# DEVELOPMENT AND IMPLEMENTATION OF A WEB-BASED FARM SUPPLY FIRM SIMULATION FOR TEACHING AGRIBUSINESS MANAGEMENT

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The focus of this work was the design and implementation of Web-based, interactive business simulations for use in better educating and training people for the increasingly complicated management of firms in the retail farm supply sector for both cooperative and non-cooperative business structures. Changes in telecommunications technology and increased provision of distance learning resources provided the opportunity to develop and implement Web-based simulations.

The first Windows version simulator [called ProSTAR] was written in Visual Basic 3.0 running on Windows 3.1. It was updated to Visual Basic 6.0 running on Windows 95/98 as a full 32-bit application and the ability to run on Windows NT as a native application. Consultations with computer programming experts resulted in the decision to write the Web-based simulation program in Active Server Pages style. This is a more difficult approach than Visual Basic or Java, but it provides for the maximum server-side and client security. The extra difficulty was deemed justifiable in light of the added security for the program code and individual decision data and user information. That approach was consistent with what many businesses do when security is a high priority in Web-based applications. The first version of the Web-based simulation used the PC-based simulation as its starting point and included, among others, the following product, service and equipment decisions.

| PRODUCTS | SERVICES | EQUIPMENT |
|---|---|---|
| Straight Goods | Floater Applic | Pickup Truck |
| Bulk Blends | High-Tech Applic -VRT | Floater Truck |
| Urea | Dry Cart Rent | VRT Truck |
| Anhydrous | Impregnation | Nurse Truck |
| Liquide | Blending | Chemical Sprayer |
| Lime | NH3 Custom Applic | NH3 Applic Equipment |
| N-serve | NH3 Tank Delivery | NH3 Nurse Tank |
| Packaged Chemicals | NH3 Equipment Rent | Dry Cart |
| Bulk Chemicals | Chemical Applic (PRE) | Chemical Storage |
| | Chemical Spray (POST) | Dry Storage |
| | Crop Scouting | Liquid Storage |
| | Soil Testing | Anhydrous Storage |
| | Soil Mapping | |

**The current Web-based ProSTAR system** is made up of the following components:

1. <u>ProSTAR Business Engine</u>:  This component contains all the business rules that are applied in the simulation. It is written in Visual Basic 6.0.

2. <u>ASP Smart Mail component</u>:  This freeware component handles the e-mailing requirements of the system. ASPSmart.com has developed it

3. <u>Access 2000 Database</u>:  The database backend was implemented in Microsoft Access 2000 [soon to be Microsoft SQL]. The database stores data for the markets, teams and the students.

4. <u>ASP (Active Server Pages) Web pages</u>:  The web site has been written in ASP and was developed using Microsoft Visual Interdev 6.0. The web site has 2 main views: the facilitator/faculty view and the student view.  The design of the web site includes the *Facilitator View* and the *Student View.*  In the facilitator view the facilitator/instructor monitors the progress of the student/participants and/or teams.  In the student view the student/participant team members enter the decisions for the current decision period and also view the reports for current and previous decision periods.

**Several of the greatest challenges encountered and continuing are:**

- Having dependable protection from hacking,

- Improving player's and facilitator's manuals to cover questions in an asynchronous environment,

◙ Dealing with "non-submitting" team in a competitive market,

◙ Finding solutions to unfriendly software and Web page attributes,

◙ Pre-programming competitors for single player mode and, probably most important of all,

◙ Maintaining a knowledgeable team of programming and content specialists.


