Beecham Research

Research Report:

Designing an M2M Platform For The Connected World

Executive Summary

A survey of the M2M solutions market was conducted for Oracle in September 2012 by Beecham Research, targeting leading M2M solution providers in North America, Europe and AsiaPac. The aim was to provide an in-depth qualitative assessment of M2M solution requirements today and how these are likely to change in the future.

The main findings from the survey were as follows:

1. The primary driver for M2M solutions is now enabling new services, rather than just improving operational efficiency/ cost saving

2. As a result, the highest priorities for M2M solutions are now seen as:
   • Ensuring end-to-end security, from the remote device through to the data center and the end user
   • Integration with IT Systems

3. Although data storage requirements for M2M solutions have often not been huge in the past, this is changing with very large volumes of data expected in the future. In addition, insight from real-time intelligence "can open up a whole new world of solutions". This data will need analysing and managing.

4. These trends point towards M2M solutions becoming increasingly mission critical, with the need to minimize downtime and provide high availability solutions

5. It is considered that using the same software development environment for all parts of an M2M solution could be a major advantage, so long as each part of it (edge vs. central) can be optimised for its own particular requirements.

6. Cloud based services are key in M2M, greatly reducing the cost and complexity of delivering M2M solution

These findings are strengthened when combined with other recent quantitative surveys among key market players and end-user adopters. Together, this body of research indicates that there are two key trends underway in the rapidly-developing M2M market.

The first is in the B2B segment. Here, M2M data from remotely-located assets and devices is increasingly being used for strategic purposes and value creation throughout the enterprise. This is a far cry from the early days when M2M data was strictly the domain of the service department and used for mainly operational purposes.

The second is in the B2B2C segment, where the opportunities associated with the Internet of Things (IoT) are now becoming apparent. IoT in the B2B2C segment will be characterised by data from large numbers of remote devices and sensors in one sector being combined with data from other sectors and with data from social media. This will impact consumer lifestyles and provide enormous potential for new services.

With these findings in mind, M2M/IoT solutions are set to become more mainstream as the volume of connected systems and devices grows. As a result, Beecham Research suggests that Oracle's 'Device to Data Center' Strategy, leveraging Java in the devices and Engineered Systems in the Data Center or Cloud will become increasingly relevant to M2M/IoT solution providers.

Introduction

M2M initially started out as solutions at an operational level within enterprises, with service departments seeking to reduce downtime, improve support efficiency and save costs. These are B2B point solutions, where remote devices communicate with a central server via the Internet. Processed data is then also distributed via the Internet. Connectivity is the key enabler for these.

M2M market growth has been sector driven, with each sector having its own dynamics, trends, technologies, standards and regulations. The purpose of Service Enablement (M2M Cloud-based platforms) is to reduce time to market and cost of deployment for new services by developing cross-sector structures.

The M2M market is now at a critical point, moving to the Internet of Things (IoT). Whereas M2M focuses on B2B, IoT focuses on B2B2C – representing an increase in both scale and scope. These factors provide the context for these survey findings: Researching the current and future needs of M2M Solutions.

To provide a consistent body of research, data for this report has been drawn from three separate surveys, as follows:

- **Survey 1 – Qualitative assessment of M2M solution requirements**
  o Survey of leading M2M solution providers conducted for Oracle by Beecham Research in August/September 2012
  o 20 in-depth interviews: CEO, CTO, CSO, CMO or equivalent M2M industry experts providing their views on M2M solution requirements and trends across their customer base and live projects
  o Interviewees selected to represent a much larger sample of the solution requirements currently being requested in the market – in principle, representing solution requirements of several hundred end users
  o Split by type: Major Mobile Operators; Key M2M Platform Providers; Leading OEMs and System Integrators
  o Regional split: North America, Europe, AsiaPac

- Survey 2 – Quantitative assessment of IT integration expectations
  o Survey of M2M enterprise users conducted by Axeda directly after Connexions conference in June 2012
  o 79 users of M2M solutions, all with managed M2M platforms
  o Regional split: North America, some Europe

- Survey 3 – Quantitative assessment of M2M platform requirements
  o Survey of M2M enterprise users conducted by Beecham Research – those with M2M platform experience
  o 7 key sectors: Transport; Energy; Healthcare; Retail; Security; Industrial; Consumer
  o 210 adopters of M2M solutions, all using managed M2M platforms
  o Regional split: 46% North America; 42% Europe: 12% AsiaPac
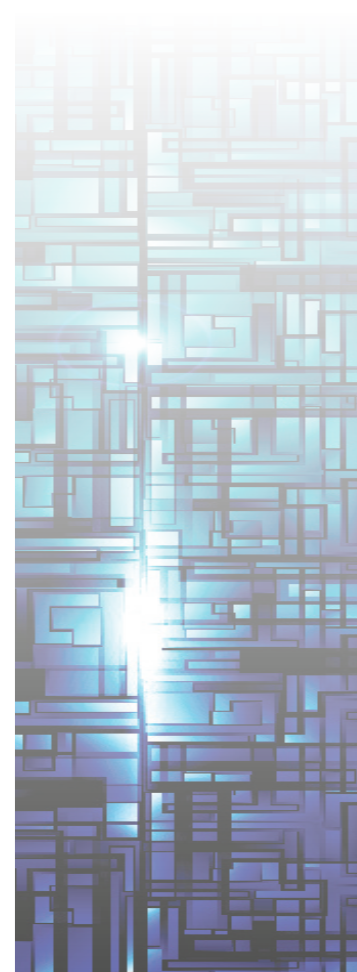
Survey 1 Findings–M2M Market Players

