# Engineered Systems Operational Management

## Best Practices and Potential Benefits

v5
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# ESOM
## Agenda

**1** ▶ Introduction

**2** ▶ Best Practices

**3** ▶ Potential Benefits

**4** ▶ Customer Examples

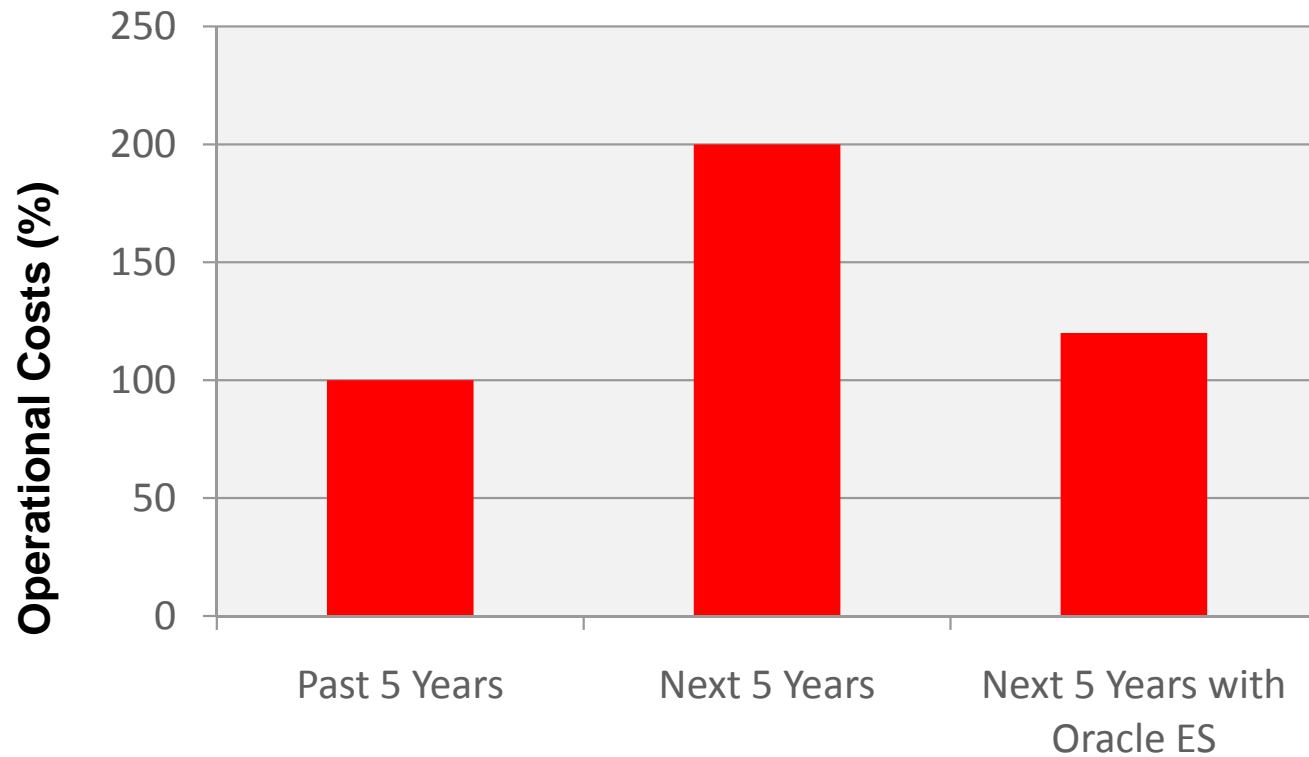**5** ▶ Discussion/ Questions

# Predicting future I.T. costs
## Assume a 20% annual growth rate in demand for I.T. services
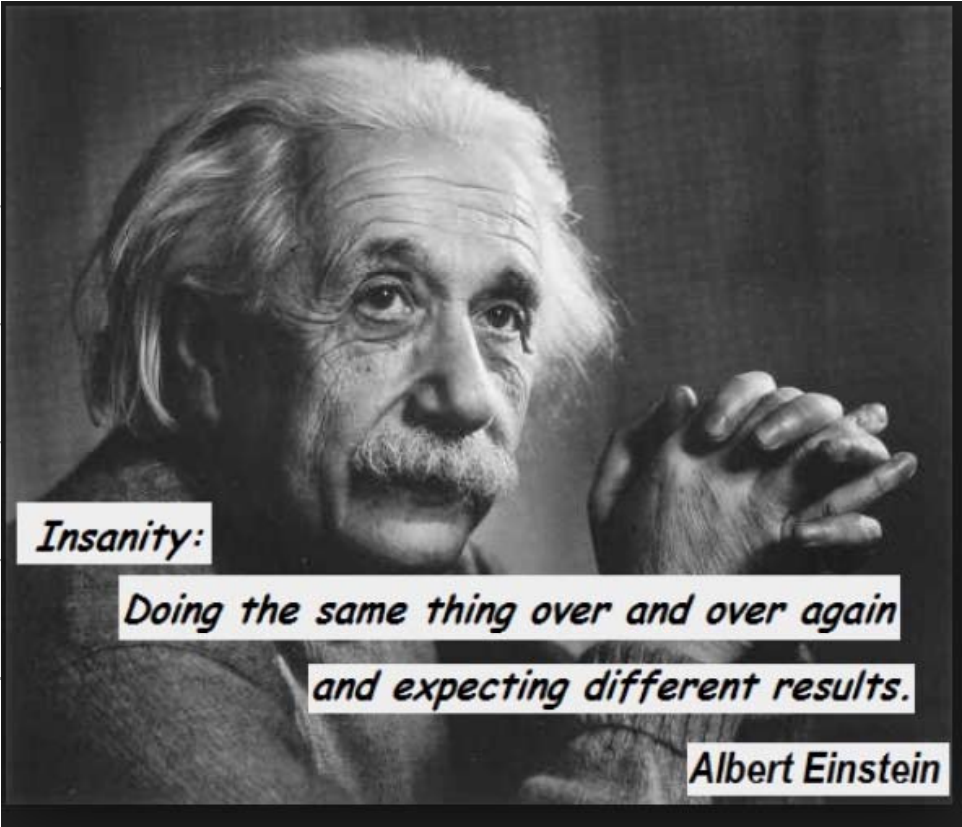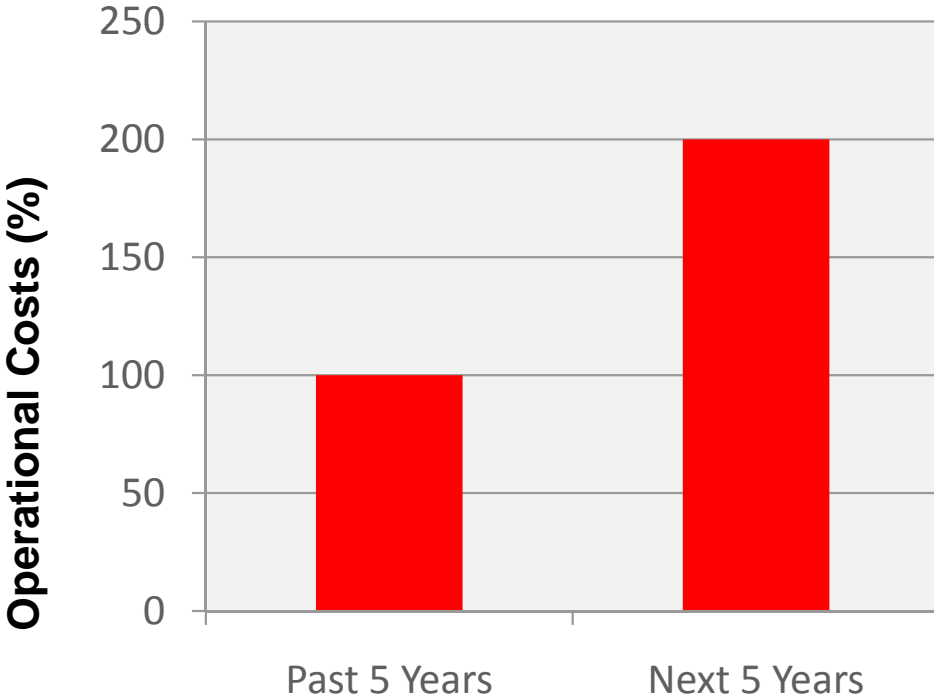
# Predicting future I.T. costs
**Assume a 20% annual growth rate in demand for I.T. services**

