On Tools and Bad Habits: Making MR Technology Fit for the Rigors of Research in the 21st Century

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> *"How people keep correcting us when we are young! There is always some bad habit or other they tell us we ought to get over. Yet most bad habits are tools to help us through life." (Nietzsche)*

Abstract

Much of the software in use within marketing research today has been arrived at through an evolutionary approach, with spurts of innovation tempered by a legacy of fairly rigid and unchanging processes. Now, the pressure is on. Research stands accused of being particularly good at the things people either don't want, or don't want to pay for. But the processes and the tools in place often make it hard to go faster, or go further, as today's clients expect.

As MR reconstructs itself as an always-on knowledge and insight provider in a post-modern world, it is time to examine just how far the tools we are using measure up to these new demands. For example, clients want knowledge pooled across surveys and from other sources of data too; post-modern consumers have become research-critical and need to be engaged in different ways; consolidation in the industry and changes to corporate governance mean, inter alia, more accountability and openness in methods and tools.

This presentation will identify rising demands where the current tools and methods often struggle to deliver what is wanted, and highlight examples of innovation and good practice from around the world in meeting these new demands.

Introduction

Marketing Research today cannot be immune to the enormous changes that have taken place in the world of the consumer, and in what is often termed the 'post modern' society. It is a term, like the society it attempts to define, which has no one definition but is a constellation of different meanings, perspectives, realities and aspirations. It is typified by greater transparency and openness, though this is often obscured by an unprecedented scale of discourse and communication such as that experienced on the Internet. It is a society in which old power hierarchies have been subverted through individual action and a desire to choose for oneself, in which the 'alternative' of yesterday has become just one of many choices available. Some yearn for a more simple world when half the nation watched the same TV program, when a career meant doing the same job for life. Specialisation has been replaced by eclecticism. It is in the new buildings we enter, on the menus of restaurants we eat in, catalogued into the bookmarks folders in our web browsers.

In marketing, the old command and control economy is gone forever. It just got even harder to discern or predict the fickle ways of consumers. Segmentation has been replaced by fragmentation. Marketers have to be more subtle to be heard and more eclectic in their approaches. And in the knowledge industry that drives marketing, our own industry, these upheavals are causing not a little discomfort. Our diverse, empowered and multiply-stimulated respondent base is both harder to reach and less willing to cooperate. The research product has to compete with an array of data from other sources, often available instantly and at little or no cost.

Research is adapting to meet these challenges, but is often doing so with inadequate, ill-fitted and worn out tools. Updating or replacing the existing technology is costly, so it is essential to invest wisely in new tools or improving the existing ones.

In this paper, we will examine some of the forces for change, and consider how the tools of the future need to be sharpened up in order to turn these changes to advantage, to the benefit of research customers, research participants and research practitioners across the board. We will consider these forces for change from the following five perspectives:

- Giving satisfaction to research buyers and users
- Reconstructing the researcher/respondent relationship
- Efficiency — using technology to be smarter in what we do
- Difficult decisions — moving towards anticipation rather than reaction
- Research in a post-modern world: the end of the specialist?

The bad habits

Nietzsche states that bad habits are the tools to help us through life. At best, relying on them can help us to survive in times of uncertainty, but not necessarily to prosper. The danger is that they encourage reactive responses and entrenched positions rather than innovation and winning strategies. But an examination of them can illustrate where changes, sometimes relatively minor changes of emphasis or incremental improvements, can bring about better practice and, potentially, with less effort.

1. Blaming research buyers for not spending enough

Research is expensive and slow compared to other sources of data. It has to offer better value to be able to demand a premium, or reduce its costs. Research has consistently under-invested in its technology and as a result of this, is not as efficient as it could be.

Technology providers have tended to concentrate on the core research processes of gathering data and processing it at the expense of all the other peripheral activities.

It is reasonable for clients to expect more than they have historically received from research. Decisions are taken faster, and decision-making is often devolved in organizations. Research needs to hit more desks, and have more impact when it does. Consistently, research buyers are telling the research industry that the research product is tired. Research needs to be more aware of its image, and its presentation. It often looks cheap, even though it is perceived as expensive.

This goes beyond mere style into substance, as many of the internal processes within research companies are manual and labor-intensive.

The opportunities for research agencies to cut costs are often considered limited, yet research by meaning in 2003 discovered that research companies, on average, are spending 11.2% of their research revenues on the salaries of their specialist IT, database, programming and systems staff, yet only 0.89% on the specialist software that they use[1]. This would appear to be a massive under-investment. According to Gartner[2], the industry norm in 2004 was 2.78% and that was predicted to increase to almost 3% in 2005.

