Studies on information as an asset II: Repertory grid

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ABSTRACT

This article presents findings from five repertory grid interviews conducted in early 2001 to identify attributes of information as an asset. Repertory grid is a technique developed by George Kelly based on his theory of Personal Constructs. Personal Construct Theory (PCT) assumes that individuals are their own "personal scientists" who mentally represent the world around them. The method was used to enable key senior executives in information-intensive UK organisations to identify attributes of information assets considered to be significant by them for their business. The findings are not intended to be representative but give an insight into the thinking of these key executives and their approaches to managing information assets.

Introduction

Five repertory grid interviews were conducted in early 2001 with senior executives in information-intensive UK organisations. These interviews aimed to identify attributes of information as an asset. As outlined in an earlier paper (Studies on information as an asset I: Definition, paper submitted to *Journal of Information Science*), information assets are defined as follows:

"Information assets comprise resources that are or should be documented and which promise future economic benefits".

The interviews identified three main areas which concerned the senior executives when dealing with information assets:

- the overarching importance of product and customer information;
- concern that only those information assets which fulfilled particular business needs should be regarded as important;
- the identification of attributes of information assets which had a strategic role in their organisations. Uses identified were: planning and control, managing internal and external operating environments, providing organisational direction and momentum for those involved in decision-making.

These areas emerged from both analysis using repertory grid technique and from informal discussions with the interviewees on identification, measurement and management of information assets.

Attributes of information as an asset

It has always been unclear what it is about information that managers really value. The information science literature, in particular, has approached the value of information in three ways. The first of these sees information as a resource in itself which has attributes of quality (for example, accuracy, comprehensiveness and credibility) and attributes of utility (for example, ease of use, accessibility and flexibility) [1]. The second approach identifies attributes that are inherent to the nature of information (for example, information improves productivity by improving decision-making, and information improves effectiveness by enabling better relationships with customers and partners). Finally, information has economic attributes that make it unique [1]. It does not deplete when used, and it can be reused for many different purposes. This makes information unlike any other economic good [2] and is often seen as the most significant attribute of information. Information is not the same as an information asset but it is a vital ingredient of any such asset, so that those attributes which are ascribed to information can equally apply to information assets.

Nine categories of information assets, which were supplied in advance to the senior executives, formed the basis of the repertory grid exercise. They were identified and selected using the following process:

Identification of information assets

The Hawley Committee [3] argued that the first step in benefiting from the information held and used by organisations was a formal process of identification.

They found that a number of information types or assets were consistently identified across their organisations. The eight categories of information assets identified by the Hawley Committee were:

Market and customer information e.g., regional utilities have large amounts of data on every household in their regions; trade names and trade marks.

Product information e.g., the depth of knowledge in particular technologies which support particular products such as fluid and thermal dynamics in the aerospace industry. This includes both registered and non-registered intellectual property rights (IPR).

Specialist knowledge and information for operating in a particular area, which is often in people's heads (e.g., retailing know-how amongst managers of grocery supermarkets who find even associated areas of retailing difficult to move into. Since the publication of the Hawley Report, retailers in the UK have become very successful in expanding their markets into associated consumer durables. This type of knowledge is also now addressed in part by knowledge management techniques but, at the time of the Hawley Report, knowledge management was not a well-established activity).

Business process information that underpins the workings of the business e.g., economic, political, share price and other information that financial markets use.

Management information, particularly that on which major policy, competitive decisions or strategic plans will be based, e.g., economic statistics, or cost base information.

Human resource information e.g., skills databases, particularly in project-based organisations such as consultants in a technology company who need to be brought together to support a client project. Again, these days knowledge management attempts to address this area.

Supplier information e.g., trading agreements or networks of contacts for services or product development.

Accountability information e.g., legally-required information including shareholder information, health and safety information or environmental pollution evidence [3].

These eight categories of information assets formed the basis of a discussion forum held by the project team in London with a group of senior British information managers in January 2001. The discussions were intended to review and update the categories of information assets identified by the Hawley Committee and to clarify them for the purposes of our further research.

Our research: revising the list
The project team made two changes to the original listing by Hawley of the categories of information assets before presenting them to the information managers' discussion forum.

These were:

1) "Market and customer information" was renamed "Customer information" to reflect the widening application of customer information to inform all aspects of business.

2) "Competitor information" was added to differentiate this asset from management information as a whole. Highlighting competitive advantage gained from information assets requires its identification as a separate information asset.

The recommendations from the information managers' discussion group were as follows:

Specialist knowledge: This term was considered confusing and out of place - especially as it brought all of the requirements to identify and define "knowledge" within the process. While recognising the importance of "knowledge", it was felt that concentration on types of information or information assets would provide a firmer foundation for later work.

Accountability information: This term was not understood by the information managers as referring to legal information (for example, health and safety information in legal cases). This was identified as one of the most important categories of information assets, and one often only identified under pressure of legal action. Renaming the asset as "Legal and Regulatory" was recommended.

Human resource information: This was regarded as an outdated term. The argument was that "people are not resources for an organisation; they are, of course, people". The term "People management" was recommended instead.

Organisational information: This asset was suggested as an important information type. It was not included in the Hawley Report [3], but is now increasingly recognised by managers as essential to organisational learning and change management:

"Organisations must be aware of the features of their organisational culture that they most value… and look at those features that make a negative contribution to corporate well-being" [4].

Of the remaining categories of information assets, Business process information provoked the most debate. Some participants argued that business process information should not be regarded as an information asset at all. Others pointed out that organisations like Cisco, the American technology giant, were packaging and selling their business processes, making such information a financial asset. The arguments for including business processes among the information assets outweighed the arguments against.