The following pages contain information on accessing ProSTAR as a facilitator.   Examples of several of the reports generated for the players are included.  Work to improve the look, feel and content continues and will be aided by viewer's critical examination and comment.  The readers of this paper may inspect an example ***beta test version*** of the type of web-enabled agribusiness simulation envisioned in this project.  Contact Dr. Patrick D. O'Rourke at porourke@ilstu.edu for demonstration information.
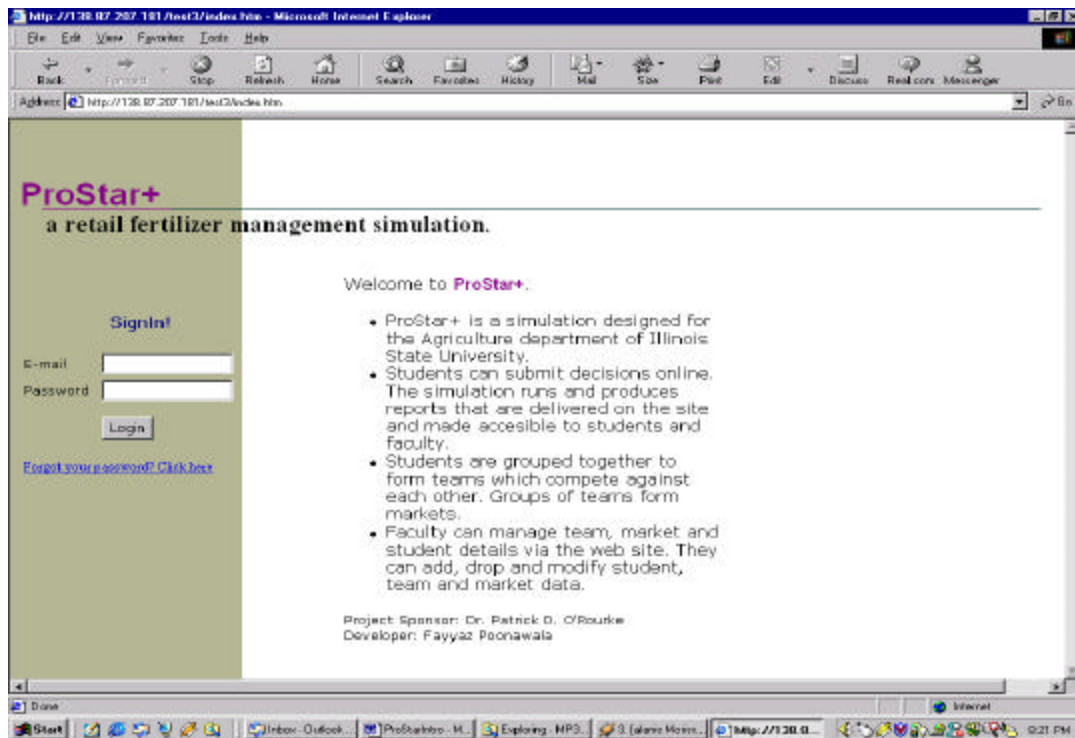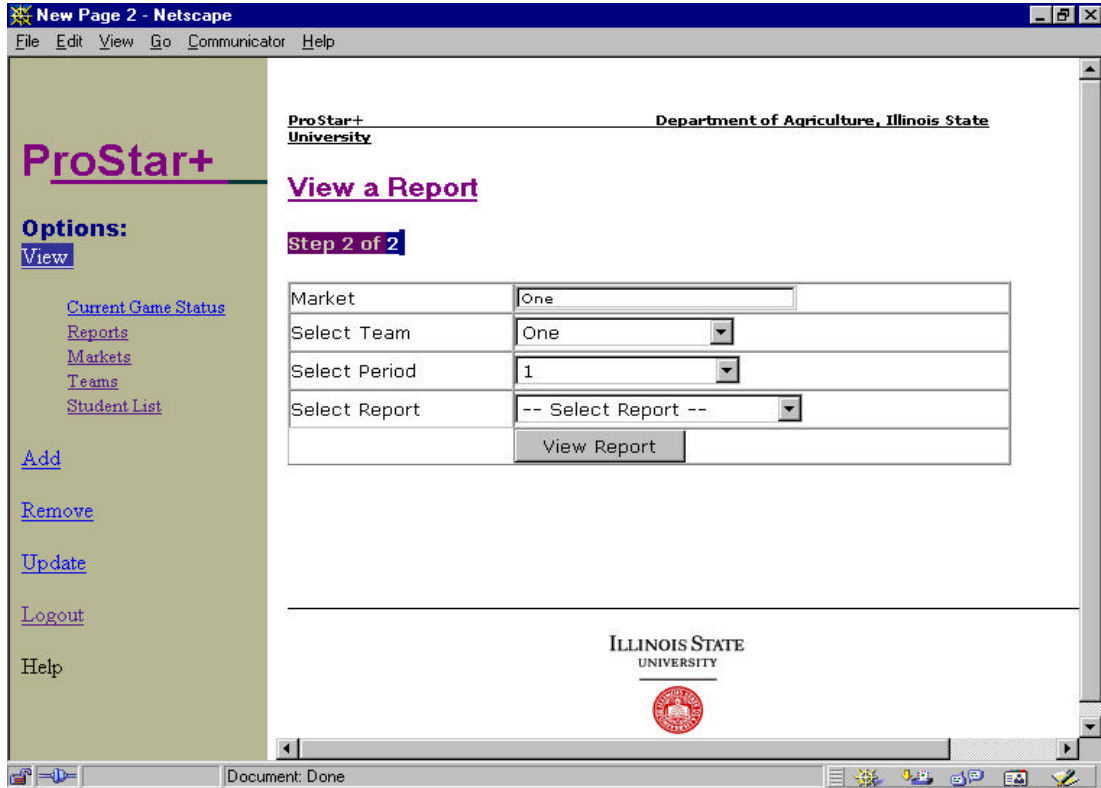
**Select Report --**
Facilitator Report
Sales Forecast
Balance Sheet
Labor Report
Plant &amp; Equipment Report
Market Share
Retail Price Guide
Team Prices
Team Service Charges
Profit &amp; Loss Statement
Sales &amp; Inventory
Services Report
Team Decisions