# ESOM
## Definition

- **Operational Management**
  - Ensuring optimal operation of the Exadata / Exalogic / Exalytics / Supercluster machines from after initial configuration until retirement.
  - Ongoing day to day / week to week / month to month admin - '*Feeding and Watering*'
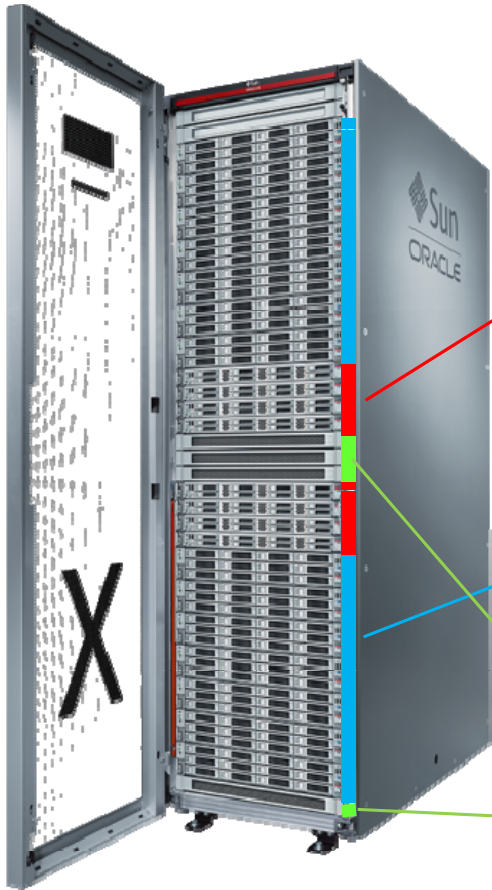  - Carried out by customer or partner data centre support / operations / admin teams

- **Not**
  - Initial configuration, implementation and set up
  - Design and architecture of ES environment
  - Migration of existing systems onto ES

# ESOM
## Exadata Architecture Review (X3 Full Rack)

**Intelligent Database Servers**

- 8x 2-socket, or 2x 8-socket Xeon database servers
- Oracle Database, ASM, RAC; Linux or Solaris
- 256 GB RAM
- Standard Ethernet to data center

**Intelligent Storage Servers**

- 2-socket storage servers, Exadata Storage Software
- Up to 500 TB disk per rack
- 56 PCI Flash memory cards per rack = 22 TB
- Exadata software

**High Speed InfiniBand Network**

- Unified internal connectivity ( 40 Gb/sec )

# ESOM
## Disruptive Technology?

- **The Same. . .**
  - Standard Oracle Db, FMW or Apps with all options available
  - Industry standard components (e.g. Intel chips, servers, Linux, Solaris O/S)
  - **Oracle s/w management tasks are 95% the same as with traditional platforms**
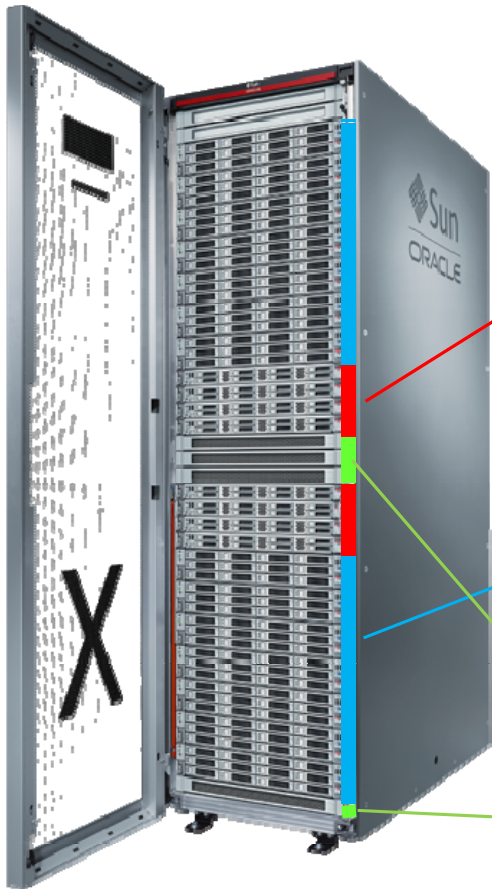
- **. . . but Different**
  - (Latest versions of) Some Oracle s/w may be new **to you** (RAC, ASM, WLS, Coherence.
  - Infiniband may be new **to you**.
  - Some new technology (Exadata Storage s/w, HCC, Elastic Cloud s/w (Exabus)

  - It's assembled differently – pre-certified and engineered to work **and be managed together**

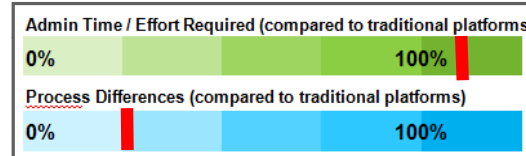  - **Infrastructure Management is simpler -** *"Fewer knobs to twiddle"*
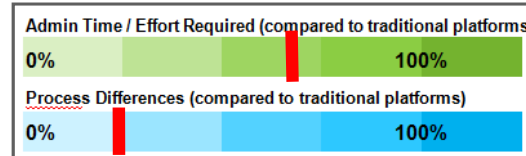
# ESOM
## Different Balance of Administration Skills

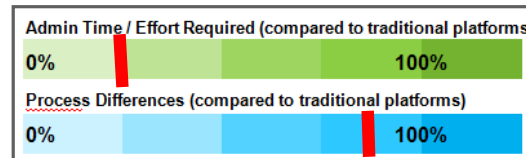### Intelligent Database Servers

- Database

| Admin Time / Effort Required (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Slightly more work

| Process Differences (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Not different

- Compute Nodes

| Admin Time / Effort Required (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Less work

| Process Differences (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Not different

### Intelligent Storage Servers

| Admin Time / Effort Required (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Much less work

| Process Differences (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Very different

### High Speed InfiniBand Network
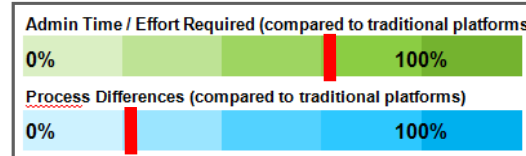
| Admin Time / Effort Required (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Much less work

| Process Differences (compared to traditional platforms) | | |
|---|---|---|
| 0% | | 100% |

Not different

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# ESOM
## Different Balance of Administration Skills (Exadata)



Chart: Stacked bar graph with y-axis from 0 to 120 (marked at 0, 20, 40, 60, 80, 100, 120). Two bars labeled "Traditional Platforms" and "Exadata".

