



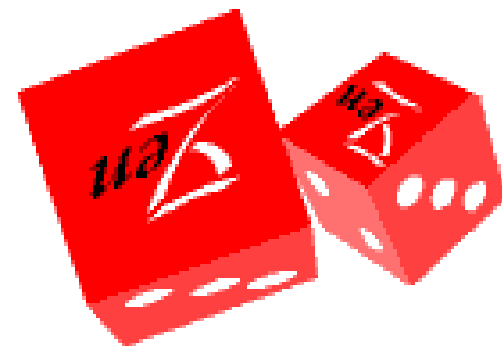
Charity Accountants' Conference 2005

“Zest for Enlightenment”

USING PREDICTIVE TECHNIQUES TO HELP COPE WITH CHANGE

Mary O’Callaghan, Z/Yen Limited
19 September 2005

Z/Yen Limited
Risk/Reward Managers
5-7 St Helen’s Place
London EC3A 6AU
United Kingdom
tel: +44 (20) 7562-9562



www.zyen.com



Agenda

- Background
- The tools and techniques
- The experiments:
 - Fundraising
 - Grant Making
- Raw findings
- Visualisation and interpretation
- Next steps





Background - Z/Yen

- UK's leading risk/reward management firm
- Most experience in: not-for-profit, technology, finance and business-to-business services
- Clients such as Barnardo's, NSPCC, The National Trust, The Shaftesbury Society, Cancer Research UK, British Red Cross Society, Action for Blind People, BEN, The British Heart Foundation, Marine Stewardship Council, The Children's Society
- Projects in strategy, intelligence, fundraising, governance, risk management, finance, IT
- Some Highlights – British Computer Society Award 2004/2005 for PropheZy and VizZy, DTI Smart Award 2003, DTI Foresight Challenge Award of £1.9M for The Financial Laboratory, Investment Banking CCC's, ***IT for the Not-for-Profit Sector, Clean Business Cuisine***

www.zyen.com





Background – Fundraising Research

- Joint Research between Z/Yen and National Fundraising Charity
- Can predictive techniques improve the targeting of fundraising campaigns leading to cost savings?
- Today – sneak preview of initial results





Background – Grant Making Research

- Joint Research - Z/Yen Limited & CASS Business School Centre for Charity Effectiveness
- Can predictive techniques inform the decisions of grant-making bodies and thus improve their effectiveness?
- Participants: New Opportunities Fund and City Parochial Foundation
- Authors of forthcoming papers
 - Ian Harris & Michael Mainelli (Z/Yen)
 - Peter Grant & Jenny Harrow (CASS CCE)
- Today – work in progress





Tools: PropheZy

- Multi-dimensional correlation (a.k.a Support Vector Machine maths)
- Helps to spot patterns and identify anomalies in data
- Classification and prediction
- PropheZy can be used to make predictive applications using readily available data

www.zyen.com



© Z/Yen Limited
2005

“Although this may seem a paradox,
all exact science is dominated by the idea of approximation.”

Bertrand Russell



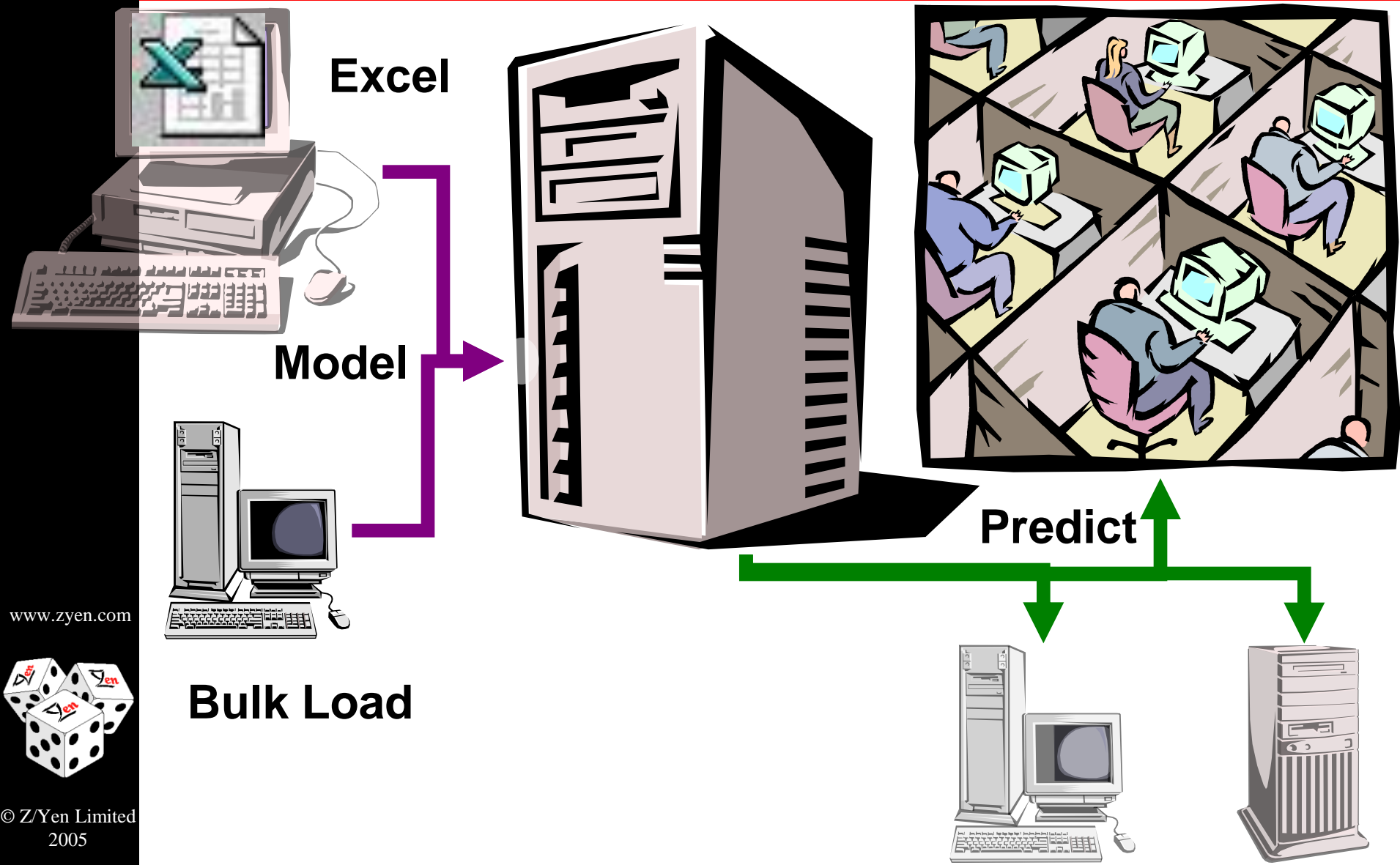
Tools: Where to PropheZy?

