benefits and costs of originality. For example, in Case 8 we focused on fast food making and delivery in a restaurant, a scope that did not include the development of new menu items (new product development); a case that focused on new product development for the same company would, no doubt, have resulted in different benefits and costs.

Data Gathering: We also conducted some “non-template” interviews to obtain context information about industry and business model to help us interpret template interviews and as a check on the consistency of information obtained in those interviews.

Analysis: We developed 13 versions of the “coding template” that we used in analysis. Versions 1 through 9, which accomplished the bulk of the scale refinement process, resulted from work with the practice interview not part of our data set. Versions 10 and 11 involved small changes during the analysis of the first 6 cases. Versions 12 and 13 involved minor changes, mainly to adapt the interview to include more complex making situations. For example, we adjusted wording to include work in the pharmaceuticals industry, when we began to analyze our first pharma case. The changes from version 9 to 13 were not substantive in terms of definitions, but mostly involved adjustments to more inclusive language. All coding used template versions 11 or higher. We also looped back to early interviews to make sure that the process used to analyze them was consistent with the process for later interviews.

Analysis: Process scope definition was very important in analysis, especially in step 3. Analysts had to agree on the scope, or they could not code reliably. If one analyst included menu item development at the fast food chain (Case 8) within her scope and the other did not, for example, they arrived at different interpretations and numerical ratings. To facilitate agreement on each process scope, analysts, in conversation with other researchers, constructed a process diagram for each case.

Analysis: In analyzing the Case 18, a print maker, researchers decided to define process scope on the making of “editions” rather than individual prints. The subject makes prints in (small) quantity, and often (though not always) aspires to keep prints nearly identical. Analysts decided to focus on editions because that’s where the passion of this maker seemed to lie. Focusing on individual prints instead would have changed, though not by much, the interpretations and coding concerning Operative Logic on benefits of original outcomes. The subject described how even at the print level, artists increasingly aspired to create variation, and to assure the individual uniqueness of prints.

Analysis: When we added an analyst relatively late in the project, we also used early, already reliably coded interviews to train her. These were in our data set, but by this time the coding

process had stabilized, and the coding of these interviews (the ones used in training) was already a settled matter. We used a total of three coding analysts throughout the project.

Analysis: In the very rare cases when a disagreement persisted, we averaged the ratings. We never, however, averaged ratings of different valence (i.e., and 1 and 4). Differences of valence typically resulted from different assumptions (e.g., in process scope) and were handled in discussions between researchers; none survived those discussion for scales we retained as reliable. Too frequent valence differences in coding caused us to drop some scales.

Analysis: Disagreement about scale ratings, when they occurred, usually arose from difficulties in interpreting how a scale should apply to a domain of making activity we had not analyzed before. For example, before we began analysis of pharma cases, we had not had much practice in applying concepts represented in our analysis protocol to the specifics of pharma activities. Sometimes, in discussing coding of such new situations, analysts learned how existing language should apply to the new context; when this happened, it sometimes caused an analyst to change interpretation and, sometimes, scale coding.

Analysis: There were very few examples of large differences of view within groups that we studied. Where this did occur, as in one design firm, it was the result of an active disagreement about the future direction of the firm and the outlier subject was at odds with others within the firm over this issue. In one other instance, the outlier was relatively new to the firm, thus not yet fully familiar with its operating context. We opted to exclude the outliers from averages.

Analysis: In three cases, we performed our analyses on written documents, typically cases already written by colleagues. For two of these, we had access to the authors of the written documents that we content-analyzed; thus, we were able to check our interpretations with them. Our analysis protocol proved quite capable of dealing with varied content sources. Our semi-structured template interviews had this advantage over secondary sources: they covered the issues more comprehensively. Even detailed secondary sources were more likely to leave gaps in our analysis. But the three secondary source cases we included gave us nicely complete results.

Limitations: The methodology we employed reflects choices and assumptions, some of which may limit the validity of our conclusions. We rely heavily on self-reporting by makers and assume that people can talk accurately about their work. Following Amabile (1996),¹ we justify this choice by noting that our interviews a) focus on concrete activities, not on introspections about thinking processes; b) are sources for theory development, not testing; and c) reveal commonalities and consistencies that suggest that we are discerning real phenomena. By watching people actually make real things, we have (in many instances) an opportunity to validate interview responses, which should reveal inconsistencies between actual making and self-reports. We have chosen not to rely on experiments, because we wish to encounter the phenomena of interest in the contexts in which they occur, and to gather accounts from makers in vivo; but we acknowledge that this limits our understanding of causality. We include artists in our sample, though we are aware that this choice might be problematic for some readers; our decision to do this rests on an assumption that there is a general process called “innovation” of use to both business and the arts. But then much research on the psychology of creativity shares this assumption, and systematic differences between innovation in the arts and business should have been revealed by our methodology. We rely to some extent on subjective coding on rating scales, which may fail to

