

Strategic Analysis of Merger/Venture Potential Using
Multidimensional Scaling to do Zwicky Morphological Analysis
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The Zwicky morphological method has been described as a way of forecasting crowding and gaps in technology [swemorph.com; Zwicky, Society for Morphological Research, 1962; Makridakis Wheelwright & McGee, Forecasting 2ed 1983, p665; identical article may be found in Wheelwright & Makridakis in Tushman & Moore, Readings in the Management of Innovation, 1982, Pitman, p318] When product attributes are described and mapped, one finds gaps in the mapping, suggesting room for innovation, or venture capital, and crowding of other areas, suggesting room for consolidation, or mergers.

Multidimensional scaling, a product of topology and analysis as much as of statistics, tries to reduce the differences between products to two dimensions and map them in a way that meaningfully represents the differences between them. Further modifications of this technique allow use of folding and rotation [p95,118, Cox & Cox, Multidimensional Scaling, 1994, Chapman & Hall] Hence, multidimensional scaling may be used to non-uniquely visualise this and other strategic options matrices; However, Don Lehmann warns that "many products are infeasible" [p619, Marketing Research, Irwin, 1979] and that "relevant attributes and key levels must be known in advance" [p622].

It is desired to perform Zwicky Morphological Analysis in a fashion after the BCG and GE industry matrices (scaling and rotation methods should easily lend themselves to other forms of strategic analysis as well) where clutter predicts mergers and sparsity predicts new ventures. The Aureka software from scientific.thomson.com performs similar analysis to visualise patent competition. In the past I have developed such maps (sample attached) nudging each firm manually while reading dozens of investor relations press releases.

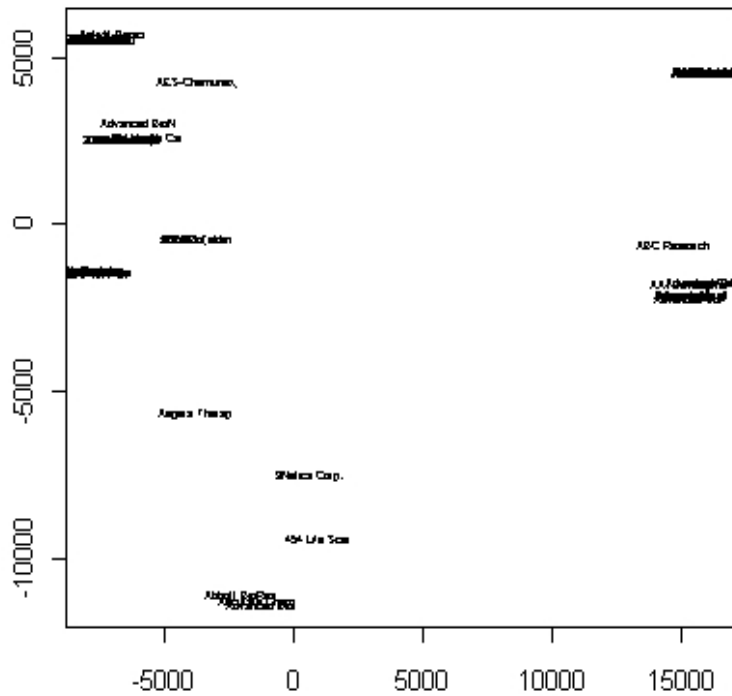
An R-language test project was developed using biomedical and biotechnology SIC codes from CorpTech.Com: Eventually, NAICS codes might be better but they were not conducive to proof-of-concept prototyping at this time; In fact, the software crashed at the full database and hence only the first fifty records were used. The map produced was meaningful, but not immediately useful. Further techniques would have to be developed to condition the data, and, given that the program crashes, select the more relevant companies to be compared. SIC codes are a bureaucratic classification invention and do not offer significantly refined mathematical measurement capability; NAICS codes are quite an improvement, but something better

would definitely be welcome. The problem with using NAICS codes is that they were not listed for all the firms and furthermore, the output of NAICS codes from the CorpTech.com database was not structured in a uniform way that could be read by computer without manual manipulation. Even the SIC codes were all lumped into an individual text field, which had to be read into Excel, output as a PRN, then read back in as separate numbers, then output as a csv file to be read by R. The computer that had access to the data did not allow installing R language, so trying to use the ability of R-language to read directly from the web could not be evaluated, yet this seems feasible and would be of immense eventual benefit.

