

## Workforce training in data analytics: a proposed competency-based solution

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### Abstract

A wide range of literature supports competency-based training in healthcare and a wide range of literature discusses the potential for data and data analytics to transform healthcare. This commentary brings these two core concepts together to discuss the benefits of providing competency-based training in data analytics to all levels of healthcare professionals. Specifically, the commentary describes three levels of relevant competency for healthcare professionals and describes how a core curriculum covering these three levels represents a working solution to the lack of data analytics education that is provided as part of normal professional training in healthcare. The commentary concludes with a proposal for an adaptive core curriculum that is adaptable to specific circumstances whilst maintaining the integrity of the needs of healthcare professionals of all levels and all disciplines in all countries.

### Introduction

The only constant in the healthcare world of the last 15 years or more has been change, and there is no area in which change has been more dramatic than in the ways that data now pervade the entire healthcare landscape. Across the globe, in almost every country, the computerization of healthcare data is now considered a normal part of the healthcare system. From real-time patient monitoring to electronic health records to smart health cards to wearables, and now even digital pills – there is no area of healthcare that has not been changed, if not transformed, by the computerization of data.

The day-to-day role of every profession in healthcare has been affected by this transformation into a digitally managed industry, and this is a global phenomenon being driven by multinational suppliers of medical equipment, support software (like electronic health records) and wearable devices. In addition, the adoption of coding systems like ICD.10 has proliferated to the point where they are now the de facto global standard.<sup>1</sup>

However, the education of most professionals has not been transformed in a similar way, leaving many healthcare professionals unprepared for the data that will be a part of their everyday work.<sup>2</sup> Competency-based training has already been demonstrated to benefit individuals in acquiring employability skills as well as improving outcomes.<sup>3</sup> This introductory paper outlines the ways that role-based data analytics can, and should be taught to healthcare professionals of all types.

### Role Based Data Analytics

Many consider the role of data analytics as being limited to those with titles like CIO, Data Scientist, Data Analyst. There is no doubt that these roles are heavily engaged in data analytics, but what is being discussed here is the skill set needed by people who do not have these titles. People with no formal training in data bases, statistics, predictive modeling, business intelligence, and so forth. People who, on a day-to-day basis interact with data and analytics as part of their job, but for whom little or no formal training was either given or required for them

to hold their current position. The goal must be to improve the skills of the individual as well as the performance of the entire healthcare team.<sup>4,5,6,7</sup>

### **Basic Analytical Skills**

A substantial majority – perhaps as much as 80% - of professionals in healthcare need data analytics skills that can be described as “basic”. In these roles people work every day with views of data and analysis that are core to their role – a chart of patient vital signs, technical output on device reliability, regular reports of departmental processes. In this role the basic skills that are required evolve around understanding the data in an output, interpreting output.

In addition, this large group of people needing basic data analytics skills are also heavily involved in the process of adding data to the system. Nurses entering information into the electronic health record, administrators completing records, technicians adding results to a chart. Basic data analytics knowledge and skills can help this group to ensure the highest quality of data input, and thereby improve one of the biggest weaknesses of the digital healthcare arena.

### **Intermediate Analytical Skills**

Where intermediate level skills are required are those members of the workforce who are also involved in some aspects of report generation. They may be a ward manager required to describe the types of analysis that nurses need to support their work with patients, or an office manager that needs additional regular reports to better manage costs. The level of understanding of these users needs to be deeper so that they can better explain their requirements, and also so that they can better understand the results.

In addition, these professionals are likely to have some supervisory duties that are likely to mean being able to support and train the more junior members of the team, and this requires additional data analysis skills.

### **Advanced Analytical Skills**

Advanced users are directly involved in the processes of managing data, generating reports and supporting interpretation and decision support. Their knowledge and skill levels need to be higher so that they can support and advise other data users in the organization - of all levels of seniority and professional type. In many cases these advanced users will be senior managers to whom the data scientists and data experts report. They need to know what is being discussed or proposed without necessarily having the skills to complete the task themselves – the classical senior manager role.

