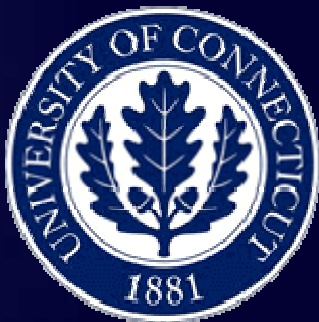


Geography and Time Independent IT-based Service Solutions

Paulo Goes

Operations and Information Management
School of Business
University of Connecticut



October 31, 2003
MIS Research Center
Carlson School
University of Minnesota

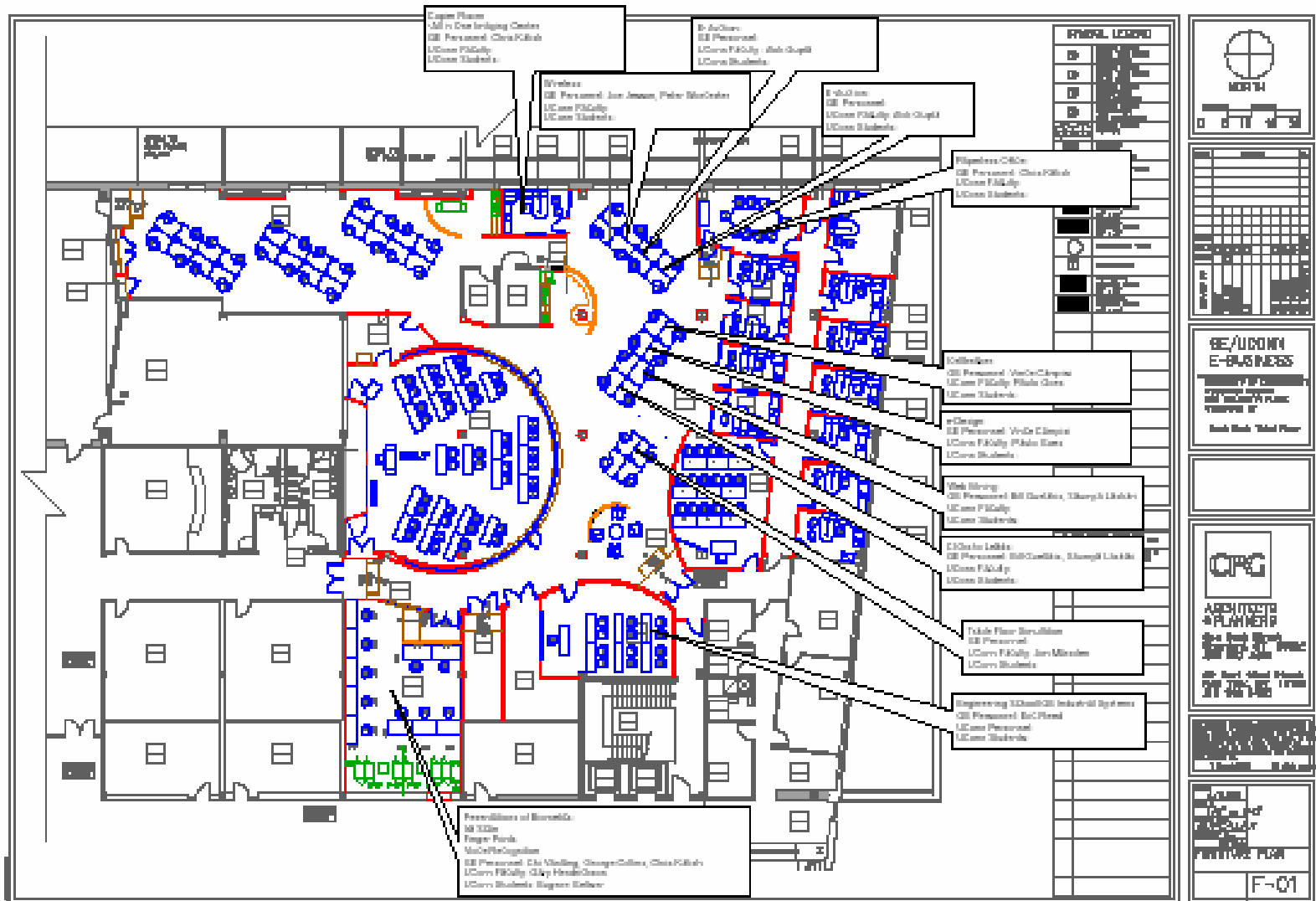
Agenda

- Introduction
- Background
- Service Centers Location
 - Outsourcing
 - Virtual Centers
- Seamless Mobility
- Conclusions



edge**lab**

- Partnership between UConn and General Electric
- State-of-the-art, high-end IT and eBusiness facility at UConn campus
- Co-locates students, faculty, and business executives
- Environment that engenders new ideas, solutions to live business problems



edge@lab



B-SCHOOLS

GE CAPITAL'S E-BIZ FARM TEAM

The company draws on UConn's tech whizzes.

On a late morning in the basement of General Electric Capital Corp. in Stamford, Conn., Anand Mehta is selling a group of executives what he believes about the old Financial Analysts' Association. "The information should be available within three clicks" of a screen, he says, instead of having to wade down a long, winding maze of e-mail lists, top-level executives such as CEO Denis J. Hayesley and Chief Technology & Information Officer Michael W. Price. For Social, it isn't a one-time Capital exercise or a top-down command. It's a revolution that started at the University of Connecticut's School of Business Administration, brought in to show GE Capital executives how to put the flow of business back in a head with the 200 billion company's business problems.

The 60,000 users were away in person. "They're not smart people," says Mehta. Five months later, GE Capital has returned a partnership with UConn's Hartford—and may establish a model for corporate and academic collaboration in new technology. The two just agreed to invest about \$15 million and has granted an additional \$1 million every year until 2006 to create and operate a new computer lab on UConn's Storrs campus. The lab also has been set up in UConn's main office. Forty students will work full time during a semester to create online business tools, blogs and more. Other students at UConn's main campus in Storrs, Conn., will participate through projects. An air machine will be assigned to the lab, working closely with faculty to guide users.

For GE, the main benefit is a pipeline of potential recruits and an inexpensive team to tackle ever-changing problems. "We're not interested in theoretical research—I need to translate my business problems into real, practical things," says Mehta, who is an alumnus of UConn's

school. "I'd like this report. I'd like to hire new people, engage consultants, or take existing employees off of another project."

The center is the largest business in its unit and a member of Industrial Systems has given \$1.2 million to UConn's school of engineering, and Richard H. Day, the UConn Hartford executive, says the school may soon become more involved in the e-biz. In the next session, however, GE Capital execs have a continuing commitment and their expectations about more such arrangements may be on the way: GE is conducting similar deals with two or three other universities.

The relationship provides a new level of collaboration between corporations and academia, which are beginning to form

- **ing that allow**
- **ment to conduct more relevant research**
- **Take the initiative**
- **the year-old Center for e-Business**
- **with a venture in-**

vestment corporate operation and Massachusetts Institute of Technology's Sloan School of Management, their statistics were made by a in the U.S. However, data in 2000 was a year, half of what good to have a faculty member, one of the student's students, and a PhD candidate work in an area important to the company. The research involves former students that have a wide, business, and don't have to develop their business solutions.

REAL WORLD. Such collaborations are quickly being copied by such universities. Faculty research, along with the University of Maryland's Robert H. Smith School of Business \$40 million a year, for instance. Organizations and foundations donate an additional \$2 million to \$3 million for research. Only \$200,000 to \$300,000 of that comes from corporations. Smith School Dean Howard Frank wants to invest that share in 20 million, but it's not as simple as saying "Money comes. Give us money," he says. "You need a reciprocal relationship."

For students like Deborah Pridemore, for a lab office, the relationship includes real-world case studies and access to top executives. UConn projects are done open all data products or services, the school has a student to student profile on Capital may say, "I have-



GE CAPITAL GOES BACK TO SCHOOL

A \$15 million collaboration with the University of Connecticut is a boon to both.

WHAT GE GETS

- Immediate e-biz access
- A pipeline of smart students
- Top 400 or less employees
- Studenting and work for both sides

WHAT UCONN GETS

- Real case studies for classes
- Real-time work with top GE execs
- Access to capital funds for loans
- Profits of \$4 million

Open for
Business:
November
2000

After 3 years



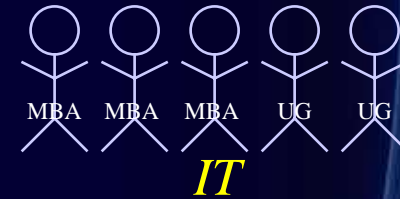
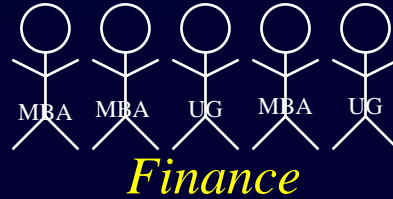
- Close to 50 projects completed
- Over 200 students
- Several GE businesses participated:
 - Financial Services
 - Corporate: IT, Quality
 - Industrial Systems
 - Equipment Management
- Check the site: www.edgelab.info

Guidelines / Selection Criteria

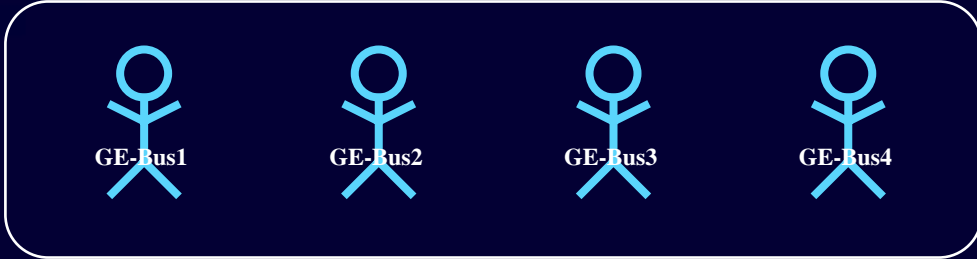
- Projects should provide tangible **financial return** (productivity, incremental growth, cost savings) and customer impact.
- Projects should be **transferable** across multiple GE businesses.
- Projects must follow the **quality** framework.
- Projects will be reviewed and approved / declined by a **steering committee** represented by GE and UConn.
- Project Teams will be comprised of students, professors, and a project manager - and supplemented with subject matter experts from **GE and UConn** faculty.
- Business unit's management and sponsors must actively **participate** in the project.

