



## Upgrading of on premises dynamics CRM 2015

Syed Z.A.\*, Soomro T.R.

Department of Computer Science SZABIST, Dubai Campus, UAE

Email: s.zubair.ali@gmail.com

### ABSTRACT

The main objective of this paper is to investigate and identify the different challenges and issues involved in on premises Microsoft Dynamics CRM 2015 upgrade process from the older versions, and to make recommendations for organizations who are willing to upgrade their Dynamics CRM environment. An actual upgrade of Microsoft Dynamics CRM 4.0 to CRM 2015 is performed for a mid-sized organization and the process of upgrade is noted with the challenges and issues faced and the knowledge gathered which can provide insight for other organizations who are willing to upgrade their environment to consider before upgrade. Developer challenges are also discussed for custom code migration during upgrade process. Finally, latest Microsoft Dynamics CRM 2016 challenges are identified for future research work.

**Keywords:** CRM, Microsoft Dynamics CRM, Migration Challenges, On Premises CRM, Online CRM.

### 1. INTRODUCTION

Customer relationship management (CRM) refers to the standard practices followed to manage customer interactions and information exchange throughout the customer lifecycle. These practices improve the relationships with customers and also assist in customer retention with better customer service [1]. CRM systems support different channels to capture the information including corporate website, mobile apps, social media, email, phone and in person visits.

Microsoft Dynamics CRM is part of Microsoft Dynamics suite of business applications, focuses mainly on Service (help desk), Marketing, and Sales sectors. Dynamics CRM is an IIS based web application which provides a development experience that can be used across a wide variety of programming languages, platforms, and devices. Clients access Dynamics CRM either by using standard web browser or by Microsoft Outlook. The latest version of Microsoft Dynamics CRM is 2016 which is released to market on 30th November 2015 [2] but in this paper upgrade till Microsoft Dynamics CRM 2015 is discussed.

Microsoft Dynamics suite has different products available which are used by a huge number of customers all over the world. As per the data updated in 2015 [3], following is the breakdown of the Microsoft Dynamics customer numbers worldwide by product also shown in the Figure 1.

As Microsoft Dynamics CRM is being used by over 40,000+ companies in the world with 4.4 million users [4], the newer version of Dynamics CRM 2016 is released on 30th November 2016 which is expected to be welcomed by companies due to the new features.

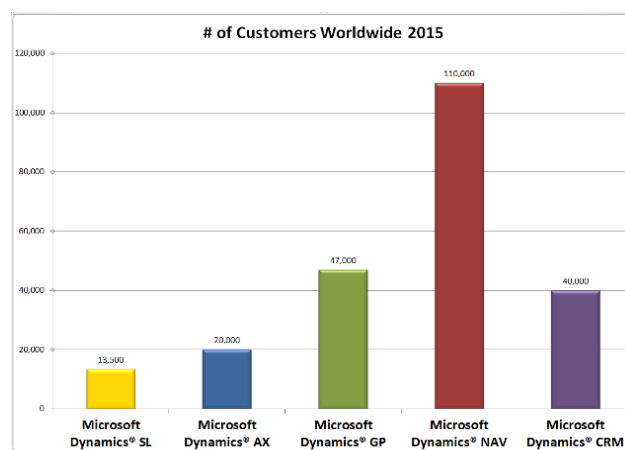


Figure 1. Dynamics Customers worldwide 2015 [3]

### 2. DYNAMICS CRM DEPLOYMENT OPTIONS

Different Microsoft Dynamics CRM 2015 deployment options can be considered based on the resources available. Following are the different options available for Microsoft Dynamics CRM 2015:

#### 2.1 On-premise

Microsoft Dynamics CRM 2015 can be installed on premise servers with the help of IT and infrastructure support to install and set up CRM 2015 and the related software applications [5]. If there is available infrastructure that is

compatible with CRM 2015, it can be reused; otherwise, it need to set up a new server or virtual servers based on the requirement.