- Commercial applications include:
 - Television audience and time predictions
 - Managing trade execution rates (with London Stock Exchange)
 - Reducing failed trades for major investment banks
 - Price-your-audit tool and studies
- Potential charity applications:
 - Identify best fundraising techniques, bid approaches or cross-sales
 - Set targets for donor revenue, profitability, bid success, satisfaction
 - “Fill in the blanks” on donor data
 - Increase success rates among targets, reduce churn
 - Improve assessment of grant applications





Tools: IT Architecture





PropheZy Model – “Cast”

Microsoft Excel - Peaktime Demo - Cast.xls

	A	B	C	D	E	F	G	H	I	J	K	L	M
	Channel	Title	Broadcast date	Genre	Broadcast time	Duration	Channel ID	GenreID	Day of Week	RoundedTime	TVR	Audience in 000's	Share %
1	C4	THE HOOBBS (RPT.)	01-Dec-02	Children's Programmes	06:22	24:00.0	4	2	1	06:15	0.00%	0	0.10%
3	ITV	MY FAVOURITE HYMNS	01-Dec-02	Religious Programmes	11:00	56:00.0	3	14	1	11:00	0.00%	1	0.10%
4	Sky1	RESCUE HEROES	01-Dec-02	Children's Programmes	07:06	25:00.0	6	2	1	07:00	0.00%	7	0.50%
5	BBC1	ON THE RECORD	01-Dec-02	Current Affairs	12:00	04:00.0	1	3	1	12:00	0.00%	10	1.00%
6	BBC1	KEEPING UP APPEARANCES	01-Dec-02	Drama: Other Serials/S	13:04	29:00.0	1	11	1	13:00	0.00%	12	0.90%
7	Sky1	MALCOLM IN THE MIDDLE (RPT.)	01-Dec-02	Drama: Other Serials/S	13:31	26:00.0	6	6	1	13:30	0.00%	12	1.00%
8	C5	THE SECRET INVASION	01-Dec-02	Children's Programmes	14:57	45:00.0	5	8	1	14:45	0.00%	12	1.10%
9	C5	FIVE NEWS	01-Dec-02	News Programmes	14:24	02:00.0	5	13	1	14:15	0.00%	14	1.50%
10	C5	MILKSHAKE	01-Dec-02	Children's Programmes	06:52	54:00.0	5	2	1	06:45	0.00%	16	1.40%
11	ITV	SPIDERMAN	01-Dec-02	Children's Programmes	08:10	09:00.0	3	2	1	08:00	0.00%	16	1.00%
12	ITV	DONALD DUCK	01-Dec-02	Children's Programmes	15:04	07:00.0	3	2	1	15:00	0.00%	16	1.10%
13	BBC1	BREAKFAST WITH FROST	01-Dec-02	Current Affairs						00:00	0.00%	17	1.90%
14	Sky1	STAR TREK VOYAGER (RPT.)	01-Dec-02	Drama: Other Serials/S						00:00	0.00%	17	2.20%
15	Sky1	KING OF THE HILL (RPT.)	01-Dec-02	Children's Programmes						00:00	0.00%	19	2.10%
16	BBC2	SMILE	01-Dec-02	Children's Programmes						45:00	0.00%	20	1.30%
17	C5	CHARMED	01-Dec-02	Drama: Other Serials/S						30:00	0.00%	20	1.40%
18	Sky1	THE SIMPSONS (RPT.)	01-Dec-02	Light Entertainment						30:00	0.00%	21	2.00%
19	BBC2	THE WILD THORNBERRYS (RPT.)	01-Dec-02	Children's Programmes						30:00	0.00%	22	1.50%
20	C4	THE ASHES	01-Dec-02	Sport						30:00	0.00%	22	1.50%
21	C5	POP	01-Dec-02	Music Programmes						45:00	0.00%	23	2.60%
22	ITV	JONATHAN DIMBLEBY	01-Dec-02	Current Affairs						00:00	0.00%	23	2.70%
23	C5	FIVE NEWS	01-Dec-02	News Programmes						45:00	0.00%	24	1.80%
24	BBC2	SOME MOTHERS DO 'AVE 'EM	01-Dec-02	Light Entertainment						00:00	0.00%	24	3.10%
25	C4	THE ODESSA FILE	01-Dec-02	Films: Cinema						00:00	0.00%	25	1.70%
