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# From Dev to the Datacenter

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## Preface

When your critical business applications start performing badly, it's often difficult to quickly pinpoint whether the problem lies with the infrastructure or the developers' code.

If you're tired of trawling through consoles and log files full of alerts to find the root cause of a service outage, then this whitepaper will show you how to leverage Microsoft's System Center and Visual Studio Online cloud solutions to get a full 360 degree view of your applications. With this knowledge, you'll gain the confidence to work with your developer teams to bring a rapid conclusion to your application problems.



## FROM DEV TO THE DATACENTER

by MVP Kevin Greene

 savision

### Introduction to DevOps

Picture the scene: your company has a mission critical application that's not performing as it should be and you have users and management coming to you looking for answers. You've checked the infrastructure that the application is running on and everything seems to be in order. You then speak with the developers of the application about the performance issue but they just shrug their shoulders and blame it on the infrastructure. Stalemate – where do you go from here?

This is a common scenario for a lot of IT Pro's and in many organizations, the development team, infrastructure support team and the end users operate in separate environments with no common management structure to tie all of their processes together. Step forward 'DevOps'. This is a methodology used to bring the communication, collaboration and integration of your software development ('Dev') and IT operations ('Ops') teams together.

Using a DevOps approach with System Center 2012 R2, you converge application support into a more centralized model - which in turn, means that troubleshooting application issues becomes much easier as it gives you the alerts and visualisations you require to monitor your applications right through from 'Dev to the Datacenter'.

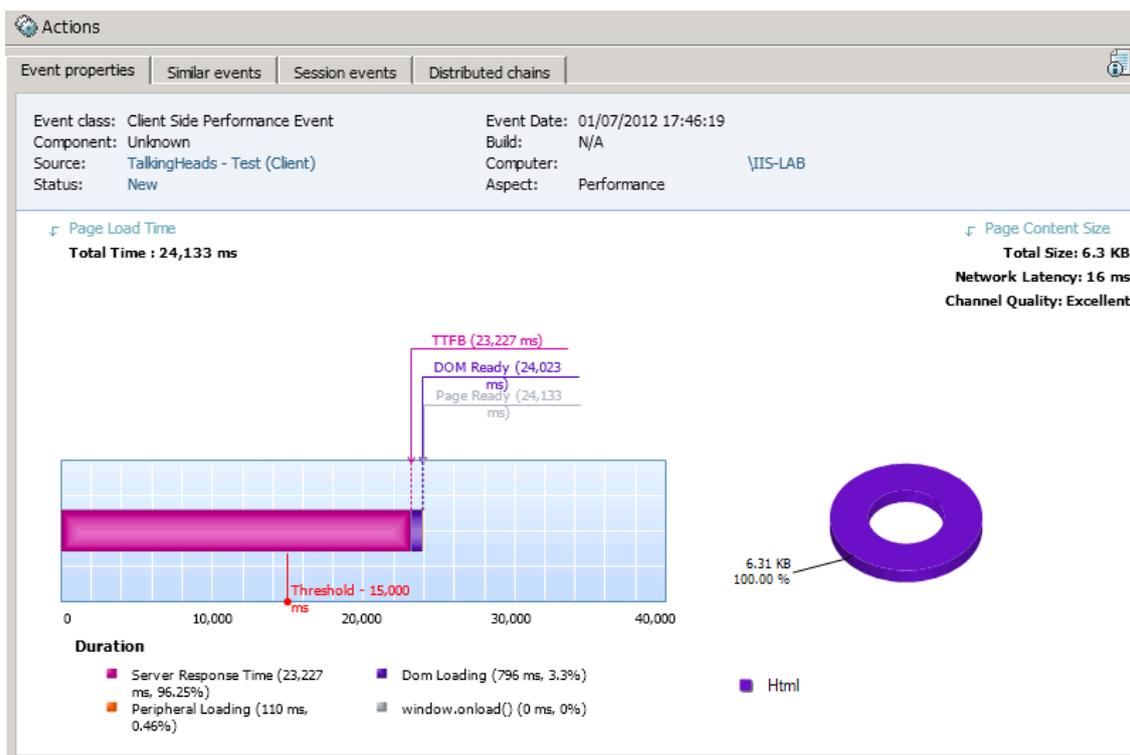
## Application Performance Monitoring

Traditionally, when developers need to understand how their applications are performing, they use a toolset they're familiar with – Visual Studio and Team Foundation Server for example. If you're a developer, then these tools can walk your application through its whole lifecycle - from creation, to testing and then onto publishing. If you're an IT pro however, there's a steep learning curve to get to grips with using developer tools such as these and chances are you'll most likely choose to stay away from them – relying instead on the developers giving you the answers to any issues that might arise with the code inside their applications.