Microsoft Dynamics CRM 2015 on premise provides full control over the database. Since the application is installed on client's own servers, they are free to access the CRM database for taking backups, restoring in case of failure, profiling, SSRS reporting, accessing records, and other activities. Microsoft Dynamics CRM 2015 on premise server is available in two editions as follows:

- (1) Workgroup edition is limited to five users and one organization.
- (2) Server edition involves unlimited users and multiple organizations.

## 2.2 Online

Microsoft Dynamics CRM 2015 Online is hosted on Microsoft's data centers. All the required infrastructure is handled by Microsoft, so it doesn't require any servers. Microsoft also provides access to nonproduction instances, which can be used for development or testing purposes based on the number of users in our production organization.

Clients don't get the flexibility on their deployment and they cannot access their CRM database, so backup and any type of database troubleshooting is not possible directly; they need to always work with Microsoft support for these activities. The database might be also hosted outside of their country because there are limited data centers available. Microsoft Dynamics CRM 2015 online provides a default size of 5 GB, which is increased by 2.5 GB for every professional user's subscription at no extra cost until 50 GB. If more space is needed after that, they need to pay for every GB.

## 2.3 Hosted

Hosted deployment is a mix of on premise and online deployment. Here, a CRM application is hosted on a third-party vendor instead of Microsoft and the services are dependent on the service agreement with the CRM service provider.

## 3. MICROSOFT DYNAMICS CRM UPGRADE OPTIONS

Based on the existing deployment type, Microsoft provides different upgrade options for Dynamics CRM. Here one important point to note that the upgrade is a one-way process and it cannot be reverted/uninstalled. For the on-premise environment, following are the options available for upgrade an existing environment:

### 3.1 In place upgrade

Client may go for the in-place upgrade option, if the existing servers hosting the current system are compatible with the new CRM system requirements. This option is not recommended by Microsoft for upgrade as the existing service downtime is more as the service will not be available while the upgrade process. While in the upgrade, databases may also get corrupted so it is recommended to take backups of the system and databases.

### 3.2 Migration upgrade

This option requires a different server setup, but still this is the recommended method of doing an upgrade because it involves less downtime. Client can use two methods of migration upgrade.

#### 3.2.1 Migrate by using a new instance of SQL Server

It is the recommended option for upgrading from a previous version of Microsoft Dynamics CRM to a newer version. Although this option requires a different computer for newer version of Microsoft Dynamics CRM Server and a different instance of SQL Server, it provides the least amount of potential downtime for Microsoft Dynamics CRM since the older version of Microsoft Dynamics CRM deployment can remain functioning until the upgrade is completed and verified.

#### 3.2.2 Migrate by using the same instance of SQL Server

This option requires a different computer for new version of Microsoft Dynamics CRM Server, but will upgrade in-place the configuration and default organization databases using the same instance of SQL Server. If issues occur during the upgrade, roll back is possible to older version of Microsoft Dynamics CRM to avoid significant downtime.

## 4. CHALLENGES OF MICROSOFT DYNAMICS CRM UPGRADE SCENARIOS

Microsoft has done a lot of changes in their new versions of Dynamics CRM and this increase the efforts to apply solutions while upgrading and it may become more complex when someone is upgrading from an older version of Dynamics CRM. For example, if someone is upgrading from CRM 4.0 to 2011, there are big changes done in the SDK and the main issues will be around the JavaScript used, Plugins which were developed and the Reports created. From upgrading CRM 2011 to 2013, fairly less changes are required and most common issues are regarding the new functionality, Business Rules and Process Stage. From upgrading CRM 2013 to 2015, programmatically everything is similar, but here it's very important to adopt features introduced in 2013 and enhanced in 2015.

Some of the common challenges that can be faced during an upgrade of a particular version of Dynamics CRM to the latest version of Dynamics CRM are listed below:

### 4.1 Challenge # 1

Microsoft has drastically reduced the use of the ASP.NET applications on the ISV folder to only those that were using the CRM 4 endpoint. ISV folder was deprecated on 2013 [6].

Solution: Use HTML Web Resources (JavaScript, Silverlight, HTML 5) and Plugins in place of ISV folder customizations.