Legend:
- H/w
- Network
- Storage
- OS
- Oracle s/w
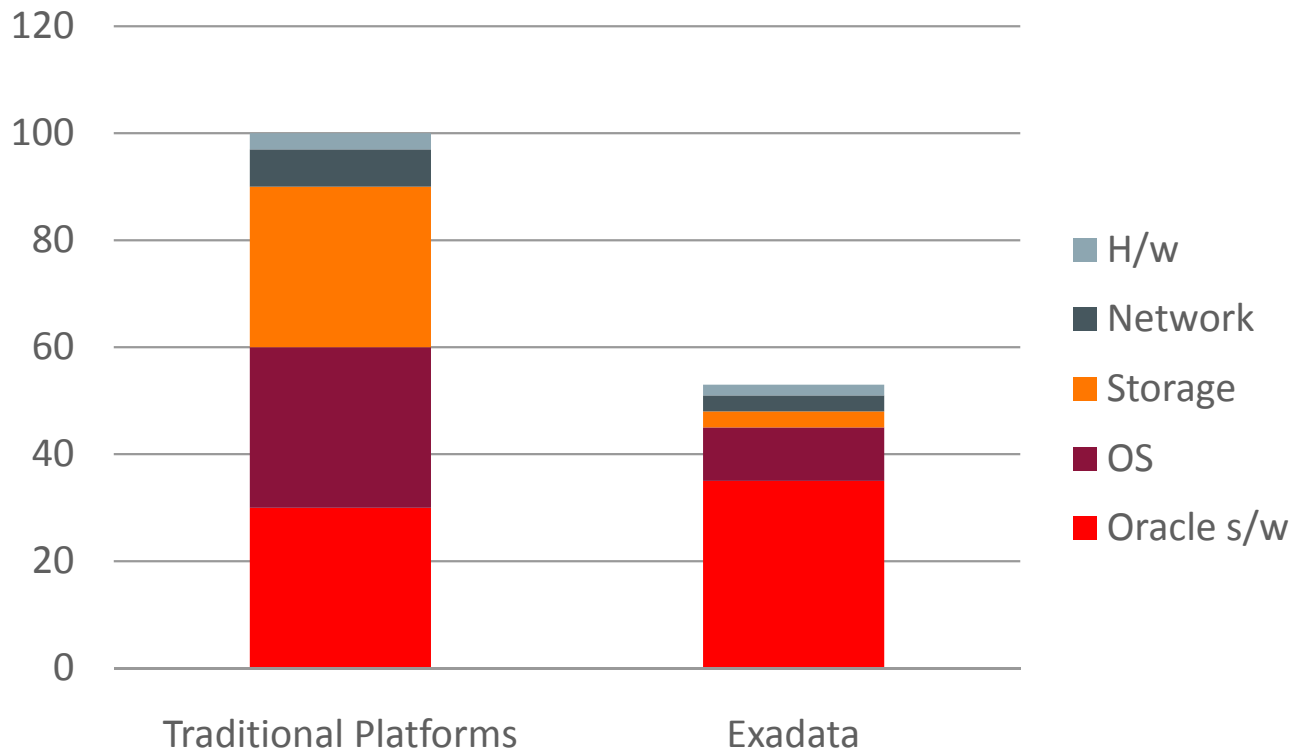
- Most of the reductions relate to management O/S, Storage, network components

- Software management (Db, FMW, Apps) effort is roughly the same
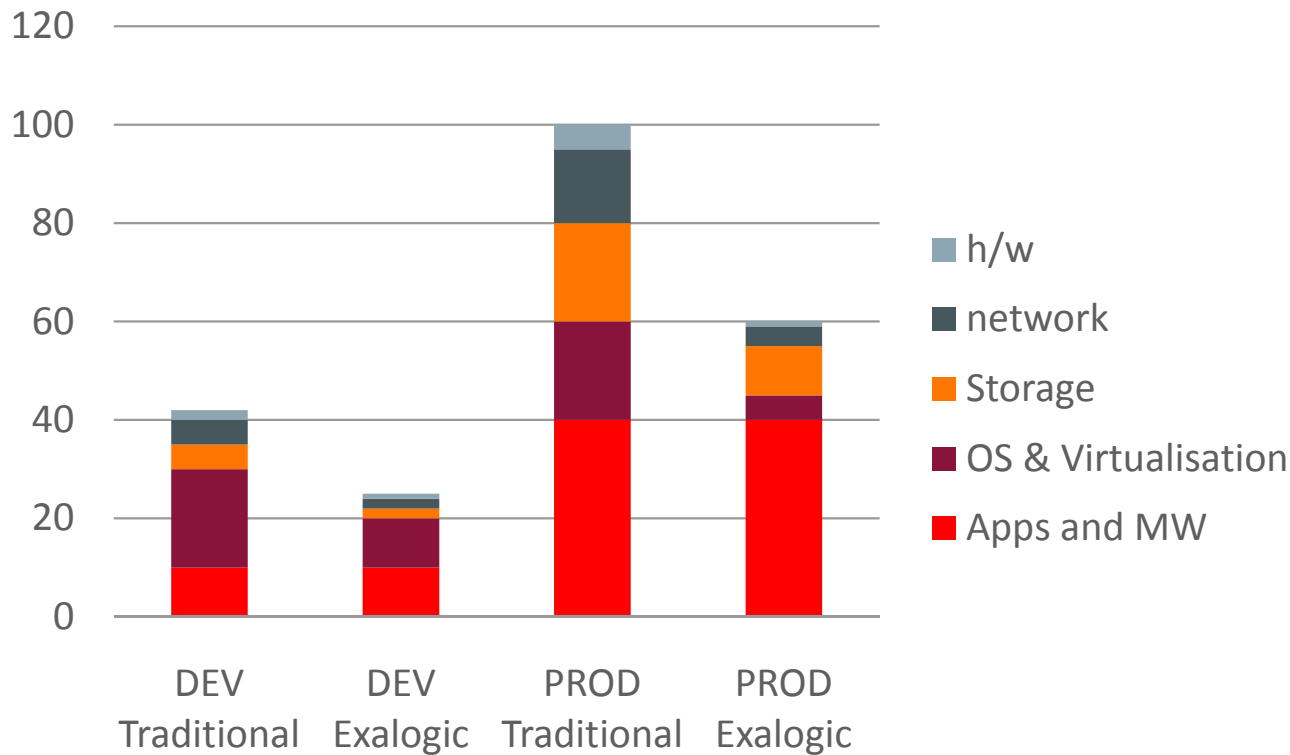
- DBA's are the lead resource for Exadata.

Source - UK Manageability Solutions Survey 2011

\* Customer Forum March 2012

# ESOM
## Different Balance of Administration Skills (Exalogic)

**Chart:**

Legend:
- h/w
- network
- Storage
- OS & Virtualisation
- Apps and MW

Y-axis: 0, 20, 40, 60, 80, 100, 120

X-axis categories: DEV Traditional, DEV Exalogic, PROD Traditional, PROD Exalogic

- Overall reduction in admin effort of **25-50%** for Exalogic compared to traditional application server systems.

- Largest reductions relate to management infrastructure components

- Oracle Software work becomes proportionately more of the total
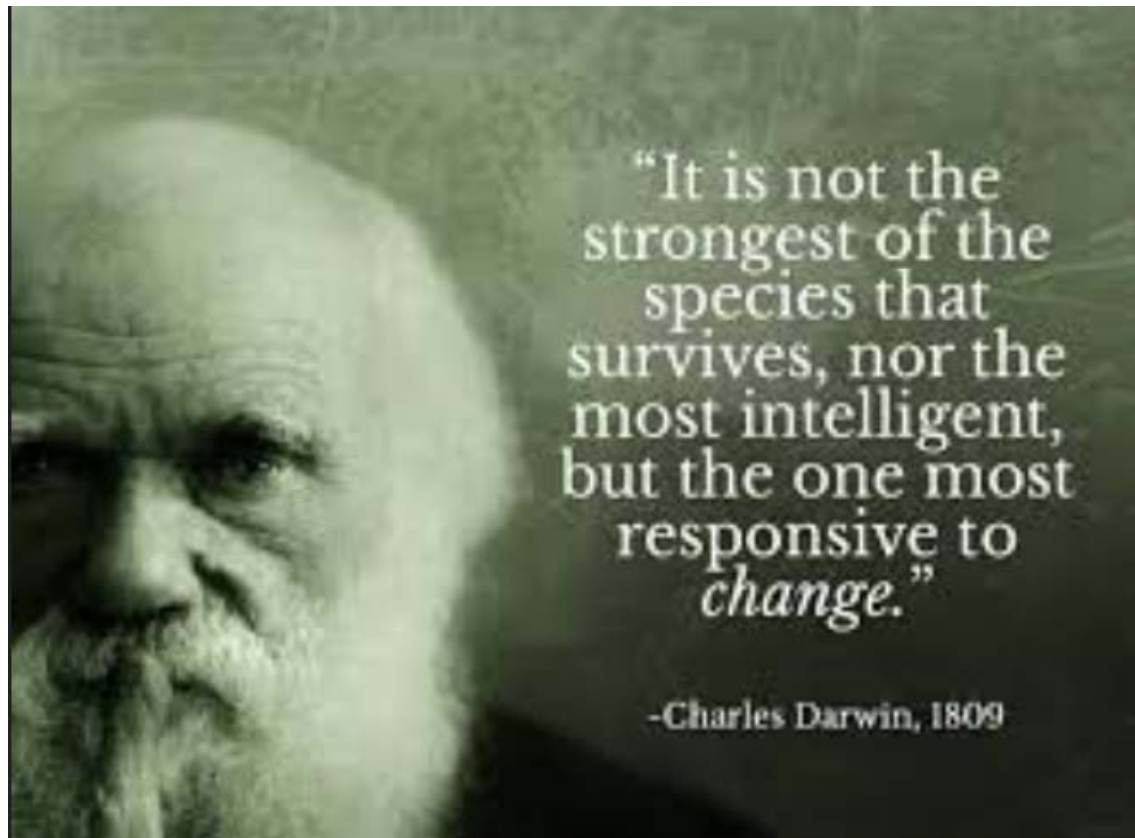
→ Middleware admin and sys admin become the key resources.