The revised list of categories of information assets based on the Hawley information assets and the discussion forum with information managers can now be used as the basis of the repertory grid exercise and is shown in Matrix 1.

Matrix 1 Categories of information assets

Customer Information	Competitor Information	Product Information	Business Processes	Management Information	People Management	Supplier Information	Legal and Regulatory	Organisational Information

Recruiting the participants

The executives interviewed were from profitable UK information-intensive

businesses. They were drawn mainly from the professional contacts of the project

team and were based primarily in the East Midlands (this is the location of

Loughborough University and reflects links developed between the Department of

Information Science and the Loughborough University Business School with local

companies). The executives were invited to participate in January 2001.

The executives were: the Finance Director of a large commercial services

organisation (Company A), the Director of Strategic Planning of a well-known

manufacturing company (Company B), the Head of Knowledge Management of a

large FTSE 100 company (Company C), the Chairman of a successful market

research company (Company D) and the Finance Director of a second large

commercial services organisation (Company E). Some job titles have been slightly

changed to provide for anonymity and brevity.

Repertory grid technique

The repertory grid technique, was developed by Kelly [5] as a method of identifying how individuals construe elements of their social world. Kelly was an American psychologist and psychotherapist and one of the founders in the 1950's of the Association for Humanistic Psychology [6]. Kelly proposed a theory called "Personal Construct Theory" (PCT) which assumed that humans are basically "personal scientists" who mentally represent the world around them and who formulate and test hypotheses about the nature of reality. Humans are continually exploring and developing an understanding of their world and, in doing so, they develop cognitive maps which then define and limit their behaviour. By discovering the personal maps of individuals, it is possible to understand their views of the world and possibly alter their maps and change behaviour [7].

The repertory grid technique itself has three main components:

- elements, which define the phenomenon to be investigated;

- constructs, which are the ways in which the person groups and differentiates the elements;

- linking mechanisms, which show how each element is judged on each construct. These are usually a set of observations and the constructs or criteria by which those observations are rated [8].

Repertory grids can enable an interview to be carried out in some detail, and reduce observer bias, but this depends very much on how the grids are administered. For

example, when choosing elements, there are three strategies which can be adopted to generate elements and each has its own advantages and disadvantages.

These strategies are:

1. The interviewer provides the elements.

2. Free response, this is where the interviewee names a list of elements spontaneously with the interviewer providing only a broad class from which to draw.

3. Using eliciting questions, with the answers to the questions forming the elements [9].

Either of the last two strategies puts the interviewer within reach of eliminating observer bias. However, this does mean that if there is a particular element which the interviewer needs to introduce (for example, a particular brand of product which is being compared to others), then it cannot be assumed that the interviewee will introduce this element. With the first strategy, where the interviewer supplies the elements, the problem is that the elements may not be familiar to the interviewee, thus reducing the usefulness of the distinctions made.

When selecting elements, there are some general rules that can be followed. Elements selected are most often people, objects, events and activities, in other words nouns and verbs. Elements should also be homogenous, that is, classes of elements should not be mixed and should not be sub-sets of other elements. For example, "Making presentations" and "Making presentations to the Managing Director" would be inappropriate. Elements should not be evaluative; terms such as "Leadership" and

"Communicating" fall into this area. A specific element will allow the interviewee scope to develop his/her evaluation [9].

An important point to remember when selecting elements is the repertory grid's basis in PCT. PCT asserts that humans can only understand what is meant by "good" by also understanding what is meant by "bad". This means that the elements must allow contrasts to be made between them. This is important for the elicitation of constructs. Constructs are basically the reflection of how the individual views the world. The process for eliciting constructs appears simple but can quickly become more complex. For example, if we take three words representing elements, such as SHEEP COWS PIGS and write them on three separate cards, we can ask in what way any two of them are similar and the other different. The answer might be that Sheep and Cows eat grass and Pigs eat anything. These answers would then form a bipolar distinction so that we have:

Eats grass – Eats anything

These bipolar distinctions represent the dimensions the interviewee uses when he/she is thinking about the elements, and these dimensions are called the constructs. The elicitation becomes more complex when we replace elements like sheep and cows with elements like my mother, myself and my boss [9]. The constructs elicited for sheep, cows and pigs may be similar for many interviewees but those elicited for my mother, myself and my boss are likely to be widely differing. By using these triadic comparisons and asking for both a similarity and a difference the repertory grid method allows equal focus on both poles of the construct. This means that a construct

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is not just composed of a phrase and its semantic opposite, it is also contrast [9]. Each end of the bipolar construct can be made equally clear. This is much more difficult to achieve when elements do not have a clear-cut "good" and "bad" contrast, resulting in the possibility of more opposites being produced than bipolar constructs.

Method

Four main steps were followed in conducting the repertory grid interviews. These were: Step 1, the selection of elements or categories of information assets; Step 2, the administering of the grid; Step 3, the elicitation of the constructs; and Step 4, analysing the grids. These are dealt with below and are supplemented by further discussion on the repertory grid method and on the attributes of information as an asset.

Step 1 Selection of elements or information assets

Nine categories of information assets (shown in Matrix 1) based on the Hawley Committee's identification of categories of information assets and our revision with the senior information managers discussion group formed the elements of the repertory grid exercise.   As can be seen from the rules for selecting elements and eliciting constructs outlined by Stewart, et al.[9], there are some problems with using these categories of information assets as elements in a grid. The first problem is that the categories are abstract. Each interviewee will have a different starting point because he/she will perceive the information assets in different ways. It can be argued, however, that the interviewees can perceive many of the information assets similarly. For example, with customer information, all of the executives would have been familiar with this information asset in their respective organisations but, of

course, they would all manage different customer bases. Similarly, they would all

have competitors and product information assets but their products and competitors

would be different.

