Ingest and Integration of Medical Data in a World with very little DICOM

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Abstract

The Digital Imaging and Communications in Medicine (DICOM) standard has held and continues to hold promise for the transformation of the healthcare systems landscape. The promise is that of rich documents from arbitrary medical devices, with lots of helpful metadata, that enables the distribution, sharing, seamless viewing and automated analysis of different facets of a patient. Unfortunately, this vision has been slow to materialize in the marketplace for a number of reasons. However, there is still a critical need to construct longitudinal and complete views of a patient. In this paper, we describe how novel and reusable ingest and integration technology can be used to bridge the current chasm.

Keywords:

Systems integration, Data systems

Introduction

Since its inception over two decades ago, the focus of DICOM [1] has been to enable the integration of scanners, servers, workstations, printers and network hardware from multiple manufacturers into a Picture Archiving and Communication Systems (PACS) [2]. DICOM has been promoted as a standard for handling, storing, printing, and transmitting information in medical imaging. As the healthcare industry consists mainly of image data, this effort is very important to the sector. Unfortunately, adoption and support of DICOM has been slow; especially in the American healthcare. One of the primary causes for this slow uptake is that healthcare vendors have made significant investment in their current offerings, which tend not to be DICOM-compliant.

Methods

MONGOOSE technology has been developed over the last few years to address the ingest requirements for advanced analytics systems across industries, e.g. media and entertainment and automotive. For this work, we applied MONGOOSE technology to the task of gathering data for a cardiology decision support project with a very large healthcare provider and then evaluated its utility.

Discussion

The cardiological instance of MONGOOSE provided a glimpse into the difficulties that IT departments in healthcare providers across the US face; due to the lack of widespread uptake and implementation of standards, e.g. DICOM [1], HL7, etc. Our initial challenge was that a unified, coherent and complete picture of the patient is required to provide the best possible care; in environments that do not support this goal. The second challenge is the struggle between legacy systems and new technology. The third challenge is that an *episode of care* may span years. Within those years, multiple technology cycles would have been experienced. The fourth challenge is the siloed nature of healthcare institutions, particularly providers, where each silo acts with a lot of autonomy and very little coordination with the other silos in order to ensure consistency. Thus, each silo may make budget decisions on technology investment that widen the integration gap. This eventually leads to a situation with lots of groups of specialized systems and groups of varying system types. These challenges would be greatly reduced (if not eliminated) were the DICOM standard widely adopted. In such a case, MONGOOSE technology would simply be used for monitoring and fault-tolerance. However, in the current healthcare environment, MONGOOSE may be used to produce complete patient profiles, with or without DICOM being present.

Conclusion

Currently, integration of healthcare data to provide a complete view of the patient is a messy task, which cannot be easily performed. Use of standards would greatly enhance the task of integration. Unfortunately, current systems require extraction and integration of some systems that are and will never be standards-compliant. In this paper, we provided a possible solution – use of MONGOOSE technology. We explained how the technology was used in a cardiac decision support solution and presented the observations and lessons learned in the process.

References

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