ITOA –A LITERATURE STUDY

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Abstract

In the past few years, Business Organizations have shown immense interest in IT Operations Analytics (ITOA) solutions. According to Gartner [2],"Global ITOA market is estimated at USD2.17billion in 2015and is projected to grow at a CAGR of35.2% from 2015to 2020." However, the literature on ITOA has not grown in the same pace. There has been limited efforts to systematically select, review, and synthesize the literature on this topic. This paper adopts a Systematic Literature Review (SLR) approach and reports challenges in the ITOA context .The review results of this paper are expected to help researchers and practitioners to understand challenges of ITOA and develop tools, methods and strategies to deal with these challenges. This paper is limited to the number of reviewed studies from selected databases.

Keywords: ITOA, SLR, CAGR

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1. INTRODUCTION

Enterprises need the support of efficient and reliable IT systems and infrastructure for their day-to-day operations. But IT Infrastructure and operations teams face relentless pressure to improve service and support growth initiatives while optimizing costs. Organizations need to reap the benefit of advanced ITOA methodologies to help manage Business Services and the quality of the end-user experience. The core benefit of ITOA comes not from the raw data, but from the processing and analysis of data and the insights, decisions, products, and services that are derived from the analysis. This is not a trivial task and in order to deliver smooth IT Operations, there is a need to understand the underlying challenges in the ITOA landscape.

The objective and motivation of this survey is to give a systematic review of existing ITOA landscape forth ecommercial products. The rest of the paper is organized as follows: In Section I, we begin the paper by defining the key tenets of ITOA. Section II focuses on the research method used in this study. Existing commercial products and architecture used by them are highlighted in Section III. Finally, it discusses the existing challenges before concluding in section V.

2. SECTION I: KEY ITEMS IN ITOA

In this chapter, we describe core concepts and background information. We start by presenting a brief primer on IT Operations Support.

IT Operations Supporter Production support is the practices and disciplines of supporting the IT systems/applications which are currently being used by the end users. Most of the Enterprises rely on conventional methods to manage vast amount of data stored across Knowledge Database, Configuration Management Database, Ticketing Systems or Monitoring alert systems to do this support.

Usuallythereare3 levels of support:
Level 1 (L1) handles on-call support incidents and provides solutions for simple and known problems,
Level 2 (L2) provides administration-level support and deeper technical support, and
Level 3 (L3) provides support for most advanced technical issues through their subject matter expertise.

IT Operations Analytics (ITOA) has been defined by IT analyst Forrester Research [1] as""use of mathematical algorithms and other innovations to extract meaningful information from the sea of raw data collected by management and monitoring technologies." ITOA primary use is to assist support team to make data driven decisions to optimize operations .It leads to operational intelligence during decision-making process itself.
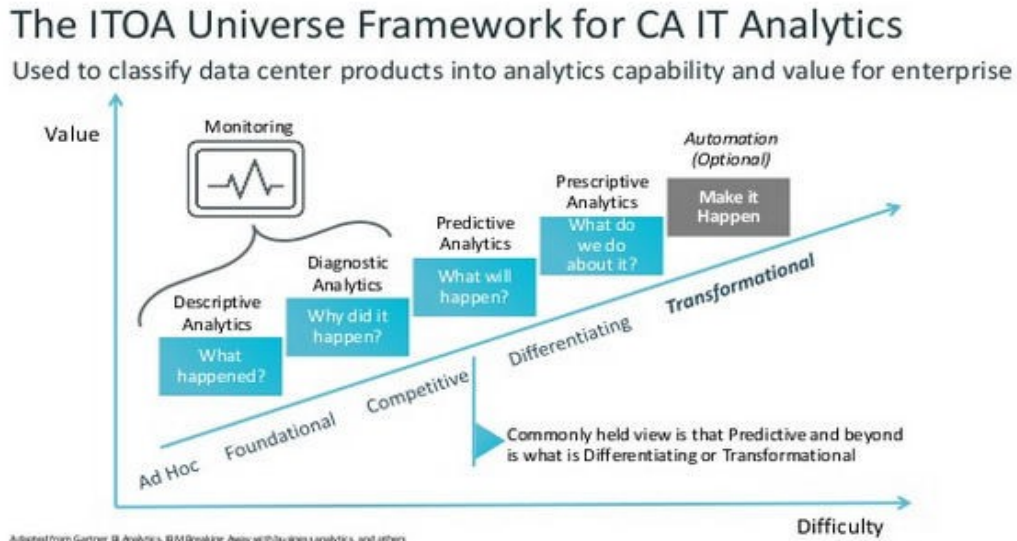
Fig 0: Shows the ITOA frame work from CA