### 4.2 Challenge # 2

Microsoft CRM 2011 had introduced the native .NET types on the Entity Attributes No need to carry on using types like CRMBoolean, Dynamic Entity, etc.

Solution: Rewriting of the code is required to support the new types. For more information check the following list by Ben Hosking [7].

### 4.3. Challenge # 3

To be prepared for upgrade to Microsoft Dynamics CRM 2013, all custom code of older version of CRM needs to be validated before upgrade. This require identification of the unsupported JavaScript libraries and HTML web resources and then rewriting of it [6].

Solution: Microsoft has provided a tool for custom code validation to target CRM v4 client SDK calls, CRM 2007 end points and common DOM manipulations [8]. The tool can be downloaded from Microsoft website [9]. Legacy Feature Check tool is designed for CRM On-premise customers to scan a CRM 2011 organization for unsupported customization on server side.

### 4.4 Challenge # 4

With 2013, Microsoft introduced the Auto Save feature that will save the record every 30 seconds if changes have been done. It will affect to Plugins, Workflows, JavaScript code written to trigger on save event [10].

Solution: Turn it off under Settings > Administration > System Settings. Another possibility is to use JavaScript to “disable” it manually on every form.

### 4.5 Challenge # 5

With CRM 2015, Microsoft has stopped adding new features to the 2011 forms. Although some people reported issues when merging the Forms and exporting the customizations.

Solution: Migrate and if required use this workaround by Jukka Niiranen [11].

### 4.6 Challenge # 6

Non-supported versions of Internet Explorer (8 and 9) are no longer redirect to the mobile website in CRM 2015.

Solution: It is important to consider any client side code that might break with non-supported browsers before it does not work while the form may load, but the logic might not work. Scenarios: Auto Populate data, OnSave events.

### 4.7 Challenge # 7

Business Processes and Business Rules have been enhanced. Jumping Process Stages depending on logic.

Solution: Use Out of the Box functionality

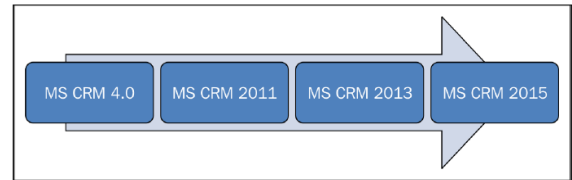
### 4.8 Challenge # 8

A lot of JavaScript is required to be converted before upgrade from CRM 4 to CRM 2011 to make sure it supports the newer version.

Solution: Use JavaScript converter tool developed by Rhett Clinton (MVP) available to be downloaded on codeplex [12].

## 5. ON PREMISE MIGRATION UPGRADE OPTION

There is no jump in upgrading from one version to third version by skipping the second version, it has to be sequential. It’s better to choose the migration upgrade option as in this case it will be less or minimal downtime of the system. But the downside of this option is extra hardware and software while in the phase of migration. Figure V.1 shows the Dynamics CRM version upgrade direction:



**Figure 2.** Versions required to upgrade

The overall migration is divided in three phases:

- (1) Phase 1 - Install and configure the environment for different Dynamics CRM versions
- (2) Phase 2 - Test Upgrade and Development
- (3) Phase 3 - Final Production Migration

### 5.1 Phase 1 - Install and configure the development environment

#### 5.1.1 Microsoft Dynamics CRM 2011 Development Server

Following is the configuration of the Dynamics CRM 2011 development server having Windows Server 2008 R2 standard 64-bit operating system, as shown in Table 1:

**Table 1.** Dynamics CRM 2011 Development Server configurations

Hardware configuration:			
Server Name:	CRM2011Dev		
Windows:	Windows Server 2008 R2 Standard 64 bit Operating System		
RAM:	8 GB	Hard Disk:	100GB
Software Installed in order:			
1.	Microsoft .NET Framework 4		
2.	Microsoft SQL Server 2012 Standard Edition (Trial)		
3.	Microsoft Dynamics CRM Server 2011		
4.	Microsoft Dynamics CRM Server 2011 Arabic Language Pack		
5.	Microsoft Dynamics CRM 2011 Reporting Extension		