¹ Amabile, Teresa M. *Creativity in Context*, Boulder: Westview Press, 1996.

capture what we intend, or may mislead us into thinking we have a more complete understanding of our emerging theory than we do; the scales that we used were reliable across independent coders, however, and we dropped scales we could not refine to satisfying reliability. Also, we used these scales cautiously, mainly to suggest broad comparisons. Despite our best efforts, though, it remains possible to raise questions about generalizations based on our conclusions, and about the value of methods that rely heavily on subjective assessments and self-reporting.

Appendix B: Interviewing Protocol and Template

The template (below) reflects the issues, questions/answers, and other information that need to be addressed in this study. All areas should be covered, but not necessarily in the order given, or all at one time; indeed, they are better discovered by first "watching" what happens then asking about it in detail subsequently. This enables the interviewer to probe the specifics of the maker's work rather than ask a series of questions that are too generic or hard for the interview subject (the "maker") to understand.

Important: Ideally we begin the interview by anchoring the conversation around a specific example of the making process, preferably a demonstration by the maker. If this is not possible, second best is a conversation that occurs

- 1) In the setting in which the maker operates, and
- 2) with respect to a particular example of the making process (e.g., focus on the making of a specific, ideally somewhat typical product). We will ask general questions about the making process, but we should take care to connect general questions back to the specific example.

Even if the conversation cannot take place in the making environment, pick out a specific example of a product to refer back to as a basis for the discussion.

Ideally, there is an interviewer and a separate cameraperson who (as unobtrusively as possible) videotapes the demonstration and interview in its entirety.

Ideally, interviewers would first follow the interviewee ("maker") in his/her workplace actually doing something, enabling the interviewer and the cameraperson to witness that and having the interviewer ask "appropriate" questions en route. After that work, specific questions—about the maker, background, meaning, motivation, details of costs, materials, and other specifics—can be queried. So:

The interview would (first) capture (in words & images) what the maker is doing, where that's happening (the workplace), the materials (equipment, tools, etc.) involved (these would be "viewed" by the camera, used by the maker and queried by the interviewer—"why do you use that?" e.g.), and learn why it all works the way we see it done (via post-work "talk"). The objective is to unearth the nitty-gritty of the approach the maker employs (and his/her "justification" of it), along with the maker's background, experience, issues of collaboration et al.

Overall, by first focusing on the maker engaged in her work, the interviewer (and camera, complement), are themselves engaged in witnessing what the maker actually does—looking at "the process" through her eyes; it is participating in the *process* by which s/he actually creates that we see (and document). Doing so enables more relevant questions *about "the process"* subsequently; such exchange doesn't risk potential misunderstanding of what "process" is—

because "we've" all been a part of it. It also can obviate bias (of the interviewer). We don't risk such bias when we, interviewers, *watch* the action unfold (the camera "witnesses"; the interviewer asks "clarifying" questions—about what is happening AS it is happening). That is, we don't have to advance a "type" of "process": we can ask directly: what were you doing?

- It's important to realize that not all makers will be given to discussing "process" the way that business academics find most comfortable. To unearth "process," we should look at it in action—and ask questions of "it" as it unfurls (if possible) or immediately after. The questions are: what is this, why are you doing that, what's this tool, how come...the basics. We, interviewers, are probing what's going on (see the Jon Sawyer interview for how this works), why, how come? Why do you use that tool? Why do you put it there? These are strictly connected to what is *actually going on*.

- It's up to us, interviewers (and analysts) to understand that failure to articulate process is not a *problem* for makers; a lack of "process specification" does not imply a lack of process. Work does not happen absent an *approach*. This research focus is on how things work in different settings, and what different *approaches* can provide (to each other).

The template (below) also asks of makers questions about how they *think* about *their work*. These are questions of motivations, "novelty" (how important is it for you to do "one of a kind," e.g.), and reputation (what is it "to you"; how important, how "valuable," etc.). Often answers to these questions will emerge amid discussion of more concrete process issues (e.g., a maker might say, in explaining a process choice, "it's important to me that...").

If you reach a point in the interview template that it seems you have already covered, you can skip that section, as long as the issue has been dealt with in sufficient detail. This will happen frequently, and will require judgment on the part of the interviewer. You will also get cues from the interview subject if he/she feels she's being asked to repeat things (a subject might say, "as I said before..."). It's okay if the subject does this sometimes, but if he or she seems to be getting frustrated by the repetition, try to be alert for that and adjust.