Efficiency

Software providers have had a tendency to concentrate only on the core research pipeline functions, and are ignoring the periphery. So some aspects are over-provided for, others are scarcely provided for at all. This is not necessarily the fault of the software providers, though there have been several high-profile manufacturers that have deliberately not chosen to develop such tools. But in a climate where expenditure on technology tends to be viewed as a necessity to be obtained as cheaply as possible, rather than an investment, it remains a high risk area for software providers.

[1] From a survey of 50 large research companies worldwide carried out by meaning ltd in 2003 and published in *Research* magazine, July 2003

[2] Gartner 2004 IT Spending and Staffing Survey Results. Percentage of gross revenues devoted to IT operating expenses.

Over supply		Under supply	
Application	Solutions	Application	Solutions
CATI	50	Panel management	4
CAPI	38	Data portal development	3
CAWI	74	Verbatim coding	2
PAPI	24	Fieldwork management	5
Batch cross-tabs	36	Powerpoint automation	2
Interactive tabs	23	Research libraries	1

Source: Research Software Central database, meaning ltd, May 2005.

Investing, and seeming so

It is not sustainable for the research industry to be investing as little as it does in its tools, and still worse that this buy cheap approach is so obvious to research buyers and research participants alike. Organisations doing face-to-face research, from the many European research agencies that practice CAPI, to the US Census Bureau[3] report that respondents are more willing to participate and for longer, when the interviewers use laptops or handheld devices, for the reason that it makes the research seem more serious, more professional. It is perceived by respondents that the investment in technology underscores the commitment of the researcher, or its sponsors, and makes the respondent feel s/he is being taken seriously.

The physical appearance of too many web surveys is also cheap and shoddy. This is not merely a case of lack of functionality in the software, though there is considerable room for improvement here too. Poorly presented survey forms, online or on paper, reflect badly on the industry. Moreover, they reinforce the notion of cheapness, in the mind of the research buyer. The same is often true of the way that output is presented. Yet the difference between something that looks cheap and something that appears to take both respondent and client seriously, with a pleasing, compelling appearance may require only a tiny additional effort over that which has already gone into the project.

It was Dolly Parton who said “It costs a lot of money to look as cheap as I do”. Tomorrow’s tools and the outputs from them must look better than they do now, in most cases, and make it easy to give the impression that money has been spent, and spent wisely. Giving good value, and emphasising that principle to buyers and respondents means spending money on the right things.

2. Blaming direct marketing for the loss of respondent co-operation

While it is no doubt true that many of the respondents now lost to the industry have failed to discriminate between genuine research and fraudulent research (selling under the guise of research); research too must acknowledge its role in the loss of goodwill through surveys that are long, boring and inconvenient for the respondent. The uncompelling appearance of many surveys, already noted, does not help, either.

Research is increasingly looking to panels as a means to secure a pool of respondents willing to participate in research, often with their efforts recognised by a reward system. While there are concerns about the reliability of the data that flows from such ‘professional respondents’, the rights of the respondent, and the responsibilities of the research industry to ensure its surveys are not onerous and do not abuse trust or goodwill has been given little proper consideration.

The rise of the panel, which is certain to continue for some years to come, does seem to be increasing the awareness, at least among panel providers, of the virtue of taking a responsible, longer term attitude towards respondents. At the very least, panel providers are aware of the time and cost involved in recruiting each member, and can see the effect of badly designed, burdensome and inappropriate research on their members, evidenced by

[3] Using Behaviour Coding to Analyse Interviewer/Respondent Interactions with a Mobile Computing Device, Jennifer Hunter, US Census Bureau, presented at ASC. Available at www.asc.org.uk

those who then fail to participate in that one survey, or lose interest in further participation. The effects can be seen and measured. Indeed, the arrival of reward or payment for participation has had a number of other positive benefits in terms of transparency of purpose and also accountability. A member of a panel has a track record, allowing for both consistency and motivational checks to be carried out.

The panel is not a universal panacea to response issues, but the lessons learned by panel operators need to be applied vigorously to other sectors in order to reduce the burden of participation on respondents, and make the experience an interesting and enjoyable one. Mixed mode research is one important development here. But on the Internet alone, there is so much more that can be done, in terms of creating compelling surveys through the greater use of interactivity and effects. Traditionalists may scoff at the notion of the survey as entertainment, but this denies the fact that most people take part in research because they are curious, and they like the feeling that someone is interested in what they think. We need tools that make it easier to produce these compelling surveys.