# Balance Sheet Report

**ProStar+**

**Options:**
View

Current Game Status
Reports
Markets
Teams
Student List

Add

Remove

Update

Logout

Help

| Market | One |
|---|---|
| Team Name | One |
| Period Number | 1 |

| Assets | |
|---|---|
| **Current Assets** | |
| Cash | $0.00 |
| Accounts Rec | $584,646.78 |
| Inventory | $290,925.98 |
| Investments | $0.00 |
| **Total Current** | $875,572.76 |
| **Net Fixed Assets** | |
| Land | $20,000.00 |
| Plant | $230,000.00 |
| Equipment | $402,710.80 |
| Storage Fac | $188,000.00 |
| **Total Fixed** | $840,710.80 |
| **Total Assets** | $1,716,283.56 |

| Liabilities & Net Worth | |
|---|---|
| **Current Liabilities** | |
| Payables | $98,943.62 |
| Mort Payable | $34,295.00 |
| Emergency Debt | $57,142.86 |
| **Total Current** | $190,381.48 |
| **Long term Liabilities** | $651,605.00 |
| **Total Liabilities** | $841,986.48 |
| **Net Worth** | |
| Common Stock | $250,000.00 |
| Retained Earnings | $624,295.78 |
| **Total Net Worth** | $874,295.78 |
| **Total Liab + NW** | $1,716,282.26 |

| Ratios | Value | Value |
|---|---|---|
| | **6 MO** | **12MO** |
| Op Profit | 7.36% | 4.21% |
| ROA | 7.65% | 2.12% |
| RONW | 15.01% | 4.23% |
| D/E | 96.30% | 96.30% |
| CA/CL | 459.90% | 459.90% |
| ACID | 307.09% | 307.09% |
| GR Margin | 21.74% | 21.65% |
| GR Profit | 33.19% | 33.37% |
| Op Exp | 25.82% | 29.16% |
| NIAT | 4.49% | 1.54% |