This no longer needs to be the case when you use System Center 2012 R2 – Operations Manager to monitor your applications as you can take advantage of the application performance monitoring (APM) feature that comes built-into the product. With APM enabled, you can monitor your mission-critical .NET and even Java applications from either a server or client-side perspective that will give you insights right down to the code level. You have the capability to create baselines that show you how often an application performance problem occurs, what the performance of a specific server was like before and during the problem and the how the sequence of events related to the original complaint of the application end-users played out. When you are empowered with this type of information about your applications, you will quickly bridge the gap between your development and IT operations teams about whose responsibility it is to resolve the performance issue.

APM in Operations Manager can be enabled without the requirement for the development team to add code modifications to the application. It also has the benefit of monitoring your application with the same tool that you use for monitoring the rest of your infrastructure. Figure 1 shows an example of a client-side performance event being highlighted by APM in Operations Manager.

Figure 1: APM in Operations Manager



For your developers, the Application Diagnostics console shown in Figure 2 is a ‘Dev-friendly’ area specific to APM in Operations Manager that developers can be given access to when they want to work with all of the APM-related events.

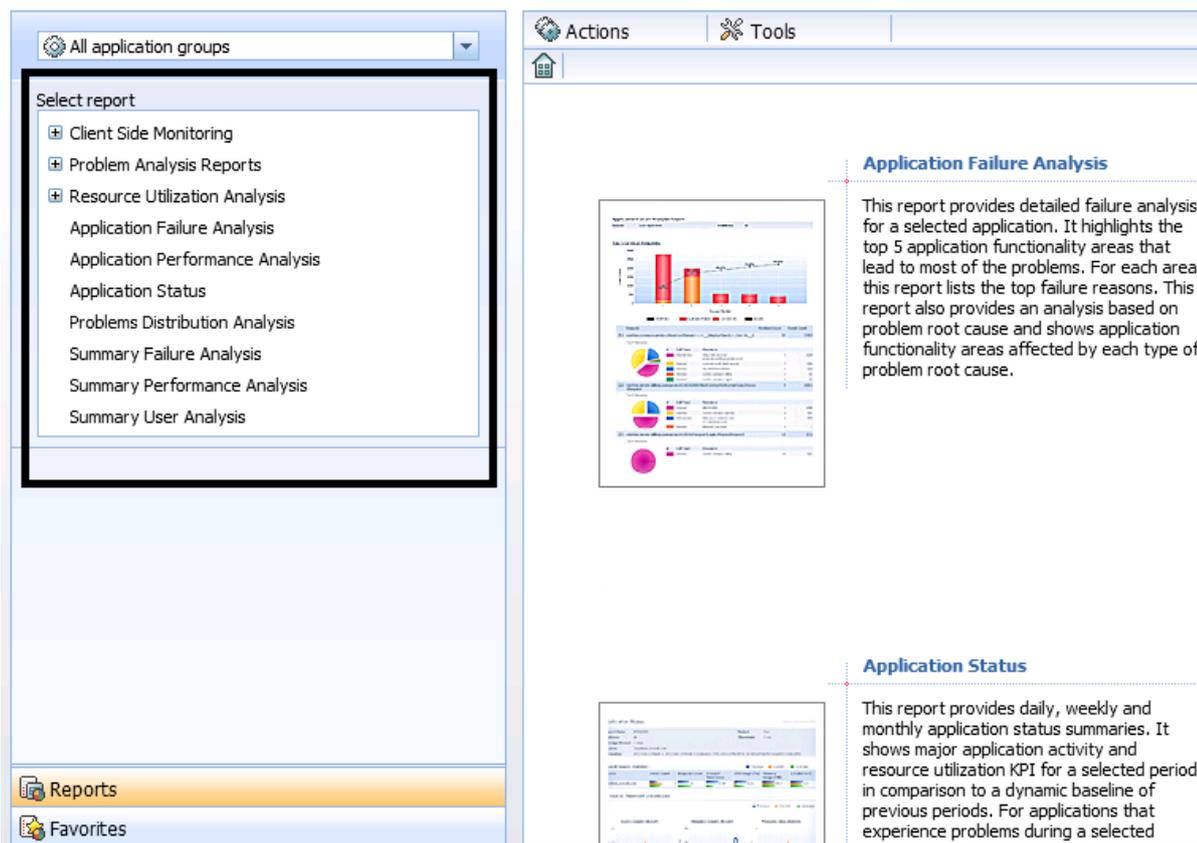
Figure 2: Application Diagnostics APM Console