Gartner has outlined core applications for ITOA:

- **Root Cause Analysis:** The models, structures and pattern descriptions of IT infrastructure or application stack being monitored can help users pin point fine-grained and previously unknown root causes of overall system behavior pathologies.
- **Proactive Control** of Service Performance and Availability: Predicts future system states and the impact of those states on performance.
- **Problem Assignment:** Determine show problems may be resolved or, at least, direct the results of inferences to the most appropriate individuals or communities in the enterprise for problem resolution.
- **Service Impact Analysis:** When multiple root causes are known, the analytics system's output is used to determine and rank the relative impact, so that resources can be devoted to correcting the fault in the most timely and cost-effective way possible.
- **Complement Best-of-breed Technology**: The models, structures and pattern descriptions of IT infrastructure or application stack being monitored are used to corrector extend the outputs of other discovery-oriented tools to improve the fidelity of information used in operational tasks (e.g., service dependency maps, application runtime architecture topologies, network topologies).
- **Real time application behavior learning:** Learns & correlates the behavior of application based on user pattern and underlying Infrastructure on various application patterns, create metrics of such correlated patterns and store it for further analysis.
- **Dynamically Baselines Threshold:** Learns behavior of Infrastructure on various application user patterns and determines the optimal behavior of the Infra and technological components, benchmarks and base lines the low and high water mark for the specific environments and dynamically changes the benchmark base lines with the hanging infra and user patterns without any manual interventions.

3. SECTION II: SOURCES OF INFORMATION

Thesearchwaswidelyconductedinthefollowingelectronicsour cestogainabroadperspective

- US Patent Office(uspto.gov)
- IEEE eXplore(ieeexplore.ieee.org)
- Science Direct(www.sciencedirect.com)
- Springer(www.springer.com)
- Market Research firm websites(Gartner, Forrester, IDC, Markets and Markets)
- ITOA commercial vendor white papers

These sources cover the most relevant journals, conferences and work shop proceedings.

The search criteria included the titles (IT Operations Analytics, BigData, IT operations) .The start year was set to 2013, and the end year was 2016.Only papers written in English were included.

4. SECTION III: ARCHITECTURE

IT Operations Analytics solution implementation is based on collecting data which is relevant to business (real-time, historical & archived) from the existing IT Operations system. This data then goes through cleansing. Analytics is applied on the top of it get the right context for an user problem and finally data visualization is done.

Ali Imran Jehangari have discussed the principles to build an ITOA tool in [3] .He has done some research work of on studying new technologies and permit research which is often not possible with commercial tools. In this section, we will focus on commercial ITOA analytics solutions.

ITOA solutions are marketed broadly under 5 applications

- Real time log analytics
- Application Performance management
- Infrastructure management
- Data Visualization
- Network Management

Table 1: shows vendors and corresponding ITOA products

Vendor	Product/Solution
Microsoft	Microsoft Operations Management Suite
IBM Corporation	IBM Operations Analytics -Log Analyzer -Predictive Insights
SAPSE	*SAP* IT Operations Analytics (*SAPITOA*)
BMC	True Sight Operations Management True Sight App Visibility Manager True Sight Infrastructure Management
HewlettPackard	HPE Operations Analytics (*ITOA*)
Splunk	Splunk IT Service Intelligence
Moogsoft	Incident. MOOG
ITRS	ITRS Insights
Zenoss	Zenossas a Service (ZaaS), Zenoss dynamics5
Evolven	Blended Analytics
ExtraHop	Extrahop Platform
VMWare	vRealize Operations
Prelert	Prelert Behavioral Analytics
Appdynamics	Application Performance Management
Nextthink	Nexthink End-user IT Analytics platform