#### 5.1.2 Microsoft Dynamics CRM 2013 Development Server

Following is the configuration of the Dynamics CRM 2013 development server having Windows Server 2012 R2 standard 64 bit operating system, as shown in Table 2:

**Table 2.** Dynamics CRM 2013 Development Server configurations

Hardware configuration:			
Server Name:	CRM2013Dev		
Windows:	Windows Server 2012 R2 Standard 64 bit Operating System		
RAM:	8 GB	Hard Disk:	100GB
Software Installed in order:			
1.	Microsoft .NET Framework 4		
2.	Microsoft SQL Server 2012 Standard Edition (Trial)		
3.	Microsoft Dynamics CRM Server 2013		
4.	Microsoft Dynamics CRM Server 2013 Arabic Language Pack		
5.	Microsoft Dynamics CRM 2013 Reporting Extension		

#### 5.1.3 Microsoft Dynamics CRM 2015 Development Server

Following is the configuration of the Dynamics CRM 2015 development server having Windows Server 2012 R2 standard 64 bit operating system, as shown in Table 3:

**Table 1.** Dynamics CRM 2015 Development Server configurations

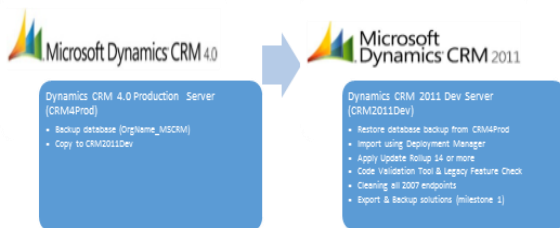
Hardware configuration:			
Server Name:	CRM2015Dev		
Windows:	Windows Server 2012 R2 Standard 64 bit Operating System		
RAM:	8 GB	Hard Disk:	100GB
Software Installed in order:			
1.	Microsoft .NET Framework 4		
2.	Microsoft SQL Server 2012 Standard Edition (Trial)		
3.	Microsoft Dynamics CRM Server 2015		
4.	Microsoft Dynamics CRM Server 2015 Arabic Language Pack		
5.	Microsoft Dynamics CRM 2015 Reporting Extension		

## 5.2 Phase 2 - Test upgrade and development

Once the Phase 1 was completed of configuring all the CRM versions machines, Phase 2 of test upgrading in development was started with three experiments for migration from Dynamics CRM 4 to Dynamics CRM 2011, then to upgrade from Dynamics CRM 2011 to Dynamics CRM 2013 and finally from Dynamics CRM 2013 to Dynamics CRM 2015. Below are the experiments mentioned, with all the steps involved:

### 5.2.1 Experiment # 1: Migration from Dynamics CRM 4.0 to CRM 2011

It is recommended to clean the organization's data before upgrading to CRM 2011. Some of the upcoming functionality depreciated from CRM 2013 version, so if we are upgrading ultimately to CRM 2015 from CRM 4.0, we need to clean the organization's data. Following are the steps performed in this experiment and also shown in Figure 3:



**Figure 3.** Migrating from Dynamics CRM 4.0 to 2011 (First scan)

(1) Cleaning Microsoft Dynamics CRM 4.0 web service endpoints (known as 2007 endpoints) are not supported by CRM 2015, so if these endpoints are being used in the code it is must to update the code to use OData or SOAP using 2011 WCF endpoints before upgrade.

(2) Microsoft Dynamics CRM 2015 does not support the CRM 4.0 object model. So, if there is any client-side code written using the CRM 4.0 object model that needs to be changed to a similar CRM 2015 object model, CRM 2013 custom code validate tool can be used to detect scripting, which was written using CRM 4.0 standards. Microsoft Dynamics CRM 2013 custom code validation tool can be downloaded from [13].