Developers can also take advantage of the IntelliTrace and Team Foundation Server integration that allows data to be exported from Operations Manager and imported into tools that they feel more comfortable with for debugging their own applications.

For APM reporting, the Application Advisor console in Figure 3 contains over 30 pre-configured reports that can deliver deeper analysis of events and performance issues over a given period of time.

*Figure 3: APM Reporting with Application Advisor*



From a security perspective, leveraging the new ‘**Application Monitoring Operator**’ security role in Operations Manager for scoped Role Based Access Control, you can ensure that only specific users or teams can access the Application Diagnostics and Application Advisor consoles in your environment.

## New Microsoft Monitoring Agent (The Missing Link)

A key enhancement to System Center 2012 R2 - Operations Manager is the introduction of a new multi-talented agent (called the Microsoft Monitoring Agent) that replaces the old ‘Operations Manager Agent’ – which was common to earlier versions of the product. Along with its core functionality of communicating monitoring data back to the Operations Manager Management Servers from managed servers and clients, this new agent can also run as a completely stand-alone agent to enhance your DevOps capabilities.

Developers can deploy a stand-alone instance of the Microsoft Monitoring Agent to servers that host their web applications and can use the agent to collect data for IntelliTrace and Team Foundation Server that can then be imported into Visual Studio for full application profiling trace analysis. It can be configured to collect these traces on demand or to simply be left running to gather trace information over longer periods of time.

The following four new PowerShell commands are used when working with the Microsoft Monitoring Agent outside of Operations Manager in a stand-alone configuration:

- **Start-WebApplicationMonitoring** – this allows you to start monitoring an Internet Information Services (IIS) web application.
- **Stop-WebApplicationMonitoring** – this enables you to stop monitoring an IIS web application and it then creates an IntelliTrace file by using data that was collected during monitoring.
- **Checkpoint-WebApplicationMonitoring** – this creates a snapshot/checkpoint of the IntelliTrace file and continues monitoring.
- **Get-WebApplicationMonitoringStatus** – this is a useful command that returns the monitoring status of all monitored web applications.

*Note: Think of this stand-alone option as a lightweight version of APM for developers that can be configured in a matter of minutes without the need for a complex infrastructure and support from the IT operations team behind it.*

Although deploying the Microsoft Monitoring Agent in a stand-alone configuration for developers is pretty cool, I did mention it was ‘multi-talented’ and it also has the capability to integrate with the newly released cloud-based Application Insights and System Center Advisor services to deliver ‘next-generation APM’ and pro-active monitoring of your applications and IT infrastructure.

