# Northfield News

**May 2007**

*A Newsletter for the Friends and Clients of Northfield Information Services*

## Motivation for EEniac and a Development History
### By Russ Hovanec and Emilan Belev

We always envisioned our Everything Everywhere (EE) risk model to be positioned as a risk management tool for balanced fund managers as well as for risk and compliance in the enterprise risk space for fund managers with holdings of more diversified asset classes. EE has always been satisfactory for balanced fund managers. However, to provide a complete solution for enterprise risk we knew we would need to provide more extensive product coverage in a convenient and easy to use fashion for our clients whether they're using our standalone products or accessing Northfield through one of our partner applications. In doing so, we felt it would also open up new opportunities for EE to be used by hedge funds and corporate treasuries.

There were several ways to provide a solution to this problem but some practical issues had to be addressed in the process. One of the biggest problems with enterprise risk systems is getting and loading all the required data for the diverse security types into a risk framework so that an analysis can be performed. This is usually the most time consuming part of implementing an enterprise risk system. Consequently our main objective was to provide a utility to clients that would automate this process. Another concern was that in order to provide coverage for US municipal bonds for example, we didn't want to simply append all 1.2 MM of them to a client's EE data file during the download as that would make for an unwieldy file to load in the risk engine.

Other objectives/considerations were as follows:

1) Each client using our risk models needs to be able to communicate to Northfield their unique list of exceptions. From that list Northfield will return to the client a file(s) to be added to the risk model data file or as composite assets. This will require Northfield to determine if the exceptions are a) security identifier mismatches for securities already included in the standard EE monthly update, b) securities not included in the standard EE monthly update but exist in the Northfield central database, c) bonds that do not exist in the Northfield central database but the client has the necessary terms and conditions for Northfield to construct the factor exposures, d) derivatives that do not exist in the central Northfield database but the client has the necessary terms and conditions for Northfield to construct the factor exposures as a composite asset, e) funds, indices, etc. where the holdings are unknown and the fund return history is used to construct the factor exposures.

2) Functionality must be reliable, available 24/7 and be accessible as frequently as desired by the client. In addition, the utility must not interfere with the client's firewall.

## Recent and Upcoming Events

## 2007 Newport Annual Summer Seminar
### Tennis Hall of Fame ● Newport, Rhode Island ● June 8, 2007

We are pleased to invite you and your colleagues to our annual summer seminar. The purpose of the seminar is to present recent research and technical advances to our clients and friends.

The Agenda will consist of Six Presentations:

**Fat Tails, Tall Tales, Puppy Dog Tails**
*Dan diBartolomeo, Northfield Information Services*

**Improving Returns-Based Style Analysis**
*Daniel Mostovoy, Northfield Information Services*

**How Large is the Equity Premium Today?**
*Tuomo Vuolteenaho, Arrow Street Capital*

**Implied Risk Acceptance Parameters (RAPs) in the Execution of Institutional Equity Trades**
*Thorsten Schmidt, CFA, Instinet*

**Alpha Scaling Revisited**
*Anish Shah, Northfield Information Services*

**Distinguishing Between Being Unlucky and Unskillful**
*Dan diBartolomeo, Northfield Information Services*

**Tennis Hall of Fame**

As always, our meeting date has been selected to coincide with the US Professional Championships of Court Tennis. Following the day's presentations, there will be a court tennis demonstration by Northfield President Dan diBartolomeo, and then a semi-final court tennis match. This year's tournament promises to be especially strong with a majority of the top 10 players in the world, including Australian Rob Fahey, current world champion and Britain's Rory Gunn who is currently ranked 2nd in the world. Court Tennis, or "real tennis" is the medieval sport that is the progenitor of all modern racquet sports.

After tennis on Friday evening, a dinner party will be held at The Chanler, Cliff Walk, 117 Memorial Blvd in Newport.

There is no charge for participation in any aspect of this event, however, we will be accepting donations on behalf of the Pine Street Inn, a Boston homeless shelter. We are accepting online registrations only. To complete your online registration, and to view the detailed conference agenda, visit **http://www.northinfo.com/events.cfm**. Contact Kathy Prasad if you have any difficulties registering, **kathy@northinfo.com**, 617.208.2020.

## 2007 Hedge Fund Seminar Wrap-Up
### Boston, Massachusetts ● March 8, 2007

Northfield held a one day Hedge Fund Seminar in Boston March 8th. The seminar was originally planned to be held in our Boston office, however overwhelming demand required it to be moved to a nearby convention center. The seminar featured hedge fund specific presentations of topics of importance to our growing number of hedge fund clients.