26	C5	FIVE NEWS	01-Dec-02	News Programmes						45:00	0.00%	26	2.00%
27	ITV	WEATHER	01-Dec-02	News Programmes						30:00	0.00%	26	2.30%
28	ITV	CORONATION STREET	01-Dec-02	Drama: Long Running S						15:00	0.00%	27	3.00%
29	BBC2	THE X FILES	01-Dec-02	Drama: Other Serials/S						00:00	0.10%	29	2.90%
30	BBC1	LDN - BBC LONDON NEWS	01-Dec-02	News Programmes						00:00	0.10%	30	3.00%
31	ITV	WEATHER	01-Dec-02	News Programmes						00:00	0.10%	31	2.60%
32	Sky1	ZOIDS	01-Dec-02	Children's Programmes						30:00	0.10%	32	2.10%
33	Sky1	MALCOLM IN THE MIDDLE (RPT.)	01-Dec-02	Drama: Other Serials/S						00:00	0.10%	32	2.70%
34	Sky1	THE SIMPSONS (RPT.)	01-Dec-02	Light Entertainment						00:15	0.10%	32	2.20%
35	ITV	CITY	01-Dec-02	Children's Programmes	10:27	31:00.0	3	2	1	10:15	0.10%	32	3.80%
36	ITV	THE PREMIERSHIP	01-Dec-02	Sport	18:34	25:00.0	3	15	1	18:30	0.10%	32	3.80%
37	BBC1	PANORAMA	01-Dec-02	Current Affairs	22:50	39:00.0	1	3	1	22:45	0.10%	32	2.10%
38	Sky1	STAR TREK VOYAGER (RPT.)	01-Dec-02	Drama: Other Serials/S	14:00	58:00.0	6	6	1	14:00	0.10%	35	2.50%
39	BBC1	THE LIFE OF MAMMALS (RPT.)	01-Dec-02	Documentaries	15:30	59:00.0	1	4	1	15:30	0.10%	35	2.70%
40	C4	THE HOOBBS (RPT.)	01-Dec-02	Children's Programmes	06:48	24:00.0	4	2	1	06:45	0.10%	36	2.60%
41	ITV	GMTV - UP ON THE ROOF	01-Dec-02	Children's Programmes	07:27	43:00.0	3	2	1	07:15	0.10%	36	3.40%
42	BBC2	WILDLIFE ON TWO	01-Dec-02	Documentaries	12:30	29:00.0	2	4	1	12:10	0.10%	36	4.30%
43	Sky1	MALCOLM IN THE MIDDLE (RPT.)	01-Dec-02	Drama: Other Serials/S	13:00	26:00.0	6	6	1	13:00	0.10%	36	3.50%
44	BBC2	LATER WITH JOOLS HOLLAND	01-Dec-02	Music Programmes	23:47	02:00.0	2	12	1	23:45	0.10%	37	2.00%
45	BBC2	CBBC	01-Dec-02	Children's Programmes	07:20	16:00.0	2	2	1	07:15	0.10%	39	3.50%

www.zyen.com



“The purpose of models is not to fit the data but to sharpen the questions.”
Samuel Karlin



PropheZy Predict - "Forecast"

The screenshot shows a Microsoft Excel spreadsheet titled "Forecast.xls" with a table of broadcast data. The table has columns for Channel, Title, Broadcast date, Genre, Broadcast time, Duration, Channel ID, GenreID, Day Of the Week, RoundedTime, TVR, Audience in 000's, and Share %. The data includes programs like BBC NEWS, HAVE I GOT NEWS FOR YOU, AS TIME GOES BY (RPT.), RELIC HUNTER, NEWSNIGHT, RAY MEAR'S COUNTRY TRIP, PORRIDGE (RPT.), V GRAHAM NORTON, and YOU'VE BEEN FRAMED.

Overlaid on the spreadsheet are two dialog boxes. The "PropheZy Addin" dialog box has tabs for "Cast", "Forecast", and "Properties". The "Choose Model" dialog box displays a "Task List" with the following items:

- Counting Values
- Creating Submit File
- Submitting data to PropheZy Server
- Creating Model
- Reading Resonse from PropheZy Server

The "Choose Model" dialog box has "Next >" and "Cancel" buttons.

“Prediction is extremely difficult. Especially about the future.”