1. Primary Drivers for M2M Solutions

Question 1: What are the primary drivers behind any M2M project you are involved in implementing?
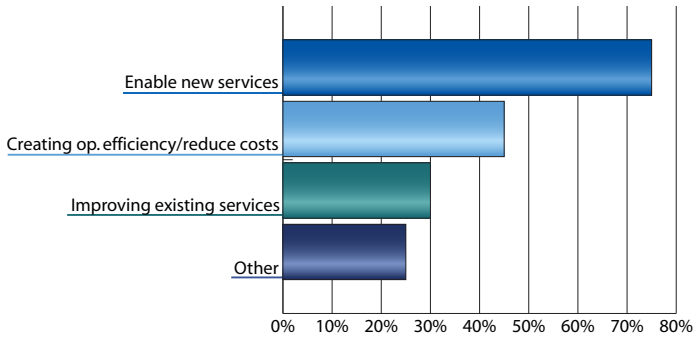
Source Beecham Research

The purpose of M2M solutions within the enterprise has always been about creating new differentiation in the market for the company's products and services. Whereas this used to be implemented mainly through providing better operational efficiency and reducing costs, M2M is now increasingly seen as an enabler for new services.

2. Top Priorities for Delivering M2M Solutions

Question 2: What do you consider to be the Top 3 priorities in delivering M2M projects?
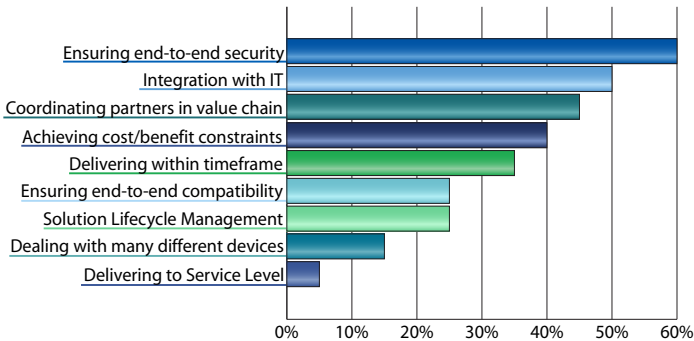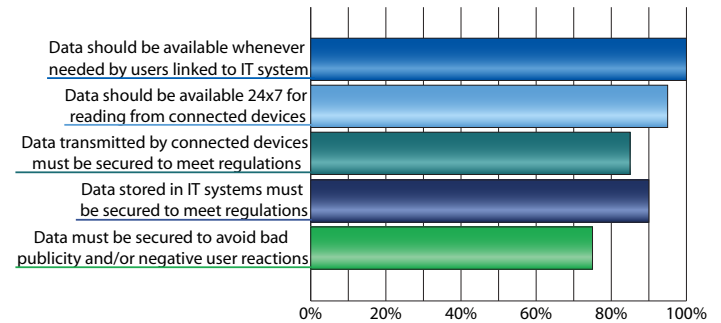

Source Beecham Research

Today, the top 3 priorities are most often seen to be:

1. Ensuring end-to-end security
2. Integration with IT
3. Coordinating partners in the value chain, where that chain is usually complex

Others are also important, as priorities depend on specific customer needs. So for example "dealing with different devices", "negotiating with firewalls", etc. may be critical for some projects.

Of particular significance is the growing requirement for ensuring end-to-end security. This is coupled with the next question, which looks further into this aspect.

Question 3: What are your primary considerations around securing an M2M solution's machine data?
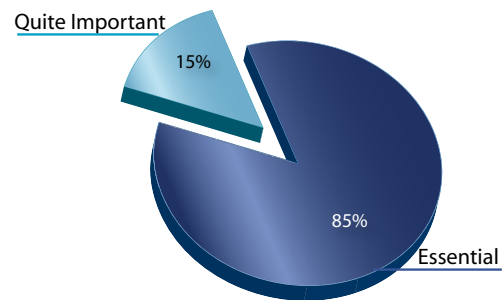

Source Beecham Research

All forms of security for M2M solutions have recently shot up the priority list and are now seen as increasingly important. This was not always the case though, particularly when M2M was only related to service departments. In fact, this increasing priority for security coincides with greater use of M2M data throughout the organization and is linked to the high priority for integration with IT – see Survey 2 for more on this.

M2M solutions are also becoming more mission critical and this trend will continue, particularly when it relates to infrastructure such as the Smart Grid.

