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Achieving Interoperability in Animal Health: common systems for common goals in responding to high impact animal diseases (HIADs)

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The Path to Interoperability

Interoperability is rapidly transitioning from:

1. concept advocacy to
2. policy formation to
3. operational practice.

This Bulletin steps through each in turn.

1. Concept - Interoperability

interoperable *adj.*
able to operate in conjunction
interoperability *n.*

When the New York Trade Center twin towers were attacked the police and fire departments discovered that their radio systems were incompatible. They could not talk to each other. This was a defining moment for the global "first responder" community that counted the cost in needlessly lost lives of such a simple, but devastating failure of the communications chain. In desperation, men from both services tried to coordinate their activities on their personal mobile phones, but of course they did not even have the numbers to hand to call their counterparts. As one of the subsequent reports commented: "it was a bad time to be handing out business cards".

Earlier in 2001, the UK saw another dimension to the same problem in the Foot-and-Mouth disease outbreak. The EU community reference laboratory at Pirbright where samples were processed used a different data system from the Veterinary Laboratory Agency at Weybridge and the two vital laboratory resources were as a result unable to share data other than manually. It was one of the more costly and more avoidable challenges faced in the UK during that episode. Partly in response to this problem, and because AVIS itself was so heavily used on line during the outbreak (by some 8 million people) Apostolos Rantsios, Mark Rweyemamu and Julian Hilton presented and then published a paper on interoperability with the EU FMD Commission: **Knowledge management and systems interoperability in animal health**[1] (October 2004).

The abstract is as follows:

[1] First presented at the Open Session of the Research Group of EUFMD, 15 October 2004, Chania, Crete

Abstract

The changing patterns in the spread and distribution of major infectious animal diseases, old and new, which pose a serious impact on animal and human health and welfare as well as human livelihoods, make animal health a matter of global public concern.

Wherever such diseases occur, they should be recognised promptly and be dealt with expeditiously. A major prerequisite is that knowledge about such high impact animal diseases and about good practices for their management be globally shared. Such knowledge should be instantly available to the global professional community, in developed as well as developing countries.

The spread of the Pan-Asian FMD Type O strain, which culminated in serious outbreaks in Europe, notably the UK in 2001, demonstrated the global risk that FMD constitutes.

During the 2001 FMD epidemic in the UK, there was extensive use of the internet, e.g. for accessing programs such as AVIS FMD, which at the height of the outbreak recorded over 8 million visits from users worldwide. But there was only partial interoperability of emergency management systems, and fragmented use of other IT tools, such as GIS and mathematical models.

Since 2001, a critical threshold has been crossed in the cost of information, which now enables all stakeholders, even in the most economically challenged of settings, to enjoy affordable access to expert knowledge, even at broadband speed, in both office and field settings. But there is not yet a coherent theoretical basis on which the strategic role of ICT, and in particular knowledge management and interoperable communications, in preventing, preparing for and responding to animal disease outbreaks or in the progressive control of such diseases (in areas where they are still endemic) can be planned, despite the growing recognition that effective responses to high impact diseases in particular are knowledge- and expertise-driven. Using FMD as an example, the paper sets out a possible model of a fully interoperable management systems design for use in the animal health setting, thereby indicating one way to harness the power, bandwidth and portability of ICT in disease surveillance, prevention and management.

In conclusion, the paper advocates interoperability as the enabling condition for a holistic disease management approach, using knowledge management systems to promote best practices, with biosecurity as the underlying driver.

The full text is available at either Avis College or the FAO websites:

www.aviscollege.com/pdfs/KMEUFMDCrete-jkh-ar-mmr21-oct-2004publication.pdf

or

www.fao.org/AG/AGAInfo/commissions/docs/greece04/App77.pdf

To achieve the optimum level of interoperability, four modes of operational barrier need to be overcome, built from a strong technical base of interoperable systems. These four modes are:

1. Technical/ technological
2. Cultural
3. Commercial
4. Policy

Without the benefit of technical and technological interoperability – hardware platforms that are compatible, running software and messaging systems that can "talk" to each other transparently – interoperability cannot happen at all. But the mere fact that systems are technically interoperable will not guarantee either the higher level engagement with interoperability as a business objective, still less its successful implementation and return on investment. So in planning for strategic commitment to delivering interoperability in practice, you may wish to do a "fitgap" analysis of what you will need to do. Start by a "present state" review of your answers to the following four questions.