At the end of the day, guests were invited to a cocktail reception during a men's doubles semi-final match at the US Open Championships of Court Tennis at the Tennis and Racquet Club of Boston.

The presentations included, "Risk Containment for Hedge Funds," "A Market Impact Model that Works," "Risk Management for Hedge Funds with Undisclosed Holdings," "Positive Hit Rates vs. Return Asymmetry—Does it Matter How Alpha is Achieved," and "Hedge Fund Performance Measurement and Attribution." The complete seminar proceedings have been posted to **http://www.northinfo.com/papersearch.cfm.**

## Northfield European Seminar
**Victoria Park Plaza ● London ● June 21, 2007**

Northfield will be hosting a one day seminar in London to showcase research on various topics in investment and risk management to our European clients. The presentations will be by Northfield staff, and other guest speakers.

The Agenda will consist of six presentations:

**Alpha Scaling Revisited**
*Anish Shah, Northfield Information Services*

**Improving Returns-Based Style Analysis**
*Daniel Mostovoy and Dan diBartolomeo, Northfield Information Services*

**Who Should You Listen To? A Decomposition of Stock Returns by Sector**
*Giuliano De-Rossi, UBS*

**Portfolio Optimisation-A Regression Approach to Portfolio Construction**
*James Sefton, Imperial College.*

**Distinguishing Between Being Unlucky and Unskillful**
*Dan diBartolomeo, Northfield Information Services*

**A Market Impact Model that Works**
*Dan diBartolomeo and Howard Hoffman, Northfield Information Services*

**The Victoria Park Plaza**

Following the days presentations, there will be a well deserved cocktail reception. There is no cost to attend. However, donations to The Prince's Trust are strongly encouraged. You can donate on-line at **www.princes-trust.org.uk** or call them in the UK on 0800-842-842. This is a very worthwhile organization that makes a huge positive difference to the lives of many thousands of young people.

Space is limited, so please register online as soon as possible. To register and view the detailed conference agenda, visit **http://www.northinfo.com/events.cfm.** Please contact Christine Milne at: + 44(0)20-7801-6250 or **christine@northinfo-europe.com** with any questions.

## Northfield Staff Speaking Engagements

On February 24th, Northfield President Dan diBartolomeo spoke at the Milwaukee, CFA Society Luncheon, The topic was "Achieving Optimal Turnover in a Multiperiod Framework."

On March 19th in London, Dan presented "Optimal Trade Scheduling and Execution" at the Chameleon Algorithmic Trading Conference."

Dan presented "Real Estate Risk Estimation" at the Boston PRMIA Meeting on April 11th.

At the April 13th at the FRA Symposium on Performance Measurement and Attribution in Miami, Dan presented "Return Attribution of Portfolio Construction."

Dan will be presenting "A Market Impact Model That Works" at the 3rd Annual Carisma Program Trading Techniques and Financial Models for Hedge Funds Seminar in London, June 26-27th. The event combines two leading topics of Program Trading and Financial Models for Hedge Funds. By providing a platform to discuss the applications and recent advances in the field, the seminar aims to bring together practitioners, academics and PhD researchers working in the area of financial planning, quantitative analysis and risk modeling. Register online at **http://www.unicom.co.uk/finance.** Registrations Received prior to May 25th will receive a £500 discount.

Dan will be speaking on the topic of "Private Wealth Management" on June 28th at the CFA Conference in Calgary, Canada. Visit **http://www.calgarycfasociety.com/Conference.html** for more information.

On February 8th, Russ Hovanec participated in a panel discussion on "Overlay Management: Approaches & Supporting Technologies" at the Separately Managed Accounts conference in New York City which was sponsored by Financial Markets World.

Nick Wade spoke on the topic of Risk Model Methodologies at Hitotsubashi University in Tokyo on February 2nd.

Anish Shah presented "Risk Containment for Hedge Funds," at the San Francisco QWAFAFEW Meeting on April 19th.

3) Clients only interaction is to initiate the process, append the outputs to their EE data file and place any composite assets in their production file directory.

4) The performance has to be fast enough so waiting is kept to a minimum.

5) Any error will be explained and have actionable steps to address the cause of the problem.

6) Clients pay additional license fees only for the additional coverage they want.