Source - UK Manageability Solutions Survey 2011

\* Customer Forum March 2012

# ESOM
## Disruptive Technology?



"It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to *change*."

-Charles Darwin, 1809

But Charles, *how* should data centres respond to the change to Oracle Engineered Systems ?

ESOM
Best Practise

# ESOM | Best Practise
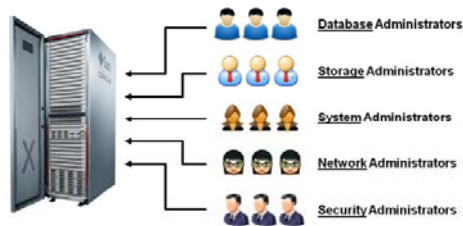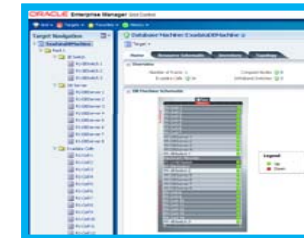
**4 keys to maximising benefit AND minimising Risk**

## 1. The Right Structure

Database Administrators

Storage Administrators

System Administrators

Network Administrators

Security Administrators

## 3. The Right Tools

EM 12c
MOS

## 2. The Right Processes

## 4. The Right Services

**Platinum Support**

Training, Support

and Consulting

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**Independent but complementary**

# ESOM | Best Practise → People
## Unified Administration Team – but evolve at your own pace

| | Multiple Admin teams | *Extended* Admin team | *Unified* ES Admin team per machine type |
|---|---|---|---|
| Definition | Multiple teams each supporting a specific technology | ES admin teams owns the machine(s), involves experts when / if needed | ES team owns and manages all aspects of the machine(s) |
| Well suited where | •ES is just one Oracle platforms | • Good cross team procedures<br>• No firm plan to consolidate | • ES are is totally strategic and the plan is to consolidate onto it |
| Training needed | • High – all teams need training | • Medium – ES team and some members of others | • Medium – ES team need to be fully skilled in all technologies |
| Management Overhead | • High | • Medium | • Low |
| Efficiency | • Low | | • High |
| Agility | • Low | • Medium | • High |
| Organisational change required | • None | • Ensure ES team has access to named specialist skills | • Skill up, and / or add specialists to, the ES team |

**Natural Evolution**

# ESOM | Best Practise → Processes

## Exadata Administration Tasks

| Component | Description | Monitor | Provision | Configure | Tune | Backup | Problem Analysis | Patch | Replace | Test |
|---|---|---|---|---|---|---|---|---|---|---|
| Database Service | Logical Db service ususllay mapped to one application or group of users. Optionally used to help manage SLA's and resource use. | Y | Y | Y | Y | | Y | | | Y |
| Database | Physical business data plus REDO Logs, Control files etc. Stored across all disks in all storage cells | Y | Y | Y | Y | Y | Y | Y | | Y |
| DBMS | Oracle Binaries and various configuration files. 1 or more per machine. | Y | Y | Y | | Y | Y | Y | | |
| Grid Infrastructure | RAC, CRS, shared filesystem and voting disks | Y | Y | Y | Y | Y | Y | Y | | |
| ASM | Oracle ASM software. Manages mirroring. | Y | | Y | Y | Y | Y | Y | | |
| Compute Nodes | Server running Oracle Linux (or Solaris), Oracle DBMS and Grid Infrastructure. Each has 2 x 8-core Intel procesors, 128GB RAM and 4 300GB disks. 8 Compute nodes for X3-2 and 2 per X3-8 | Y | | ? | | ? | Y | Y | Y | |
| Storage Cells | Server running Oracle Linux and Exadata software. 14 Cells per full machine providing total capacity of 100 TB of storage, 168 cores for SQL processing. Each has 12 Disks | Y | | | | | Y | Y | Y | |
| Flash Cache | 4 PCI memory cards in each storage cell, each card is 0.4 TB, total of 22 TB. | Y | | | | | Y | | Y | |
| Storage Software | Oracle software that runs in storage cells to optimise I/O. | Y | | | | | Y | Y | | |
| Infiniband Switches | Each switch is a small server running cut | | | | | | | | | |
| Management Switch | | | | | | | | | | |
| Hardware | | | | | | | | | | |

**Db is business as usual**

**Infrastructure Is simpler**

- Admin teams (however structured) need to be in a position to carry out any of these
- Frequency will vary – some may be very rare
- Some will be required as a result of others and some will be done as a part of others
- Wherever possible these processes should be standardised and automated

# ESOM | Best Practise → Processes
## Patching

- Quarterly Patch Bundles
- Pre-tested and certified
- Cumulative single file download, single MOS note

- Exadata
  - All components
  - Applied per component
  - Storage cells rolling or all at once
- Exalogic (physical and virtualised)
  - Infrastructure separate from WLS / Coherence/Tuxedo
  - Applied together for all components using ExaPatch tool
- SuperCluster = Exadata + [Exalogic or standard Sparc / Solaris environment]

- Ideally: patch D/ R first, test, switch clients over, patch primary, optionally switch back
- Apply whole bundle (e.g not just IB switch or compute node OS)
- Do NOT apply standard patches in isolation

# ESOM | Best Practise → Processes and People

**RACI Charts (Exadata Example)**

**Exadata RASCI Diagram - unified DBMA Team**

| Task | DBMA | OS SysAdmin | Network | Storage | CIO | Security |
|---|---|---|---|---|---|---|
| Day-to-day operation | R | | | | A | C/I |
| Testing | R | | | | A | C/I |
| Monitoring | R | | | | A | C/I |
| Configuration Mgmt | R | | C | | A | C/I |
| Tuning | R | | C | | A | C/I |
| Patching | | | | | | |
| Storage Cells | R | | | | A | C/I |
| Infiniband | R | | C/I | | A | C/I |
| Cisco Public Network | R | | C | | | C/I |
| Db Compute Nodes | R | | | | A | C/I |
| Database | R | | | | A | C/I |
| Backing up Data | R | | | | A | C/I |
| Upgrading S/W | R | | | | A | C/I |
| Replacing H/W | R | | | | A | C/I |
| Metering & Charging | R | | | | A | C/I |