3. Data Storage/Processing Requirements

Question 4: To what extent do you consider it important to manage the large volumes of M2M machine generated data to address performance and costs?
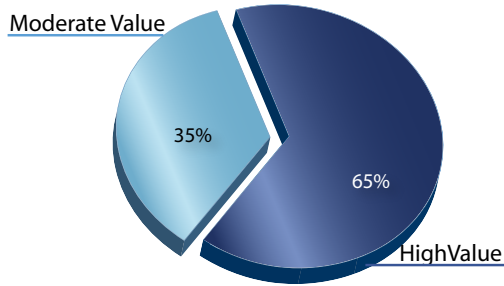

Source Beecham Research

Up to now, data storage requirements for M2M solutions have often not been huge. This is changing, though, with applications like smart metering and auto telematics/auto diagnostics now increasingly generating very large volumes of data. This trend is expected to develop quickly in the future, particularly in the IoT space but also for B2B enterprise activities.

A typical response among these market players was that insight from real-time intelligence "can open up a whole new world of solutions". This extends to Complex Event Processing.

What value can be gained from Complex Event Processing?

Source Beecham Research

CEP is seen as a major opportunity for the future, both for B2B and especially B2B2C next generation of applications. This includes situations where several data sources contribute to a decision process without human intervention, such as:

- Reflecting weather conditions in agriculture management – automatic irrigation
- Predicting performance/failure of a large population of big generators in the field
- Smart City applications, such as pollution monitoring and traffic management
- Real time human behavior profiling and facial recognition for Security applications

Respondents indicated that "many clients are investigating this now"

Which of these provides the most value in extracting intelligence from collected M2M data?
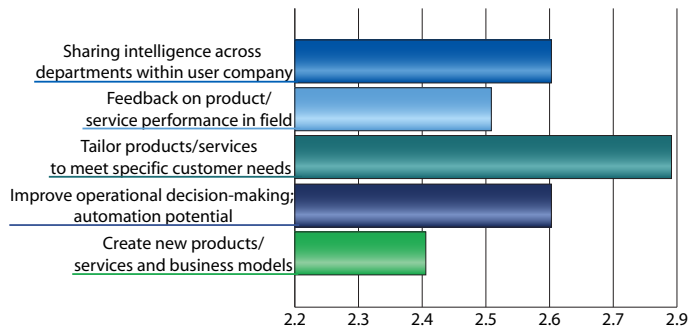
Source Beecham Research

This question – more than others – indicates the growing interest among adopters in using M2M data for strategic analysis and decision making rather than just for traditional operational purposes. All of these areas are considered by market players to be of growing interest to their adopter clients. However, it is very early days for this, with key issues for adopters being:

- Where is the value?
- What is the benefit of storing large volumes of data: Where is the Return on Investment?
- What data needs to be stored?

4. Downtime and Availability
How important is minimising downtime in your M2M implementation?
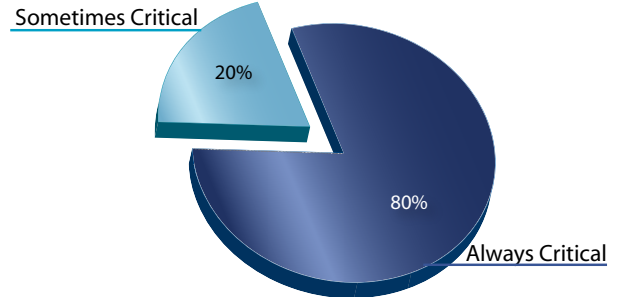
Source Beecham Research

While minimizing downtime of assets monitored has always been a key benefit of M2M solutions, when confined to the service department the M2M solution itself was seldom a mission critical activity.

All that has now changed. The M2M activity has now become mission critical in its own right. Why is that?

For many respondents, the answer is that M2M is increasingly being used to create differentiation in an adopter's own market sector – providing competitive advantage through better service, for example. This service then often needs to be available 24x7.

A further reason is the increasing reliance on M2M data throughout the organization. With greater integration to IT – pointed out in Question 2 of this Survey as the highest priority after Solution Security – comes the need for greater availability. Survey 2 further explores this growing need for greater integration with IT.

5. Software Development Environment
To what extent would it be an advantage to have the same software development environment for all parts of the M2M solution using the same programming language?
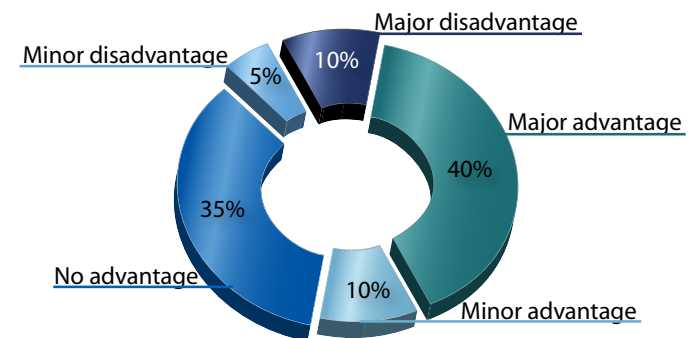
Source Beecham Research

Fully 50% of the market players surveyed see an advantage in using the same software development environment – such as Java – for all parts of an M2M solution if that can be managed. A further 35% were neutral, seeing neither a particular advantage nor disadvantage.