A greater difficulty is the requirement that elements should have a "good" and "bad"

range so that contrasts can be made between them. As the categories of information

assets (see Matrix 1) were basically generic types of information, none could really be

seen as good or bad in its own right. The interviewer endeavoured to elicit bipolar

constructs by asking additional questions but, as can be seen from Figure 6, some

opposites were described, for example, internal - external, and future - past.

It should be noted that, although a combined grid is presented in Figure 6, the

repertory grid is not really a useful tool for comparison. It is an individual method

and shows only the individual view of the participant. To use it for comparison

between individuals is to deny Kelly's basic premise that all humans see things

differently, resulting in unique and individual world views. However, it can be argued

that some useful insights can be gained from making comparisons while recognising

that the grid was not designed originally with this in mind. We have therefore

presented a combined grid of attributes of information as an asset (see Figure 6) to

show the range of attributes identified rather than to draw comparisons.

Step 2 – Administering the grid

For the repertory grid exercise, the senior executives were given the revised set of

nine categories of information assets as elements in a grid (see Matrix 1). They were

told that these assets were commonly identified as being present in many

organisations. It was noted that the assets are not always completely distinct from one another. The executives were initially sent slides that showed each category of information asset individually and provided some basic context for the assets. For example, customer information was shown to concern customer databases and organisational information assets were shown to include the history and culture of the organisation. The participants were able to print these slides in note form. Interviews were conducted at the offices of the participants and each lasted for one hour.

Step 3 – Elicitation of Constructs

The aim of the repertory grid exercise was to investigate whether those attributes of information, identified as important in the information science literature [1] were those considered significant by senior executives. If they were not, this might explain why the importance of information was not recognised at senior management level [3]. To investigate this, we needed the senior executives to describe attributes of information assets without prompting from the interviewer. This, it was hoped, would result in a range of attributes being identified independently which could then be compared with traditional attributes. Problems of context would be eliminated as the attributes would be described by the executives themselves. The identification of attributes was undertaken as follows:

The participants were given prepared sets of combinations of three categories of information assets, or triads, printed on 6" x 4" index cards. The cards had no additional contextual information, as this had been provided before the exercise and we wanted to encourage a focus on the elements themselves. Participants were then

asked to identify two of the information assets in the triad which they considered similar and one information asset which they considered different. They were then asked to describe why the two they selected were similar and why the remaining one was different. Then a second set of five cards with the numbers one to five was presented and laid out in numerical order. The two assets identified as the same were placed at number one and the one asset identified as different was placed at five. Participants were then given cards specifying the six remaining information assets and asked to position them in relation to the constructs, or attributes they had identified for the triad. This gave a result for all the nine categories of information assets in relation to the attributes proposed. The numbers one to five carry no inherent meaning but simply provided a way in which the executives can position the elements in relative terms.

In all, four triads were used:

123   Customer information, Competitor information, Product information

456   Business processes, Management information, People management

789   Supplier information, Legal and regulatory, Organisational information

159   Customer information, Management information, Organisational information

With the nine information assets it would have been possible to present at least nine different triads of information assets. However, time constraints meant that only a limited number of four triads was completed by each executive. This influenced the analysis of the grids: it was decided to combine the attributes elicited from the five participants over one grid to provide a richer picture of the range of attributes identified, while analysing the information assets separately for each executive. The

length of time taken to complete a repertory grid has been identified as a major

drawback of this method, with a twenty by ten matrix taking up to one and a half

hours to complete [7]. It was clear also that the executives found it difficult to think

of information assets in such a formal way and they subsequently reported that they

felt challenged by the process but that it was "fun" overall.

Step 4 - Analysing the grid

Cluster analysis is the primary method used to analyse the senior executives'

information asset grids. Both cluster analysis and content analysis were used to

analyse the senior executives' combined attributes grid. Cluster analysis is described

in detail below. It is designed to calculate correlations between pairs of elements or

constructs.

The tool used to analyse the senior executives' grids was WebGrid II

(http://www.repgrid.com/WebGrid/WebGridII.html) which is a Web-based version of

the repertory grid technique for building conceptual models [10]. It is based on the

concept of revealing the meanings in a grid by re-sorting it so that like elements are

placed together and like constructs are placed together as in visual focusing (where

the analysis is conducted by eye).

WebGrid II is based on the FOCUS program developed at Brunel University by

Gaines and Shaw [9]. The FOCUS programme works in the same way as visual

focusing but allows correlations to be made. It uses variations of cluster analysis.

This makes the analysis much more sensitive and able to deal with five or nine point

scales. FOCUS looks first at the elements and searches for correlations between them.

When it finds a correlation it joins the elements together and creates a new element, which it then prints on a vertical scale between 50 and 100 points. It continues to search until all the elements are covered. The programme then re-sorts the grid and prints the complete dendogram or tree diagram [7] with the inter-correlations on the bottom. The same process is carried out on the constructs. The grid is then re-sorted so that similar constructs are placed together. The constructs are sorted using a rating scale of one to five. In WebGrid II, the "FOCUS" button is used to sort the grid, and thus bring similar elements and constructs together. Element dendograms are printed to the bottom right of the grid and construct dendograms are printed to the upper right of the grid, along a vertical scale ranging, in this case, from 50 to 100 (see Figures 1-6).

Using WebGrid II, we first produced a grid for each of the senior executive's information assets. WebGrid II uses a city block distance measure [11] which is almost identical to that used by Shaw in construct clustering algorithms in the FOCUS program [11]. These distance measures, when applied to the grid of one person, enable natural clusters to emerge, so that two dendograms of inter-element and inter-construct distances are developed [11]. These are seen at the bottom right of the grid (information assets) and to the upper right of the grid (attributes) in Figures 1-6.