EXCERPTS FROM INTERVIEW TEMPLATE

1) *The Process Demonstration/Anchoring Example*

Purpose of this section:

- See process illustrated, if possible.
- Locate conversation in the making workspace, if possible.
- Anchor conversation in a particular product example

Questions:

What do you make? (Whenever possible and appropriate, seek an "I" answer to this question, rather than a "we.")

Note: *If subject makes more than one kind of thing, ask them "Which of these are you most passionate about?" "Which of these is the focus of your most important work right now?"*

Can you show us an example? Or at least describe an example?

Can you show us where you make it?
Would it be possible to see you make something?

Note: *Especially in some business settings, the best you will be able to do here is anchor on descriptions of a particular example. Obviously a pharmaceutical company researcher, for example, will not be able to take you to the lab and cook up a new drug for you. You may be able to work this out in setting up the interviews, by requesting that interviewing begins with a walk through of lab and/or production facilities.*

A CEO, CIO or other manager may also have difficulty demonstrating the work. In the case of these managers, it is most important that the making example is specific to what they make. A CEO might say, "We make interface technologies for aerospace." Pursue this by asking "What do you make?" And encourage the subject to use "I" instead of "we" as he answers. Perhaps there is a particular product idea, process approach or innovation plan that this manager has put into action.

2) **Work process details**

Theory areas to explore:

- Process structure, iterative or sequential
- Degree of process standardization
- Degree of separation (if any) between design and production
- Degree to which actions are preplanned
- Degree of interdependency among parts of the process
- Closure

Questions:

How does the work get done? Please talk me through the process.
How does it begin? What happens first? Second?
Do things in the work repeat? Why?
Is the work process ever interrupted? If so, how does that impact the work?

Closure

What tells you that the work is done?
Do products ever continue to evolve over time?
Do you work under deadlines? How does that impact the process?

Planning & Separation

How much thinking gets done before the doing begins?
How much planning is involved?
How is the planning conceived and recorded?
[In prototyping cases:] When do you start working in the "real" materials?
Do you end up where you thought you would at the beginning? Is this good or bad?
Do you make a lot of changes along the way?

Process Variety & Locus of Mastery

Do you always do the work this way?
Does your process ever change? Why?
Who determines this work process?
Is your process written down? If so, who made that document?

3) *Unplanned Variation*

- Degree to which process is open or closed to unplanned variation
- Collaboration with materials (response to unexpected variation in materials)
- Control
- Pliability of materials
- Attitude towards failure

Questions:

What are your materials?
Do the materials ever behave in surprising ways? How do you respond?
Do things ever happen accidentally in your work? [unexpectedly]
If so, how do you respond to these accidents? [unexpected events]
Do you do anything specifically to let accidents happen or to make accidents happen?
Does your work process ever get “out of control?” In what way?

Failure 1

Do mistakes happen often in this work? How easy is it to recover from a mistake?
If you try something and it doesn't work, do you consider that a failure?

4) *Demand for novelty*

- Underlying degree of demand for novelty
- Where do ideas come from; when is value recognized

Questions:

How different are the products of this work from each other?
How important is it that outputs stay the same/vary?
What makes your product valuable?
How important is it for you to differentiate from your competitors? How do you do that?

Idea Event

Where do new ideas come from?
How do you decide what to make?
How many ideas are typically considered before you decide what to make?

5) *Cost information*

- Underlying cost of reconfiguration
- Underlying cost of exploration
- Underlying variable cost

- Strategies for managing costs
- Attitude towards failure

Questions:

When is your product sold—before it’s made, after it’s designed, after it’s made?
 How do you determine the price?

Reconfiguration

How difficult is it to rearrange the materials and production process when you want to make something new?
 How expensive is it to rearrange the workspace?
 How much time does it take to reconfigure?

Exploration & Failure 2

Is it expensive to try something that doesn’t work out?
 Is it worth it, even if it is expensive?
 Do you think of these attempts as failures?
 Do you have to “scrap” outputs of your work?
 Can you measure how much “scrap” results from your work?

Cost concerns

How important is it that you find ways to reduce costs? How do you achieve that?
 Does IT help you reduce the costs of exploring new ideas? How?
 Do you ever change what you are making [or compromise] in order to keep costs low?
 ...

7) *Preparation and Mastery*

Theory areas to explore:

- Notions of practice
- Repetition, its relationship to form and skill (Mastery)
- Ways of capturing and developing ideas
- Ideas about “inspiration” and their relevance

Questions:

Do you do anything to prepare or practice for the work?
 Is there anything particularly demanding in your work that requires extra preparation?

How do you get better at doing this work?
 How do you know that you are doing your work well?
 ...