1. What technical barriers need to be overcome and what systems capacity and capability, including user training and support, is needed to succeed to achieve interoperability under conditions of
   a) business as usual OR
   b) crisis or emergency?

2. What current farming practices and other cultural issues might be promoting endemic disease? How can these be reframed and reformed?

3. What market forces are in place and what commercial incentives can be aligned to assist eradication?

4. What national and regional policies, and what incentives for achieving success, are in place re: endemic disease?

On the basis of the "fitgap" analysis it will be possible to construct a migration pathway as to how, operationally, to transition the veterinary service from its current to its desired future state. Such a transition may involve a significant change in operating culture, and will therefore, need to be complemented by a change management plan. Typically such a process may take 3 - 5 years to complete and requires top management commitment, and active participation, to succeed.

2. Policy: An EU Policy Framework

A helpful "alignment of the stars" frames my presentation in that on February 28 2007, in Berlin, under the EU Presidency of the Federal Republic of Germany, a major meeting is being held on interoperability as a key enabling condition of transparent government and service delivery to the citizens of Europe. It is hard to imagine a more valuable aspect of that service than endemic disease prevention and control, although in fact the Berlin meeting is not addressing food at all, but is focused on information technology itself, the other theme of my presentation.

Interoperability means the ability of information and communication technology (ICT) systems, as well as, of the business processes they support in order to exchange data and enable the sharing of information and knowledge.

Interoperability is a key factor to all of IDABC's so-called horizontal measures (HM) activities: The implementation of pan-European eGovernment requires the collaboration of public administrations in 27 different Member States and in EU institutions. That collaboration will lead to the emergence of better services for European citizens and businesses and further promote a more efficient implementation of EU policies.

Following the outlines of the eEurope Action Plan, the IDABC decision (Decision 2004/387/EC) is therefore based on a framework of common principles and rules, as well as, on the agreement on open standards and interfaces for the implementation of interoperability between systems, applications, business processes and actors producing or using eGovernment services.

This network-based approach requires a great effort in order to define rules of collaboration, coordination of processes, formats and specifications, as well as instances acting as brokers between systems.

IDABC activities are therefore not limited to producing guidelines; they also entail planning and implementing infrastructures to support interoperability[2].

Since 2001, and even more since late 2004, interoperability has emerged from the shadowy world of IT and radio-telephonic "boffinry" into mainstream thinking about how to foster coherent, efficient emergency response capabilities on a regional or even global basis. It has a "zero condition", the technical foundation which enables communications platforms, such as databases, telephone systems or radio networks, to interact effectively and transparently to non-technical users.

But merely being able to exchange dialogue or data does not in and of itself guarantee that the exchange will achieve benefit or enable a positive outcome. **To derive dependable value from interoperability, the definitional reach of the term now has to embrace cultural, commercial and policy considerations as well.** All four layers, individually and severally, need to be satisfied to achieve effective communications and coordination of responses to

[2] http://europa.eu.int/idabc/en/

complex challenges. If they are satisfied, "eGovernment" becomes an achievable reality, and with it the vision of consumer-driven regulation, for example in food safety and quality, can actually be delivered in practice.

3. From Policy to Practice – Achieving a Sustainable Outcome

Paul Miller offers an active definition which moves the term in the direction of practice:

> to be **interoperable**,
> one should actively be engaged in the ongoing process of ensuring that the systems, procedures and culture of an organisation are managed in such a way as to maximise opportunities for exchange and re-use of information, whether internally or externally[3].