The dendograms show the level of statistical similarity between the different elements and constructs. There is, however, a significant problem in deciding whether the clusters are an artificial outcome of the computational process or a meaningful reflection of the interviewees' understanding [12]. This can only really be addressed by further discussion with the interviewees. The problem is most apparent in Figure 6
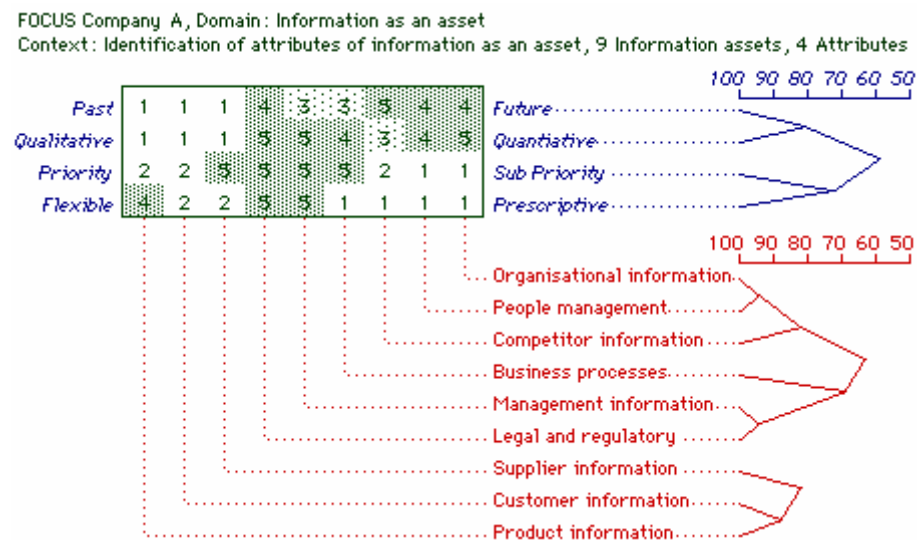
where we have presented the clusters and subsequently also performed a content analysis (see Table 2). Given the demands on the time of our participants, it was not possible to return to them and discuss the grids in detail. (It should be noted that Kelly's approach would be to return to the interviewees to clarify findings.)

The benefit of cluster analysis is that it is relatively easy to understand. However, it does have some problems [12]. It is sometimes very difficult to attach labels to constructs. While we attempted to do so in the analysis of the information assets, we found it impossible to do so with the analysis of the attributes and reverted to using content analysis. Another difficulty is that some constructs appear in clusters because they correlate mathematically but may not fit naturally [12].

Cluster Analysis for Information Assets

Figures 1-5 show information asset dendograms to the bottom of each grid. Attribute dendograms are also shown (attribute dendograms are those to the upper right of the grid). Within the grids themselves the darker shaded areas show a high score (i.e., the asset is felt to be more significant to the right hand attribute while the whiter areas show a low score, i.e., the asset is felt to be more significant to the left hand attribute). The scale to the right, of between 50 – 100, is a percentage scale and matches are estimated at an approximate percentage point by eye. We have attempted to draw some insights from the clusters produced but these are, of course, our interpretations of the executives' grids.

FIGURE 1 FINANCE DIRECTOR, COMPANY A: INFORMATION ASSETS

FOCUS Company A, Domain: Information as an asset
Context: Identification of attributes of information as an asset, 9 Information assets, 4 Attributes

For Finance Director, Company A, the information assets clustered into three main groups as shown in Figure 1.

Group one contains *Organisational Information*, *People Management* and *Competitor Information*. The match between *Organisational Information* and *People Management* was 94%, showing a strong linkage of organisational information and people, as might be expected. *People Management* also linked to *Competitor Information* at 82%, showing a perception of dependence on people for competitive advantage.

Group two contains *Management Information* and *Legal and Regulatory*, which matched at 94% clearly linking these formal information assets.
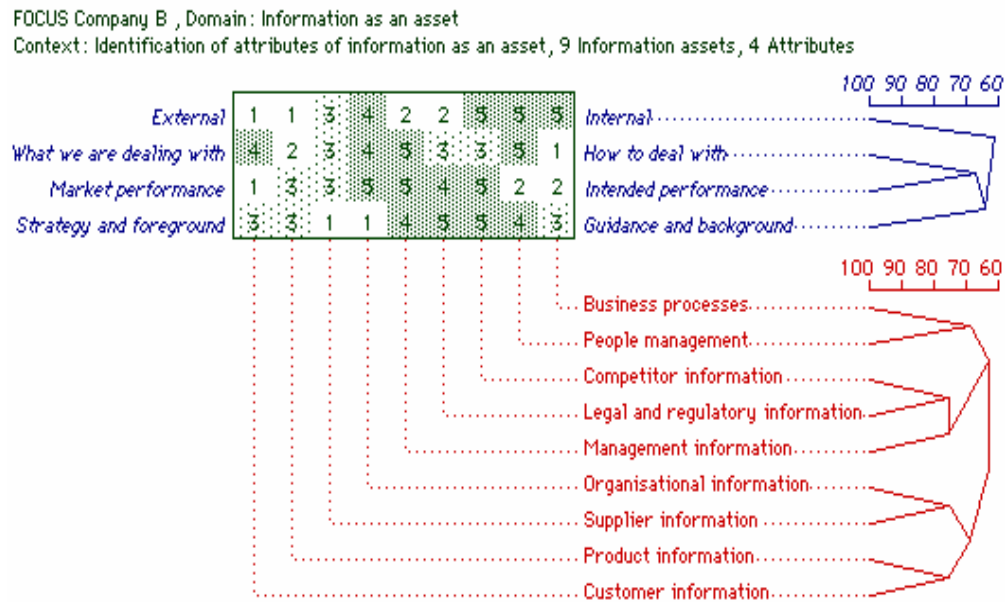
Group three contains *Supplier Information, Customer Information* and *Product Information.* The match between *Customer Information* and *Product Information* was 88%, while *Supplier Information* joins *Customer Information* at 82%. By linking products and customers, and suppliers and customers Finance Director Company A shows that he sees his organisation as flexible in a changing consumer market. He sees the organisation as quick to meet the demands of the market, often negotiating with suppliers and changing products. It should be noted that this group did not join to the other Information Assets above 50%, reflecting perhaps the participant's view that identification and use of information assets should change as business priorities change.