3. Using tools that are no longer fit for the purpose

Is it comfort or cost that leads researchers to cling to old tools and methods when others would allow for more innovation? Is there any other industry that still talks of punch card images, a 19th century creation, in the 21st century?

There is still a reliance in the industry on turning out another project, because that is what the research pipepline delivers: interviews, data, cross-tabs. Companies are looking for something new. For many, the research project, with a deck of tabs and a powerpoint presentation in a darkened room no longer cut it. They want to set the research alongside all the other information they have access too. And they don't want to spend much time looking at it, unless something really interesting jumps out. They want someone else to point them to what is interesting, and to find that it really is interesting because they can do something with the information.

Technology providers, in collusion with the research company users, focus on providing ever-more feature reach tools for collecting data. This only becomes a problem when this is the only area of innovation.

Below are some of the areas that research software needs to address, in order to meet the needs of research clients, and to allow research companies to become leaner and fitter through process improvements:

Mixed- and multi-modal interviewing

An essential requirement to reduce the burden of survey participation on respondents, this also allows for cost to be reduced without an impact on quality or reliability. It improves reliability by increasing the reach of the survey to its target population, and usually increases participation rates.

Many research packages now claim to offer multimodal research capabilities, but few still offer switching of interviews from one mode to another in real time. Solutions of note include Askia, Interview Technology, Nebu, Pulse Train and Voxco. Perhaps the most ambitious and now fully coming to fruition is mr Interview within the SPSS Dimensions suite.

Change- and version control for trackers and continuous work

The way that most packages handle systematic change is unacceptable, and ignores developments in the last 20 plus years elsewhere in IT such as versioning and the ability to roll back to a previous version. This is not helped by such a large proportion of software still using location dependent record structures, where a large proportion of the work involved in updating a survey from one wave of research to the next is concerned, with the layout of the data. In most cases, the method for handling change between one wave and the next is laborious, error prone and relies almost entirely on human intervention.

Two solutions of note that provide complete version control and allow simultaneous interviewing and clean handover from one version to the next are SPSS Dimensions and Askia.

Automated testing and error detection of scripts

With the exception of the ability in many packages to generate logically consistent dummy data that follows the routing of the survey instrument, the concept of automated testing of questionnaires or CAI scripts is unknown in MR packages. Testing therefore involves skilled and highly paid people performing duties they would rather not perform. Yet the consequences of errors in interview scripts can be calamitous.

Automated checking of tables

The amount of time that both DP and research staff spend checking tables must add up to years of staff time annually in most medium- to large sized research companies. Software designers need to pay attention to ensuring that errors are harder to make, by providing early feedback in their tools as to the effect of changes being applied, especially with difficult areas such as filters and conditions. However, it should also be possible to create software that can apply rules to tables to perform the kinds of tests that many research assistants carry out on tables ad nauseam each day.

Cross-platform portability of survey data and survey instruments

The Triple-S standard is setting a good precedent here, but more needs to be done, both in terms of getting software providers and users to adopt the standard, and in terms of finding ways to take these standards initiatives further.

Research companies stand to benefit more from these cross-platform initiatives than the small band of enthusiasts who look after these standards on an unpaid basis, whose efforts deserve the highest praise. Yet Harris Interactive stands alone in providing any actual funding to sponsor the development of these initiatives.

Notable innovators in this field are Pulse Train, working on “Project Apollo” to create cross-platform operability; GMI which permits limited import of scripts from other systems into its multi-modal interviewing platform and QEDml, from Philology, a cross-platform survey authoring tool, currently limited by a lack of support for routing controls between platforms. Also worthy of note is the SPSS Dimensions Data Model, which encourages other vendors to create so-called Data Source Components to allow for data to be shared between different applications. Again, this support does not extend to entire survey instruments or their routing constructs, which for the time being remains the unattained holy grail of portability.

Interviewer booking online or via SMS text messaging

It is imperative that the CATI, CAPI or mystery shopping system of the future must be able to assist fieldwork managers in the most tedious and time-consuming part of their duties: estimating the number of interviewing shifts or assignments and forming these into shift rosters, then filling these shift rosters with available and suitably skilled interviewers. For an interviewing facility that handles ten different languages, this is a gargantuan task, and as call centers become distributed, due to the influence of web-enabled CATI, the task, if anything, gets harder.