Since the successful coordination of responses around the world to SARS, interoperability has also started to come to the attention of the wider public health and safety community. And it is clear now, however theoretical the current risk, that were Avian Influenza ever to mutate into a form that could readily spread from human to human, that without interoperability between systems there would be no prospect of any kind of effective response to the pandemic. But cultural and institutional challenges abound. For example, work processes that were traditionally conducted in series, on paper, can now be conducted electronically almost in parallel. Are the administrations built on paper-based practices ready for this? Professional and technical communities used to building and protecting their knowledge and their secrets are now able to share such knowledge easily with others. Are they ready to do so? At a simple level, you may wish to use the following checklist to evaluate how ready for interoperability the "farm to fork" stakeholders are within your region or community:

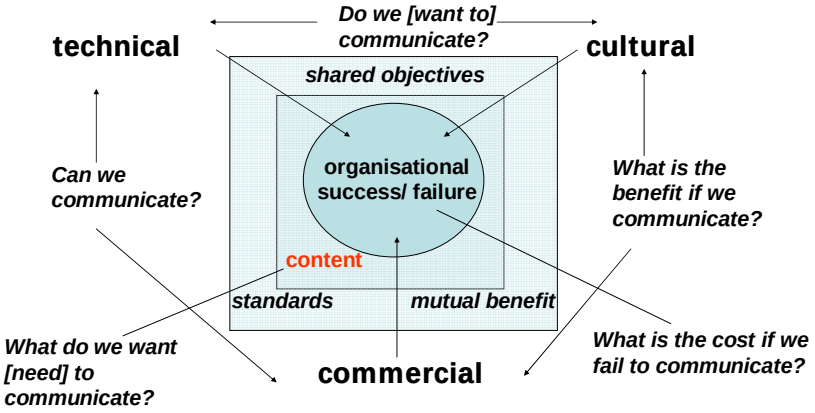
Interoperability checklist

1. Can we communicate?	
2. [Why] Do we [want to] communicate?	
3. What do we want [need] to communicate?	
4. What is the [mutual] benefit if we do communicate?	
5. [Do we know] What happens if we fail to communicate?	

At its most idealised, a fully resolved, sustainable practice of interoperability might be represented as follows:

[3] http://www.ariadne.ac.uk/issue24/interoperability/

Making IT happen - sustainably



Interoperability brings benefits well beyond the management of acute risk or emergency situations. For example, if the German Presidency is to achieve its February 28 goal, traceability of food from farm to fork will move significantly closer as a real world benefit to consumers. It would mean you could really trace for yourself, on-line and at little or no cost, where what you eat came from, how it got to you and what effect it might have on you, positive or negative.

4. Constraints

But, great though the benefits of interoperability may, and likely will be, there are two highly significant constraints operating on it which in the end will determine its capacity to sustain delivered value over the long term. These are quality assurance and efficiency.

- **Quality Assurance**

Knowledge systems share with biological systems the property that if they become too "monocultural" the risk of rapid spread of infection and disease escalates markedly. This challenge is at no point more acute than in a crisis or emergency situation. It is essential to be able to achieve rapid, consistent and accurate communications between all parties.

Perhaps the only advantage of systems that are not interoperable is that they have the merit of slowing down or stopping the transmission of error or disinformation as well as impeding the transit of useful knowledge and data from one person to another. The removal of such barriers places a critical burden on the knowledge and data quality assurance process. The rapid spread of both BSE and FMD in UK animal producing centres shows how a system geared for efficiency can as efficiently promote disease as commerce.

AVIS College will be happy to work alongside national, regional and other authorities to ensure the appropriate nature and level of quality assurance for the initial achievement and the long-term sustainability of your goals.

- **Efficiency (return on investment) – Coping with Quantity and Complexity**

For significant efficiency gains to be achieved, in other words to avoid the negative externality penalty of regulations and laws and rather turn them to advantage, two returns must be visible on the interoperability investment. These address:

1. the sheer quantity of laws and regulations that need to be followed and
2. the complexity of stakeholder relations.

It is a key question for the successful approach either to the "chronic" challenge of eradicating endemic disease, or the "acute" demands of a particular outbreak, to understand how critical to your success are reducing or eliminating the possibility of "broken" or conflicted communications processes between stakeholders. These processes are necessarily complex, even in "normal" times. What is less well understood is that a) an effective technical and scientific response to disease outbreaks may well be impaired or fail altogether if communications processes and messages are conflicted or break down and b) the effort and investment required to get interoperable systems up and running, and keep them there is at least as demanding as the veterinary-technical aspect. Veterinarians may also need to learn how to work in teams with communications and data specialists, regarding them as equals rather than auxiliary workers.

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