## Next-Generation APM with Application Insights

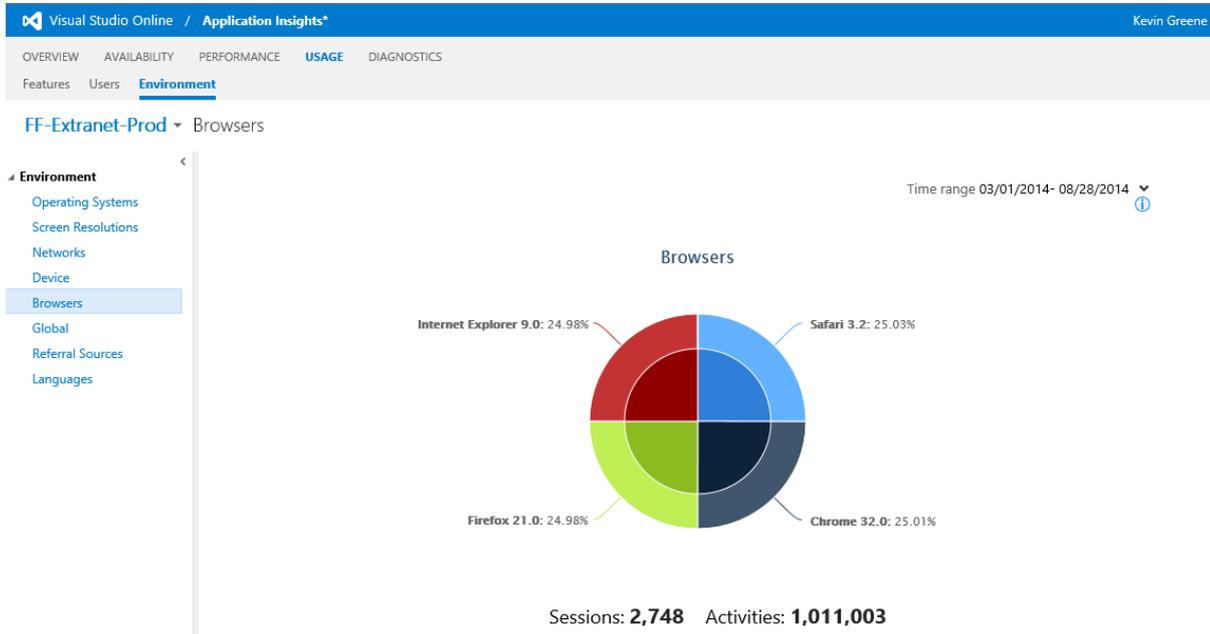
As we see a substantial shift in enterprise workloads moving to cloud-based platforms, it’s only logical that Microsoft would be one of the front-runners when it comes to facilitating these moves – Office365 being a perfect example of this. On the developer side of the house, Visual Studio Online is fast becoming the cloud-based equivalent to its on-premise predecessor and the Application Insights service that comes bundled with it ties in nicely to our DevOps story.

Essentially, Application Insights is a set of cloud-based services that provides actionable insights into your applications. With it, you can get:

- **Outside-in availability monitoring for web applications** – This is identical to the Global Service Monitor (GSM) offering of System Center 2012 that can monitor external URL’s from different Microsoft Azure points of presence around the world.
- **APM** – Gives an understanding of how your applications are performing and includes information like the Top 10 slowest requests, response times, exception rates and load. This is very similar to what we get with the APM capability inside Operations Manager.
- **Usage** – Supplies analytics and statistics in the form of charts and dashboards that help you to understand how your customers and end-users are using your applications.