In particular, this could be a major advantage when the eco-system surrounding the whole solution can be controlled. For example, using Java at both ends could deliver a clean environment for an integrated medical devices and monitoring application. However, the device element and the application element are seen as very different environments by solution providers. In the device, the requirement is often for a "light" programming language since the need is to optimize processing capability and memory. This is very different to the server-based application – often cloud-based – and in the IT environment where memory and processing power are not constrained and where there are very different development priorities. Of particular note are the constraints imposed by working with an installed base of devices, where the programming environment is already defined.

In practice, these factors point towards a mixed environment in many M2M solutions into the future. However, a further developing trend for some application areas – in particular related to growing IoT opportunities – is an increasing need for processing at the network edge. For example for intelligent edge devices to share data across a network rather than being processed in the cloud. For these, traditional constraints in processing power and memory at the device level will become less apparent.

With this increasing requirement for processing data on the network edge comes a change in the requirements of the programming environment. The ability to take application logic and move this closer to the device, enable faster, local decisions and minimise data transmission will become increasingly valuable. Oracle believe that Java is the ideal programming language to deliver against this requirement.

6. Cloud-based Solutions
Question 9: What importance should be given to Cloud based services in M2M projects?

Very Important — 10%

90%

Vitally Important
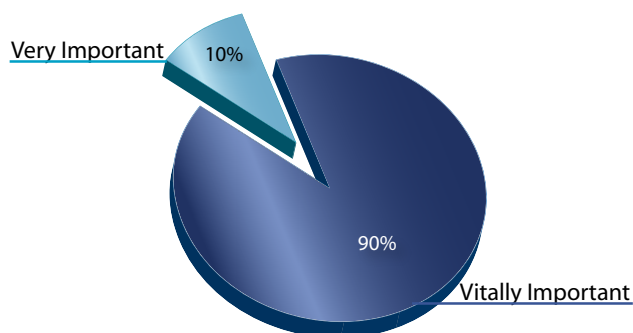
Source Beecham Research

M2M market players are major users of Cloud methods, with transition to cloud delivery occurring several years ago. For those interviewed, the general response was that it is a "no brainer" M2M and Cloud-based platforms are now inseparable for at least the following reasons:

- It greatly reduces the cost and complexity in delivering M2M solutions
- Customers avoid investing in infrastructure and the "plumbing" involved in all M2M solutions

- Behind an M2M solution there are a wide variety of resources used – servers, databases and a wide variety of enabling services, such as configuration management and maintaining software updates – see Survey 3 for more on this. All of these are in the Cloud
- As a result, customers get faster ROI for their M2M solutions with lower TCO (Total Cost of Ownership)

Respondents noted that there are public network cloud target customers and there are private network cloud target customers. For example, defence contractors like Boeing and Lockheed Martin would not use a public cloud. Nike for smart tennis shoes would use a public cloud. There is a spectrum of requirements in-between. This is the main reason for the "Very important" score versus "Vitally important".

Survey 2 Findings – M2M Adopters

Question 1: What is your organization's ERP/CRM system integration status?
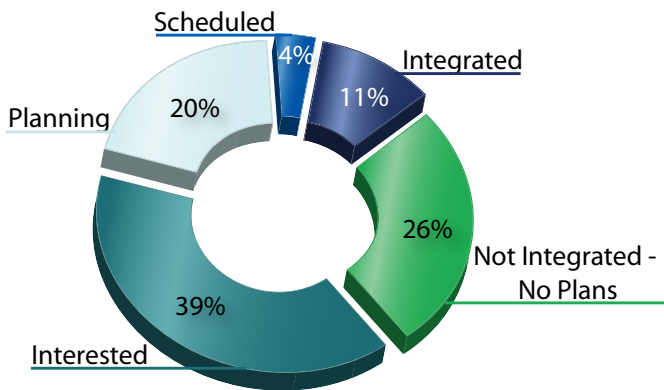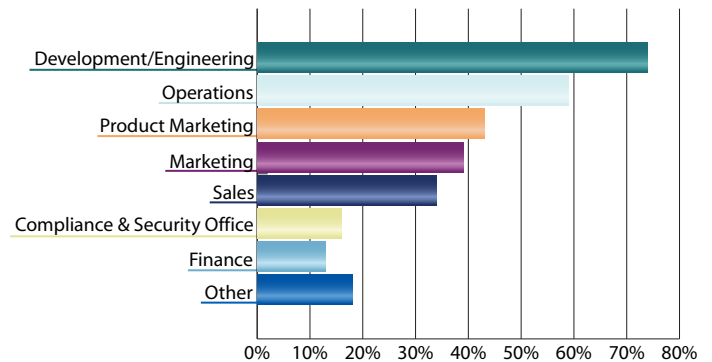

Source Axeda

This survey sought responses from key adopters surveyed by Axeda – a leading M2M platform provider (www.axeda.com). These were all expert adopters who are very familiar with M2M and have already implemented M2M solutions within their companies.

The findings show that 11% of these respondents have already integrated M2M data with their ERP/CRM/Data Warehousing applications, with a further 63% positively disposed to doing so. Those "interested" are interpreted as having given the matter thought, but not yet planning to move ahead. Taken overall, this is an overwhelmingly large majority of such adopters who are now positively disposed towards moving their M2M activities beyond its initial focus, and towards gaining more strategic value from their M2M data within their organizations.

Question 2: What business function would you be most likely to share your connected product info with?