"We identify the area we want to go into and then we find the information we need."

Finance Director, Company A.

Finally, for Finance Director, Company A, *Business Processes* matched with **Group two** at 69%. *Business Process* and **Group two** matched with **Group one** at 63%.

FIGURE 2 DIRECTOR OF STRATEGIC PLANNING, COMPANY B:

INFORMATION ASSETS


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FOCUS Company B , Domain: Information as an asset
Context: Identification of attributes of information as an asset, 9 Information assets, 4 Attributes
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For Director of Strategic Planning, Company B, the information assets also clustered
into three main groups:

Group one contains *Competitor Information*, *Legal and Regulatory* and *Management
Information*. The match between *Competitor Information* and *Legal and Regulatory*
was 75%, showing a close link between those information assets. *Legal and
Regulatory* also linked with *Management Information* at 75%, showing perhaps the
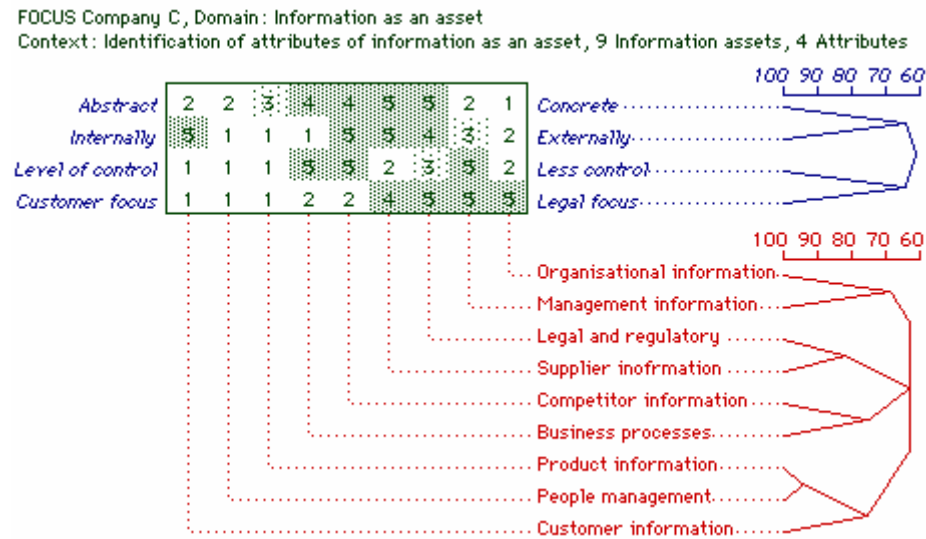importance of legal and regulatory compliance for management.

Group two contains *Organisational Information* and *Supplier Information* which
match at 75%, suggesting long standing relationships with suppliers who perhaps
share the culture of the organisation.

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Group three contains *Product Information* and *Customer Information*, which also matched at 75%, showing (as with Finance Director, Company A), a responsive approach to meeting customers' needs and changing products.

Group two and **Group three** matched at 69%.

Finally, the two remaining information assets, *Business Processes* and *People Management*, matched at 69% before joining the three groups at 62%, suggesting the overarching importance of these information assets throughout the business.

FIGURE 3 HEAD OF KNOWLEDGE MANAGEMENT, COMPANY C:

INFORMATION ASSETS

For Head of Knowledge Management, Company C the information assets clustered
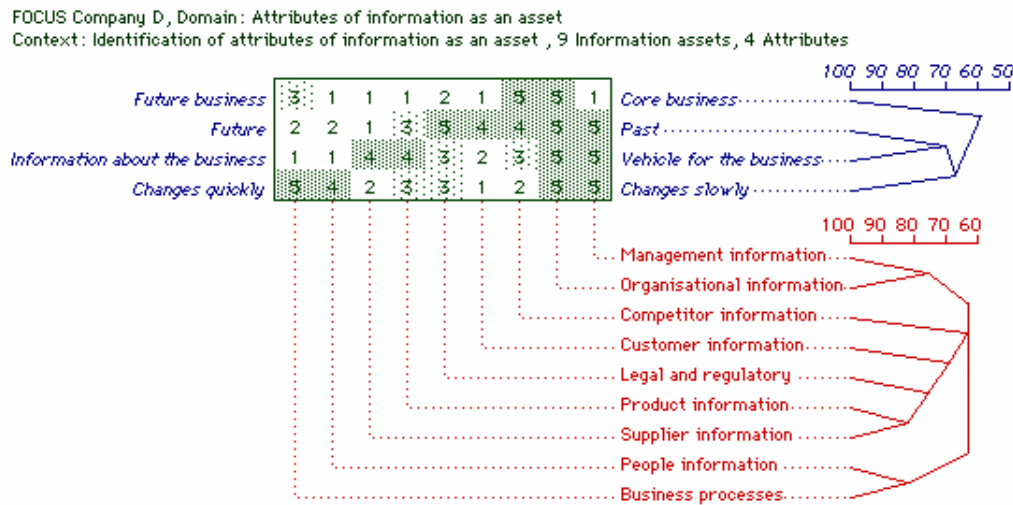into four main groups:

Group one contains *Legal and Regulatory* and *Supplier Information* matching at 81%
and showing that little distinction was made between these two information assets by
Head of Knowledge Management, Company C.