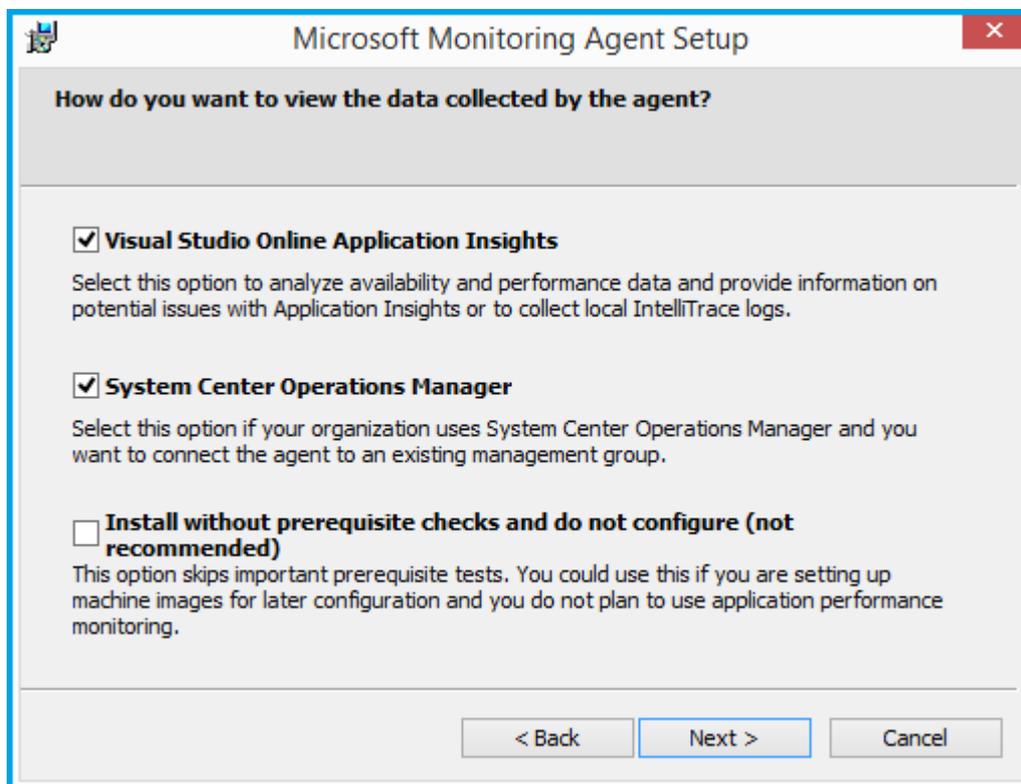
With all of these services readily available for you to fire up and target at your production web applications, you are guaranteed to get some valuable monitoring information back to ensure your applications perform at an optimal level. Figure 4 shows one example of the really useful Environment Usage feature of Application Insights - which displays a dashboard view of different types of web browsers that have been accessing a web application over a given period of time.

Figure 4: Application Insights Environment Usage



Some of the features of Application Insights – such as ‘Outside In’ availability monitoring - can be configured without the requirement for an agent to be deployed to your application servers but other features will need an agent pushed out so you can take full advantage of their capabilities. When an agent has to be deployed, you’ll find that the agent is none other than the ‘Microsoft Monitoring Agent’ that can also communicate data back to Operations Manager. In Figure 5, we can see how the installation of the agent presents us with a choice of connecting it to Application Insights and/or Operations Manager.

Figure 5: Connecting the Microsoft Monitoring Agent



If you choose the 'System Center Operations Manager' option during agent installation, you will need to specify your management group and management server names to ensure that monitoring data on the agent is passed back into your Operations Manager environment.

*Note: At the time of writing, the version of Microsoft Monitoring Agent that can communicate with both Application Insights and Operations Manager is still in preview and the options presented in Figure 5 are only applicable to this preview version.*

## Proactive Monitoring with System Center Advisor

[System Center Advisor](#) (available as a limited preview at the time of writing) is a new proactive monitoring solution from Microsoft that delivers log management, capacity planning, configuration assessment and update assessment all from the cloud. Leveraging information gained from working with customers all over the world through their customer service and support channels, Microsoft has created this offering to complement your on-premise infrastructure monitoring solution to ensure you have the most up-to-date information on best practice configurations available to you.

Using the Microsoft Monitoring Agent, Advisor is available as an attached service to System Center 2012 R2 – Operations Manager and it works by collecting data from your installations, analysing that data and then generating alerts that identify potential issues (such as missing security patches and updates) or anywhere that best practice configuration and usage methods are not being followed.

Advisor can analyse information from the following list of technologies:

- Windows Server
- Active Directory

- Hyper-V
- SQL Server
- SharePoint Server
- Exchange Server
- Lync Server
- Virtual Machine Manager

Computers with the Microsoft Monitoring Agent deployed can be designated or excluded from analysis with Advisor ensuring that you have total control over the information it generates – while still ensuring that Operations Manager is carrying out its normal monitoring of the workloads they are running.

You can view the information and alerts from Advisor directly inside the Operations Manager console or from the cloud in a web browser as shown in Figure 6.

*Figure 6: System Center Advisor Overview*



Although Advisor can be configured with relative ease, there are a number of prerequisites to be aware of before you deploy it:

- If deploying with System Center 2012 SP1 – Operations Manager, then Update Rollup 6 or higher is needed.
- If deploying with System Center 2012 R2 – Operations Manager, you'll need Update Rollup 2 or higher.
- For the Capacity Planning component to work, you need to connect your Operations Manager environment to Virtual Machine Manager.
- Advisor alerts for SharePoint and Lync will only work when a RunAs account has been configured.