This second question then follows on directly from the first. In sharing data with other business functions, the single highest response was for Development/ Engineering, or R&D. 74% of those interested in integration expected this to be the most likely area where their company could gain new value. It clearly reflects the aim to learn from experiences in the field and reflect these in new product designs. Central operations, for billing and other purposes, also scored 58%. Product Marketing, Marketing and Sales all also scored highly and indicate the growing interest in integration with CRM and other systems.


Source Axeda

These findings confirm and develop the views identified in Survey 1 that M2M data is no longer the preserve of just the service department and why integration with IT systems is considered a high priority.

Survey 3 Findings – M2M Platform Users: Service Enablement Services (SE Services)

What are SE Services?

1. SE Services are defined as the layer above network connectivity - such as mobile airtime - and the layer below end user services.

2. These are horizontal services applicable across all M2M service sectors.

3. Set-up activities such as network certification, solution design and installation are not included as SE services.

4. They are usually cloud-based and offered within M2M platforms.
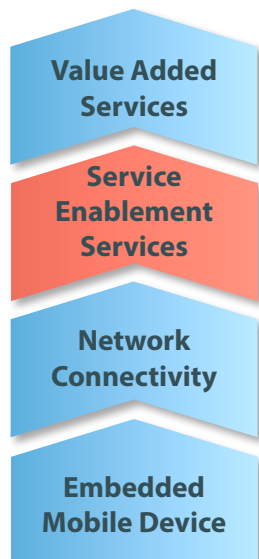
Using these platforms, new adopter service offerings can be brought to market faster and at lower cost with the aim of improving adopter market differentiation.

Such platforms provide a means for moving the market from M2M point solutions (B2B) to Internet of Things (B2B2C) solutions, where higher levels of interoperability are required.

Value Added Services

Service Enablement Services

Network Connectivity

Embedded Mobile Device

Authorisation/ Access Control	Enterprise System Integration	Location-based Services	Subscription Services	Identity Management	Technical Support
Connectivity Management (Lifecycle Provisioning)	Portal Service	Data Warehousing	Content Management	Data Management	Data Analysis & Presentation
Device Management	Application Development Tools	Disaster Recovery	Digital Vault	Message Management	Billing Management
Device Data Security		Emergency Support		Application Management	Policy Management

Source Beecham Research

The scope of SE services is large, with 22 service groups and at least 112 service elements within these groups identified in Beecham Research's second and latest study. This compares with 14 service groups (those highlighted in grey) and 54 service elements identified in the first study in 2009/10.

This growing sophistication is beyond the scope of most adopters to develop themselves. The platforms required for the growing B2B2C IoT segment are even more out of scope for adopters to develop.

Question 1: Do you currently cater for these services with in-house or externally purchased resources?
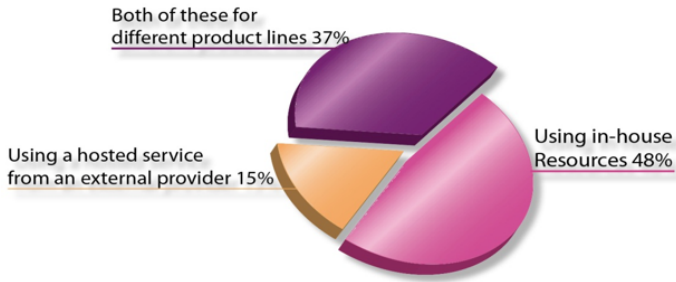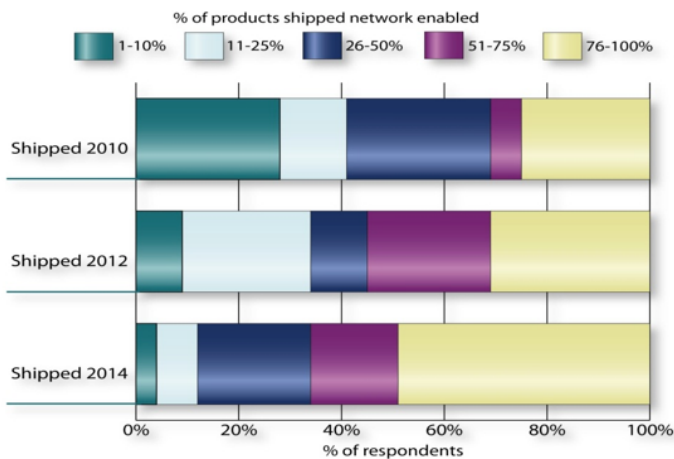

Source Beecham Research

For these adopters, only 15% use externally-sourced, cloud-based managed services at this time. A further 37% use a mix of internally and externally sourced services whereas 48% do it all themselves.

With SE services growing rapidly, and adopters seeking to differentiate their service offerings in the market by improving their capabilities, adopter in-house solutions will struggle to keep up with new development initiatives in the M2M market. A better use of their resources would be to find a trusted external provider.