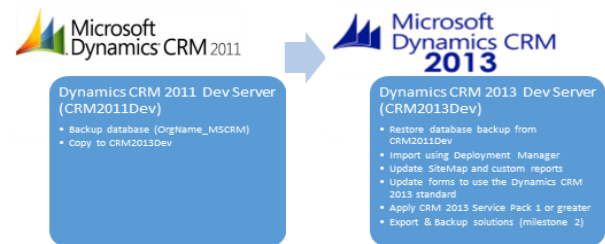
(3) Backup Microsoft CRM 4.0 database (OrgName\_MSCRM) from production & copy it to Microsoft Dynamics 2011 development server

(4) Restore OrgName\_MSCRM database and import using Deployment Manager

- (5) Review log file
- (6) Apply Update Rollup 14 or more
- (7) Execute Code Validation Tool and Legacy Feature Check
- (8) Update plugins/JavaScript/ISV
- (9) Test the CRM with all the features working
- (10) Export & Backup Dynamics CRM 2011 solutions
- (11) Backup Dynamics CRM 2011 OrgName\_MSCRM database.

### 5.2.2 Experiment # 2: Migration from Dynamics CRM 2011 to CRM 2013

Once the steps are being performed in first experiment, now it's time to move to Dynamics CRM 2013 with second experiment. Following are further steps performed in this experiment continued to the previous experiment and also shown in Figure 4:

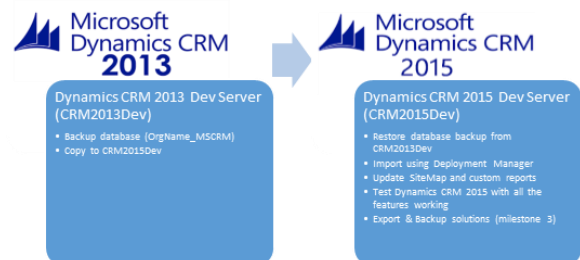


**Figure 4.** Migrating from Dynamics CRM 2011 to 2013 (First scan)

- (1) Restore OrgName\_MSCRM database and import using Deployment Manager
- (2) Review log file
- (3) Update SiteMap and custom reports
- (4) Update forms to use the new Dynamics CRM 2013 standard
- (5) Apply Dynamics CRM 2013 Service Pack 1 or greater
- (6) Test Dynamics CRM 2013 with all the features working
- (7) Export & Backup Dynamics CRM 2013 solutions
- (8) Backup Dynamics CRM 2013 OrgName\_MSCRM database.

### 5.2.3 Experiment # 3: Migration from Dynamics CRM 2013 to CRM 2015

Once the steps are being performed in second experiment, now it's time to move to Dynamics CRM 2015 with third experiment. Following are further steps performed in this experiment continued to the previous experiment also shown in Figure 5:



**Figure 5.** Migrating from Dynamics CRM 2013 to 2015 (First scan)

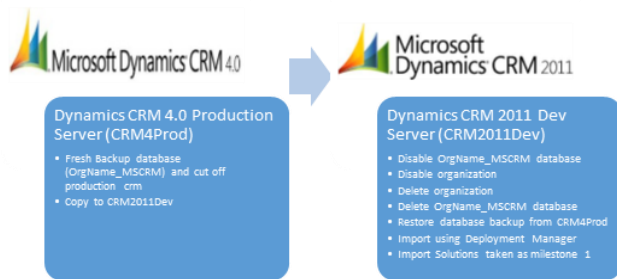
- (1) Restore OrgName\_MSCRM database and import using Deployment Manager.
- (2) Review log file
- (3) Update SiteMap and custom reports
- (4) Test Dynamics CRM 2015 with all the features working
- (5) Export & Backup Dynamics CRM 2015 solutions
- (6) Backup Dynamics CRM 2015 OrgName\_MSCRM database.

### 5.3 Phase 3 - Final production migration

After completing the phase 2 successfully by making sure all the possible issues are taken care of, now it's time to do the final production migration. A fresh backup of production is required and continue the below steps on the existing servers.