Niels Bohr





Fundraising Experiment (1)

- Test PropheZy ability to improve fundraising approach, e.g.,
 - Are some people being mailed who are unlikely to ever respond?
 - Are there defining characteristics for those who will respond?
 - Are we failing to mail people who should be targeted?
- Work with National Fundraising Charity's database
- Including ~ 250,000 records of active warm donors in last 3 to 5 years, excluding committed givers





Fundraising Experiment (2)

- Training Set (cast) included: Gender, Postcode, Contact history, Date of Birth, Campaigns Mailed, response to campaigns
- Test set (forecast): aim to predict responses to September 2004 campaign
- Iterative approach, refining and developing questions, allowing PropheZy to cope with charity hit rate





Initial Findings

- Series of tests based on responses to 3 to 15 mailings
- PropheZy can identify response rates with up to 90% accuracy
- Most accurate for Yes/No response, more difficult with different response levels
- Best results by excluding those with no contact history





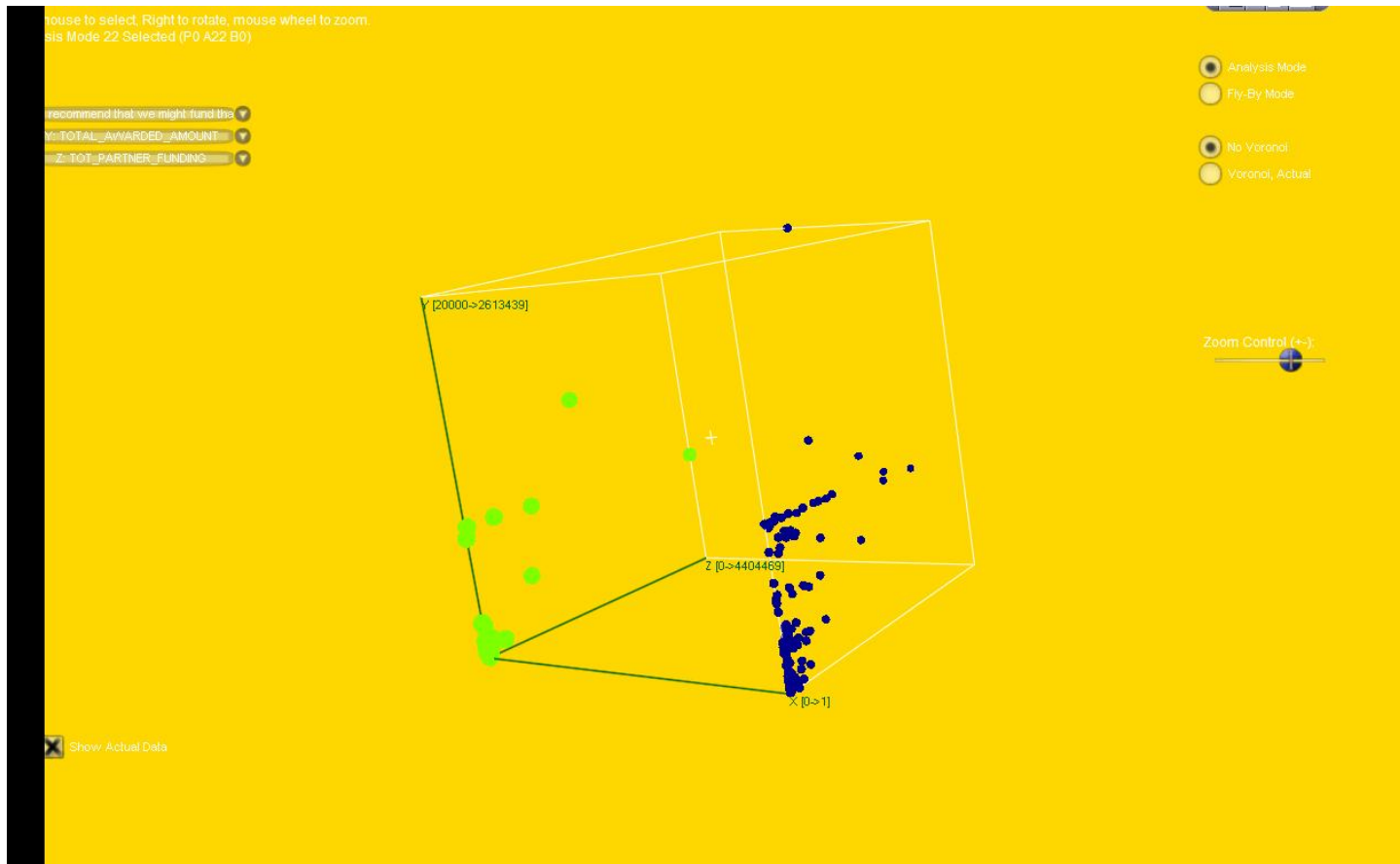
A bit more detail

- Test includes history of one year's mailings (excluding those with no history)
- Comparing “Zero responses” with “Responses”
- Of the predicted responses:
 - 61% were correctly identified – have the characteristics of givers
 - 37% had not responded – potentially have the characteristics of givers
 - 5% had not been mailed – Charity did not believe they had characteristics of givers, but PropheZy does





VizZy – Anomaly/Pattern Detection In Fundraising



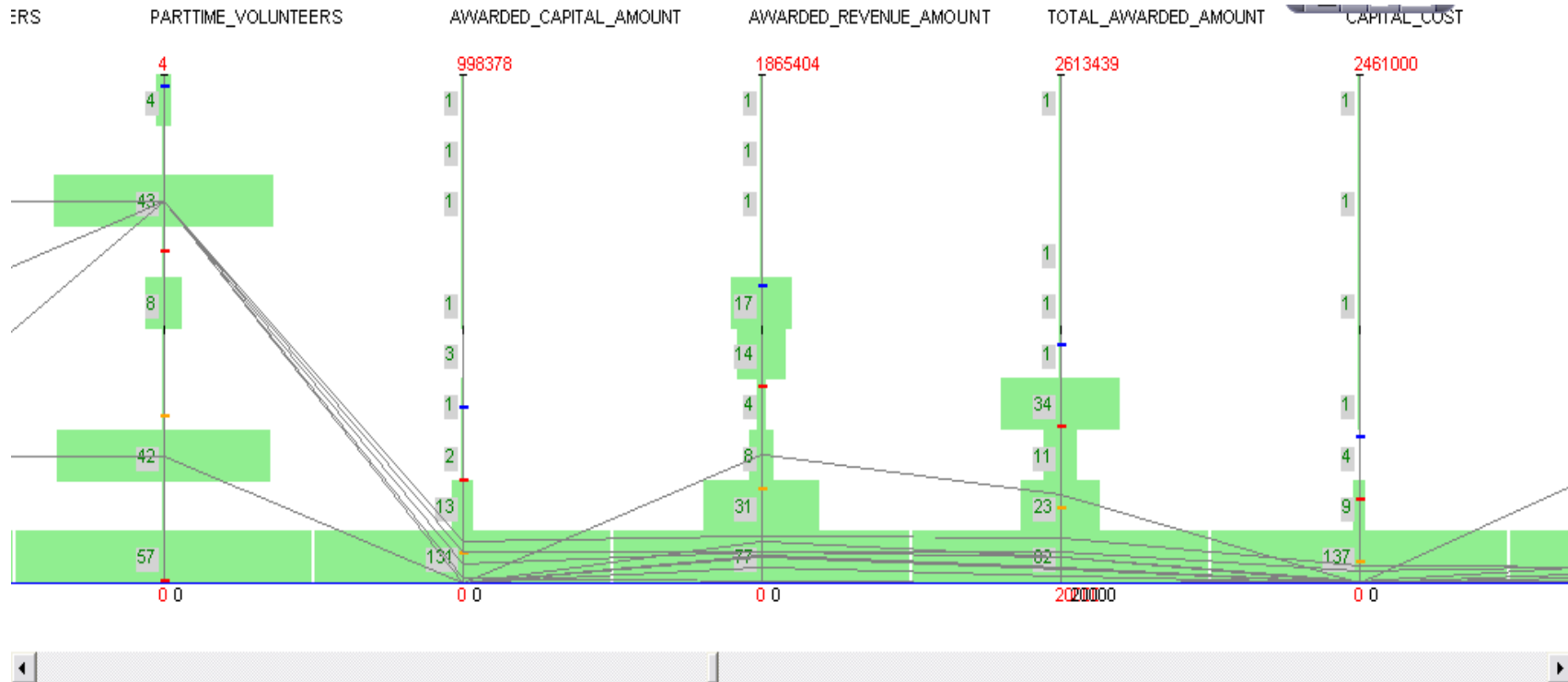
“You can only predict things after they've happened.”

Eugene Ionesco





VizZy – Anomaly/Pattern Detection In Fundraising



www.zyen.com

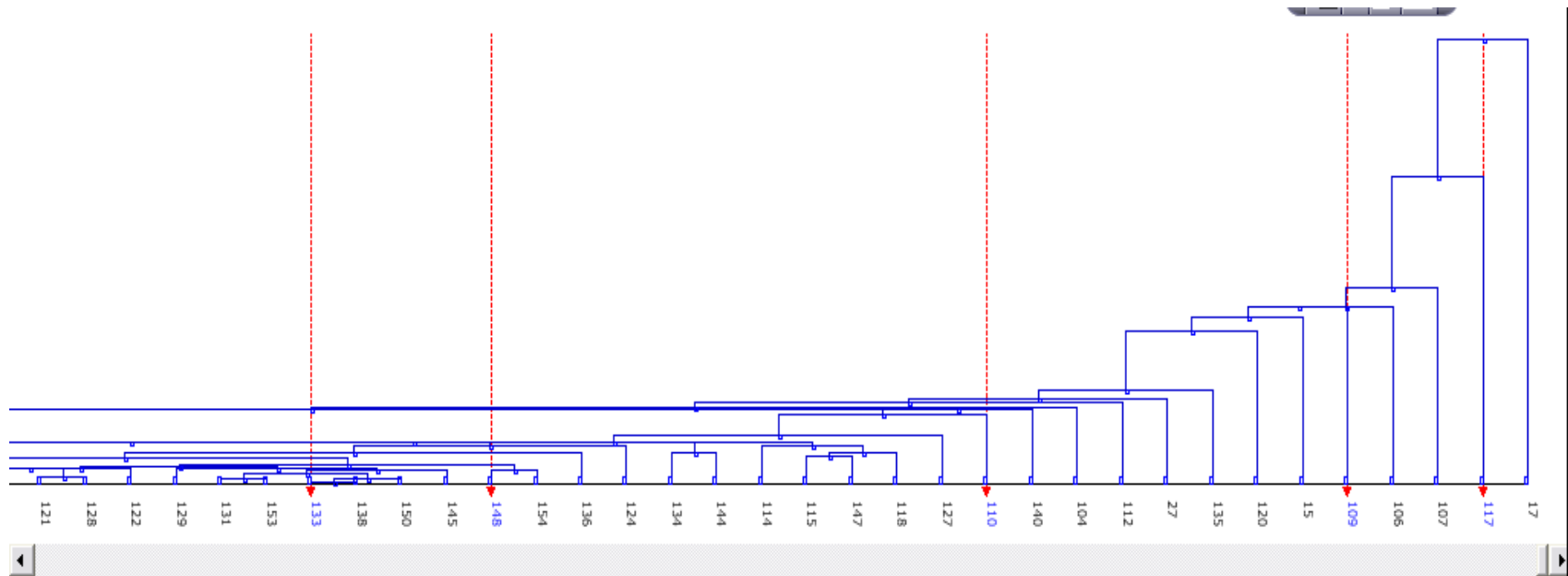


© Z/Yen Limited
2005

“You can only predict things after they've happened.”
Eugene Ionesco



VizZy – Anomaly/Pattern Detection In Fundraising



www.zyen.com





Fundraising Interpretation (1)

- PropheZy identifies three groups for further investigation:
 - Farmland (61%): targets who give, and may have the characteristics of committed givers
 - Rocky Soil (37%): targets who did not respond, but worth investigating to find if they would ever respond
 - Hunting Ground (5%): targets who were not mailed but have the characteristics of those who should respond



Potential Implications

- Farmland: up to 5,000 additional committed givers
- Rocky Soil: An additional 2,300 responses could increase donations by £30,000 OR provide savings by not mailing them
- Hunting Ground: at least 150 additional donors, previously considered “cold”





Fundraising Next Steps

- Tests show groups worth investigation:
 - Farmland: consider approaching actively as committed givers, saving money on direct mail, and increasing lifetime value
 - Rocky Soil: potential to increase income or make significant savings following further research to find why they don't respond (e.g., returns)
 - Hunting Ground: begin active fundraising relationship
- Further research underway, e.g.,
 - Seasonality
 - Predicting value of donations





Where Could Predictive Analysis Be Useful to Fundraising Charities?

- Reduced costs – printing, postage etc
- Improved relationships – more effective targeting
- Potential for growth in committed givers
- Enhanced data quality “Fill in the gaps”

www.zyen.com





Grant Making Experiment (1)

- Three post hoc evaluation questions:
 - Did the funded work mostly achieve its objectives?
 - Was it the right decision to have funded?
 - Did you fund again / would you recommend funding again?
- Look at all readily accessible applications data stored for each fund





Grant Making Experiment (2)

- City Parochial Foundation
 - all grants awarded in 2000
 - 50 “training set”
 - Remainder (c150) “test set”
- New Opportunities Fund
 - 3 programmes – Community Access to Lifelong Learning, Digitisation & Healthy Living Centres
 - 150 “training set” (50 from each)
 - Remainder (c1500) “test set”





Grant Making Experiment (3)

- Where PropheZy flags up anomalies (i.e. “no answers”), test whether that result concurs with those of evaluators
- City Parochial insufficient no answers to enable prediction on that volume of data – asked evaluators to rank projects A, B or C instead
- New Opportunities Fund did generate sufficient no answers to spot 30 potential anomalies on the test set for one fund





Grant Making Raw Findings (1)

- Even with the ABC ranking rather than yes/no answers, PropheZy couldn't find anomalies in the City Parochial Data
- Possibly down to sample size and the relatively limited amount of data stored for each grant at City Parochial
- Hands-on evaluation on application c/w process-based application methods