Question 2: Please estimate the percentage of your products shipped that were/will be network-enabled in each year
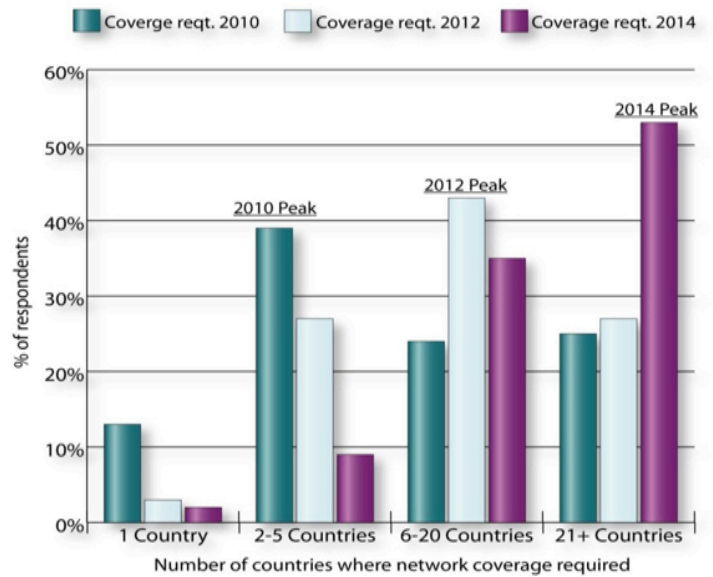

Source Beecham Research

This question shows past, present and future expectations for shipping network-enabled products, where connectivity is embedded during manufacture. It indicates that while those shipping 1-10% of their products network-enabled is expected to decline rapidly, those shipping 76-100% of their products network enabled is expected to increase very quickly. Adopters include connectivity in their products in order to introduce new services associated with those products, such as monitoring services. For a variety of reasons, Beecham Research expects most of the growth in the M2M market will come about as a result of this type of activity.

The main conclusion from this is that it is becoming more standard to embed connectivity into products during product design, and represents a likely increase in service offerings being brought to market. This is a main driver for implementation of SE services.

Question 3: Please estimate the number of different countries worldwide where your products/services are/will be required to be connected in each year
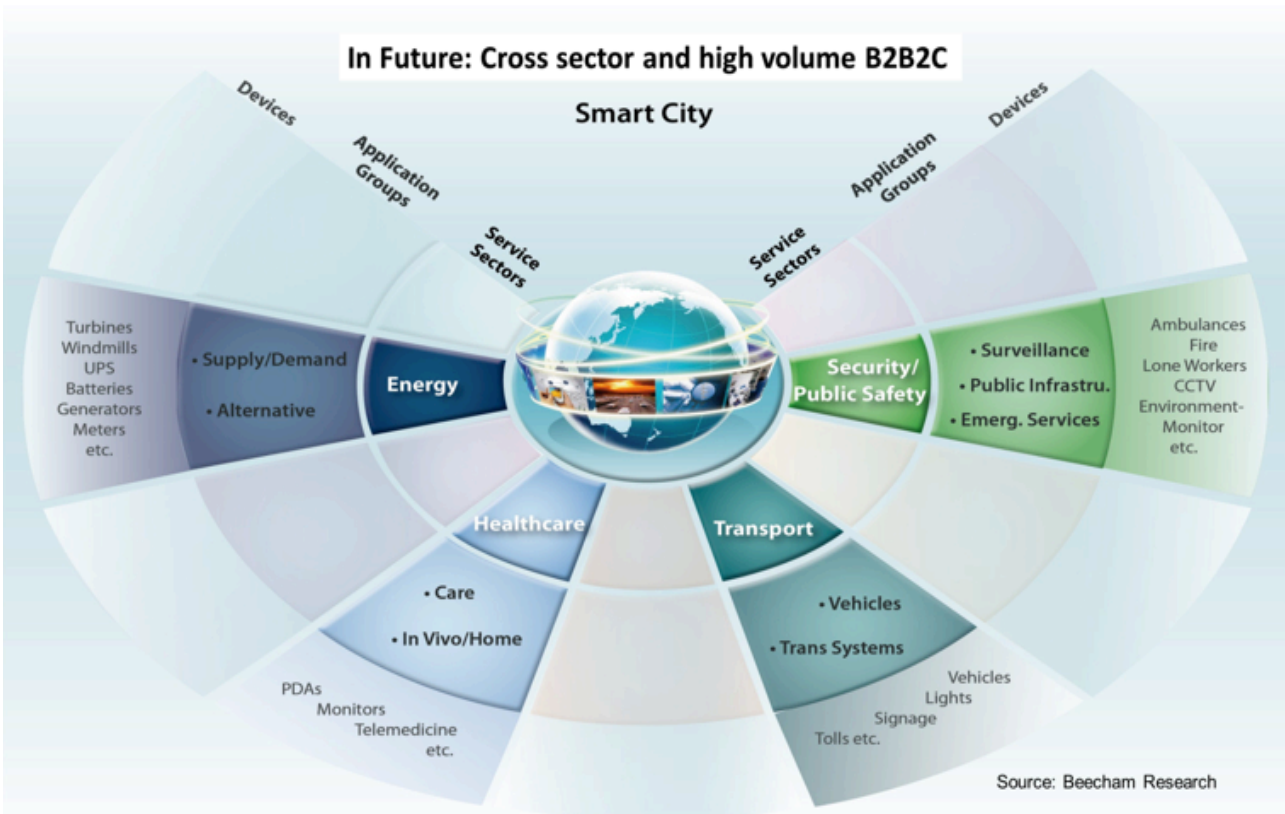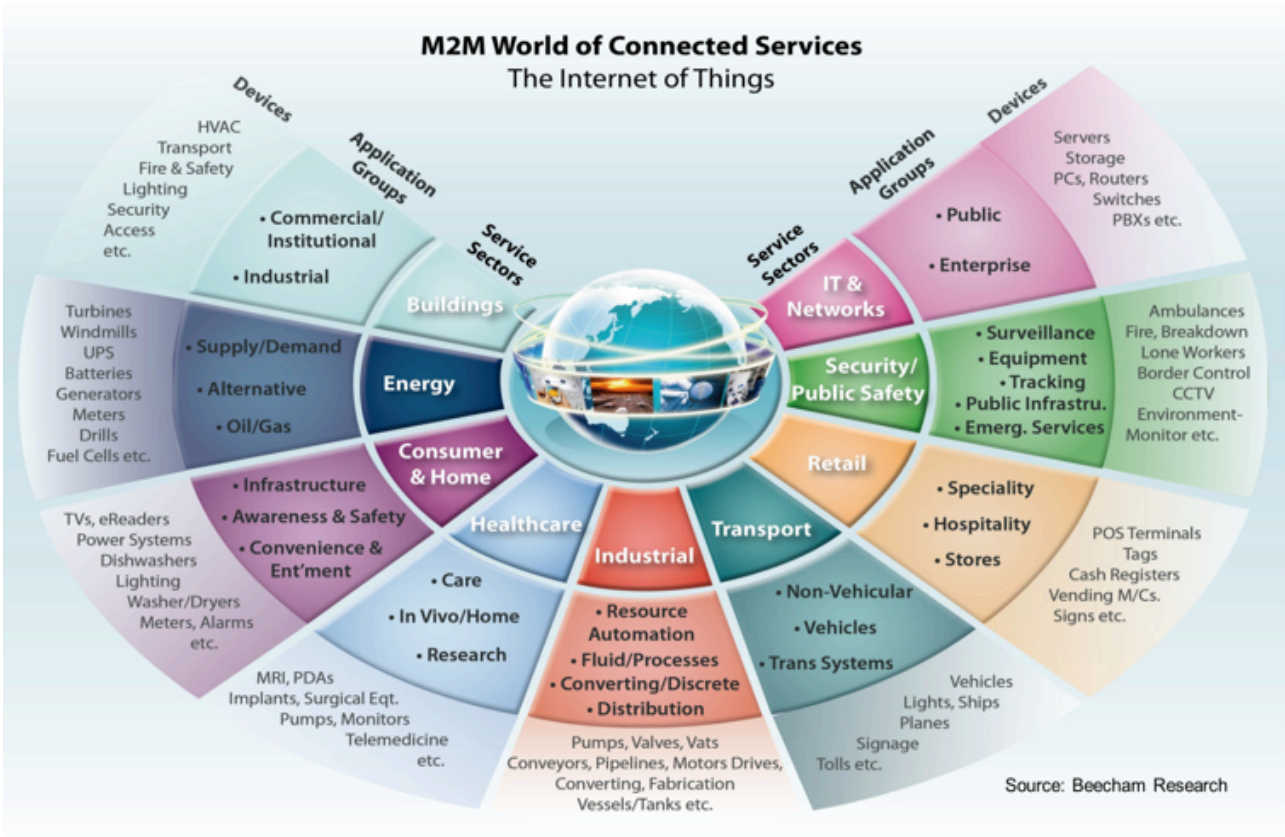

Source Beecham Research

This question shows past, present and future expectations regarding network coverage requirements for network-enabled products. It indicates that coverage requirement was typically 2-5 countries in 2010, rising to 6-20 countries in 2012 and 21+ countries by 2014. Coupled with the previous question, this shows that products with embedded connectivity M2M solutions are quickly becoming more international in scope and that network coverage capability must track that.

At the same time, it makes clear that M2M solutions are inherently international in scope and that the breadth required for these is increasing. This is highly consistent with cloud-based platforms incorporating SE Services.

M2M Market Overview

The first of the following two charts shows the main service sectors within which M2M solutions are usually implemented. This provides a useful market segmentation for the whole M2M market.

M2M World of Connected Services
The Internet of Things

Source: Beecham Research

In Future: Cross sector and high volume B2B2C
### Smart City

Source: Beecham Research

The chart shows each sector – such as Buildings – comprising of several main application groups and, at the outer edge, examples within each sector of devices which when connected provide the means for creating new services. The chart shows both the breadth and – by the same token – the relatively high fragmentation of the overall M2M market. There are very few service providers operating across more than one service sector. Instead, they are highly vertically-oriented within individual sectors. The aim of SE Services and Cloud-based M2M platforms is to bring together the common parts of all applications, thereby seeking to reduce the fragmentation effect.

In contrast, the second chart shows the service sectors that may be involved in a Smart Cities implementation – a typical IoT B2B2C application. This will draw on data from the Energy/Power, Healthcare, Transport and Security/Public Safety sectors. Depending on the requirements, other sectors may also be included, such as Buildings. The key difference with these is that data from several sectors will be required to be combined to create new service opportunities.