Group two contains *Business Processes* and *Competitor Information*, which matched
at 75%. These assets differed on only one attribute (Internally-Externally), on which
they were poles apart (see Figure 3, attribute dendogram to the upper right of the
grid).

Group three contains *Product Information*, *People Management* and *Customer Information*. *Product Information* and *People Management* were strongly linked and matched at 94%. They only differed slightly in one construct (Abstract-Concrete). This indicates the strong role of employees in developing and delivering this organisation's products as construed by this executive. *Customer Information* is linked with *People Management* at 75%. Head of Knowledge Management, Company C, seems confident in his organisation's management of customer information but is unsure of his organisation's employees' management. *Customer Information* and *People Management* differed only on one attribute (Abstract-Concrete) which occupied different poles (see Figure 3, attribute dendogram to the upper right of the grid).

Finally, *Organisational Information* and *Management Information* matched at 69% and then matched with **Groups one, two and three** at 62%.

FIGURE 4 CHAIRMAN, COMPANY D: INFORMATION ASSETS

FOCUS Company D, Domain: Attributes of information as an asset
Context: Identification of attributes of information as an asset , 9 Information assets, 4 Attributes

Future business	3	1	1	1	2	1	5	5	1	Core business
Future	2	2	1	3	5	4	4	5	5	Past
Information about the business	1	1	4	4	3	2	3	5	5	Vehicle for the business
Changes quickly	5	4	2	3	3	1	2	5	5	Changes slowly

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100 90 80 70 60 50
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100 90 80 70 60
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Management information
Organisational information
Competitor information
Customer information
Legal and regulatory
Product information
Supplier information
People information
Business processes

For the Chairman, Company D, the information assets clustered into three main groups:
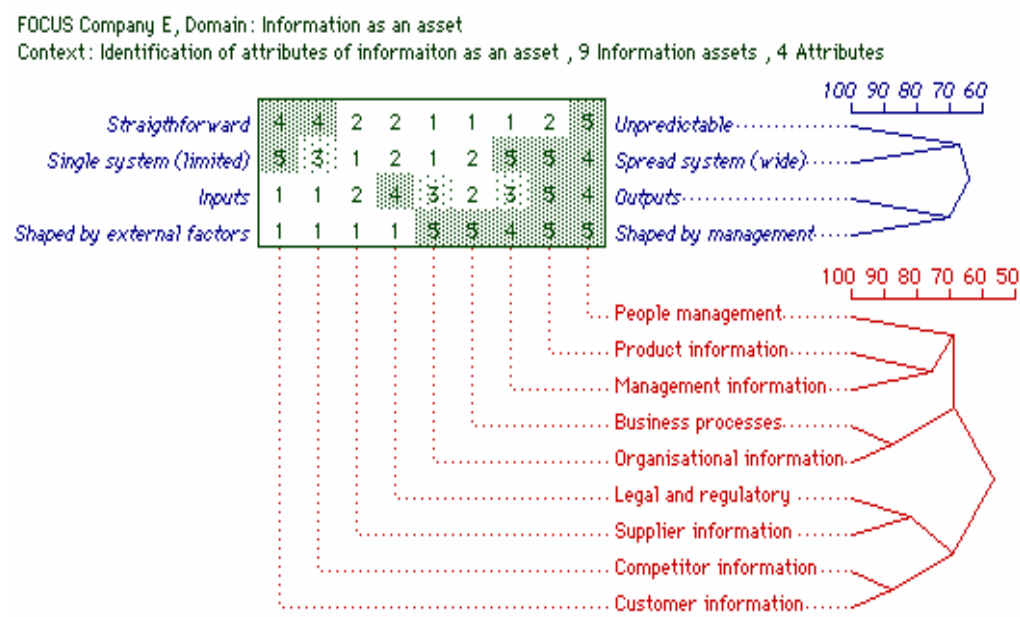
Group one contains *Management Information* and *Organisational Information*, matching at 75%, showing these assets are closely related in the view of the Chairman.

Group two contains *Customer Information*, *Legal and Regulatory*, *Product Information* and *Supplier Information*. *Product* and *Supplier Information* linked at 81%, showing a relationship between products and customers. *Legal and Regulatory* matched with *Product Information* at 75%, then *Customer Information* linked at 69% with *Legal and Regulatory*. This may suggest that product and customer information are seen as being in need of legal protection by the Chairman.

Group three contains *People Information* and *Business Processes*, which matched at

81%, showing these assets are perceived as being closely related.

Finally, *Competitor Information* and **Groups one, two and three** linked at 62%.

FIGURE 5 FINANCE DIRECTOR, COMPANY E: INFORMATION ASSETS

For Finance Director, Company E, the information assets clustered into four main

groups:

Group one contains *Product* and *Management Information* matching at 75%,

showing little distinction was made by the Finance Director between these two assets.

Group two contains *Business Processes* and *Organisational Information* matching at 88% again showing little distinction between these two and perhaps suggesting the influence of culture and history on existing business processes.

Group three contains *Legal and Regulatory* and *Supplier Information*, which matched at 81% suggesting a concern perhaps with ensuring that contractual agreements with suppliers and partners are formalised and protected.

Group four contains *Competitor Information* and *Customer Information*, which matched at 88%. These differed slightly on only one construct (Single System Limited – Spread System Wide (see Figure 5, attribute dendogram to the upper right of the grid.)

Finally, *People Management* links up with **Groups one and two** at 69% and then with **Groups three and four** at 56%.