One of the most elegant solutions to this problem is the NEBU DubPlanner®, which anticipates the workload from the projects and their interviewing and quota requirements, and sample strike rates, and advertises the available shifts to interviewers by sending them either email messages or SMS text messages. Interviewers can log on to a website, and sign up for shifts, or provide their availability for the future. Supervisors can then instruct the planner to create a plan, optimizing the availability of interviewers and their language skills against the shifts on offer. It then notifies the interviewers, again by email or text message, of their specific assignments, and again these can be checked on the web. The model can even be re-run once a project is underway, to see if the shifts have been over- or under-resourced to meet the actual strike rate being achieved, and make all the adjustments needed, including booking additional interviewers. It is a superb piece of software which could save most interviewing centers a small fortune, as well as allowing them to react much more quickly to

late changes, overruns, and is a perfect example of the kind of functionality that is too often omitted from software development plans.

Collaborative survey component libraries

Tools often claim they allow the reuse of components without providing systematic ways to catalogue them or even basic tools to search them. Those that exist assume that someone will take on the role of librarian or gatekeeper, which ensures that they get off to a good start, only to wither on the vine over time. These tools will work best if they take the model of the wiki, such as the Web encyclopedia Wikipedia which allows for teams to collaborate and contribute items, while maintaining standards through change control and a peer review process.

To date, I have found no examples of collaborative library tools, and most library facilities in software still tend to lack the kinds of search and tagging capabilities common on websites or in content management systems.

Integration of research processes with accounts

Today, most CATI and CAPI software seems to overlook the fact that interviewers are paid according to the work they do (more usually by the shifts they work than the interviews they complete) but although they capture almost all of the information required, they do not make it easy to extract it and use it as a feed to accounting processes. Neither do they provide capabilities for monitoring budgets against actual costs incurred. As a result, time is wasted in recreating this data in parallel, usually after a great deal of manual effort.

Again, the exception to the lack of support for this is Nebu, which provide job cost control and budgeting, as does GMI's Net-MR.

"RBRM" or research buyer relationship management software — CRM for research companies

Take accounts integration a stage further, and the research system of the future becomes a complete research workflow system, managing all the interactions between suppliers, clients, casual staff or fieldworkers, as well as handling all of the documentation, signoff and handover at each stage, and so on.

The most impressive example of this kind of system is one aimed not at research companies, but research buyers: Research Reporter from the Australian developer, Insight Marketing Systems.

Easy integration with data from other sources and non-research data

The distinction between research data and other forms of data is obvious only to those within the industry. To those with commercial enterprises, it is all data and is only useful if it can be searched and located along with other corporate or business intelligence data on the corporate intranet or knowledge base.

Benchmarks and norms

Research clients have long woken up to the notion that old research still has useful insights to offer, even though they may need to be treated with caution. But research agencies ignore the rich resources that are at their fingertips, due to concerns over the ownership of data. While these concerns are legitimate, the issue of reusing data, in an ethical way, is not insurmountable. Perhaps the greater barrier is the difficulty this poses for most research software, which is unaware of any data outside of the current survey being worked on. In fields such as customer satisfaction, and more generally where normative measures such as rating scales are applied, the value of the results, and the expertise of the agency can be enriched enormously if they can be interpreted in the context of benchmarks and norms achieved across a much larger base. It is extraordinary that it is done so infrequently.

Software capabilities for Quantitative researchers

To date, most of the attention to the needs of qualitative researchers has been in providing tools to facilitate online focus groups. Yet this is a method that most qualitative researchers see as a tool that can be used only in exceptional cases. Qualitative research is being carried out on ever grander scales, with some projects running to 50 or more groups. There is a desperate need for tools that sympathetically help quantitative researchers handle the sheer volume of data and aid their ability to think and interpret the findings.

Until recently, the only tools available were CAQDAS (Computer-assisted qualitative data analysis software) products aimed at social researchers and used almost exclusively in universities and academic research institutes. One of the major producers of these tools, QSR, has now filled this gap with a qualitative analysis tool with a feature set specifically created to match the various ways in which qualitative researchers need to work.

This is a welcome development. It is possible that these tools may also find a place in allowing qualitative researchers to cope with the growing mountain of unanalyzed verbatim comments generated by online surveys, where the length of answers often knows no bounds. I understand that a future version of this product will provide specific features to assist in this area. It will also provide a different way of treating such responses, allowing unusual comments, which may be important and significant, to emerge. These tend to be lost, by virtue of the process, in classic verbatim coding, as they are swept into the “others” category.

Qualitative findings must also become an integral part of any data portal offering. Again, to the non-researcher, research data, whether from qualitative or quantitative, are just data and need to be accessible along with all the other data.

4. Going for the quick fix

Regulatory changes, such as ‘do not call’, section 508 and the Sarbanes Oxley Act have forced changes on organisations, often in a reactive way. Yet organisations that are already taking a holistic view to their business practices will often find they are already well on the way to being able to accommodate these new demands. Legislation does not come out of a vacuum: it is usually in response to the political climate and public mood at the time. Is it really the case that the research industry is unaware of what the public is thinking? The answers are often there in front of you, but the problem is that they may not always be in sync with the questions you are considering at the time.

Coping with regulation

There is no doubt that regulation is placing a heavy burden on some parts of the research industry today. Furthermore, some software seems to be a lot better at coping with regulatory change than others.

The W3C AAA accessibility standards, and subsequently the 1998 amendment to section 508 of the Rehabilitation Act has caught a great many software providers out. In some cases, redevelopment is proving to be complex and costly. Several firms are saying that their new software will all be 508 compliant, such as SPSS, who have already made the respondent interfaces in their new Dimensions range fully 508 compliant.

The Sarbanes Oxley Act is causing an unprecedented burden of administration in terms of recording and reporting of routine processes for public quoted companies. Systems which contain an audit trail or contain a workflow model within them are able to reduce this burden considerably, but few of the traditional MR software tools provide such capabilities and it would be costly to add them. Interestingly, the newer, simpler tools, which larger research agencies have tended to overlook, such as Nebu or MI Pro, are much better in this respect. Regrettably, many software providers still do not see the creation of workflow systems within their data collection tools as a priority.

Regulatory changes are likely to continue to have an impact on software. However, the systems that cope better with making these adjustments are those which are more open and allow customization to take place. The use of an industry standard database such as SQL Server is also likely to make software more amenable to change.

The other part of the equation in developing a strategy to make software more able to meet the increasing burden of regulation is anticipation. Laws do not come out of a vacuum. The public discourse and political discussions are there to be observed long before the legislation bites. It is an area where industry bodies such as CASRO, AMA, ARF, MRA and ESOMAR often have an awareness of the early signals that changes are on their way. It will benefit all involved with technology, both within research companies and software companies, to work closely with these associations who can, and often do, play an active role in ensuring that the particular needs of the research industry are considered in legislation, and not mistakenly swept into the general category of marketing. At best, it can provide an 18 month lead on likely changes.

Reactive innovation

Another example of the need to anticipate is in the client driving changes in technology. I often find a lot of the innovation has come about because research *buyers* have been agitating for change, leading researchers to look at new ways of doing things. In my practice, a common opener in companies seeking new software is the statement that "we have a client that wants us to be able to…", rather than "We've had an idea that would like to …" Researchers still often appear uncomfortable about technology and are unimaginative in their approach, and in doing so are perhaps failing to see how it can build better business in the future.

One exception to this is the rise of portals, which many research companies have been keen to construct. Research buyers are increasingly sceptical and resistant to these, seeing them as an attempt to lock them into sourcing all of their research from a single vendor, and losing freedom of choice and control over their data in the process.

There are still very few tools on the market to allow buyers or suppliers to create vendor-neutral portals. Notable exceptions are Pulse Train's Pulsar Web and Cobalt Sky's Vector and SPSS mr Tables. Additionally, E-Tabs provides a vendor-neutral means to distribute tables via the web or electronically, but without any analytical capabilities. Both Confirmit and GMI provide portal building tools within their data collection platforms, but for the most part, only for data collected using their software.

A notable exception to the rule with research company portals is Nunwood Consulting, a research and technology company based in England, who provide a Triple-S upload capability to their data portal. Provided you have an account with them, you can load entire surveys into their portal, and then build charts and tables, interactively, without requiring any specific technical oversight at all.

5. Overspecialization

In our post-modern world, we need to be polymaths, Below I have listed the subject disciplines that a manager with responsibility for technology within a research company is likely to find herself or himself drawing on over the space of a week:

- Technologist
- Software engineer
- Hardware technician
- Researcher
- Business Analyst
- Administrator
- Statistician
- Communicator
- Writer
- Teacher
- Diplomat
- Psychologist
- Philosopher

It is a very diverse list. Philosophy may not be an obvious discipline in daily use. However, it is directly relevant with relation to research ethics, and the increasing consideration we need to be making to the ethical impact of our work, on the public, on co-workers and partners, and in relation to our clients. So even philosophy is on the list.