Document: Done

# Facilitator's Report

## ProStar+

**Options:**

View

    Current Game Status
    Reports
    Markets
    Teams
    Student List

Add

Remove

Update

Logout

Help

| Market | One |
|---|---|
| Period Number | 1 |

| | Team 1 | Team 2 | Team 3 | Team 4 | Team 5 |
|---|---|---|---|---|---|
| Total Receipts | $2,923,233.89 | $2,961,755.48 | $2,763,003.25 | $0.00 | $0.00 |
| Svc Revenue | $334,707.51 | $343,885.73 | $305,629.93 | $0.00 | $0.00 |
| | | | | | |
| Gross Margin % | 21.74% | 18.58% | 23.19% | 0.00% | 0.00% |
| Gross Profit % | 33.19% | 30.19% | 34.25% | 0.00% | 0.00% |
| Total Op Expense % | 25.82% | 25.95% | 24.65% | 0.00% | 0.00% |
| Total Op Profit | $215,177.24 | $125,820.04 | $265,370.89 | $0.00 | $0.00 |
| | | | | | |
| Net Inc % | 4.49% | 2.44% | 5.95% | 0.00% | 0.00% |
| Net Worth | $874,295.78 | $815,320.02 | $907,423.58 | $0.00 | $0.00 |
| | | | | | |
| End Cash | $0.00 | $0.00 | $50,068.03 | $0.00 | $0.00 |
| End Debt | $841,986.48 | $1,372,954.61 | $773,762.99 | $0.00 | $0.00 |
| End Emergency Loan | $57,142.86 | $586,076.71 | $0.00 | $0.00 | $0.00 |
| | | | | | |
| RONW % | 15.01% | 8.86% | 18.11% | 0.00% | 0.00% |

Document: Done

# ProStar+

**Options:**
View

Current Game Status
Reports
Markets
Teams
Student List

Add

Remove

Update

Logout

Help

| | Last 6 Months | | | | Last 12 months | | |
|---|---|---|---|---|---|---|---|
| | **Dollars** | **Percent** | **Fixed Cost** | **Variable Cost** | **Dollars** | **Percent** | **Fixed Cost** |
| Product Sales | $2,588,526.38 | 88.55% | | | $3,962,261.38 | 88.29% | |
| Service Income | $334,707.51 | 11.45% | | | $525,597.51 | 11.71% | |
| Total Receipts | $2,923,233.89 | 100.00% | | | $4,487,858.89 | 100.00% | |
| Cost of Goods | $1,953,154.02 | 66.81% | | 66.81% | $2,990,471.02 | 66.63% | |
| Gross Margin | $635,372.36 | 21.74% | | | $971,790.36 | 21.65% | |
| Gross Profit | $970,079.87 | 33.19% | | | $1,497,387.87 | 33.37% | |
| **Operating Expenses** | | | | | | | |
| Management Team | $75,000.00 | 2.57% | $75,000.00 | | $150,000.00 | 3.34% | $150,000.00 |
| Full Time Labor | $126,000.00 | 4.31% | $126,000.00 | | $222,000.00 | 4.95% | $222,000.00 |
| Part time Labor | $69,750.00 | 2.39% | | 2.39% | $121,500.00 | 2.71% | |
| Over time Labor | $0.00 | 0.00% | | 0.00% | $0.00 | 0.00% | |
| Total Labor | $270,750.00 | 9.26% | $201,000.00 | 2.39% | $493,500.00 | 11.00% | $372,000.00 |
| Tax, Ins & Lic | $22,840.00 | 0.78% | $22,840.00 | | $45,680.00 | 1.02% | $45,680.00 |
| Depreciation | $95,278.50 | 3.26% | $95,278.50 | | $192,957.50 | 4.30% | $192,957.50 |
| Rent & Lease | $1,751.01 | 0.06% | | 0.06% | $1,751.01 | 0.04% | |
| Adv & Promo | $8,000.00 | 0.27% | $8,000.00 | | $16,000.00 | 0.36% | $16,000.00 |
| Dist Eq Exp | $48,534.81 | 1.66% | | 1.66% | $72,985.81 | 1.63% | |
| Maint & Rep | $97,035.40 | 3.32% | $9,217.50 | 3.00% | $145,231.40 | 3.24% | $18,435.50 |

