What is performance-centered design (PCD)?

Now that you've skimmed through the "lectures" you are probably closer to knowing the answer to the above questions at a high level, but are perhaps more confused about the details. This is as expected.

If you have been scanning the literature and Googling the web, you have no doubt found nothing with regard to a formal process called performance-centered design. Gloria Gery refers to it along with a number of practitioners, but never articulates it. Burt Huber's company is called "Ariel Performance-Centered Systems" for example, but he does not delineate his process. So what exactly is the formal process (or *any* formal process) that we can call PCD? Good question. It is the question that I asked myself in 1992 and have worked on answering ever since. To my knowledge, no one else has attempted to formalize PCD in a manner that recognizes the multidiscipline nature of performance support and integrates the successful methodologies of those disciplines into a single, comprehensive lifecycle.

Methodologies for developing quality products and organizations have been around for a long time and they continue to evolve. W. Edwards Deming (see http://www.lii.net/deming.html) is arguably the most memorable figure in recent history to evolve such methodologies and the principles behind them. Consider his 14 Points (included in the link above). You will notice that "business performance through human performance" rings true throughout, notably in several of the 14 Points:

- Build quality into products *in the first place*
- End the practice of awarding business solely on the basis of price tag
- Improve every process
- Institute training on the job […he actually meant learning and performance-GD]
- Break down barriers between organizations
- Eliminate the use of slogans, posters and exhortations for the work force e.g., demanding "Zero Defects" - without providing methods for achieving results

You have seen the influence of Deming's work whether you know it or not. For example, the ADDIE process for instructional systems development (ISD) is a Deming/"Quality" methodology that the Department of Defense developed starting in the 1960s. There are also the more general IT lifecycles (system development lifecycles – SDLCs), like rapid application development (RAD) and XP (Extreme Programming). Further, there are methodologies like business process reengineering (BPR) and derivatives (Adaptive Enterprise and Six Sigma).

Disciplines and methodologies have evolved that focus on the person who does the work, based on general principles of cognitive and behavioral science. These include Usability Engineering, Human-centered Design, User-centered design and Usage-centered design and graphical user interface design (GUI design) and general user interface design (UI design). Such methodologies evolved to defend and support human attributes in the age of the machine. There are valid, scientific instruments that measure human preferences around interests, values and personal style based on the works of Carl Jung, E.K. Strong,

John Holland and others. Explicitly or implicitly, the characteristics of people identified by these inventories are addressed in the human-centered methodologies.

Another category of methodologies (arguably a subset of the SDLCs) can be referred to as information engineering and includes knowledge management (KM), hypertext/hypermedia engineering, content management and learning management. These typically address the structures of content (information, knowledge) with respect to wayfinding (where am I, how do I get there, am I there yet), reachability (how "far" it is between one chunk of information and another). The most recent manifestations of these disciplines include RDF and RDF schema, ontologies and the more general notions of the semantic web. There is obviously much focus on technology-delivered content/info/knowledge and the ability of humans and machines to communicate, but the methods are at some level general with respect to organizing, wayfinding and reachability, regardless of media type.

Each of the disciplines listed above attempts to address business performance and/or/through human performance in a Deming way. The problem is that any one of the methods you choose leaves out an important part of the picture inherent in the others. What picture? The one that makes us "smart." Remember the lessons of distributed cognition? Put very simply, we deal with representations of the things around us. If those things and the representations are arranged in just the right way, we are "smart" and can perform. Otherwise, there are gaps (in thinks, learning, reasoning methods etc.) that must be filled. The following example, although simple, illustrates the point.

The Game of 15

Suppose we wanted to engage two people in a strategic interaction, toward a win for one person and the loss for the other, but in a context where there could be a draw (in game-theoretic terms, this would not be a zero-sum game). The "suppose" of the last sentence is our business goal: *Enable two people to engage in a strategic interaction toward a win for one person and the loss for another, but in a context in which there could be a draw.* To accomplish this goal, consider the *game of 15*:

The 'pieces' for the game are the nine digits-1, 2, 3, 4, 5, 6, 7, 8, 9. Each player takes a digit in turn. Once a digit is taken, it cannot be used by the other player. The first player to get any three digits that sum to 15 wins. Before reading further, I suggest that you try playing the game of 15 with someone.

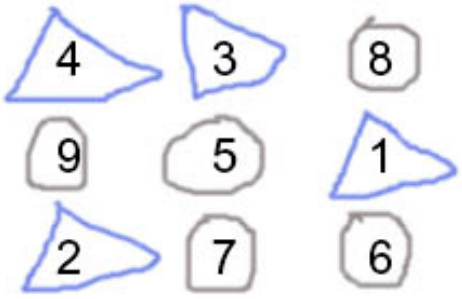
This representation of the game requires the players to know four rules, to keep track of which numbers have been chosen, and to perform arithmetic calculations. If you are like others with whom I have played this game, you may have either given up in frustration, reviewed the rules repeatedly, written them down or searched for a calculator. Consider the following sample game that I played with one of my GMU students:

First player	Second Player

Pick: 9	Pick: 4
Pick: 5	Pick: 1
Pick: 7	Pick: 3 (Defensive move, because the other player has 5 and 7)
Pick: 8	Pick: 2 (Defensive again….)
Pick: 6 (No other choice.)	

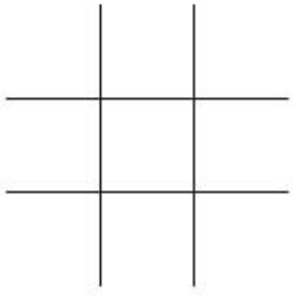
The game was a draw. Remember, it is any SUBSET of three numbers that can add up to 15. The first player is dealing with 9+5+7 or 9+5+8 or 5+7+6 or (any sum that is the combination of three numbers in his or her chosen numbers).

Now consider an alternate representation of the game, a so-called "cognitive isomorphism" – which is a version in which a game board (job aid??) is employed to assist the players by reducing the cognitive overload of the first representation. All rows, columns and diagonals of the board add up to 15, thus the computational task is removed from the game, eliminating the need to do math-on-the-fly and imagine all possible subsets of three. It becomes a simple matter of players alternately choosing numbers, shown here with circles and triangles (as they were chosen above):



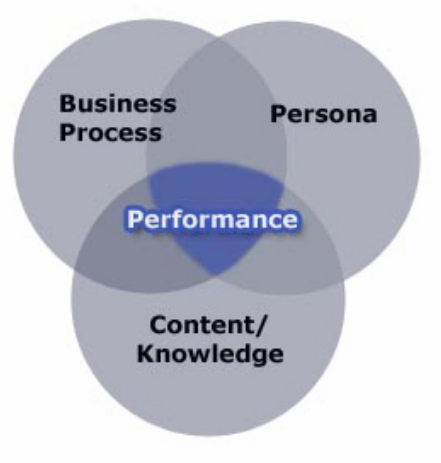
The game board provides a further advantage of making the outcomes of tactical moves visible. The "cognitive isomorphism" is this spatial equivalent of the permutations of sums-of-three required of the strategy.

Think about it. The mathematical attributes have been replaced by the physical constraints of the game board. *In fact*, the numbers are irrelevant! You can replace this game board with the one below (a second "cognitive isomorphism"):



Clearly, if players use X's and O's to make choices, the game is tic-tac-toe (or "crosses and naughts" if you are from Great Britain). This third representation of the game further simplifies the players' environment as it removes the now-irrelevant numbers. The problem has been transformed from feats of calculation, memory and thinking ahead to one of simple spatial orientation and strategy.

These are three equivalent representations of a solution addressing the same need (with respect to the problem statement). The first requires learning, memorizing, thinking ahead and computing - not fun at all. ***The representation fits the task, but is not appropriate for most people and contains more than essential information.*** The second case is much easier - but the numbers actually obscure the game's focus. ***The representation fits the task and is appropriate for most people, but contains more information than is necessary (the numbers).*** The final case—the familiar tic-tac-toe board—demonstrates clearly that the physical constraints imposed by the artifact can quite elegantly enable task completion (***fits the task, fits the person, and contains only essential information***).



Now think about our PCD diagram. The task representation is the business process. The essential information representation is the content/knowledge. Preferences of the people who must do the work are represented by the *persona* or people representation. Performance is enabled (we are "smart") when we experience the intersection of all three representations. Or, put another way, the performance-centered representation of the problem is the one where business process (task), persona and content/knowledge (minimal information) are all optimally represented. This is the space of optimal distributed cognition, which of means "cognition" is enabled because of its participation in process, persona and content/knowledge – all of the artifacts that make up our world of work.

What does this suggest to you about a process that rigorously and consistently enables us to create solutions that are performance-centered? We wish to incorporate the history and genius of ADDIE (systematic analysis, design, development implementation and evaluation) and couch it in the mentality of Deming, to arrive at the performance zone.

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So consider:

Analysis	Design	Development	Implementation
E V A L U A T I O N			

…while you consider Deming's principles and the performance zone:

Analysis	Design	Development	Implementation
1. Articulate the compelling business need. 2. Translate the need into a mission statement and action plan that has support across the organization, including top sponsorship – but do not lose site of the compelling need! 3. Model the business process. 4. Model the diversity of the people who must do the work. 5. Model the content/info/knowledge that is needed to do the work. 6. Refine the content/knowledge model structurally and semantically, according to how people who do the work might "name that tune in one note." Create simple units or nodes of information that make sense individually and in context. 7. Map the information nodes to the task flow of your process model	8. Create a representation of the business problem that addresses the mission statement and action plan that reflects the business process, the diversity of people who do t he work and contains just enough information/knowledge to get the job done. 9. (See EVALUATION) 10. Create ANOTHER representation that reduces complexity around any of the three representations. …back to 9… 11. Create another…. …back to 9… 12. …and another perhaps… …etc. EACH TIME YOU CREATE A REPRESENTATION, go to step 9 below. Depending on the results, come back here and try making yet another representation. APPLY DEMING's PRINCIPLE "build quality into the product in the first place" before you start development!	13. Create content/info/knowledge base. Apply ecological principles, not information engineering (aka databases) principles. 14. Create interface to the knowledge base (…well, 12 and 13 really happen simultaneously…). Consider this a proof-of-concept or prototype. 15. See EVALUTION) 16. Revise 13 and 14 as required. …back to 15… 17. Revise 13 and 14 as required…as many times as required With sufficiently many iteration of the proof-of-concept to demonstrate quality in performance, begin building the production solution (step 19)	19. Roll out succession of prototypes to small populations of performers, then go to EVALUATION (steps 15, 21) 20. Repeat step 19 as necessary, with successive prototypes and Evaluation 21. Expand rollout and evaluation 22. See EVALUTION
9. Test representations with real people who must do the real work (using low-fidelity renderings…NOT DEVELOPMENT YET!). 15. Test "usability" (i.e., "performability") of the prototype/proof-of-concept knowledge base and interface. Use principles of usability engineering. 18. Test performability of production solution 22. Implement continuous evaluation protocol and maintenance plan (essentially, go back to Analysis on a limited basis) E V A L U A T I O N			

I have represented the process described above as follows in a number of legacy documents (and here showing the performance zone elements mapped to the process):

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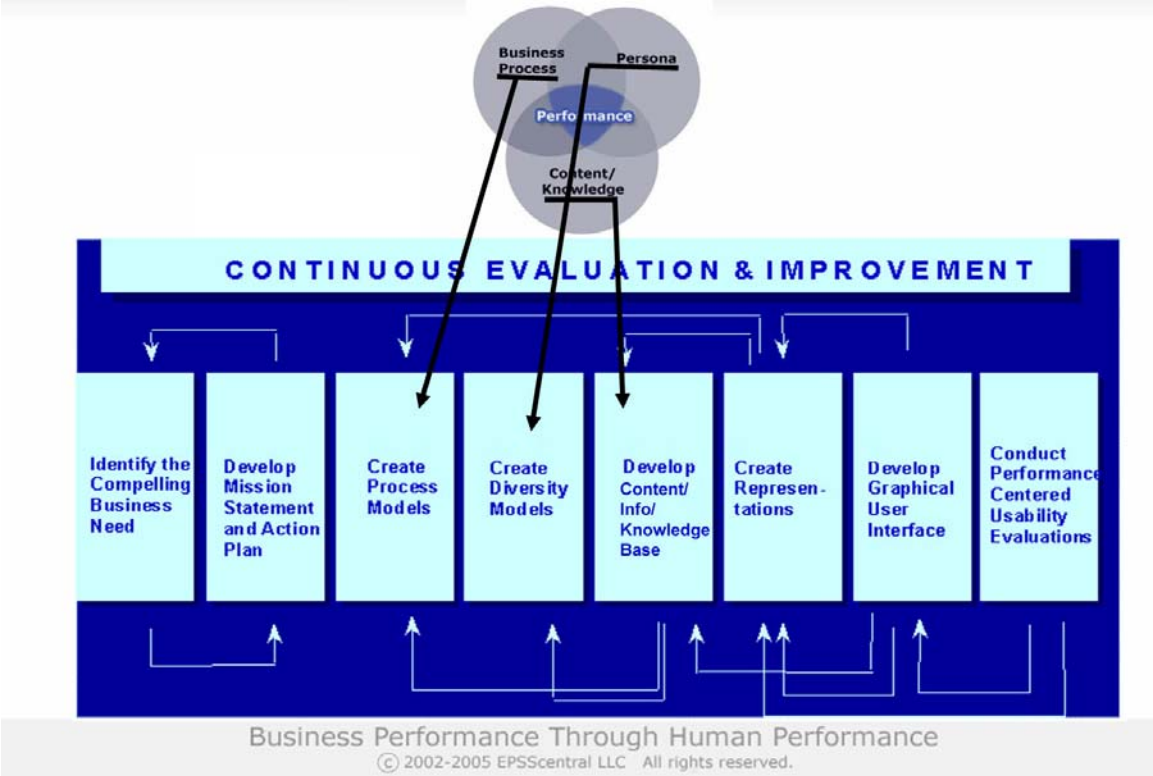

The key elements of the process are that it must:

1. Be couched in terms of business (or organizational) goals;
2. Be articulated in terms of mission statements and action plans, relating the performance improvement agenda to gaps that are business-critical, and with concrete steps and outcomes
3. Include a process model
4. Include a diversity model (delineate and describe the personas)
5. Include a content/info/knowledge model
6. Map the content model to the process model in a way that makes sense to the personas
7. Include iterative representations that focus more precisely on performance outcomes each time (and, ultimately, address the compelling business need)
8. Include iterative testing in a scientific manner (e.g., usability evaluation principles)
9. Implement gradually, further testing design and distribution issues, measuring and ensuring that the compelling business need is addressed
10. Implement continuous evaluation and improvement protocol.

That said, the rest are details (How do I state the business needs? How do I write a mission statement and action plan? How do I create a process model? ….). Again, overviews and many hints are contained in the "lectures;" the details will appear here. Stay tuned!