### **Essential Elements of the Curriculum**

In preparing a curriculum to meet these data analytics skills it is essential that a number of core characteristics are maintained:

1. International applicability – the skills should form part of an internationally recognized certification program that provides professional recognition and support to all who take the course (of whatever level);
2. Predominantly on-line training – the volume and geographical spread of professionals requiring these data analytics skills is too great for any other form of training;

3. Consistency across levels – what is learned at each level of expertise must be consistent with the same elements of skill acquisition at other levels.

The last point – consistency – carries with it a particular benefit in that it enables professionals to migrate from one level to another without needing to learn any new fundamentals. This encourages skill development as well as improving the training experience.

There are six core elements of the data analytics curriculum:

- Understanding data types – ranging from highly structured databases to unstructured text information.
- Data management – the processes by which data are managed, maintained, and updated.
- Regular reporting – working with through to helping design reports produced on a regular basis (either every time a certain event occurs or after a certain period of time).
- Ad hoc reporting – working with and helping design reports that are ad hoc, one-off (although these frequently become regular).
- Interpretation – basic to advanced critical thinking skills aligned with data analysis to improve decision making.
- Decision support – specific data analytics that are included in a decision support system to aid decision making in all areas (including clinical decisions to administrative decisions)

Each of these broad areas can be broken down into elements, further into subsections, and then into details in order to support the level of training needs required. In the following section we describe the ways in which this works for one particular section – Data Management.

### **Content Specific Example**

To illustrate the stratified nature of the content such training would provide we can explore the first core topic – Understanding data types.

The first, Basic, layer of knowledge covers a small number of subjects in a broad way, ensuring that these users have a minimal acceptable level of understanding as befits their day-to-day role. Figure 1.

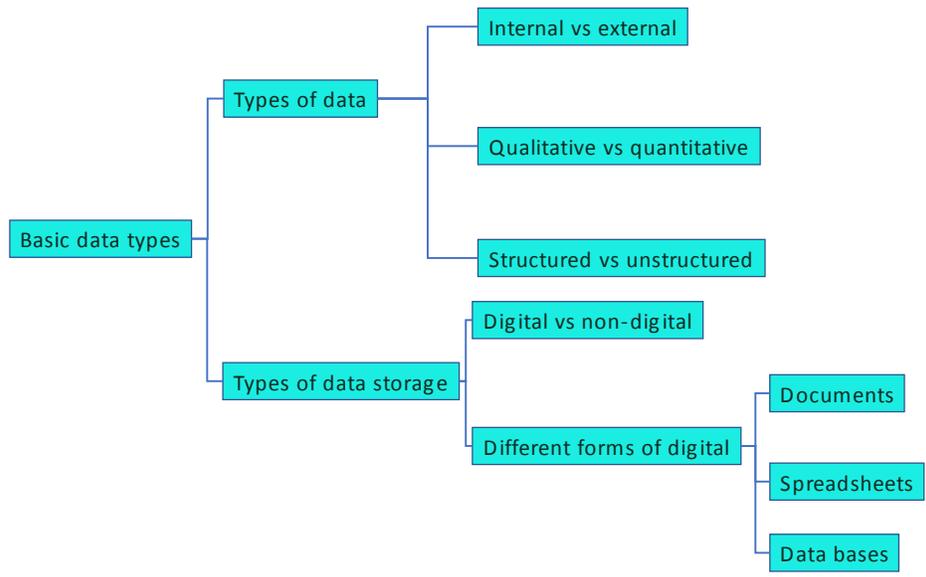


Figure 1: Basic Data Types

The goal is to ensure appropriate coverage of the key data types that will be encountered, without going into levels of detail that are beyond the competence requirements of these team members.

By the intermediate level the data types being covered are expanded both in depth and breadth, as well as including more understanding of data structures. Figure 2.