## 360 Degree Monitoring with System Center Operations Manager

Services such as APM, the stand-alone Microsoft Monitoring Agent and Application Insights are definitely targeted at the developer side of the 'DevOps' story and now it's time to discuss how we can perform full 360 degree monitoring of our workloads and IT infrastructures using Operations Manager.

To deliver a true 360 degree monitoring solution, you need to have the capability to monitor:

- **Workloads** – Windows Server, SQL, Exchange, SharePoint etc.
- **Internal Web Applications** – Websites, Intranets, LOB applications
- **Private Cloud Fabric** – virtual hosts, virtual machines, network devices, storage, physical hardware.
- **Public Cloud Resources** – IaaS and SaaS monitoring from public clouds such as Azure.
- **External Web Applications** – Websites and URL's that are hosted externally and away from management reach.

System Center 2012 R2 – Operations Manager gives us all of the above capabilities through a combination of best-of-breed management packs for Microsoft workloads, APM for code-level application monitoring, Virtual Machine Manager integration for fabric monitoring, public cloud monitoring for Microsoft Azure IaaS and Office 365 SaaS and external web application monitoring through the use of Global Service Monitor integration. Add System Center Advisor integration into the mix for proactive best practice recommendations and you have yourself a true 360 degree view of your IT services that span across all platforms and geographical locations.

## Modelling Your IT Services

To bring all of these monitored components together, you need to take a step back from the trenches and make a list of all the IT services that you and your team have responsibility for managing within the business. This list will form the basis of your IT Service Catalogue. To get you started, here's an example of some common IT services:

- Active Directory Service
- Internet Service
- Email Service
- Backups Service
- Intranet Service
- Finance Service
- Virtualisation Service

From your newly formed IT Service Catalogue, you can go through each IT service on the list and map out each of the sub-components that service has a dependency to function on– using a tool such as Microsoft Visio is an excellent aid for this process.

As an example, if you take the 'Email Service' from our list above and then map out its sub-component dependencies as comprising some Microsoft Exchange Mailbox Servers, a CAS Array, some Hub Transport Servers, a few network devices, the physical server hardware the servers run on and your Active Directory FSMO role holders – you then have the basis of a pretty comprehensive IT service.

With all the sub-components of an IT service mapped out and documented, you can then go ahead and ensure that each of them are being monitored in Operations Manager. Some services will require

deeper monitoring than others – particularly the ones that require APM for code-level analysis – and others will be pretty straight-forward to configure.

When you have all of the sub-components of each IT service monitored, it is then time to create a [Distributed Application](#) in Operations Manager - which enables you to bring all of the various bits and pieces of an IT service together into a single entity that represents the overall service. This is a crucial piece of the jigsaw puzzle because when you can represent an IT service as a single entity, you can then associate availability, performance and SLA's against that service – all of which enable you to manage your services in the same way that your end users consume them (Up = **Green**, Down = **Red** and Not Fully Working = **Yellow**).