For the "data analytics, these products rely on using Machine Learning /Behavioural Analytic principles as shown in Figure 1
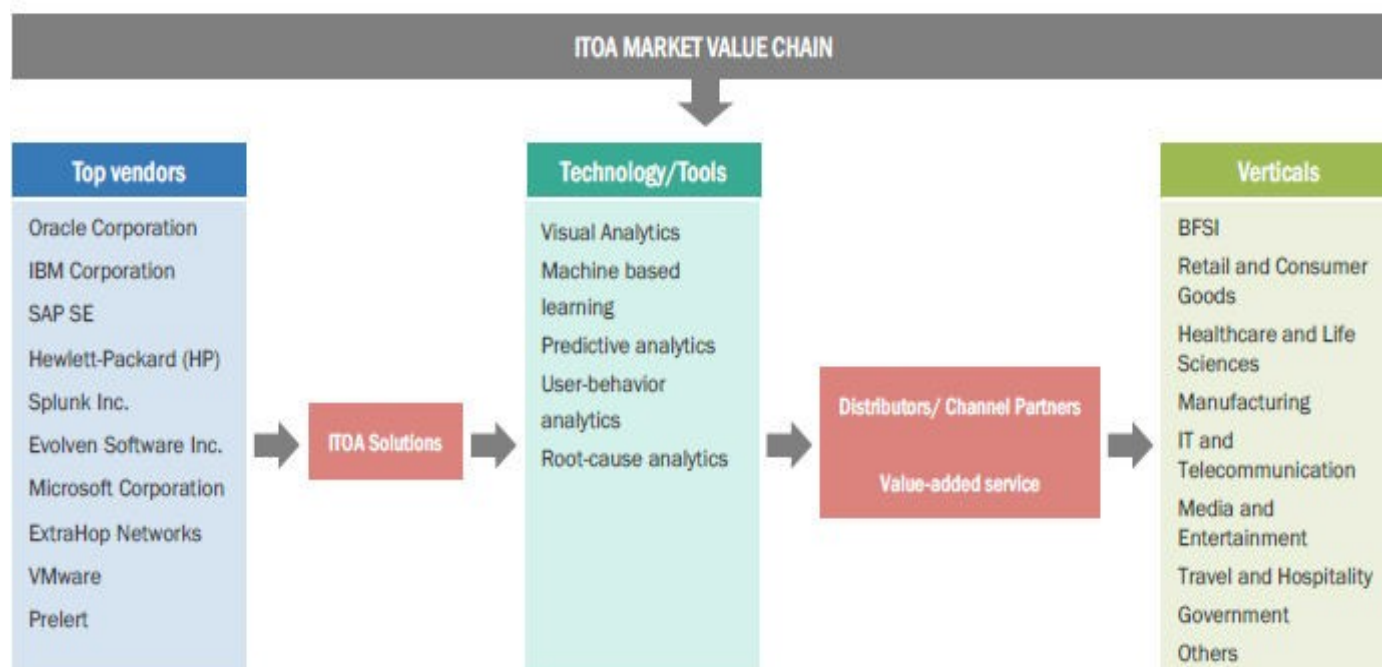
Source: Literatures, Articles, Press Releases, Company Website, MarketsandMarkets Analysis
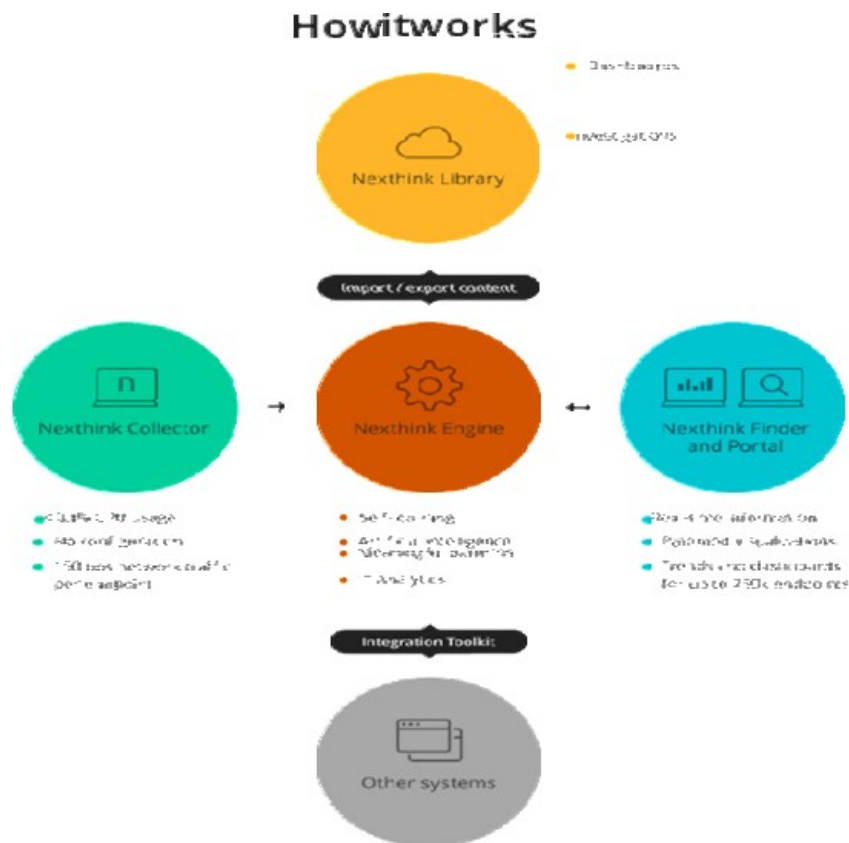
Fig 1: ITO A value Chain