Your personal list may be slightly different, but it certainly won't be any shorter than this. Once thing is certain: the knowledge and expertise we are expected to administer in our everyday work is far greater than it used to be. We may have experts to call upon, but we are expected to have a professional working knowledge across a very eclectic range of subjects. And in

many ways, the wider the better, as it provides the best route to understanding the complexity and diversity we all experience today.

A whole systems approach

Technology and methodology are part of the craft of doing research. Researchers need to understand it better. Those of us involved in technology need to do a better job of making it less opaque to researchers. In return, researchers need to take more of an interest in it and see it more as a core skill rather than an expertise that others apply.

The organizational development guru, Marvin Weisbord, inventor of the Futuresearch method, constructed a model showing that the focus of inquiry shifts, over time, from the expert to everyone involved.

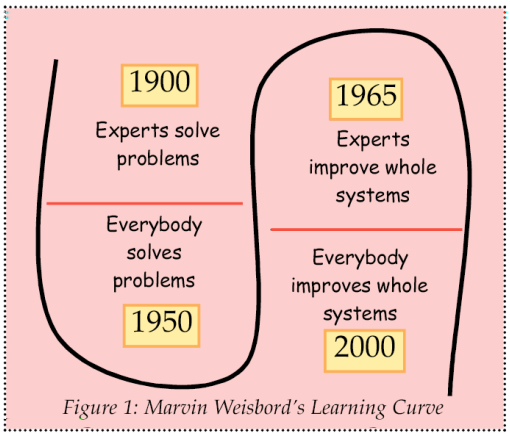

Figure 1: Marvin Weisbord's Learning Curve

It is a model that explains the move towards more participatory approaches in management and in government, involving stakeholders and partnerships. Yet it is a model that could be applied to research and the systems we are creating.

In our case, as in Weisbord's model, stakeholders come from within the organization, such as researchers, both qualitative and quantitative, technicians and technologists, fieldwork managers and fieldworkers, and outside the organization, in the form of respondents, suppliers, clients, and trade bodies such as CASRO or ESOMAR.

In our version of the model, it would be appropriate to state that in 1980 it was researchers that carried out research and in 2005 everybody within the research company, and potentially beyond, is participating and contributing to the research process and the goal of providing clients with knowledge, insights and objective data to support decisions.

In moving towards a whole systems research approach, research providers will be able to unlock potential from every level within their organization to achieve better research, and research which is more valuable for their clients, and more interesting and enjoyable for their research participants. A key component of this is the role of technology in facilitating this change, and the responsibility of technology specialists to ensure that the technology is approachable and manageable.

Future directions

Research technology over the years has tended to concentrate on core data collection and analysis capabilities which, in this paper, I have referred to as research pipeline processes. However, it is at the periphery of activities where there is now a need to focus on providing better tools. Research is meeting with resistance from both clients and respondents. The two major demands from clients: to do more and do it more cheaply may appear to contradict, but closer examination shows that this is only part of a wider picture in which clients need newer, more flexible products which are more focused on providing fresh ideas, or helping a wider group of managers within enterprises to take decisions and anticipate changes.

There are still many opportunities to make research more efficient, and tomorrow's tools need to focus especially on productivity and process improvements such as administrative support, accounting integration, project communication and the automation of testing. They must be open, and use whatever standards are available to ease the transfer of data from one platform to another, and facilitate collaborative endeavor.

Research is too often a high quality and high value product let down by poor presentation. It is clearly not the case that marketing research is becoming irrelevant today, but we need to be vigilant of the areas where appearance, availability and accessibility are being compromised because the underlying tools are limited in their scope.

Respondent interface issues need to be taken seriously at every level, in order to make survey participation something people find enjoyable and worthwhile. Survey interfaces, especially on the Internet, now have to compete with sites containing stunningly creative visual effects. Surveys need to be compelling, or at least, look much more interesting than they do at present, and be able to do this relatively easily.

And for the technologist, the challenge is to understand everything else that is going on and anticipate the next set of changes. Bad habits can help you survive, but only smarter, sharper tools will help us create the research products needed to sustain and develop the craft into the future.