- Responsible
- Accountable
- (Supporting)
- Consulted
- Informed

# ESOM | Best Practise → Tools
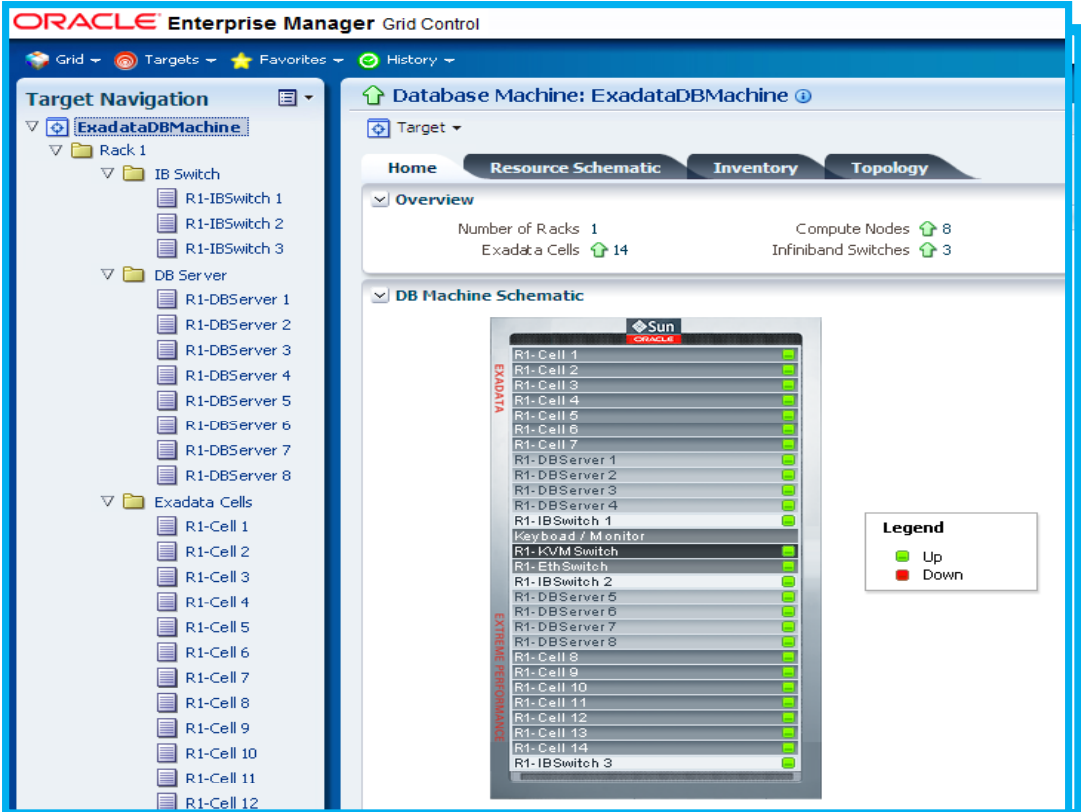
## EM12c provides end to end monitoring and management

**ILOM**
OS and below

**EM 12c**

My Oracle Support



Software

Oracle Support

**ASR**
Hardware error correction
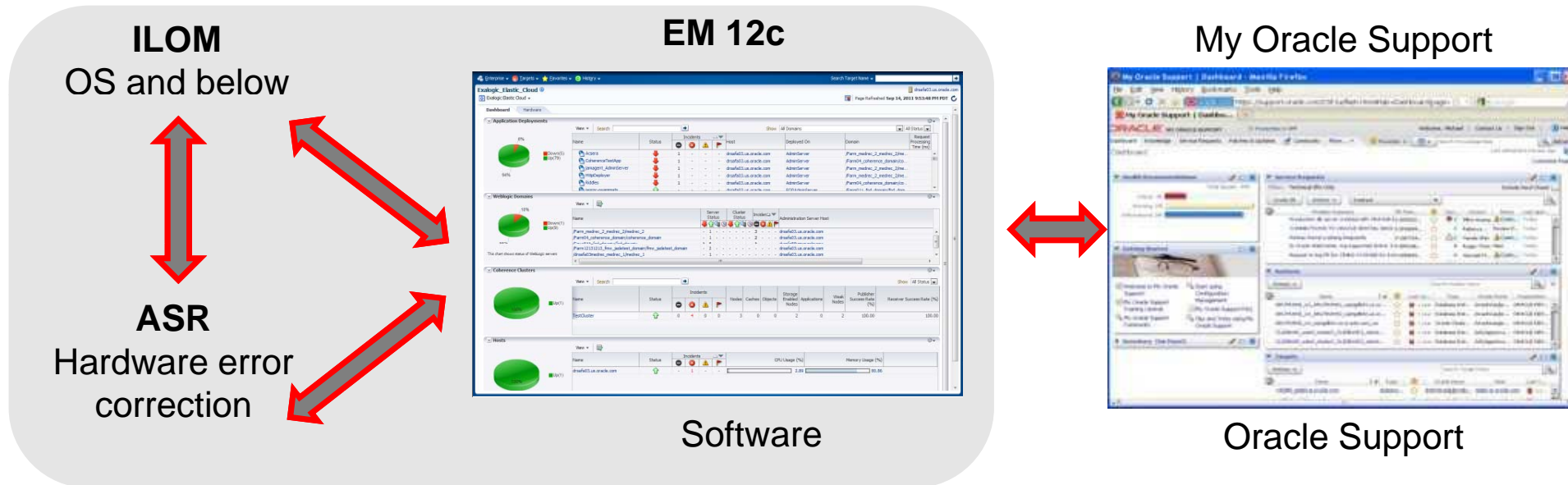
Exadata, Exalogic, SuperCluster, ZS-ES . . .

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# ESOM | Best Practise → Tools

## EM12c is Exadata - aware

- Integrated view of hardware and software

- Hardware
  - Schematic of cells, compute nodes and switches
  - Management of network switches
  - Hardware monitoring alerting based on environmentals

- Software
  - Performance, availability, usage by databases, services, nodes, storage cell
  - Software alerts for Db, cluster, ASM
  - Smart –scan – aware tuning recommendations (e.g. not 'more indexes)
  - Topology view of database systems / clusters

- Incidents, SLA's recommended patches, configuration and compliance for all

# ESOM | Best Practise → Tools
**EM12c provides a holistic view**

**Business Users**.

**Applications Admin;**
Just the apps.

**ELA**
**Exalogic Admin;**
Everything except apps

**DBMA**
**Db Machine Admin;**
Everything

My Oracle Support.

Helpdesk App.

Corporate
Monitoring Tool(s).

Exalogic Control

Exalogic runs Apps

Exadata runs Db

**Existing Teams.**
Network / Sys Admin / Security / Storage
Involvement decreasing over time.
Role for Oracle ES relates more to policies
ment, integration and strategic planning

# ESOM | Best Practise → Services

## Platinum Support

| Integrated Support | Proactive Support Tools | Monitoring & Updates |
|---|---|---|

**Integrated Support**
- ✓ 24/7 HW and SW support
- ✓ Consistent service across the stack from single vendor
- ✓ SW and OS updates included
- ✓ Integrated online support interface – My Oracle Support

**Proactive Support Tools**
- ✓ Personalised health checks
- ✓ Advanced knowledge sharing and communities
- ✓ Integrated stack delivery with Oracle Enterprise Manager Converged HW mgmt with Oracle Enterprise Manager Ops Center

**Monitoring & Updates**
- ✓ 24/7 remote fault monitoring
- ✓ Industry-leading response times:
  - 5-min fault notification
  - 15-min restoration or escalation to development
  - 30-min joint debugging
- ✓ Risk mitigation and business innovation through update and patch deployment

**ORACLE PREMIER SUPPORT** → **PLATINUM** →

Platinum Services are provided at **No Extra Support Cost.** **This ensures that the systems remain at optimum patch levels while providing pro-active monitoring and resolution.**
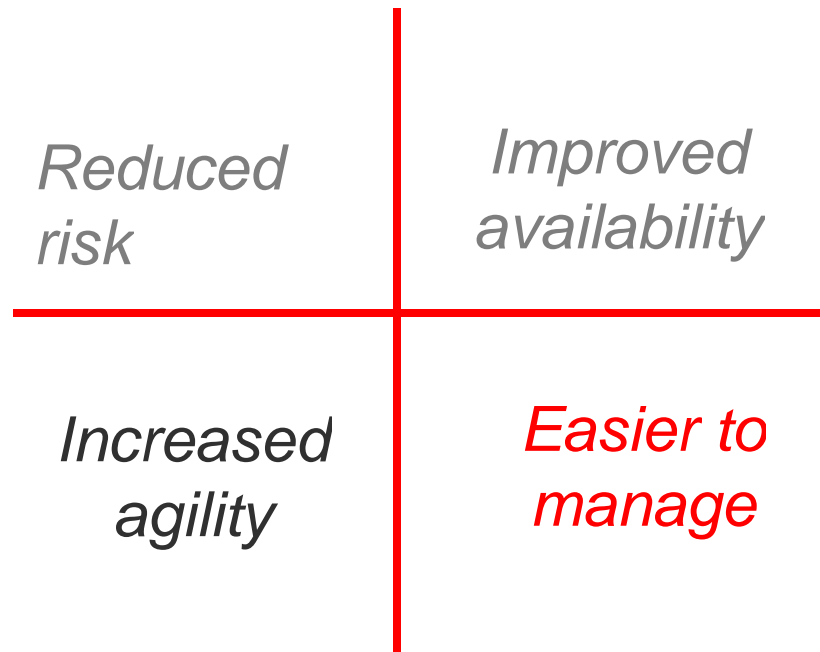
# ESOM
## Potential Benefits