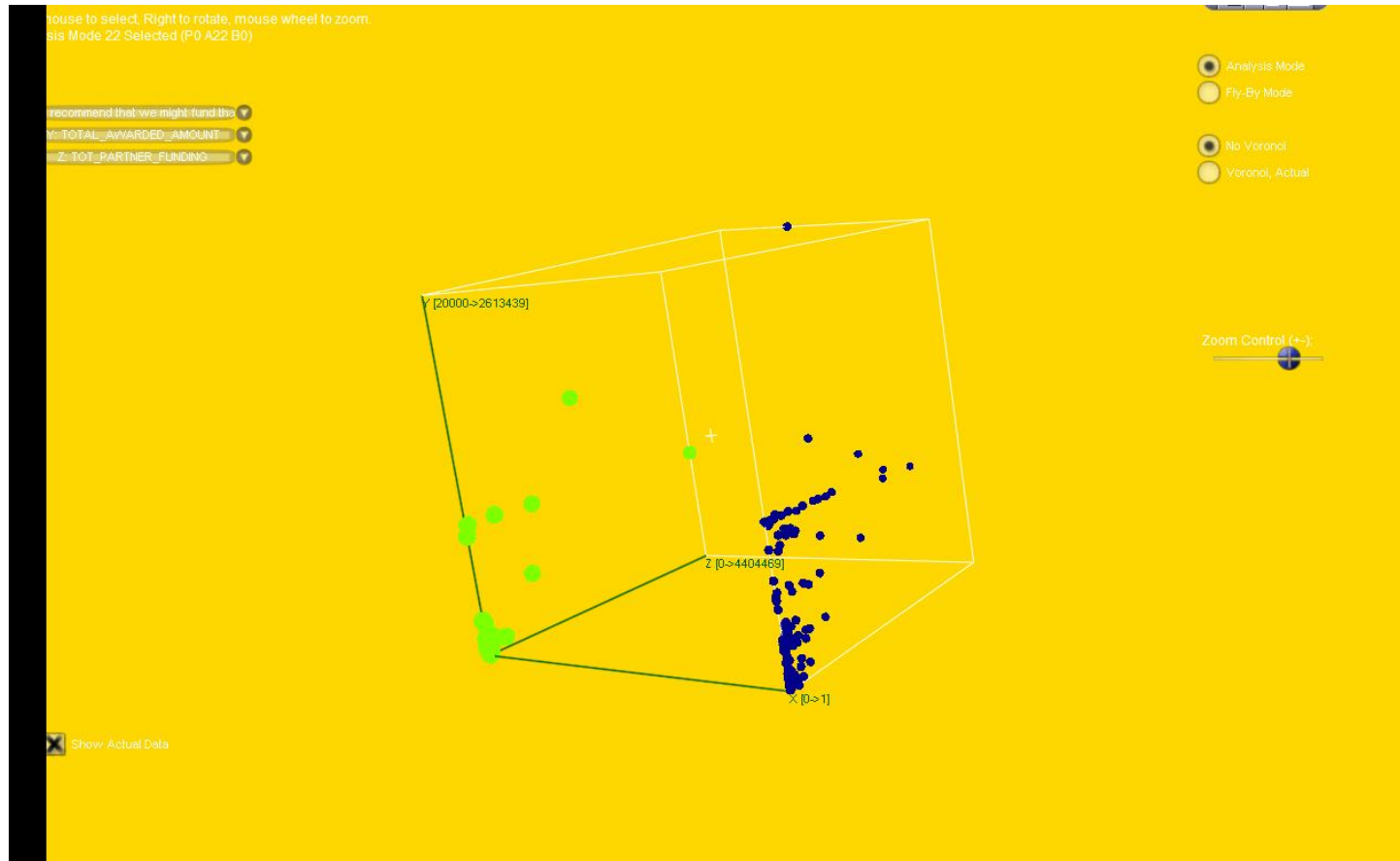
Grant Making Raw Findings (2)

- Of the 30 potential anomalies PropheZy found at nof, 50% were confirmed to indeed be problematic grants
- The training population, a random sample from the whole population, had 18% anomalies (26/141)
- A 50% “hit rate” is statistically significant at 99.9% confidence, on this sample size
- These results are very encouraging





VizZy – Anomaly Detection In Grant Applications



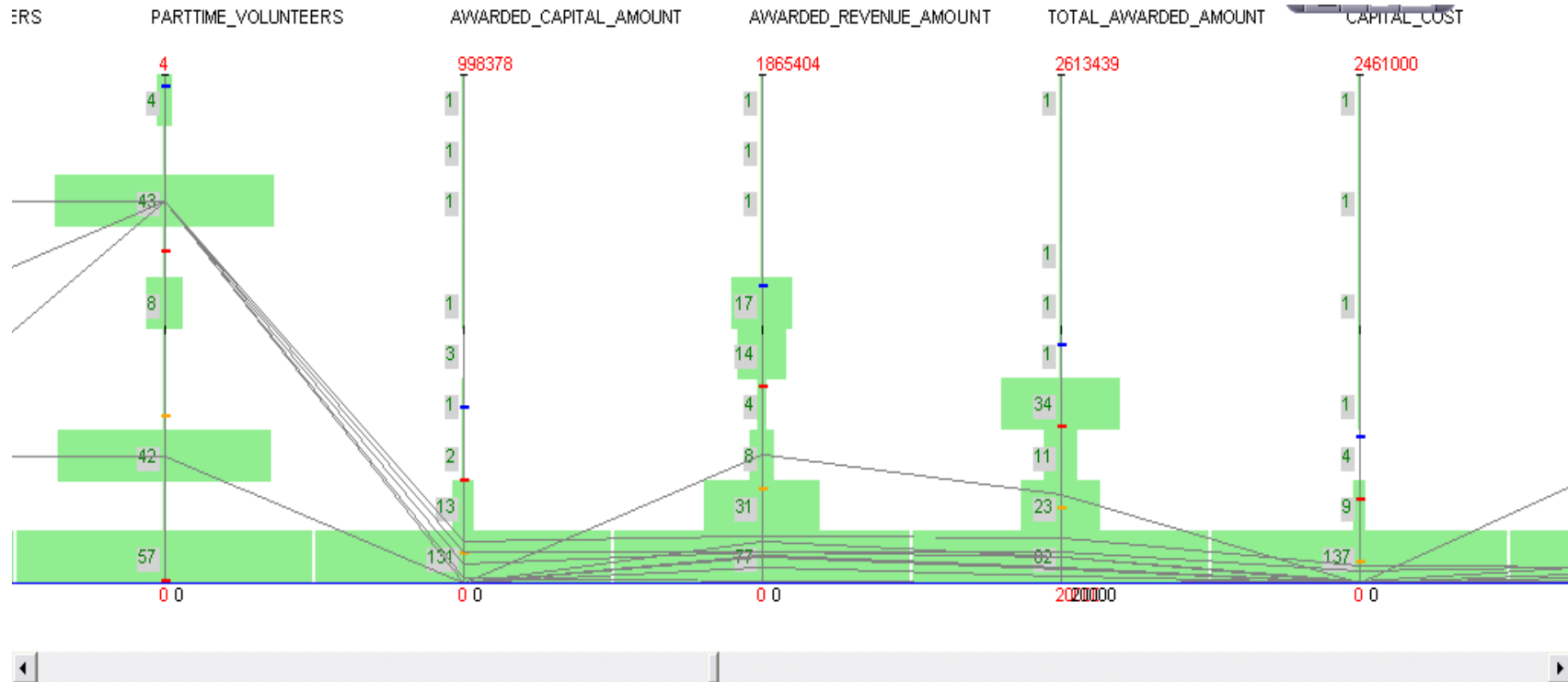
“You can only predict things after they've happened.”