The resulting utility is called the Everything Everywhere Northfield Information Access Console or "EENIAC" for short. We believe that it accomplishes all the above objectives, but to be fair, we view it as a work in progress as there are many other functions that we plan to add to it over time including increased product coverage for the never ending stream of new products provided to investors. Please contact your Northfield sales person or e-mail us at **sales@northinfo.com** for more details.

## Functional Capability

Below is a summary of the EENIAC systems current capability, regarding functions related to various asset classes, and the corresponding actions performed by the server. The functions described are by no means necessarily performed in the order given and neither is it needed to perform all of them at any given point. Users invoke only those functions which serve a purpose to improve coverage (e.g. derivatives or muni bonds, or both) for their particular portfolio, and they can invoke more than one function with the same request to the server.

### 1) Municipal Bonds

**FUNCTION**: Extraction of data file records (i.e. factor exposures, specific risk per security) from Northfield's municipal bond EE database.

**ACTION**: provided an asset input file, the system retrieves data from our data warehouse for the list of municipal securities the user has uploaded with the asset input file.

**OUTPUT** is a .CSV file with records of a data file (akin the records in the monthly EE data file). The user has to append them to the master copy of the data file residing on their machine.

### 2) Agency MBS Pass-Thrus

**FUNCTION**: Extraction of data file records from Northfield's mortgage pool bond EE database.

**ACTION**: provided with an asset input file, the system retrieves data from our data warehouse for the list of agency pass-thru securities the user has uploaded with the asset input file.

**OUTPUT** is a .CSV file with records of a data file. The user has to append them to the master copy of the data file residing on their machine.

### 3) Equities and Government/Corporate Bonds

**FUNCTION:** Extracting EE data file records for exceptions that a user gets in an Northfield Optimizer exception report, caused by the use of a different ID type in the client's HLD file vs. the EE data file supplied with the regular model update. This would occur for example if the two files had for the same security respectively: a cusip vs. an isin, or a ticker vs. a sedol, or 8 digit cusip vs. 9 digit cusip, etc.

**ACTION**: provided with an asset input file, the system retrieves data from our data warehouse for the list of securities the user has uploaded with the asset input file.

**OUTPUT** is a .CSV file with records of a data file. The user has to append them to the master copy of the data file residing on their machine.

### 4) Derivatives

**FUNCTION:** Providing the risk parameters (factor exposures and specific risk) for derivative positions based user supplied input derivative parameters, and preparing the file fixtures (data file records, HLD files, composite files) to be used later with the Optimizer. Currently, derivative coverage encompasses equities and currency options and futures, as well as bond futures.

**ACTION**: provided with an asset input file with derivative types and specifications, the system performs asset-specific calculations to deliver the representation of the derivative positions for the list of securities the user has uploaded with the asset input file. For the derivative types currently covered, these representations are calculated based on the underlying risk parameters – effectively scaled either using a beta against the underlying (futures), or through a delta (options). In case it is a derivative on a composite (i.e. index), the list of constituents has to be provided in an HLD file which has to be supplied to EENIAC together with the asset input file.

**OUTPUTS** will vary depending on the type of the underlying. Currencies would not have any asset specific risk (currencies are factors in the model) and as such their derivatives representation is to be shown directly as records of a data file. Consequently, the user has to append them to the copy of the data file residing on their machine. Non-currency underlying usually do have asset specific risk and as such they would be represented as composite assets of the underlying (scaled in proportion to the delta or beta mentioned before) and offsetting position in dummy cash.

Composite asset representation comes in the form of HLD files for each derivative and corresponding entries in the Optimizer composite asset file.

## 5) Government/Corporate Bonds

**FUNCTION:** Providing the risk parameters for government and corporate bonds that figure as exceptions from the regularly distributed monthly EE data file. These exceptions are due to actual non-coverage rather than the ID issues referred to in item (3).

**ACTION:** Calculation of the bonds' risk parameters using the same analytics as for bonds in the regular EE update. Terms and conditions for these instruments need to be supplied by the user with an asset input file.

**OUTPUT** is a .CSV file with records of a data file. The user has to append them to the master copy of the data file residing on their machine.

## 6) Funds, Indices, and Stocks

**FUNCTION:** Providing the data file records (risk parameters) for these assets/positions.

**ACTION:** Processing exception composite (fund, index) and equity return series through the EE-style regression methodology to calculate their risk parameters (factor exposures and specific risk). Return series are provided through an asset input file by the user for all securities/composites for which coverage is requested.