Knowledge Management

What inspires this work?

Do you collect or capture ideas or things outside the immediate making?
What kind of things? How do you use them?
Do you keep notebooks or sketchbooks?
Do you exchange information with others? How does this happen?
Do you ever go outside your work to learn or develop skills or to gain new experience?
...

11) *Background info*

Questions:

How long have you done this work?
How did you get involved in it?
What training do you have?
How are you especially suited to this work?
How have others acknowledged your achievements?

Appendix C: Content Analysis Protocol and Excerpts from Coding Template (v.12)

For coding interviews, documents and other material, this is our process:

1. Those researchers who conducted the interview or collected the data will define, for the purpose of analysis, the process scope and boundaries, and the resulting product, then distribute this information to the assigned coders.
2. Independently, a minimum of two researchers will code the material using the attached coding template, and each will determine the “Average Score Before Comparison.”
3. Recommended coding procedure:
 - a. Review material in total before coding (ie. view the whole interview DVD; in the case of company interview sets, review ALL interviews—case and template—before coding), taking detailed notes as you review.
 - b. Use these notes (and subsequent review of the material as needed) to enter the “evidence” into each evidence category on the coding document. Whenever possible, capture the subject’s words.
 - c. It might be useful to mark evidence as you copy it from your notes to the coding document, so that you can see what additional information might not be captured by our coding categories. (Some evidence may apply to multiple coding categories).
 - d. Based on the complete evidence, code each item that can be numerically coded and provide a short (one-sentence) response of non-numerically coded items.
4. When coding, use whole numbers 1-2-3-4-5. Do not use decimals, such as 1.5.
5. Researchers are encouraged to code based on the information contained in the interview, since not every coder may have access to additional contextual information. However, do not disregard context to the point of coding something in the interview that you know is not true. If such a contradiction arises, please check “Could not numerically code this item

from content available” and enter in the evidence box: “Evidence contradicts case research.’

6. These two or more researchers will meet to compare and discuss their coding, to target places of disagreement and to see if agreement can be reached. A third party will be present to listen to the discussion and validate that the reasoning is compelling enough to support agreement, outside any desire to agree for agreements’ sake.
7. If convinced to make adjustments to the original coding, researchers will re-calculate an “Average Score Post Comparison.”

of items coded: _____/of 20 total

Coding Template (v.12)

Subject: _____

Document? _____ Interview? _____ Other (describe)? _____

Company (if applicable): _____

Evaluated by: _____

Agreed (for purposes of analysis) definition of process scope and boundaries:
[as defined for other coders in advance by those who conducted the interview/collected the data]

Definition of a “product” (service, outcome, etc.) that results from agreed process scope: [as defined for other coders in advance by those who conducted the interview/collected the data]

Sample Scales

A. Product Variety

Could not numerically code this item from content available: _____

- | | | |
|---|--|---|
| 5 | <div style="position: absolute; top: 0; left: 0; right: 0; bottom: 0; border-left: 1px solid black; border-right: 1px solid black;"></div> | Standard designs are intended to be produced in multiple copies that change rarely |
| 3 | <div style="position: absolute; top: 0; left: 0; right: 0; bottom: 0; border-left: 1px solid black; border-right: 1px solid black;"></div> | Standard designs are intended to be produced in multiple copies that change frequently |
| 1 | <div style="position: absolute; top: 0; left: 0; right: 0; bottom: 0; border-left: 1px solid black; border-right: 1px solid black;"></div> | Every product is intended to be a unique design (no standard design) |

Evidence or Observations: (quote or summary description from interview)	
--	--

...

G. Planning Intensity/Degree t/w Original Intent Determines Final Outcomes

Could not numerically code this item from content available: _____

- 5 ● Knows exactly what will result from making before beginning to make; plans and then executes exactly to plan
- 3 ● Figures out important aspects of product while making it; some important things “change in the middle”
- 1 ● No plan at outset what final product will be; process “takes over;” discover what you are making while you are making it; outcome “emerges”

Evidence:	
-----------	--

I. Unplanned Variation in the Process

Could not numerically code this item from content available: _____

- 5 ● Tries to avoid unplanned variation in the process while engaged in making so as to avoid unplanned variations in the product; unintended variation is always a bad thing
- 3 ● Open to variation during making process, looking for ways to incorporate unplanned opportunities; unintended variation can just happen and *can* be a good thing; we are okay with variation, we just don't try for it
- 1 ● Intentionally introduces unplanned variation into the making process by injecting randomness or inducing “accidents”; unintended variation is vital to creating value in the product, so we are not only okay with it, we try for it; process *relies* upon unplanned variation

Evidence:	
-----------	--