Discussion of information assets

Overall, *Product* and *Customer Information* tended to be grouped together for all the senior executives. This suggests a strong market and customer orientation for all the companies represented. The executives are successfully linking products and customers to meet the demands of fast-moving markets as increasingly sophisticated customers become more demanding. The executives perceived their organisations as long-term bodies with "just-in-time" approaches. Only product and customer information had an overarching role. This "just-in-time" approach was also taken with their information assets. They were relying on the immediate availability of any

information they require. This approach has worked well for them. The exception is Finance Director, Company E for whom *Product* and *Customer Information* have a very weak association. This Finance Director identified managing customers as a weak area where he said:

"customer targeting is not something we are very good at."

<div align="right">Finance Director, Company E.</div>

The Finance Director of Company E, as well as interviewees in Companies A, B and D, also argued strongly that identifying information assets was dependent on a specific business need being identified.

"We don't look at the business along the lines of information assets. We look at the business and how we control the business on a risk-based approach. We ask what are the objectives, what are the risks to achieving those objectives and therefore what would you need to control the business? That would include information assets. Thinking about individual information assets might just be a little abstract in a business context, you have to have some framework within which that particular idea fitted."

<div align="right">Finance Director, Company E.</div>

The view was that information assets changed as business needs changed. This highlights the practical approach of the majority of these executives where information assets are concerned. It suggests that locating information assets within a business development framework may be a useful approach.

<u>Repertory Grid: Cluster Analysis for Attributes of Information Assets</u>

Attributes elicited from the five senior executives were combined over the same nine categories of information assets to form one large grid (see Figure 6). When

combined and analysed using WebGrid II, eighteen of the twenty attributes (see

attributes dendogram to the upper right of the grid) fell into four main groups. The

attributes were re-sorted so those similar attributes are grouped close together and are

reversed in some cases. Again, within the grid the darker areas show a high score,

i.e., the asset was felt to be more significant to the right hand attribute, while the

whiter areas show a low score, i.e., the asset was felt to be more significant to the left

hand attribute. Information assets are also shown in the bottom right dendogram. The

scale to the right, of between 60 – 100, is again a percentage scale and matches are

estimated at an approximate percentage point. The cluster groups start with the most

similar and then the next most similar until all the constructs are clustered.

Presentation of the attributes in this way helps to visualise the range of attributes

identified. They are also presented as a worked example in Table 1. Figures 1 – 5

show which constructs have been elicited from each senior executive in their

individual grids. It is clear from Table 1, however, that the clusters have emerged

more from the process of WebGrid II performing the analysis than from the

distinctions made by the executives. Where the constructs seem relevant, we have

noted this on the individual grids presented in Figures 1-5. It proved very difficult to

assign any labels to the construct groups. We therefore also performed a content

analysis (see Table 2) on the attributes to attempt to gain more insight.

FIGURE 6 COMBINED GRID: ATTRIBUTES OF INFORMATION ASSETS

FOCUS Combined grid , Domain: Attributes of information as an asset
Context: Identification of attributes of information as an asset , 9 Information assets , 20 Attributes
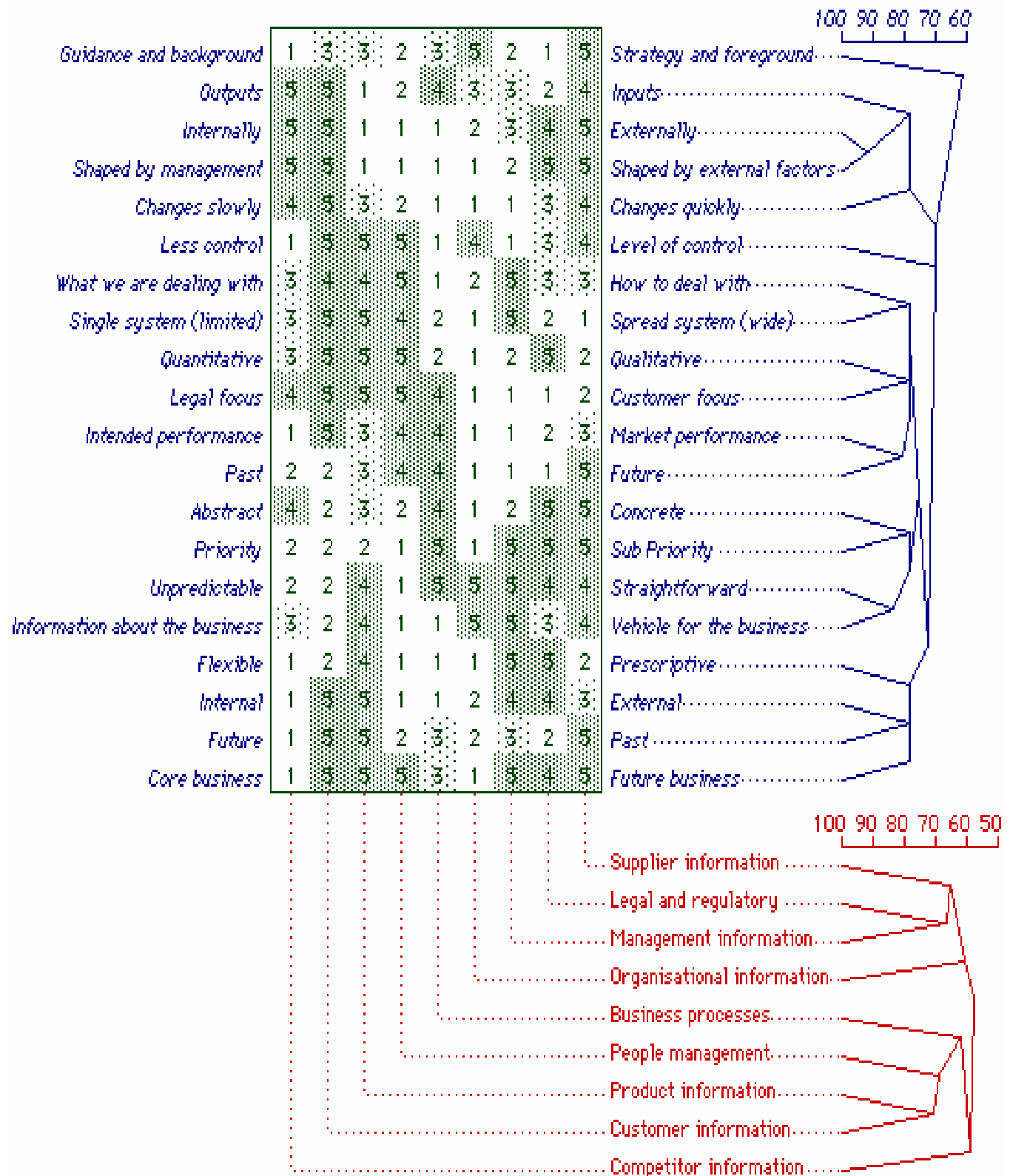
Table 1 Cluster analysis for attributes of information as an asset