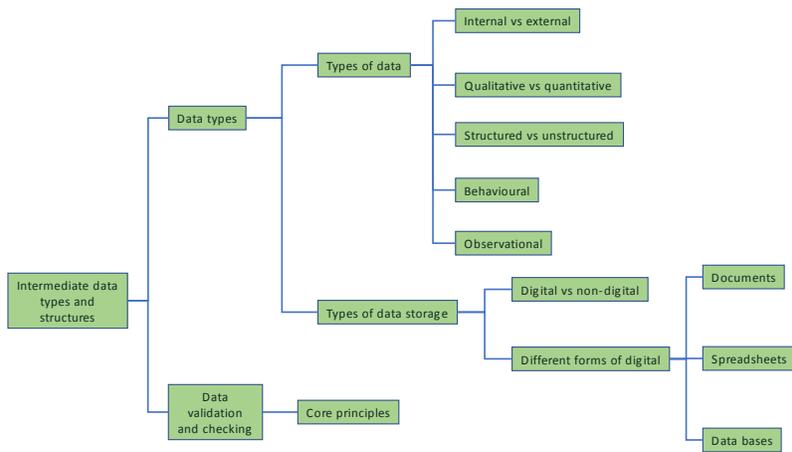


Figure 2: Intermediate Data types and Structure

All of the topics from the Basic level are built upon in ways that address the greater depth of knowledge required by these team members, but there is a core assumption that they do not need to be competent in the full depth of data types and structures.

The advanced material covers a lot more depth and includes data management as well as increased granularity regarding sources and types of data. Figure 3.

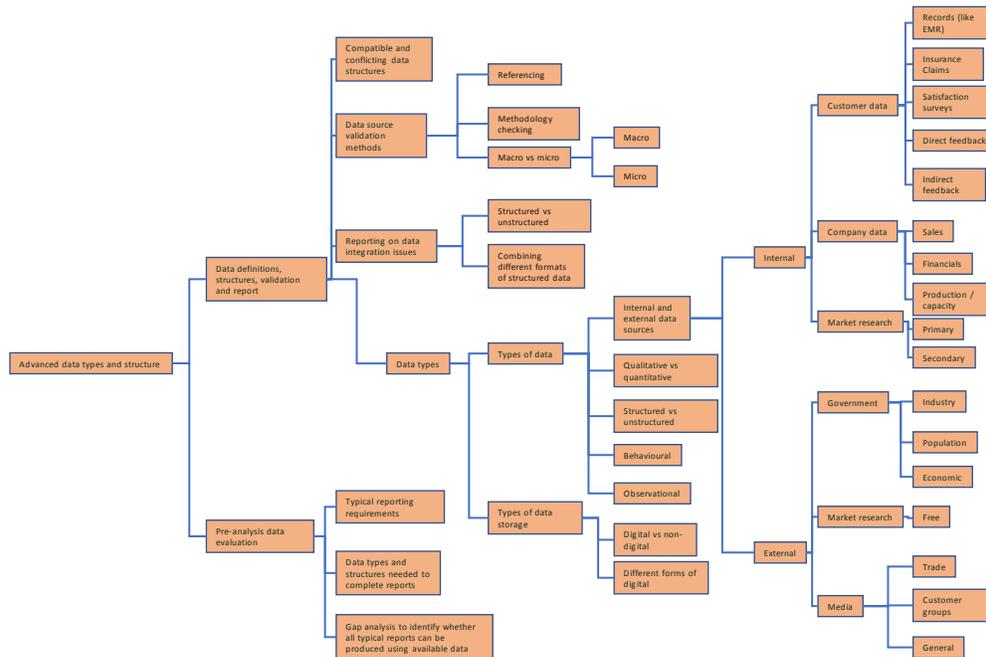


Figure 3: Advanced Data Types and Structure

At this level the team member needs to have strong awareness of sources and types of data that may not currently be available within the organization. The advanced data analysts must, for example, know what sources are available to fill gaps in knowledge.

The approach of progressive curriculum expansion is applied to all 6 of the core subject elements. It is, of course, possible to produce a hybrid curriculum that is suited to specific needs of a particular team or organization, with elements added, expanded or contracted as required.

## Conclusion

Competence based training in areas adjacent to the specific professional skills of healthcare workers is an increasingly accepted principle in all areas of training. Data analytics is one of the areas in which all healthcare workers have a need for improved competence, and these needs range from basic to advanced, in a curriculum that is adapted to the specific requirements of the organization. The goal is that the curriculum meets the needs of the organization so that all team members may become better healthcare analytics citizens.

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