Further study would involve ways of conditioning the industry classification, perhaps with folding and rotation techniques, and totally automating the process. It has also been suggested using XML Smart Tags to exploit indices generated by Google when it is fed keywords about an industry; since the Unix version of the statistical R-language is able to input web pages as data this seems extremely promising.

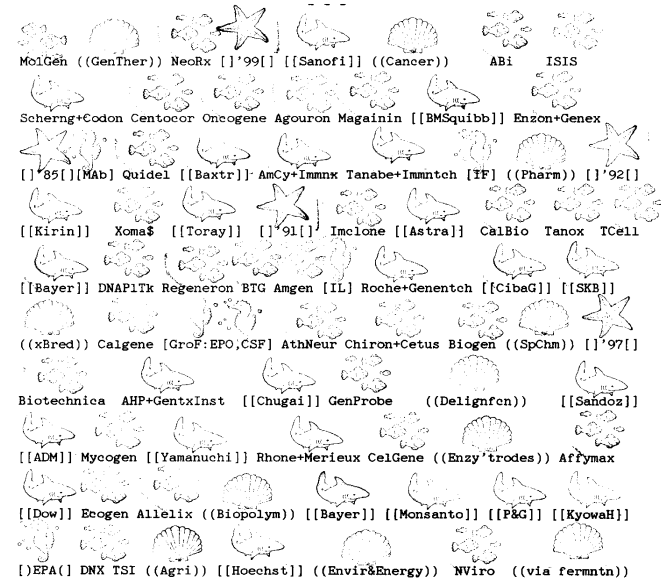
```
R-language program:
xinp<-read.csv("c:/windows/desktop/mc/s2.csv")
xdat<-as.matrix(xinp[1:50,2:17])
xnam<-as.matrix(xinp[1:50,1])
xloc <- cmdscale(dist(xdat))
xlocx <- +xloc[,1]
xlocy <- -xloc[,2]
plot(xlocx,xlocy,type="n", xlab="", ylab="")
text(xlocx,xlocy,xnam,cex=.5)
```

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Data sample:
20/20 GeneSys,2836,3841,,,,,,,,,
3M Health Car,2836,3841,3842,3845,2599,2834,7372,3822,,
3Netics Corp.,3826,8700,3829,,,,,,,,,
3rd Millenniu,8742,,,,,,,,,
454 Life Scie,3826,8731,,,,,,,,,
A.G. Scientif,2836,2819,,,,,,,,,
"A/F Protein",,2836,,,,,,,,,
AAI Developme,8734,8711,6719,,,,,,,,,
Aalto Scienti,2869,2836,,,,,,,,,
"Ab
Peptides",,2869,,,,,,,,,
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Automated

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 Marison Panyot & Virgilson Consultancy of Samenl Intl Entpses
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This chart indicates major players, potential acquirers, external forces, and timeliness; It is a proprietary hybridisation of the BCG/GE profitability and the Zwicky contiguous innovation charts. [Although information herein obtained from sources believed reliable, accuracy is not guaranteed and information may be incomplete or condensed. All opinions and estimates constitute current judgement subject to change without notice. For information purposes only - not intended as offer or solicitation with respect to purchase or sale of any security. Does not preclude our involvement with mentioned firms nor our relying on opinions issued by others for such involvement. Not responsible for errors, omissions, or misinterpretations herein nor in any way liable for any resultant consequential, incidental, special, indirect or other damages; no warranty (of merchantability, of fitness for a particular use, or of any implied or expressed kind) exists. For confidential use of subscribers; reprint by permission only.]

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