High matches indicate that the relevant attributes share a similar or identical rating for the majority of the information assets.

Four main clusters emerged:

Group one contains:

"Outputs-Inputs", "Internally-Externally", "Shaped by management-Shaped by external factors" and "Changes Slowly-Changes quickly".

"Internally-Externally" and "Shaped by management-Shaped by external factors" match at 92%.

"Internally-Externally" joins to "Outputs-Inputs" at 78%.

"Changes slowly-Changes quickly" and "Shaped by management-Shaped by external factors" match at 78%.

Group two contains:

"What we are dealing with-How to deal with", "Single system (limited)-Spread system (wide)", "Quantitative-Qualitative", "Legal focus-Customer focus", "Intended performance-Market performance" and "Past-Future".

"Intended performance-Market performance" and "Past-Future" matched at 81%.

"What we are dealing with-How to deal with", "Single system (limited)-Spread system (wide)" matched at 78%.

"Quantitative-Qualitative", " Legal focus-Customer focus" also linked at 78%.

Table 1 Continued

Group three contains:

"Abstract-Concrete", "Priority-Sub Priority", "Unpredictable-Straightforward" and "Information about the business-Vehicle for the business".

"Unpredictable-Straightforward" and "Information about the business-Vehicle for the business" joined at 83%.

"Abstract-Concrete" and "Priority-Sub Priority" joined at 78%.

"Unpredictable-Straightforward" and "Priority-Sub Priority" joined at 78%.

Group four contains:

"Flexible-Prescriptive", "Internal-External", "Future-Past", "Core Business-Future Business".

"Internal-External" and "Future-Past" matched at 78%. "Flexible-Prescriptive" and "Internal-External" also linked at 78%. As did "Future-Past" and "Core Business-Future Business".

Finally, the two remaining attributes were "Less control-Level of Control" and "Guidance and background-Strategy and foreground".

Table 2 Content analysis for attributes of information as an asset

Categories	Attributes
Planning and control	Ouputs-Inputs
	Less control-Level of control
	Intended performance-Market performance
	Unpredictable-Straightforward
Managing internal and external operating environments	Shaped by management-Shaped by external factors
	Internal-External
	Internally-Externally
Organisational direction/Momentum/ Orientation	Past-Future
	Future-Past
	Core business-Future business
	Information about the business-Vehicle for the business
	Priority-Sub Priority
Decision-making	Guidance and background-Strategy and foreground
Information assets	What we are dealing with-How to deal with (for example, product information is what we are dealing with, business process information tells us how to deal with).
	Single system (limited)-Spread system (wide) (for example, a customer database was seen as a single system and management information as a spread system).

Table 2 Continued

Quantitative-Qualitative (for example, product information was seen as mainly quantitative and organisational information as mainly qualitative).

Legal focus-Customer focus (for example, legal and regulatory information was seen as having a legal focus and customer information a customer focus).

Abstract-Concrete (for example, a customer database was seen as concrete and organisational information as abstract).

Prescriptive-Flexible (for example, legal and regulatory information was seen as prescriptive whereas organisational information was seen as flexible).

Discussion of attributes of information assets

It was clear that the attributes of information assets described by the senior executives were not the same as those identified as being significant in the information science literature. We found a strategic role for information assets in planning and control, managing internal and external operating environments, providing organisational direction and momentum in decision-making. Attributes were described in terms of the inherent qualities of information assets and in terms of the information asset as a resource in itself. This suggests that executives at such senior levels in an organisation expect quality and accuracy in their information assets as given (whether such quality and accuracy exists has not been investigated). They see information assets and their attributes as having a role in improving the effectiveness of, and decision-making processes in, their organisations. The absence of economic attributes suggests that the recognition of the "value of information" is still the prime area of difficulty and one which will not be easily solved.

Conclusions

The attributes of information as an asset identified in this paper point to a much wider range of attributes than those hitherto described in the information science literature. It also shows that some attributes are not identified as being significant. In particular, economic attributes were not identified by the senior executives. Greater attention needs to be directed toward emphasising the attributes of information as an asset related to overarching business objectives rather than inherent and accepted qualities of information as an asset. The main conclusion to be drawn from the interviews which are reported here is that information as an asset must be positioned within a wider business performance framework if it is to be seen as being significant. This is

perhaps not surprising. The argument is that information assets should be identified

and managed to meet changing business objectives. In fast-moving and competitive

business environments, flexibility is critical and information assets and their attributes

do have a role to play.

Acknowledgements

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