**OUTPUT** is a .CSV file with records of a data file. The user has to append them to the master copy of the data file residing on their machine.

## Operation

The general steps in operating the system are uniform across all functions described above.

**Step 1.** Prepare an input CSV file. The first column for each record in that file is a code, which will instruct the system which function to engage in processing those records. Note that users can mix request records for different functions in the same asset input file. Two Excel templates will be of assistance in preparation of input files respectively for derivative (item 4 above) and bond processing (item 5 above). Those templates would instruct the user what fields and formats should be used, will verify the data integrity, and will output user data to a file that conforms to the requirements of an EENIAC input asset file. Below is an example record entered in a derivative template (regardless that the example shows one record, user can enter as many as they would like on one sheet of the template).

**Step 2.** Run the client scripts that will send the user's request to the server. This is done with one line entered into the command prompt console (line format is: triggering application name, user, password, input filename). Below is a screen shot of what the command to trigger a processing request on a sample asset input file looks like.

```
Command Prompt

C:\north_term>client_upload scottuser tigerpass asset_file_20070402_USD.csv
```
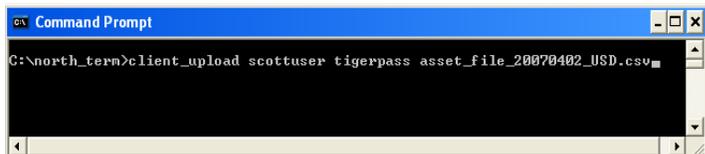
**Step 3.** The last step is the download of the user output to his machine, which happens without any user intervention

Microsoft Excel - EENIAC_template_derivs.xls [Read-Only]

File Edit View Insert Format Tools Data Window NField FactSet Help

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FIELDS: | Type | ID | Name | V | Q | SID | S | Payoff | Exercise |
| 2 | EXAMPLE: | 4300 | BarrCurr | Barrier Currency Option on USD | | | 2 USD | | 1 CB | B:2007/06/01;2007/06/16 - 2007/06/23;2007/07/01 |
| 3 | | 4300 | BarrCurr | Barrier Currency Option on USD | | | 2 USD | | 1 CB | B:2007/06/01;2007/06/16 - 2007/06/23;2007/07/01 |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | Barrier Options | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | Field | | Values | | | Description | | | | |
| 9 | Type | | 4300 | | | Barrier currency option | | | | |
| 10 | | | 4320 | | | Barrier index option | | | | |
| 11 | | | 4340 | | | Barrier stock option | | | | |
| 12 | | | | | | | | | | |
| 13 | ID | | | | | ID | | | | |
| 14 | Name | | | | | Name | | | | |
| 15 | V | | | | | Value. If blank, we price. | | | | |
| 16 | Q | | | | | # shares/contracts in the client's portfolio | | | | |
| 17 | SID | | | | | ID or composite ID of the underlying | | | | |
| 18 | S | | | | | Price of the underlying in base currency | | | | |
| 19 | | | | | | | | | | |
| 20 | Payoff | | C | | | Vanilla Call | | | | |
| 21 | | | P | | | Vanilla Put | | | | |
| 22 | | | CB | | | Binary Call | | | | |
| 23 | | | PB | | | Binary Put | | | | |
| 24 | | | CA | | | Asset or Nothing Call | | | | |
| 25 | | | PA | | | Asset or Nothing Put | | | | |
| 26 | | | | | | | | | | |
| 27 | Exercise | | E | | | European | | | | |
| 28 | | | A | | | American | | | | |
| 29 | | | B:<dates> | | | Bermudan e.g. 'B:2006/05/01;2006/05/14 – 2006/05/21;2006/06/01' | | | | |
| 30 | | | | | | Note: The ranges of dates exercisable are separated with a semicolon and the format of the dates is y... | | | | |

Basic Options / Warrants / Forward Start Call Options \ **Barrier Options** / Asians / Lookb

Control Box — Output

after running the client script. All outputs are downloaded to the output folder of the installation on the user's machine (normally "C:\north_term\Output_Files\"). From there the user has to transfer them to the respective Optimizer default input folders, so that the newly retrieved data from EENIAC can be utilized in Optimizer analyses.

Since processing times on our server will vary depending on different factors including size of input file and request type, the time it will take for the user to get his output will vary accordingly. The average time it takes for EENIAC to complete a request is between 3 and 5 min.