The edgelab project team

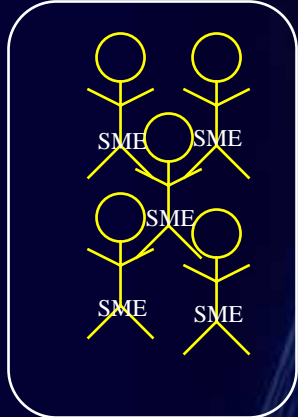
Students



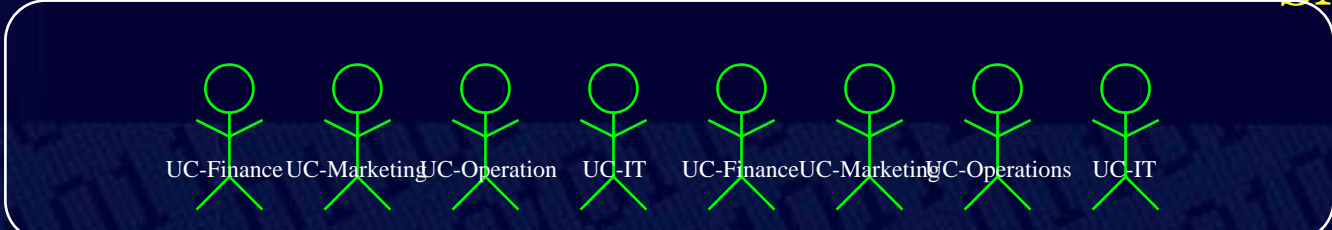
GE On-site



GE Sponsors

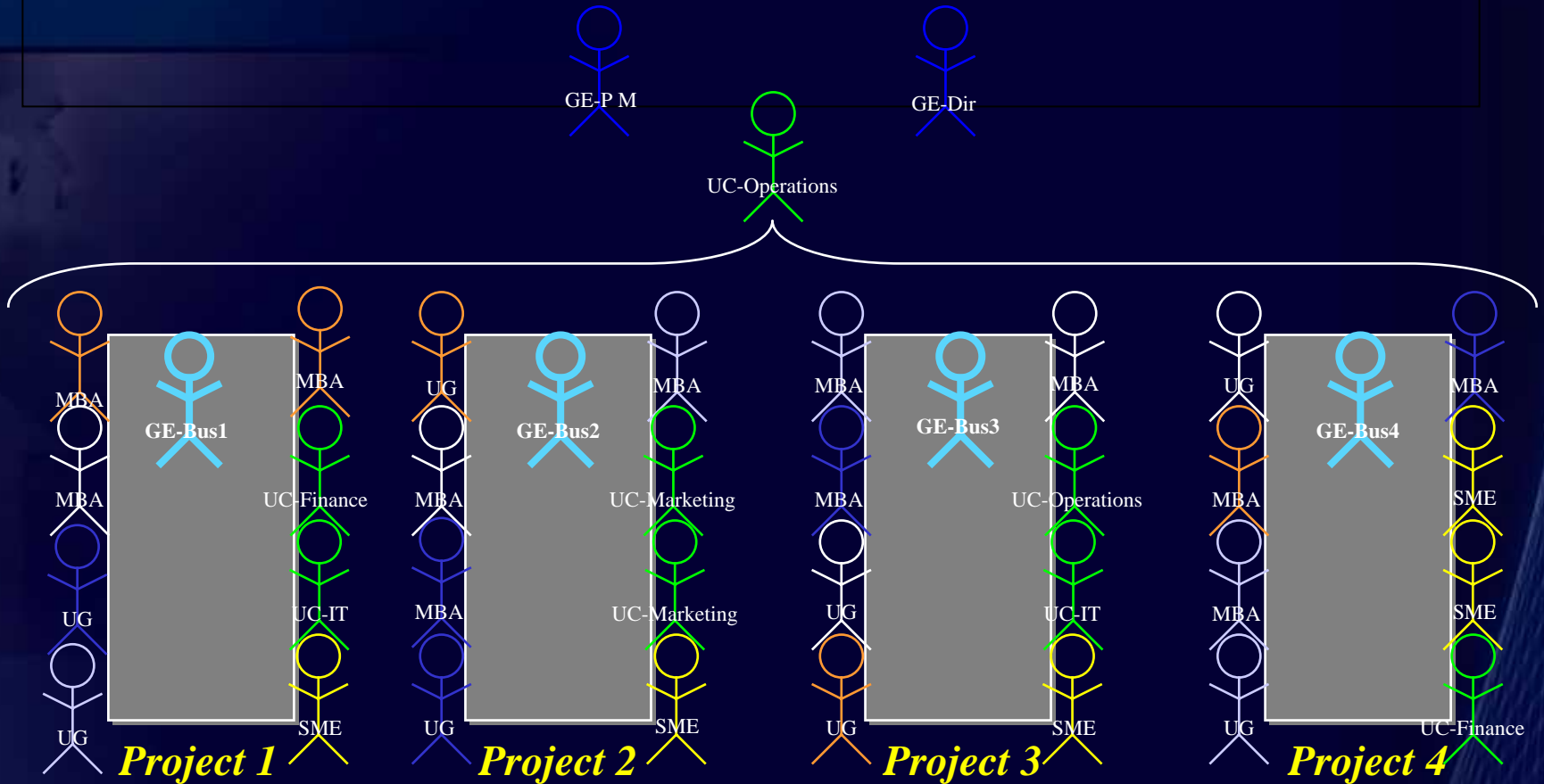


GE/UConn
SME's



UConn Faculty

The edgelab project team



Typical Project Team

- 3-5 Cross-Functional Students
- 2-3 Faculty Members
- GE Edgelab Project Manager
- GE Business Project Managers / Sponsors
- GE / UConn Subject Matter Expert(s)

*A recurrent theme:
"anywhere anytime computing"*

- Several projects:
 - Virtual collaboration
 - m-commerce
 - Biometrics security
 - Digital signatures
 - Sales Force Automation
 - **Virtual Service Operations**
 - **Seamless Mobility**
- Geography and Time Independent Solutions

Geography and Time

an old framework?

| Impact/Value | Efficiency | Effectiveness | Innovation |
|----------------------|-----------------------------|----------------------------|---------------------------|
| Time | Accelerate Business process | Reduce information float | Create service excellence |
| Geography | Recapture size | Ensure global mgmt control | Penetrate new markets |
| Relationships | Bypass intermediaries | Replicate scarce knowledge | Build umbilical cords |

Hammer and Mangurian (1987)

16 years later – framework for service sourcing

| Impact/Value | Efficiency | Effectiveness | Innovation |
|---------------|-------------------------------|----------------------------|-----------------------------|
| Time | Accelerate business processes | Reduce information float | Create service excellence |
| Geography | Cut costs, Scale gains | Ensure global mgmt control | Labor pool from new markets |
| Relationships | New intermediaries | Replicate scarce knowledge | New forms of partnerships |