Eugene Ionesco





VizZy – Anomaly Detection In Grant Applications



www.zyen.com



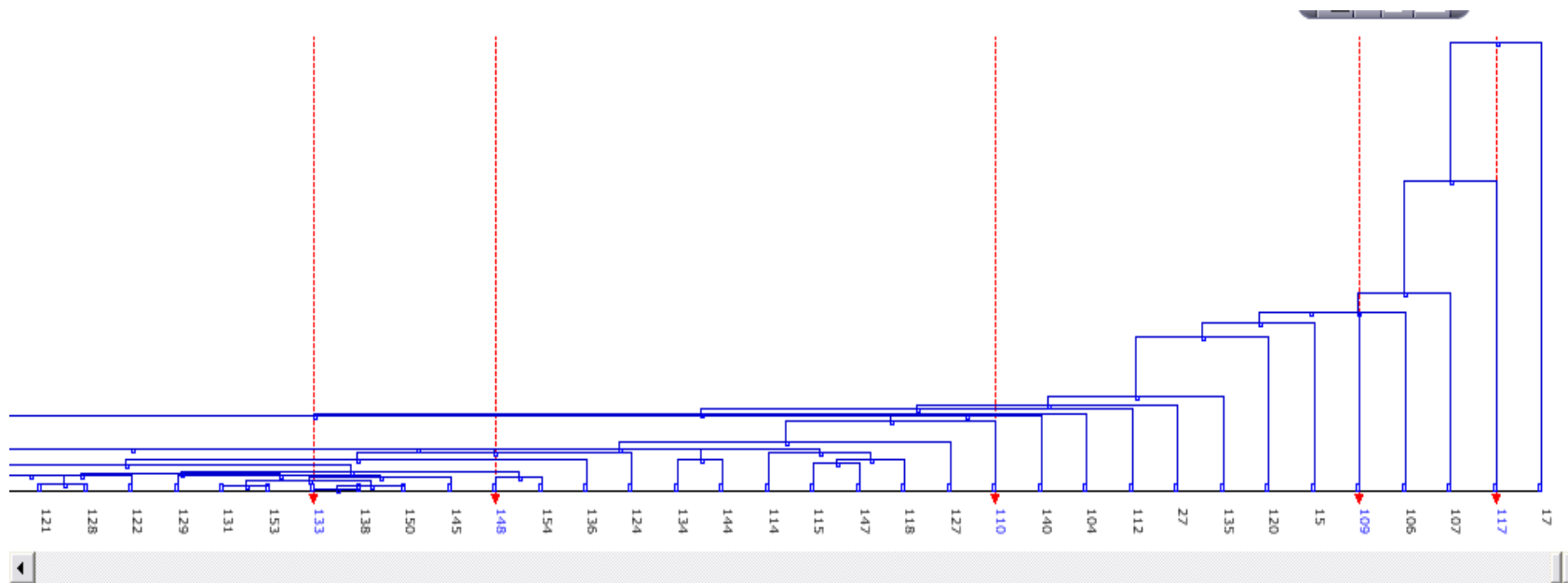
© Z/Yen Limited
2005

“You can only predict things after they've happened.”

Eugene Ionesco



VizZy – Anomaly Detection In Grant Applications





Grant Making Interpretation

- Where sample size is large enough and procedural methods are used for most applications, predictive methods could flag up potential problem grants in advance of funding
- As predictive tools of this kind learn from additional training data, the hit rate could improve to well above 50%:50%
- NOT a substitute for other methods – should not base decisions on this alone





Grantmaker Participants' Feedback

- Initial scepticism – is grant making an art, or a science?
- Issues with data – concern about subjective responses
- Concerns about timescales – what is correct timescale for evaluating a piece of work?
- Emphasise that techniques cannot replace the human element





Where Could Predictive Analysis Be Useful to Grantmakers?

- Public grantmakers: Encouraged to demonstrate accountability
- High volume grants with human resources at premium: Process based evaluation of applications
- Organisational rather than project investment: where investments aim to meet programme aims
- 'Social return on investment': developing venture philanthropy





Real-time Charities

- Coping with floods of rapidly changing information
- Static MIS not good enough
- Seeking robust, general-purpose tools suitable for many datasets
- Seeking quantitative ways of assessing outcomes
- Moving from analytics to action



Next steps

- Needs further work on visualisation (outputs as well as inputs)
- Further refinement of data and tests with other organisations
- Keen to do further work with other charities