There are two noteworthy considerations that the user has to observe in regards to the successful operation of the system:

**Installation of client application.** It has to be done in the correct location on the user's machine and is simply accomplished by unzipping a distribution archive as described in the manual accompanying the software.

**Firewall issues.** The user machine on which the EENIAC client application is installed does not necessarily need a static IP address and can be behind a firewall. The firewall, however, has to be set to allow outgoing traffic on particular ports if it has been blocked (in rare cases).

We generally complete the user account setup that allows the usage of the EENIAC system in a matter of 1 business day, if all data subscription issues have been previously cleared. We would provide the needed support to ensure the system is operating successfully on your site.

## Further Development

As implied, on one side, by the name of the Everything Everywhere (EE) model and, on another, by the incessant innovation of investment products, the task of complete asset type coverage is a journey rather than a destination. We have identified, however, the next milestones that will address the points of highest interest to our clients. The timeline priorities (in brackets) of these additions to the EENIAC coverage are given below.

**(1)** Collateralized Mortgage Obligations – on-demand processing of CMOs with deal data from our Intex data feed.

**(1)** Interest rate and bond derivatives – similar to our current derivative approach we would start processing FRAs, swaps and swaptions, caps, floors, bond futures options, etc. with proprietary user input data.

**(1)** Hedge fund coverage – a new methodology using style analysis will replace the current return series regression approach to covering composites – hedge funds, mutual funds and indices. For details please

see the material "Finding Proxy Holdings for a Hedge Fund with Undisclosed Holdings" from our Hedge Fund Seminar proceedings (March 2007).

**(2)** ABS – on-demand processing of ABSs with deal data from our Intex data feed

**(3)** Credit derivatives – coverage of credit default swaps, total return swaps, as well as other types of credit derivatives based on user supplied derivative parameters.

To make the operation and usage of the system even more productive, we plan two types of improvements of the utilization of data provided by EENIAC's users.

**1)** Derivative data supplied by users will be deemed effective and stored in our databases for certain periods of time to save the need of reloading input derivative parameters over times frames where immaterial changes have occurred for a particular derivative security.

**2)** For bond proxies for which users upload terms and conditions to EENIAC in between monthly updates, the users will have the option to consent to inclusion of those security records in the data file they receive in the subsequent monthly update distribution.

## Northfield Partner Update

### Instinet

Northfield partner Instinet, a global agency broker officially released Wizard Pro (for portfolio trades), a trade scheduling tool that incorporates the Northfield Open Optimizer and short term risk models available through Instinet's Portal and Newport trading platforms in January. This extension to the previously released Wizard (for single trades) allows managers to consider the covariant effects as well as the market impact of portfolio trades in order to better manage their transaction costs. Please contact Russ Hovanec **russ@northinfo.com** at Northfield or **Tom.Whelan@instinet.com** at Instinet for more details.

### FlexTrade

Northfield partner FlexTrade Systems, a global leader in broker-neutral algorithmic trading platforms and rules-based order-management and execution systems for equities, foreign exchange and listed derivatives released FlexPTS, (portfolio trade scheduler) trading solution. FlexPTS enables users to determine the best trading trajectory for their portfolios while minimizing market-impact cost and the risk of underperforming benchmarks. FlexPTS utilizes FlexTrade's own proprietary components along with Northfield's Short Term risk models for risk assessment as part of the process. Please contact **sales@flextrade.com** at Flextrade for details.

# Technical Support Tip: Cash Constraint in a Long-Short
## *By Mike Knezevich*

When using the Northfield optimizer to construct a long-short portfolio, the user must pay particularly close attention to weight constrains on the cash asset. The cash asset is used to represent the offsetting proceeds from the shorts.