## Visualising Your Monitoring

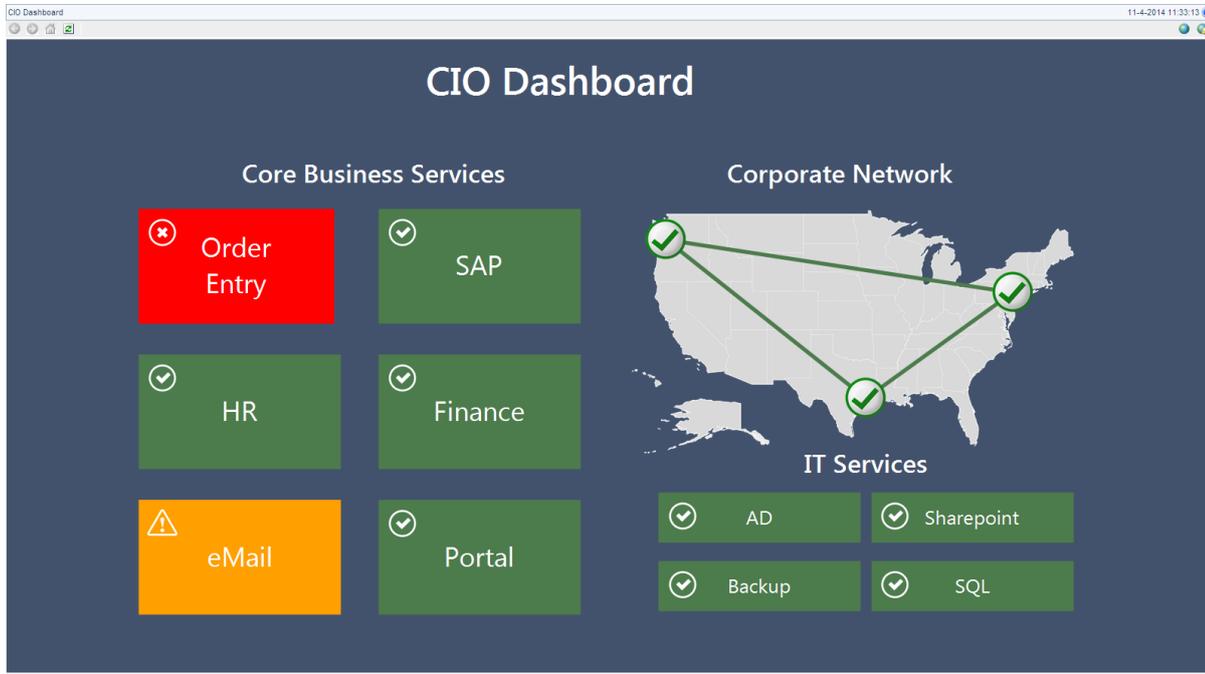
There are a number of ways to view your newly modelled IT services out of the box in Operations Manager by configuring Diagram Views, State Views and custom dashboard widgets but if you really want to take your visualisations to the next level, then leveraging some of the solutions from partners like Savision who work with Microsoft on delivering augmented System Center solutions is a no-brainer.

Live Maps is one such product in the Savision product catalogue that enhances Operations Manager visualisations by helping you to structure your monitored IT components so that it becomes very easy for all stake holders in your organization to understand the impact and root cause of service outages. It offers out of the box dashboards for C-level management, Service Owners, IT management, Helpdesk and Application and Infrastructure Engineers.

Savision will even take the complexity of Distributed Application deployment away from you by creating a new Operations Manager Distributed Application with each service view that you build inside Live Maps!

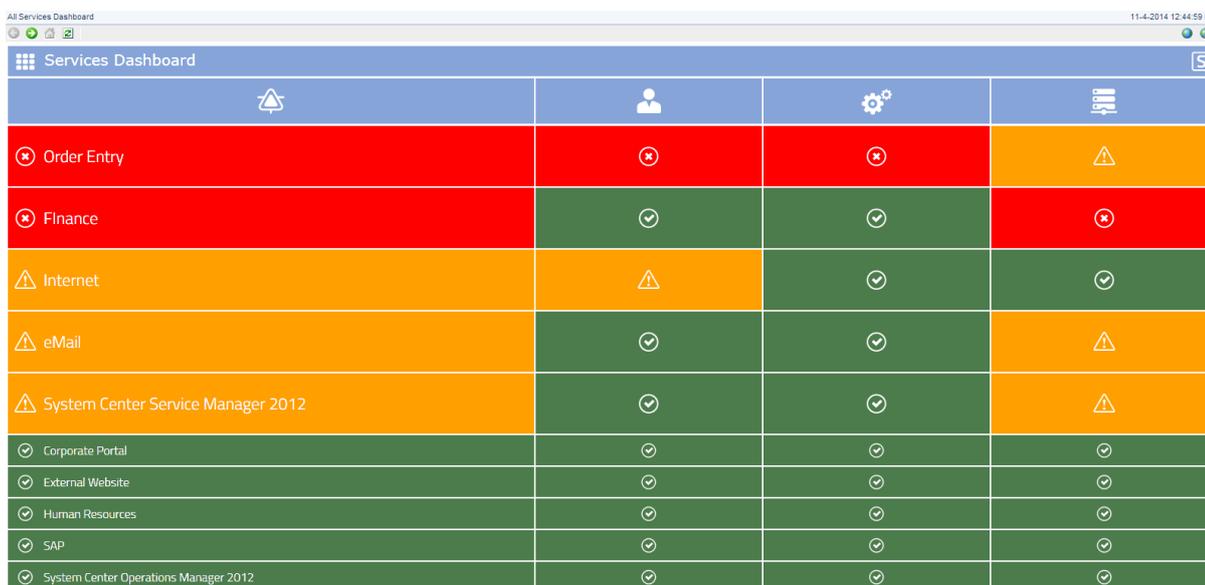
Figure 7 shows an example of a 'C-Level' management dashboard type that (in my opinion) should be deployed inside every organisation that's serious about IT service monitoring. This dashboard example represents all of the IT services and corporate network connectivity in an easy to consume high-level format to keep your senior management informed about how IT is performing in the business.