# ESOM | Potential Benefits

**Operational Benefits**

| | |
|---|---|
| *Reduced risk* | *Improved availability* |
| *Increased agility* | *Easier to manage* |

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# ESOM | Potential Benefits

**Why is management easier?**

**Simpler Architecture**

Single purpose infrastructure, pre optimised with fewer options
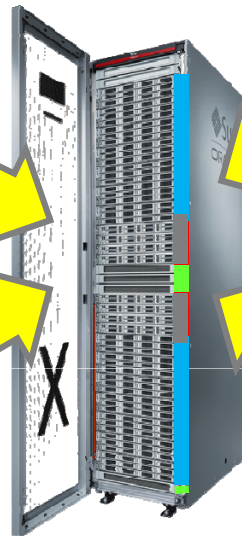
**Self Contained**

Everything needed, changes have minimal impact on datacentre

**More Standardised**

Components, configurations and manufacture

**Easier Support**

Single vendor for all components. known configurations

**Fewer administration tasks, and many are simpler.**
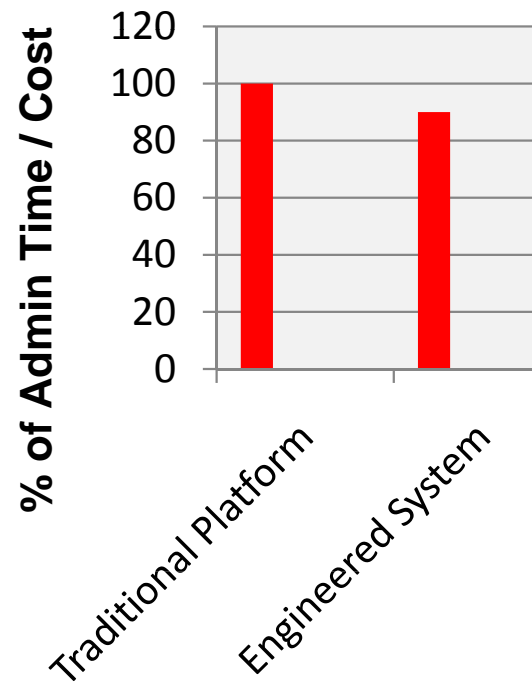
# ESOM | Potential Benefits

**Examples of easier management**

- Monitoring
  - Centralised, holistic and detailed, single source of truth, one toolset for all teams

- Provisioning
  - Done by software configuration, physical infrastructure is already in place

- Performance Tuning
  - Required less, more automated, single toolset

- Problem Resolution
  - Single Vendor, standardised platform

- Patching
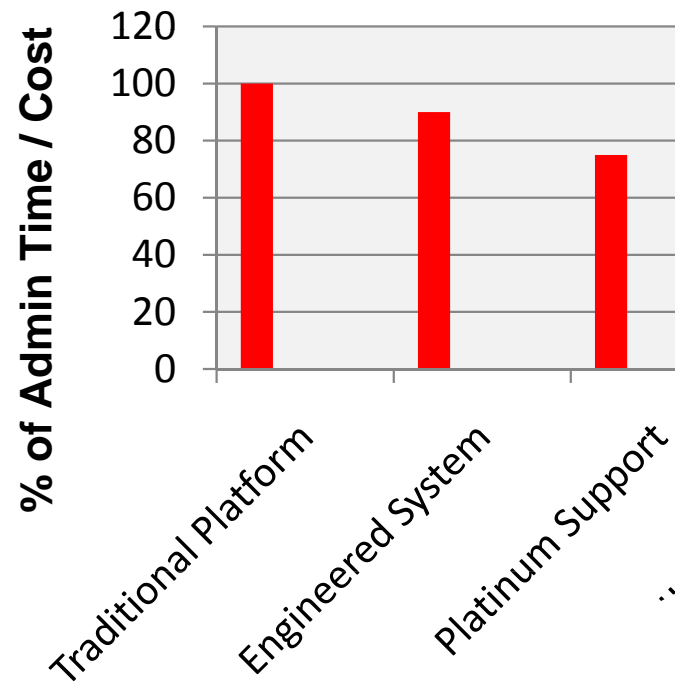  - Pre-certified and pre-tested bundles across whole tech stack

# ESOM | Potential Benefits

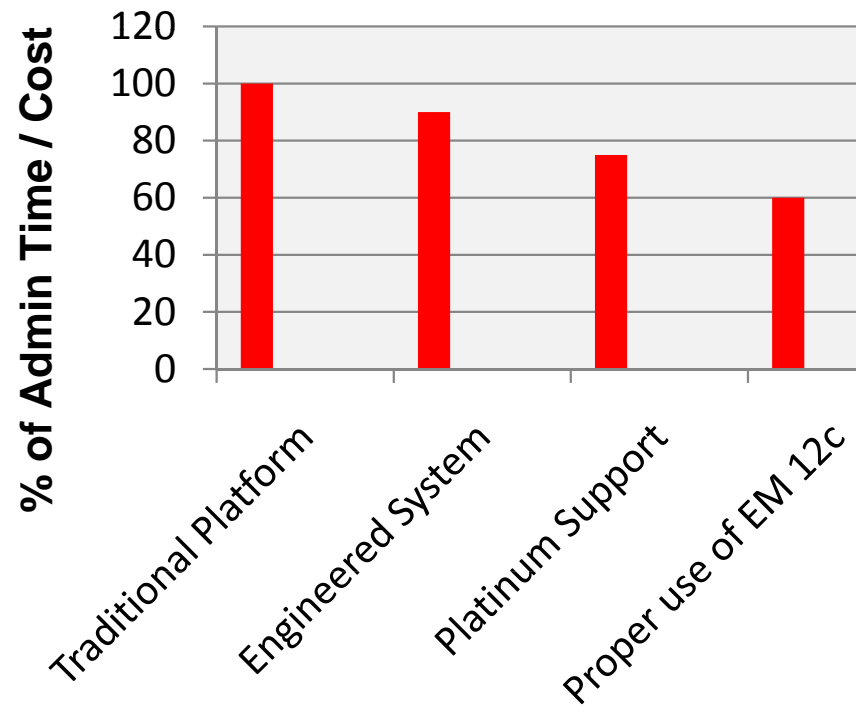## Cumulative reduction in administration effort from multiple sources