#### 5.3.1 On Dynamics CRM 2011 Development Server

Following are the steps need to perform on final production migration as shown in Figure 6:

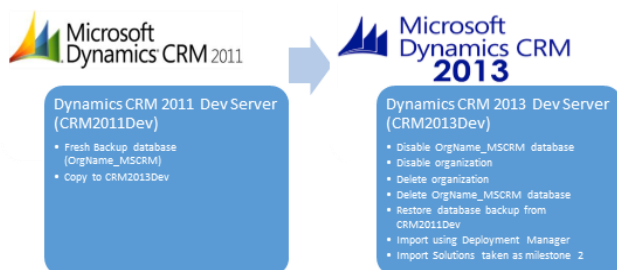


**Figure 6.** Migrating from Dynamics CRM 4.0 to 2011 (Final scan)

- (1) Disable Dynamics CRM 2011 OrgName\_MSCRM database
- (2) Disable organization
- (3) Delete organization
- (4) Delete OrgName\_MSCRM database
- (5) Restore OrgName\_MSCRM database (fresh from CRM 4.0 production) and import using Deployment Manager
- (6) Review log file
- (7) Import Solutions (which were taken on experiment # 1 step 10)
- (8) Backup Dynamics CRM 2011 OrgName\_MSCRM database

#### 5.3.2 On Dynamics CRM 2013 Development Server:

Following are the steps need to perform on final production migration as shown in Figure 7:

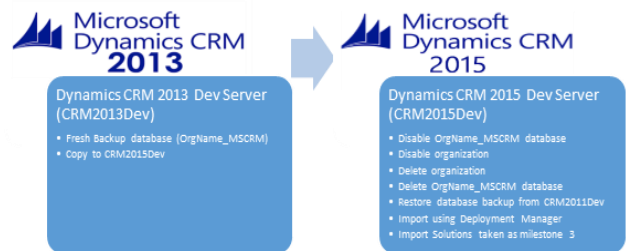


**Figure 7.** Migrating from Dynamics CRM 2011 to 2013 (Final scan)

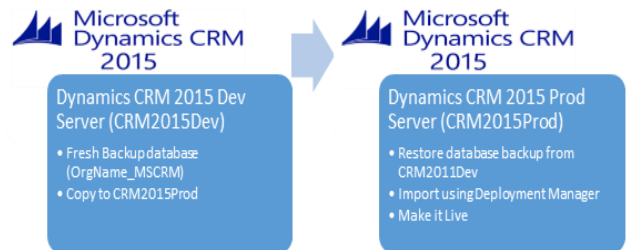
- (1) Disable Dynamics CRM 2013 OrgName\_MSCRM database
- (2) Disable Dynamics CRM 2013 organization
- (3) Delete Dynamics CRM 2013 organization
- (4) Delete OrgName\_MSCRM database
- (5) Restore OrgName\_MSCRM database (step #8 of heading 3.1.3.1.) and import using Deployment Manager
- (6) Review log file
- (7) Import Solutions (which were taken on experiment # 2 step 7)
- (8) Test Dynamics CRM 2013 with all the features working
- (9) Backup Dynamics CRM 2013 OrgName\_MSCRM database

#### 5.3.3 On Dynamics CRM 2015 Development Server:

Following are the steps need to perform on final production migration as shown in Figures 8 and 9:



**Figure 8.** Migrating from Dynamics CRM 2013 to 2015 (Final scan)



**Figure 9.** Migrating from Dynamics CRM 2015 Dev to CRM 2015 Production

- (1) Disable Dynamics CRM 2015 OrgName\_MSCRM database
- (2) Disable Dynamics CRM 2013 organization
- (3) Delete Dynamics CRM 2013 organization
- (4) Delete OrgName\_MSCRM database
- (5) Restore OrgName\_MSCRM database (step #9 of heading 3.1.3.2.) and import using Deployment Manager
- (6) Review log file
- (7) Configure Email Router/Server-Side Sync
- (8) Import Solutions (which were taken on experiment # 3 step 5)
- (9) Test Dynamics CRM 2015 with all the features working
- (10) Backup Dynamics CRM 2015 OrgName\_MSCRM database and restore to production Dynamics CRM 2015 and go live.