Fig 2: below shows the implementation principle for Next think
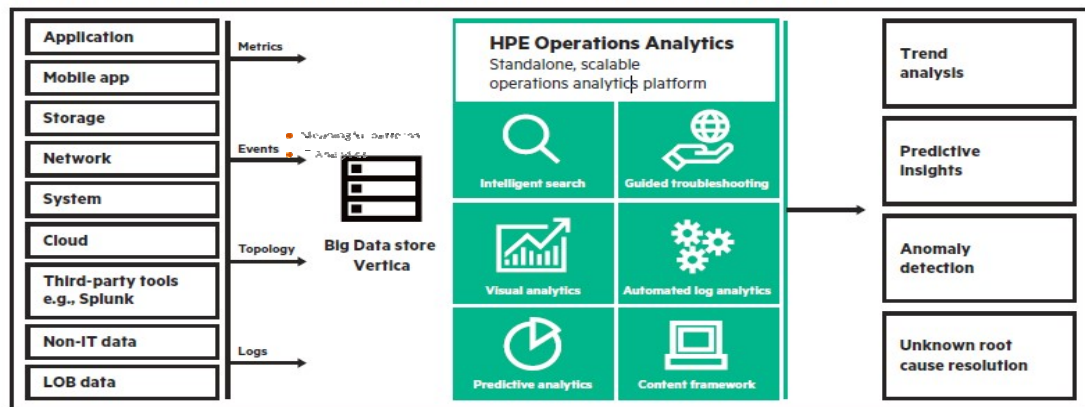

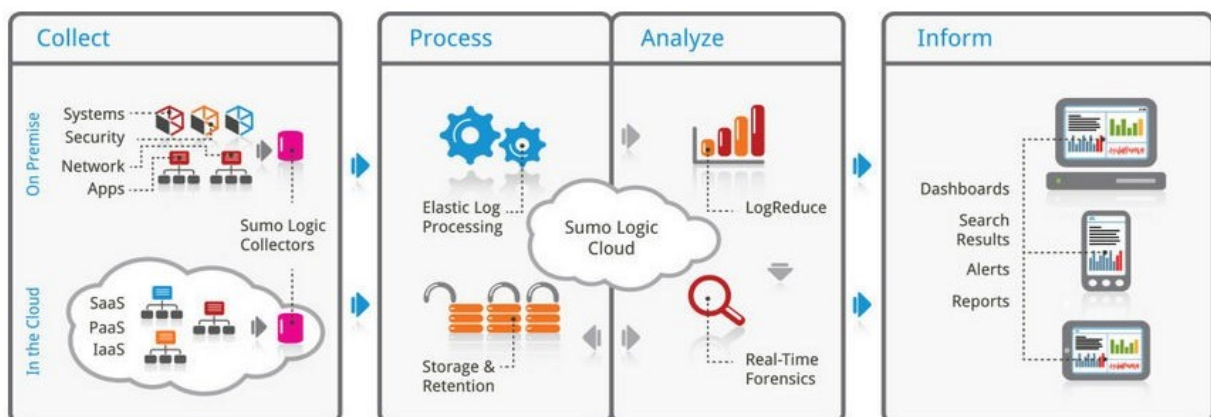**Fig 3:** below shows the implementation principle for HP.

Fig 4: below shows the implementation principle for Sumo logic

5. SECTION IV: CHALLENGES IN ITOA

ITOA solutions suffer from some limitations like:

- Issues are not always evident from logs. Useful information is scattered over diverse location like logs, metrics, events, transaction traces, stack traces, heap dumps, tickets etc. All the data needs to be correlated for accurate analysis.
- Different ITOA solutions work of different data set like Splunk (logs), ExtraHop (network data), Appdynamics (data collected by application) and the data extraction layer is domain/application specific
- Enterprises use separate tools for infrastructure and Business application monitoring resulting in Analytics silos
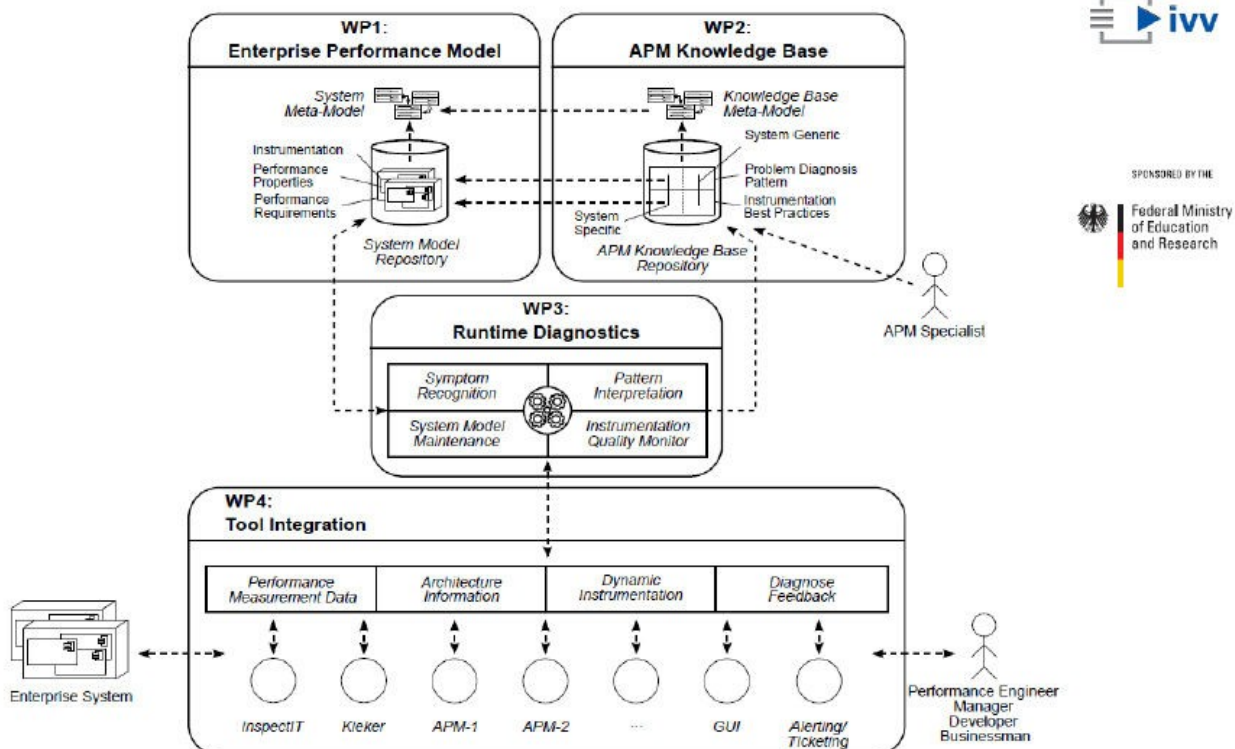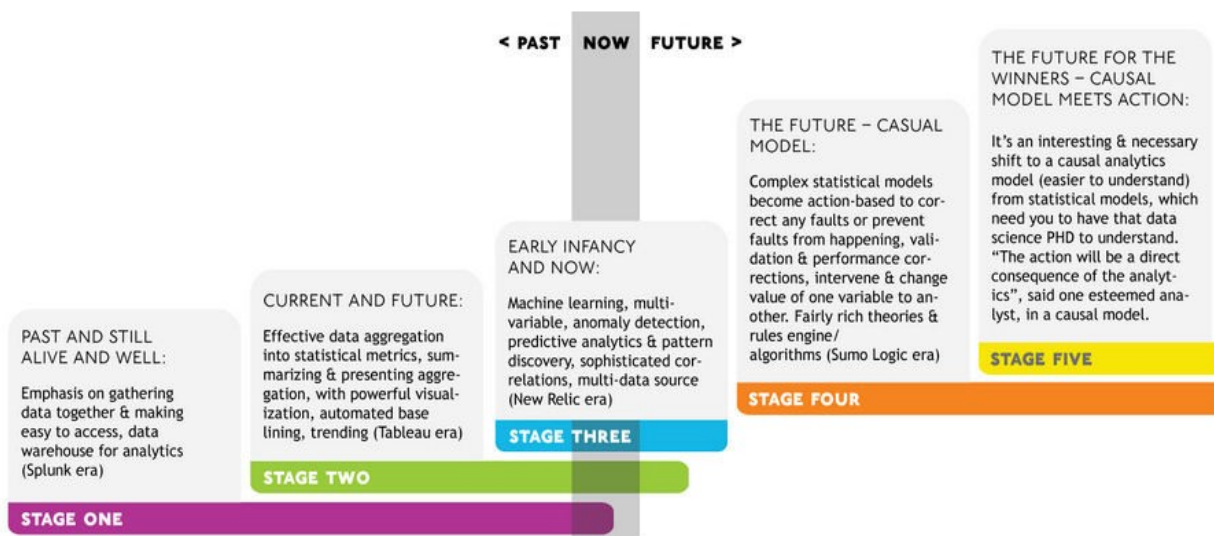- Alerts are based on threshold configuration and is not free from configuration issues.
- Supervised training of the system is non-trivial
- Error messages are thrown even during healthy system state. Depending on the IT environment, machine learning can typically reduce operational noise to some extent

6. SECTION V: CONCLUSION

6.1 WIP

Dynapps. A leading vendor for IT operation analytics has outlined the future of ITOA as shown in diagram below:

REFERENCES

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[3] http://www.apmbuyersguide.com
[4] www.datasciencecentral.com/profiles/blogs/it-s-time-for-businesses-to-use-it-operational-analytics