# ESOM | Potential Benefits

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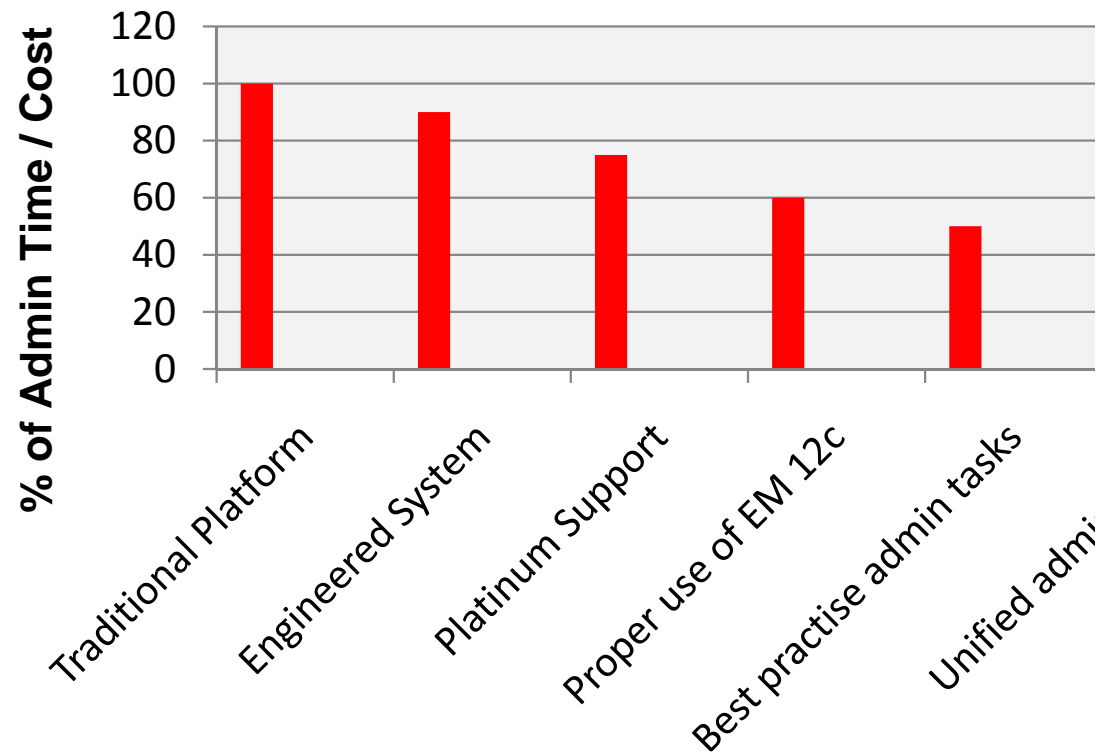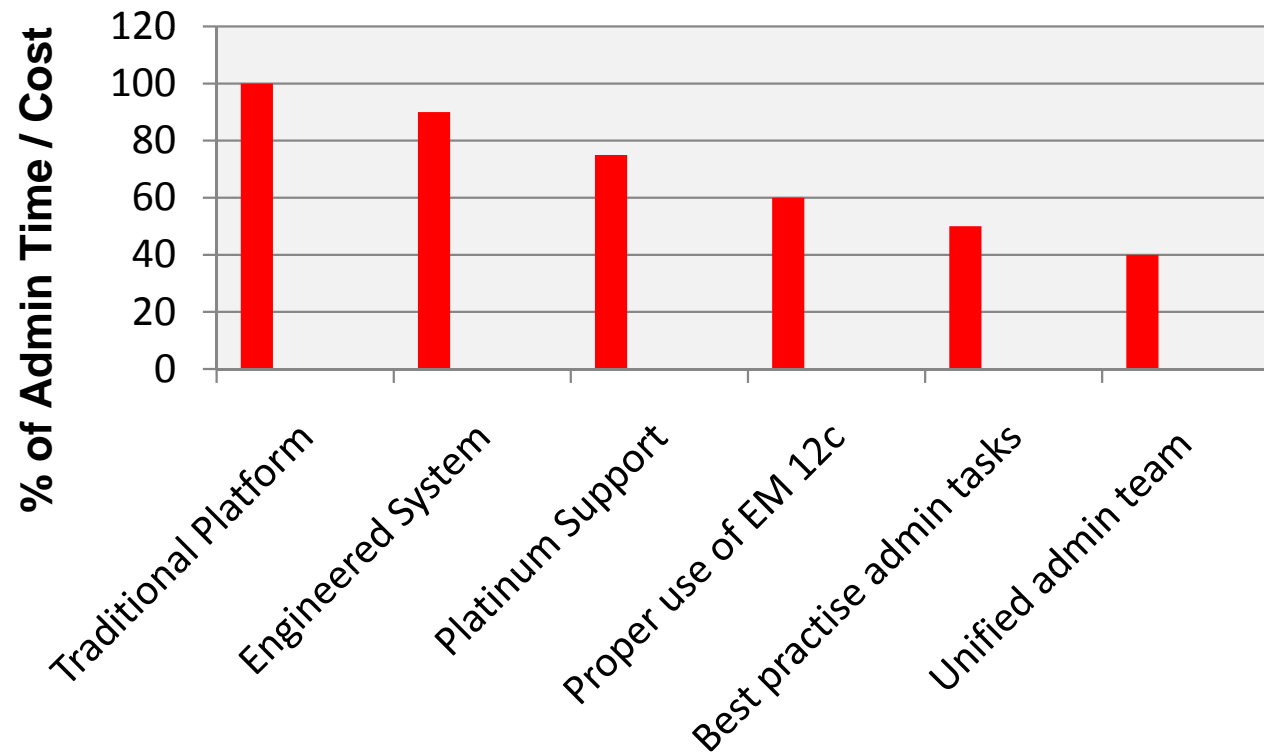**Cumulative reduction in administration effort from multiple sources**

# ESOM | Potential Benefits

## Cumulative reduction in administration effort from multiple sources
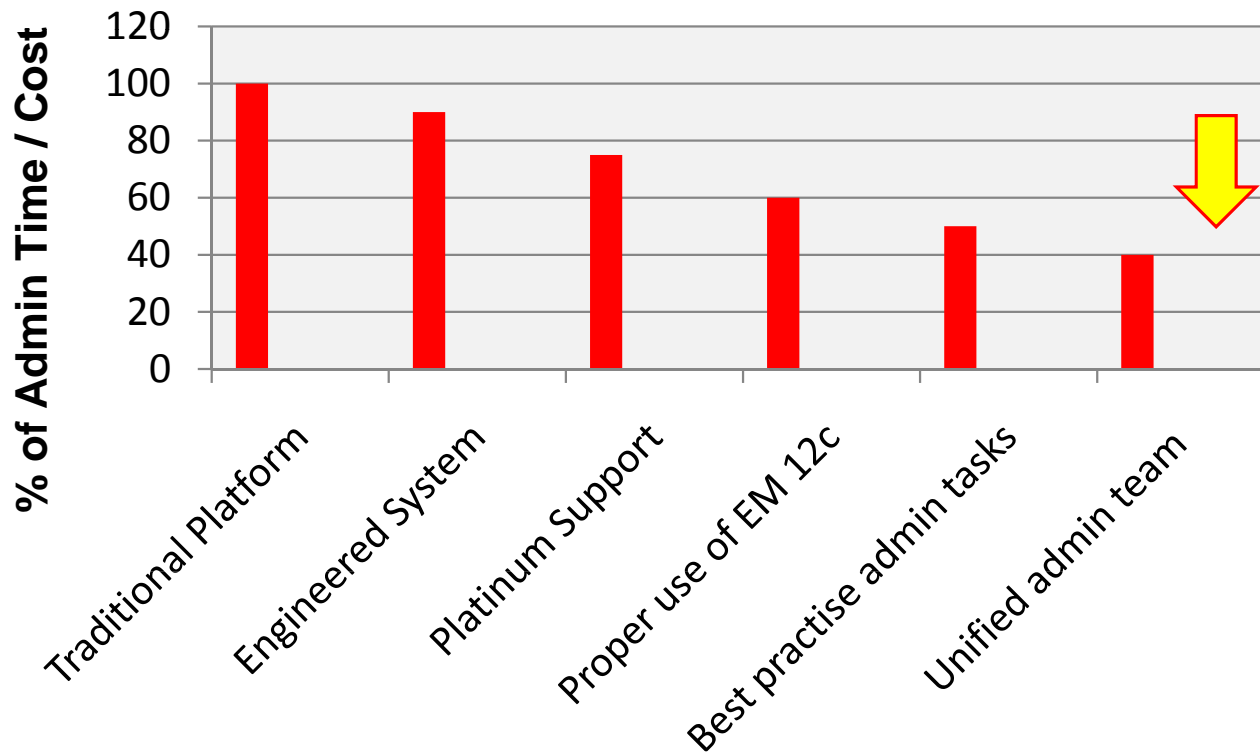


**>50% reduction in admin effort**
- **Free up resources**
- **Minimise Contractor costs**
- **Optimise outsourcing contracts**

"CIOs spend only **7%** of their budgets on **innovation**, **using the rest primarily for maintenance, and operations**. Three times as much money is spent on technology innovation outside the IT budget ."