Figure 7: C-Level Management IT Service Dashboard



In Figure 8 we can see a heat-map type dashboard that also represents the IT services in a particular organisation but in this case you have different health states that represent the overall service, the end-user, the application and the infrastructure perspective health states.

Figure 8: IT Services Dashboard



Along with these sample dashboards, you can create completely unique visualisations from scratch with the Live Maps authoring console and your options to visualise your IT environments through monitoring is only limited by how far your imagination can stretch.

## Summary

Whether you're an IT Pro or a Developer, deploying System Center 2012 R2 – Operations Manager as a part of your DevOps methodology will enable you to not only monitor your IT infrastructure and services, but also your applications - right down to the code-level with APM. Deploying the new Microsoft Monitoring Agent to integrate with services such as Visual Studio Online Application Insights and System Center Advisor only further strengthens the relationship between developer and IT operations teams.

With your IT Service Catalogue mapped out, you can then start to bring all of your IT services under a central monitoring solution in Operations Manager. To super charge your investments in monitoring, deploying augmented System Center partner solutions such as Savision's Live Maps to create the right visualisations and dashboards to suit the various business units of your organisation will quickly deliver return on investment and reduce your mean-time-to-resolution of IT service outages.

## About Kevin Greene

Kevin Greene works as the CloudOS practice lead for Ergo, an IT consulting company and Microsoft Gold Certified Partner based in Ireland. He's a Microsoft [System Center Cloud and Datacenter Management MVP](#) and co-author of *Mastering System Center 2012 - Operations Manager* (Sybex) and *Mastering Windows Server 2012 R2* (Sybex).

An active member of the System Center and CloudOS community, you can find him on Twitter [@kgreeneit](#) or on his blog at <http://kevingreeneitblog.blogspot.com>

## About Ergo

Headquartered in Dublin, with in-excess of 200 employees, Ergo has provided IT solutions and services to the private and public sector for over 20 years, building up trusted relationships and helping organisations realise their business goals through the use of technology. The company has a team of highly skilled technical consultants and IT experts that help clients adapt to change, using the latest technologies to stay lean and competitive in good times and bad.

A Microsoft Gold Certified Partner and HP Gold Specialist, Ergo provides its clients with expertise around best-of-breed products.

With a portfolio of in-house solutions, Ergo has won international recognition and [awards](#) such as; ['Microsoft Partner of the Year'](#) and ['ICT Excellence - Managed Services Company of the Year'](#). The company has also been recognised as a ['Deloitte Best Managed Company'](#) and a ['Great Place to Work'](#).

For consultancy and more information: [www.ergogroup.ie](http://www.ergogroup.ie)

## About Savision

Savision is the market leader in business service and cloud management solutions for Microsoft System Center. The company's monitoring and visualizing capabilities bridge the gap between IT and business, by transforming IT data into predictive, actionable and relevant information about the entire cloud and datacenter infrastructure. Savision's intuitive and customizable dashboards provide context for each business service, increasing organizational efficiency, reducing IT operational costs up to 20%, and preventing IT-related problems and business downtime.

Savision's solutions scale from small and medium businesses and government bodies to Fortune 500 companies operating in different fields and have been adopted by over 650 organizations worldwide.

Savision is headquartered in Amsterdam, The Netherlands, and has offices in Dallas and Ottawa.

For more information, visit [www.savision.com](http://www.savision.com)