## 6. UPGRADE FINDINGS

The findings of the experiments are:



(1) Since upgrade to all intermediate versions of CRM is required, current CRM implementation should be assessed properly before upgrade. The more the intermediate versions to upgrade the more the complexity of the upgrade process.

(2) The upgrade to intermediate versions can be temporary and after testing be moved to the next version.

(3) In the need of less downtime when system is getting upgraded, migration upgrade is better but this require hardware and trail versions of CRM from Microsoft for 180 days.

(4) The source code of existing custom development should be available.

(5) Custom workflows using Microsoft Dynamics CRM API Service calls must be upgraded to CRM 2013 mode of calls.

(6) In upgrading the code to support Microsoft Dynamics CRM 2015, it is needed to remove references to old assemblies and add references to the Microsoft.Crm.Sdk.Proxy.dll and Microsoft.Xrm.Sdk.dll assemblies [14].

(7) JavaScript referring the Microsoft Dynamics CRM 4.0 object model must be changed to use Microsoft Dynamics CRM 2015 object model. All breaking JavaScript must be corrected, which is a subset of unsupported JavaScript

(8) Several common functions can be moved to common JavaScript libraries in Microsoft Dynamics CRM 2015. Most or all external JavaScript files can be moved into Web resources in Microsoft Dynamics CRM 2015

(9) Custom Web applications must be architected to work outside of CRM application.

(10) Convert the applications to .NET framework 4.0 and perform necessary configuration changes

(11) Update style sheet and web resource components to align with CRM 2015 UI

(12) For the code to work natively in Microsoft Dynamics CRM 2013, it is recommended to rework it. The service references need to be changed. Code need to be re-compiled in 64 bit. Dynamic entity related code need to be modified as Microsoft Dynamics CRM 2015 does not support DynamicEntity. Data Types need to be modified to use native .NET types as Microsoft Dynamics CRM 2015 support generic data types.

## 7. CONCLUSION & FUTURE WORK

Since the on premises option gives full control to the clients, one of the best suited product for on premises CRM system is Microsoft Dynamics CRM. Now after deploying a particular version of the Dynamics CRM, there will be a time to move to the newer version of the product. There is no jump in upgrading from one version to third version by skipping the second version, it has to be sequential. It is very important to plan and assess the efforts required before migrating existing on-premises Dynamics CRM to latest version. As with proper planning before upgrade, best option to upgrade can be selected and less surprises can be expected. The key here is correct analysis of existing environment about customizations as more customizations leads to more effort in recoding. The tools available to assess the level of customization are helpful to know beforehand.

New version of Microsoft Dynamics CRM 2016 is now released and there are lots of improvements in the newer version like contextual documents related to CRM records, Next generation of CRM app for Outlook, Mobile Offline Support, enhanced Excel experience and Guided user

experience. Existing CRM implementations can be migrated to newer version with the same process as described in the steps above in experiments. However, upgrading to Microsoft Dynamics CRM 2016 requires effective planning to have a smooth upgrade, similar to previous Microsoft Dynamics CRM upgrades. There are a few focus points to consider when upgrading to the latest version. Following are some important points mentioned below that should be considered for a successful upgrade [15]:

(1) Can the organization cater to the new hardware and software requirements for Microsoft Dynamics CRM 2016 on-premises? The system requirements for Microsoft Dynamics CRM 2016 are listed here [16].

(2) Following products and components aren't supported with Microsoft Dynamics CRM 2016 and won't be upgraded during Setup [17]. To upgrade a Microsoft Dynamics CRM 2015 system that includes the product or component listed these products or solutions may not function correctly. It is recommended to uninstall or manually remove the component before the upgrade.

- o Microsoft Dynamics CRM 2015 Reporting Extensions (on-premises only)

- o Microsoft Dynamics CRM 2015 Email Router

- o Microsoft Dynamics CRM List Component for SharePoint Server

(3) Before upgrading the production to Microsoft Dynamics CRM 2016, make sure all Dynamics CRM Outlook client users who are Offline go back online to sync the most recent data back to the Dynamics CRM server [15].