*Harnessing Business-Led I.T. | CEB | 2014*

**Oracle ES can help change that.**

# ESOM | Potential Benefits

## Consolidation reduces net TCO and increases agility



**% of Oracle admin efficiency / agility _before_ ES's** (y-axis: 0 – 200)

**% of Oracle estate consolidated onto Engineered Systems** (x-axis: 0 – 100)

Legend:
— Admin Costs
— I.T. Agility
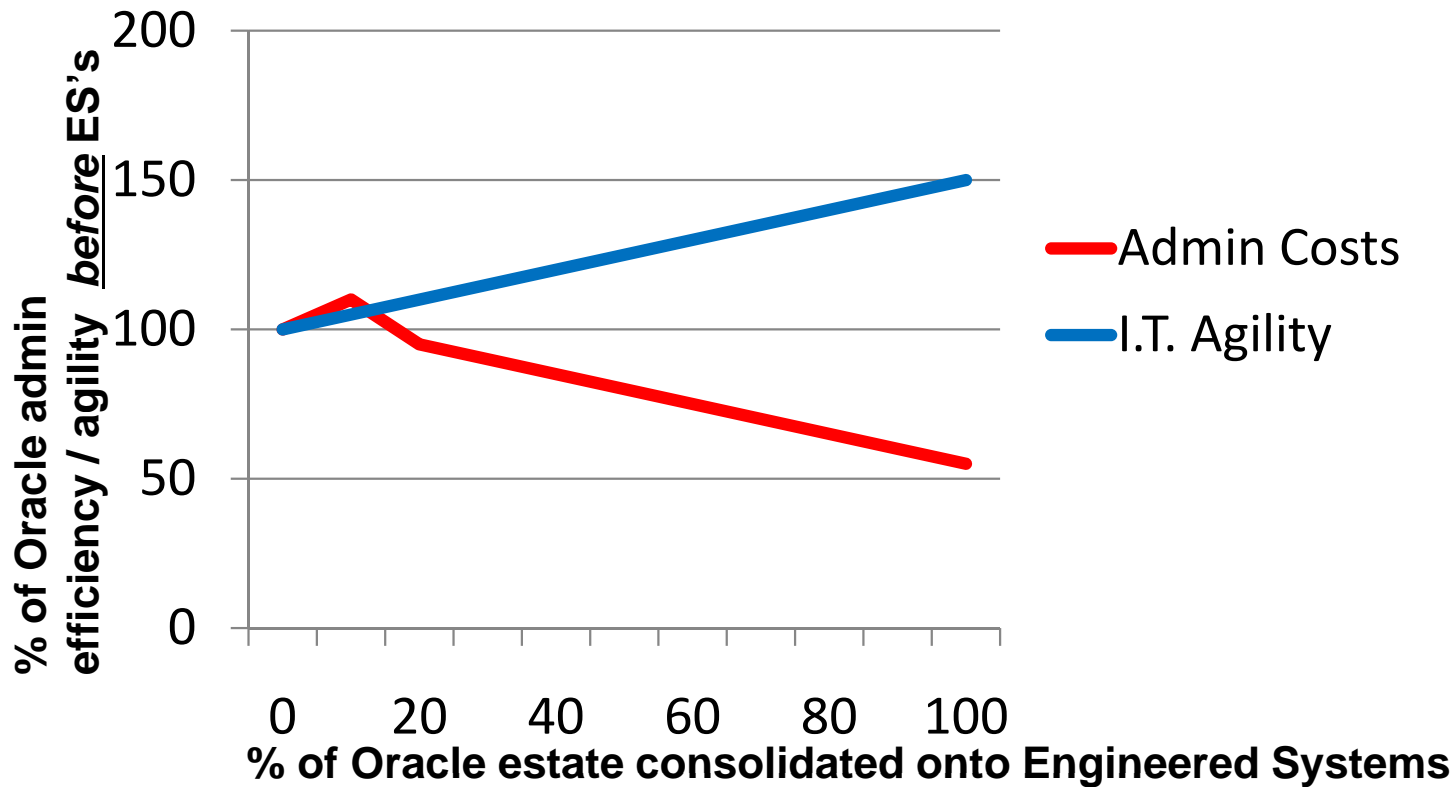
Engineered systems can be approx 20 – 30% easier to manage than traditional multi-vendor I.T. platforms

**As ES are used for more of a companies' Oracle estate, the operational benefits become ever more significant.**

# ESOM | Potential Benefits

**Increasing evidence that Engineered Systems deliver OPEX benefits**

"Exadata Systems are 23% cheaper to manage"

"Exalogic requires approximately 50% less administration effort to run PeopleSoft Apps"

"Engineered Systems reduce operational management costs by 20%"

"Oracle Management no longer requires any storage admin and only rarely needs assistance from the UNIX team. Provisioning a new Database takes 1 day rather than 1 week."

# ESOM | Potential Benefits

## Example: UK Rail ticket and travel information provider

- Implemented Exadata in 2012 (2 x ¼ racks – single instance databases)

- *2 machines managed by 3 CAP Gemini FTE's (blend of skills) and 1 in-house DBA*

- Using EM 12c (with Packs) to manage all stages of the Oracle Exadata lifecycle and automate deployment, maintenance, diagnostics, and tuning.

- Using Oracle Platinum for 24 x 7 monitoring and patching

- **Required admin effort 45% less than for traditional, previous platform (from 7 to 4 FTRE's)**

- Reduced planned outages (for patching, upgrades etc) *by 85%, from 24 hours to 3*

- Reduced problem diagnosis and resolution times *by 95%, from 4 hours to 5 min*

- EM allows immediate monitoring of the entire infrastructure, assisting all admin tasks

- *"Oracle EM vastly outperforms third-party tools in monitoring and managing Exadata."*

- *"Out of 4 hardware refreshes in the last 12 years, this was by far the smoothest".*

# ESOM | Potential Benefits

**Example: Global I.T. Services Company**

- One of worlds largest PeopleSoft implementations
  - 150,000 users / broadest functional scope (using 52 modules) since 2004.

- 70 IBM AIX blade servers for PROD.
  - → Batch and on-line capacity and performance problems
  - → Admin nightmare needing 40 FTE

- 2012 migration to 1 Exalogic ½ rack (16 nodes) in < 90 days.
  - No major issues / No downtime. Much better use of RAM. OTD excellent.
  - Applications Performance 2 – 10x better.

- Administration effort reduced by 50%
  - **Simpler Admin with more automated and standardised processes**
  - **Developers spend more time developing, less time on MW Admin and waiting for changes**

- Now migrating Database to Exadata from IBM P7

# ESOM | Potential Benefits

## Key Points

- Oracle Engineered Systems can be considered '*disruptive technologies*'.
    - Great opportunity to **do some things differently**

- Operational Management **Best Practise**:
    - **People**          | Move towards a more unified administration team structure
    - **Process**         | Implement best practice for all administration tasks
    - **Technology**   | Make Full use of Enterprise Manager 12c
    - **Services**        | Use Platinum Support and the right services to get up to speed
    - Planning your approach **early** → **smoother project implementations**

- Operational Management **Benefits**:
    - ES proven to enable a **step change in the efficiency** of your **Oracle systems management**
    - More cost effective and **agile** administration of Oracle systems
    - Easier to **ensure optimal performance, stability and availability** of Oracle systems
    - These benefits apply to **both in - house and outsourced** support teams

# ESOM

**What now?**

- ESOM Workshop (for managers and admin team leaders)
  - More detail on processes and tools
  - RACI Charts
  - Platinum and Support

- Hands-on admin workshop (Oracle Solution Centre)

- Read more – 'Managing xx' White Papers

- Business Case development (using Benefits Calculator)

- Oracle services discussion (config and set-up, migration, operations etc)

- Technical Training

# Thank You

**Questions?**

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