Let's say for example I currently have a portfolio (L) with a value of $100 in various assets. I then decide to construct a dollar neutral long-short portfolio. I can borrow the assets (S) I wish to short and sell them on the market. This generates cash (C) that must be accounted for in a marked to market account. My net value is the value of these three values combined $N = L - S + C$ which equals to 100% or $100 as the portfolio is dollar neutral.

| Leverage Example | | | Value | Percentage |
|---|---|---|---|---|
| | L | $ | 100.00 | 100% |
| + | C | $ | 100.00 | 100% |
| - | S | $ | (100.00) | -100% |
| = | N | $ | 100.00 | 100% |

In practice, finding a precise short to equal the longs is more difficult. Northfield suggests providing a range around your desired level of long and short values. For example to implement a dollar neutral strategy in practice it is best to set a range of long and short around the desired 100% values as illustrated below.

| Constr. | Globals | Long/Short | Rounding |
|---|---|---|---|
| Min. Sum of Short Weights | | 99% | |
| Max. Sum of Short Weights | | 101% | |
| Min. Sum of Long Weights | | 99% | |
| Max. Sum of Long Weights | | 101% | |

In this case the weights for the cash value is no longer simply 100%, but can range 98% and 102%

### Calculating the cash range:
1) This range is simply calculated by taking the min and max sums of the long and short weights. Where Lmin is the Min Sum of the Long Weights, etc.

| | L | S |
|---|---|---|
| Min | Lmin | Smin |
| Max | Lmax | Smax |

2) Determine the smallest and largest ranges by calculating the net of the two furthest possible outcomes.

| Net | |
|---|---|
| Min | Lmin-Smax |
| Max | Lmax-Smin |

3) Subtract the inverted net values from 100% to determine the cash value.

| Cash Constraint | |
|---|---|
| Min | 100-(Lmax-Smin) |
| Max | 100-(Lmin-Smax) |

### Applying these formulae to the market neutral example above:

| Example Dollar Neutral | | | | | |
|---|---|---|---|---|---|
| | L- | S= | Net | | Cash Constraint |
| Min | 99% | 99% | -2% | min | 98% |
| Max | 101% | 101% | 2% | max | 102% |

Note: the Net values make sense as the optimizer reaches either extreme:

- Long side = 101% and short side = 99, then we need -2 net cash so our cash constraint on minimal side is 98%. Ninety-nine percent value is received by 1% is used to fund the additional long over 100%, hence the cash is 99-1 = 98%.

| Minimum Holdings (1) | | ID | Value |
|---|---|---|---|
| Maximum Holdings (1) | 1 | *$$$ | 98.0000 |

- Long side = 99% and long side = 101%, we will receive additional cash from our shorts which is not needed for our longs and the net is 2% implying a maximum cash constraint of 102%.

| Minimum Holdings (1) | | ID | Value |
|---|---|---|---|
| Maximum Holdings (1) | 1 | *$$$ | 102.0000 |

For further inquiries, contact Technical Support in Boston: **support@northinfo.com** or call 617.208.2080. European clients can contact: **support@northinfo-europe.com** or call +44-(0)-20-7801-6260. In Asia, contact Nick Wade, **nick@northinfo.com**.

## Northfield Goes Hollywood!

One of the great challenges of quantitative finance is being able to communicate the often arcane mathematical and procedural concepts that underlie our analytical processes. Often the impediment to success of "quant" efforts is not an analytical problem but rather the inability to convey our ideas to important constituencies of colleagues and clients who are less familiar with quantitative finance. Northfield has undertaken to create a series of instructional videos that are designed to effectively communicate the advanced methodologies behind many of our services.



**MARS Portfolio Construction Video**

To date, eight videos have been created, ranging in length from five to ten minutes each. Five of these relate to our ART product area (**http://www.northinfo.com/modelssoftware.cfm?TypeID=2&SoftID=10**), with one video devoted to an overview of the ART system, while the remaining four provide detailed illustration and explanation of several of the ART system's advanced functions. Among the featured functions are the Analytic Hierarchy Process for bringing "expert opinion" into asset allocation and manager selection problems, and CUSUM analysis, a method for refining the evaluation of managers. We have also created three videos to describe our MARS system, which is a comprehensive platform for the management of large numbers of investment accounts, as would be typical in private bank. The MARS videos (**http://www.northinfo.com/modelssoftware.cfm?TypeID=2&SoftID=12**), illustrate our concept of "portfolio manufacturing" using the analogy of an automobile manufacturing facility, and were done with in the similar animation style as the popular motion picture Cars.

All of the video material was created by Lineplot Productions, LLC. (**http://www.lineplot.com**) in Cambridge, Massachusetts. Lineplot's founder, Pasha Roberts, presented at Northfield's most recent annual conference, on the issues of cognitition in financial applications. Streaming video versions are available on our website in both low and high resolution video formats. DVD copies are also available at no cost.

Feedback from clients and prospective clients who have viewed the videos has been positive. In that these videos are our first effort to use a very new media, we would very much appreciate hearing from anyone with comments.