(4) Make sure that the latest Microsoft Dynamics CRM 2016 Outlook client are being used with Microsoft Dynamics CRM 2016 (minimum is Office Outlook 2010, light Dynamics CRM Outlook App requires Office Outlook 2013 and above) [15].

## REFERENCES

- [1] Rouse M., What is customer relationship management CRM?, from <http://searchcrm.techtarget.com/definition/CRM>, accessed on Nov. 2014.
- [2] Plourde A., R. Microsoft dynamics CRM 2016, from <http://www.crmsoftwareblog.com/2015/09/microsoft-dynamics-crm-2016-release-date-announced-2/>, accessed on 8 Sep. 2015.
- [3] Ciecierski A., How many companies use Microsoft dynamics ERP?, ERP Software Blog, from <http://www.erpsoftwareblog.com/2015/03/how-many-companies-use-microsoft-dynamics-erp/>, accessed on 16 Mar. 2015.
- [4] Hollar K., Top CRM Software, Capterra, from <http://www.capterra.com/customer-relationship-management-software/#infographic>, accessed on 30 Nov. 2015.  
Planning on-premises CRM 2015, Microsoft, from [https://technet.microsoft.com/en-us/library/hh699790\(v=crm.7\).aspx](https://technet.microsoft.com/en-us/library/hh699790(v=crm.7).aspx), accessed on 2015.
- [5] Supported extensions for Microsoft dynamics CRM, Microsoft, from [https://msdn.microsoft.com/en-us/library/gg328350\(v=crm.5\).aspx](https://msdn.microsoft.com/en-us/library/gg328350(v=crm.5).aspx).
- [6] Hosk B., Type mapping between versions CRM 2011 and CRM 4 – Hosk's Dynamic CRM Blog, from <https://crmbusiness.wordpress.com/2011/01/28/type-mapping-between-versions-crm-2011-and-crm-4/>.

- [7] Check your JavaScript code to prepare for your upgrade, Microsoft, from <https://blogs.msdn.microsoft.com/crm/2013/08/23/check-your-javascript-code-to-prepare-for-your-upgrade/>.
- [8] Download Microsoft dynamics CRM 2013 custom code validation tool from official Microsoft Download Center, Microsoft, from <https://www.microsoft.com/enus/download/details.aspx?id=30151>.
- [9] Manage auto-save, Microsoft, from [https://technet.microsoft.com/enus/library/dn531073\(v=crm.7\).aspx](https://technet.microsoft.com/enus/library/dn531073(v=crm.7).aspx).
- [10] Niiranen J., Don't merge your entity forms in CRM 2013, Surviving CRM, from <http://survivingcrm.com/2014/10/dont-merge-forms-in-crm-2013/>.
- [11] Clinton R., Dynamics XRM Tools - Home, Dynamics XRM Tools, from: <http://dynamicsxrmtools.codeplex.com>.
- [12] Download Microsoft Dynamics CRM 2013 Custom Code Validation Tool, Microsoft,. from <http://www.microsoft.com/en-in/download/details.aspx?id=30151>.
- [13] Upgrade plug-ins and custom workflow activities, Microsoft, from <http://msdn.microsoft.com/en-us/library/gg334459.aspx>.
- [14] Are you prepared for Microsoft Dynamics CRM 2016 upgrade? - Microsoft Dynamics CRM Professionals, RSM, from <http://www.dynamicscrmpros.com/prepared-microsoft-dynamics-crm-2016-upgrade/>.
- [15] Microsoft Dynamics 365 system requirements and required technologies, Microsoft, from <https://technet.microsoft.com/en-us/library/hh699831.aspx>.
- [16] Before you upgrade: issues and considerations, Microsoft, from [https://technet.microsoft.com/en-us/library/hh699765.aspx#BKMK\\_NotSupported](https://technet.microsoft.com/en-us/library/hh699765.aspx#BKMK_NotSupported).