## Table 1

| | Total Units | % Units | Total Dollars | % Dollars | Lost Units | Lost Dollars | Ending Units | Ending Dollars |
|---|---|---|---|---|---|---|---|---|
| Straight Goods | $951.89 | 1.90% | $219,887.64 | 8.49% | $184.15 | $31,416.90 | $726.21 | $123,892.72 |
| Bulk Blends | $2,229.40 | 4.45% | $537,284.73 | 20.76% | $42.28 | $7,213.50 | $0.00 | $0.00 |
| Urea | $1,128.37 | 2.25% | $305,788.70 | 11.81% | $14.17 | $2,805.14 | $236.63 | $46,845.14 |
| Anhydrous | $1,149.86 | 2.30% | $363,354.48 | 14.04% | $0.00 | $0.00 | $450.14 | $111,329.36 |
| Liquid | $980.62 | 1.96% | $158,860.76 | 6.14% | $44.35 | $5,454.43 | $29.38 | $3,613.45 |
| Lime | $864.32 | 1.73% | $78,653.49 | 3.04% | $0.00 | $0.00 | $75.68 | $4,887.38 |
| N-Serve A | $286.42 | 0.57% | $1,718.54 | 0.07% | $0.00 | $0.00 | $86.08 | $357.94 |
| Chem Pack A | $4,440.00 | 8.86% | $112,332.00 | 4.34% | $36.52 | $720.91 | $0.00 | $0.00 |
| Chem Bulk A | $38,058.50 | 75.98% | $810,646.05 | 31.32% | $1,687.35 | $28,259.24 | $0.00 | $0.00 |

## Table 2

| | Price / Unit | CGS / Unit | Total GM Dollars | % Contribution to GM | $ GM / Unit | GM Percentage |
|---|---|---|---|---|---|---|
| Straight Goods | $231.00 | $170.60 | $57,492.36 | 9.05% | $60.40 | 26.15% |
| Bulk Blends | $241.00 | $170.60 | $156,944.72 | 24.70% | $70.40 | 29.21% |
| Urea | $271.00 | $197.97 | $82,405.84 | 12.97% | $73.03 | 26.95% |
| Anhydrous | $316.00 | $247.32 | $78,972.84 | 12.43% | $68.68 | 21.73% |

## Team Decisions

| | | Team 1 | Team 2 | Team 3 | Team 4 | Team 5 |
|---|---|---|---|---|---|---|
| 1 | Price for Straight Goods ($/ton) | 231.00 | 227.00 | 233.00 | 0.00 | 0.00 |
| 2 | Price for bulk blends ($/ton) | 241.00 | 237.00 | 243.00 | 0.00 | 0.00 |
| 3 | Price for Urea ($/ton) | 271.00 | 267.00 | 273.00 | 0.00 | 0.00 |
| 4 | Price for Anhydrous Ammonia ($/ton) | 316.00 | 312.00 | 317.00 | 0.00 | 0.00 |
| 5 | Price for Liquid Solution ($/ton) | 162.00 | 157.00 | 165.00 | 0.00 | 0.00 |
| 6 | Price for Lime ($/ton) | 91.00 | 87.00 | 93.00 | 0.00 | 0.00 |
| 7 | Price for Lime ($/ton) | 6.00 | 5.40 | 6.30 | 0.00 | 0.00 |
| 8 | Price for CHEM Packaged ($/Acre) | 25.30 | 23.50 | 26.50 | 0.00 | 0.00 |
| 9 | Price for CHEM Bulk ($/Acre) | 21.30 | 19.50 | 22.10 | 0.00 | 0.00 |
| 10 | **zero** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11 | Charge for Floater Application ($/Acre) | 3.70 | 3.50 | 3.50 | 0.00 | 0.00 |
| 12 | Charge for VRT Applicator ($/Acre) | 7.30 | 7.00 | 7.00 | 0.00 | 0.00 |
| 13 | Charge for Dry Cart Rent ($/Acre) | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 14 | Charge for Impregnation ($/ton) | 4.60 | 4.50 | 4.50 | 0.00 | 0.00 |
| 15 | Charge for Blending ($/ton) | 2.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 16 | Charge for NH3 Custom Application ($/Acre) | 5.00 | 5.00 | 5.00 | 0.00 | 0.00 |
| 17 | Charge for NH3 Tank Delivery ($/ton) | 10.00 | 10.00 | 10.00 | 0.00 | 0.00 |
| | Charge for NH3 Equipment | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |