**The Digital Transformation**

**Part II: In-House (re)Training of Technical Staff**

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Machine  
Learning  
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Data Ops

Data Ops

Data  
Cleansing

Data  
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Your company has been exploring bringing in artificial intelligence (AI) and machine learning (ML) into its services and products it provides, streamlining its process and reducing human knowledge workers with intelligent ‘learning’ agents (IA).

A component of your strategy is the technical skill requirements, and whether your organization on-boards new staff, retrains existing staff, or a combination of the two.

There are a some initial questions to considering the option of retraining existing technical staff.

1. How will the retraining impact our schedule?
2. What will be the staff time commitment?
3. How will the retraining distract the existing workflow?
4. How will it impact our staff’s personal assessments?

**Corporate Training versus A-Z Training**

As an organization, one has many options for retraining of staff to consider, from online courses, private coding schools, to professional corporate training.

What’s A-Z training, and why would it not be effective for your organization. A-Z means that the curriculum is pre-canned. There is a basic starting point, the ‘A’, and a final point the ‘Z’, and a progression path over the course of the training. This is the ‘academic’ model. The burden is on the student to make it to point ‘Z’ and how to apply the skills. This is the type of training one gets from online courses and generally from private coding schools. It is also commonly pitched to corporations. Its low cost to the training organization, and what is pitched is the end-point ‘Z’.

There are many reasons for why this will fail the objective for the task of retraining your staff. Here are just some of the reasons:

* The staff are likely at a mix level of skill at the start of the training. Some will be too far below the level of ‘A’ and others too far.
* Those that are too far below the level ‘A..Z’ will by the second day quietly give up.
* Those that are too far above the level ‘A..Z’ will get bored and look for reasons to give management to bail out.
* It’s generic. It doesn’t reflect the actual issues specific to the staff and the management objective.
* By the end, a significant portion of the staff have bailed out, or pre-occupied with work email.

This outcome I described I refer to as the 3/3/3 outcome. One third of the staff stays engaged and complete reaching the ‘Z’ point. A second third of the staff got left behind early on the second day and just linger to the end. And the final third have successfully overcome management’s objections and found a way to bail out and return to their normal daily work.

This 3/3/3 outcome, while common, is a failure.

**The Purpose of the Training is to Fill Gaps**

Your organization’s objectives, trajectory and the skills of the staff have gaps, and it is those gaps that the training must fulfill, and those gaps will be diverse.

Before your organization proceeds with hiring corporate training, your organization will need to plan:

1. What are the gaps in our digital transformation roadmap?
2. What is the distribution of skills that are needed to accomplish the digital transformation?
3. What is the trajectory for integrating and deploying our digital transformation?

**Planning**

This initial task is done with the individuals who are responsible for your organization’s planning of future products and services, and how those will fit into the existing and future distribution channels. Your organization will identify the components that will need to be in the roadmap. For example:

* Natural Language Processing
* Natural Language Synthesis
* Speech to Text
* Chat Bots
* Intelligent Search and Extraction
* Computer Vision
* Facial Recognition
* Autonomous Navigation
* Robotic Manufacturing
* Knowledge Engineering
* Disease Identification and Diagnosis
* Robotic Surgery
* Real-Time Modeling
* Augmented Reality
* Intelligent Inventory Control and Fulfillment
* Fault Detection and Prediction

Next, the research, development and operations managers need to compile the skills that will be needed by staff. These should be broken down into design (architect), applied (engineers) and deploy (operations). Those doing design (architect) will need deep understanding of the corresponding subject matter to make decisions on technologies, approaches and methodologies. For example:

* Conditional Probabilities
* Dynamic Programming
* Graph Theory
* Statistics
* Computational Math
* Deep Learning
* Reinforcement Learning
* Natural Language Processing
* Sensor Fusion

Those doing applied (engineering) will need to know the frameworks and tools for utilizing these technologies. For example:

* Python, Numpy, Pandas, Sci-Learn
* Google TensorFlow, Keras, AutoML
* Amazon Machine Learning (AML)
* Microsoft CNTK
* Torch
* Caffe
* Natural Language Toolkit (NKTK)
* Apache Spark MLIB

Those doing deployment (operations) will need to know how to deploy, manage and monitor both data and models. For example:

* Data Warehousing
* Dimensional Modeling
* Data Ontologies
* Data Preparation

**The Training**

Your training is a significant investment to the organization, typically lasting three to five days, with an average of 15 staff members. Consider the actual in-house cost. Your typical professional, with salary, benefits, equipment/space and administrative costs average $100/hr. At four days and 15 professionals, your organization has redirected $48,000 of internal staff expenditures to the training. This sum will dwarf the cost of the training itself. Therefore, it is important that the training is done right, and dead on, and that the organization has worked into its plan how that cost will be amortized.

A successful corporate training will incorporate several components:

* They will have met with your planning and reviewed in-depth the information your organization has gathered during the planning stage.
* They will have tailored the training based on the planning information.
* They will set a starting point that is not too far below or too far above the mean of the current skills of the staff.
* They will develop course work that:
  + Starts with a consistent progression to bring up all the staff evenly to a common baseline.
  + Diverges into tracks for individualized group development of skills.

*Initiation*

The first day of the training should start with the participation from a management/planning staff member of your organization. This person should re-iterate to the staff the goal is to fill gaps. The statement should be clear and succulent, and should cover:

* Training is inclusive (equal opportunity for all).
* Tailored training for all staff.
* Group tracks of individualized training.
* The organizations commitment to (re)training of staff.

*General Sessions*

The general sessions should focus on fundamentals and progressively bringing up all the staff to the same level. These sessions initially move at a slower pace to give time for each staff member to stay in sync and for the instructor to identify the training objectives and gaps of each staff member. It is less important how much material is covered, and more important that each staff member can be engaged to sufficiently comprehend the material.

The general sessions typically are done on the first day and a half and the mornings of subsequent days, and follow the following format:

1. Pre-readings done the day before by staff.
2. Recap of material covered the day before.
3. Lecture.
4. Code-Along.

*Tracks*

Generally, there are two tracks are focus on job specific skills relating to applying tools and frameworks to the objectives defined by your organization during the pre-planning stage.

The tracks are done as breakout groups. The instructor moves from breakout group to another. Typically there will be an instructor assistant that maintains continuity in the other track. The format is generally as follows:

* Whiteboard session where group discusses a gap relating to the organization’s roadmap.
* Instructor led selection of approach to tackling the gap.
* Working sessions with tools and frameworks mimicking tackling the gap.
* Review/Retrospective of the approach and alternatives.

*Summary*

Your organization’s (re)training is a sizable cost and commitment. It must be planned and executed properly. Otherwise, a 3/3/3 outcome will be a failure.