For these to be effective, huge amounts of data will need to be processed in the cloud and information made available in multiple forms for different user groups, in real time. This is the essential challenge for M2M/IoT infrastructure moving forward.

M2M Services – Revenue Projections
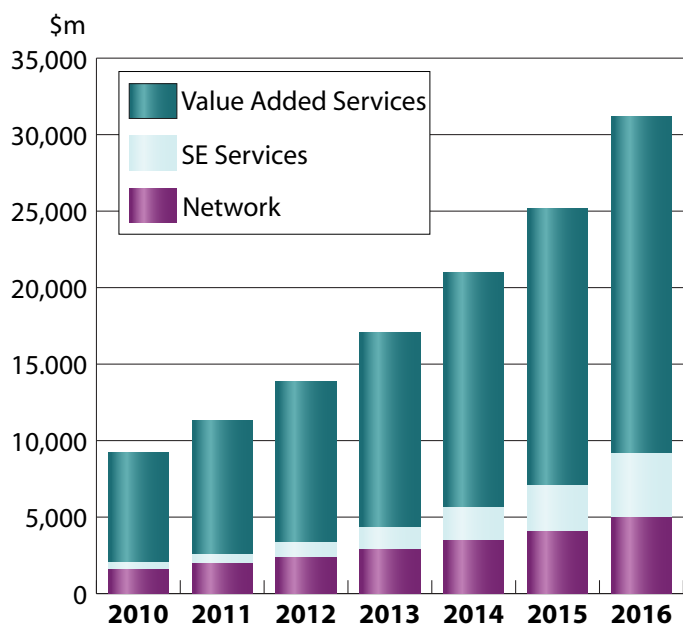
Source Beecham Research

The effect of these developments on revenues is shown in the revenue projections. Value Added Services are end user (adopter) service revenues – such as Fleet Management - and represent the largest part of the overall revenue stream. However, they are vertically aligned. In contrast, both SE Services and Connectivity revenues are horizontally aligned, meaning that they are applied across all sectors.

Although Connectivity revenue growth will be solid, various factors are expected to slow this down. In contrast, SE Services growth is expected to be swift.

Key Take-Aways

1. The primary driver for M2M solutions is now enabling new services, rather than just improving operational efficiency/cost saving
   - It is all about creating market differentiation for B2B adopters to deliver new competitive edge

2. As a result, M2M data is becoming increasingly important within organizations
   - Leading implementation priorities now : Ensuring end-to-end security; Integration with IT; Coordinating partners in (increasingly complex) value chain
   - Others, such as achieving Cost/Benefit constraints, also top priorities for individual projects

3. Security has shot up priority list – was not always the case
   - Adopter companies now relying more on their services for market differentiation.
   - Linking to IT and rest of enterprise has also been a game changer

4. Integration with ERP/CRM/ Data Analytics now of high interest
   - Sharing M2M data widely within organizations – in particular, feedback to R&D

5. Data volumes expected to grow substantially in future, both for B2B and for B2B2C

6. Indicates important trends developing:
   - B2B: Moving to enterprise integration, more data used more widely and more strategically
   - B2B2C: New market developing in Consumer and Lifestyle related services – Internet of Things (IoT)
   - IoT: Processing of large amounts of data, plus in real time (Complex Event Processing)

7. As a result of these trends, M2M solutions becoming increasingly mission critical – minimizing downtime and higher availability of solutions

8. Same software development environment for all parts of M2M solution could be major advantage
   - But requirements for each point in the solution are different and need to be optimised for own function – "Sum of correct parts" is key

9. Cloud is key in M2M – greatly reduces cost and complexity of delivering M2M solutions.
   - Service Enablement (SE Services) is a Cloud-based opportunity

10. Future of M2M is in embedded connectivity – in everything . . . internationally.

11. Service Enablement is key for M2M and IoT market development
    - Manage fragmented market and turn it into an advantage

12. More SES services will come to market with more sophistication than adopters can develop themselves
    - M2M Adopters will increasingly need to partner with SES providers to achieve competitive edge in their own markets

About Beecham Research

Beecham Research is a leading market analyst and consulting firm that has specialized in the development of the rapidly-growing M2M/Internet of Things market worldwide for over a decade, since 2001. Based in Cambridge UK and in Boston US, we actively participate in initiatives aimed at achieving M2M market development and growth. Recent research has included two market-leading and widely supported studies on M2M Cloud-Based Platform Services and a study of the worldwide Satellite M2M market contracted by the European Space Agency. Ongoing research includes new business models for the Internet of Things, Healthcare and other vertical sectors.

A particular specialty is primary research surveys involving users (adopters) and market players worldwide, in multiple languages.

In conducting our research, we cover 9 key industry sectors and their associated devices including all principle technologies for connecting them – both fixed line and wireless. We offer customized market analysis and consulting services including subscription-based services tailored to individual company needs.

Contact us at:

Website: www.beechamresearch.com
Email: info@beechamresearch.com
Tel: +44 (0)845 533 1758 Fax: +44 (0)845 533 1762
M2M blog at: http://blog.m2mapps.com