Project I

*Call and Service Center
A B2B Specialized Finance Unit*

Call Center for Commercial Finance Unit Business Problem

- Calls vary in complexity level
- Calls originated from external customers and internal constituents
- Business and system knowledge is limited to a few key resources
- Flat staffing model for uneven call center workload
- Agents are allocated to servicing customers by region, yet calls are answered on a first come first serve basis

Goal Statement

- Examine the feasibility of creating a virtual resource pool for call center activities
- Reduce cost to service
- Enhance quality of service to external and internal customers
- Study variable staffing model
- Improve level/quality of employee and expand knowledge resource pool

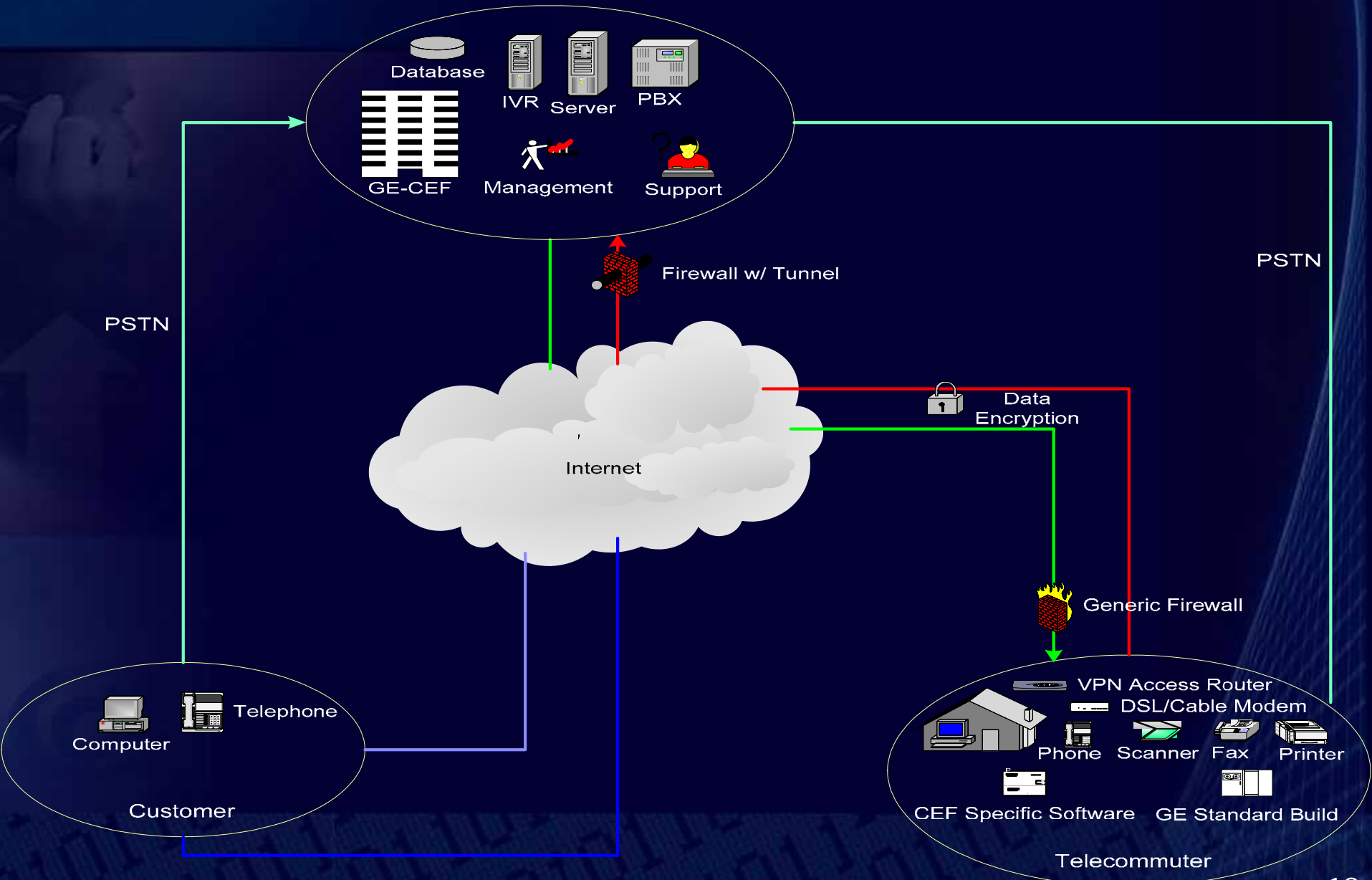
Underlying Call Routing



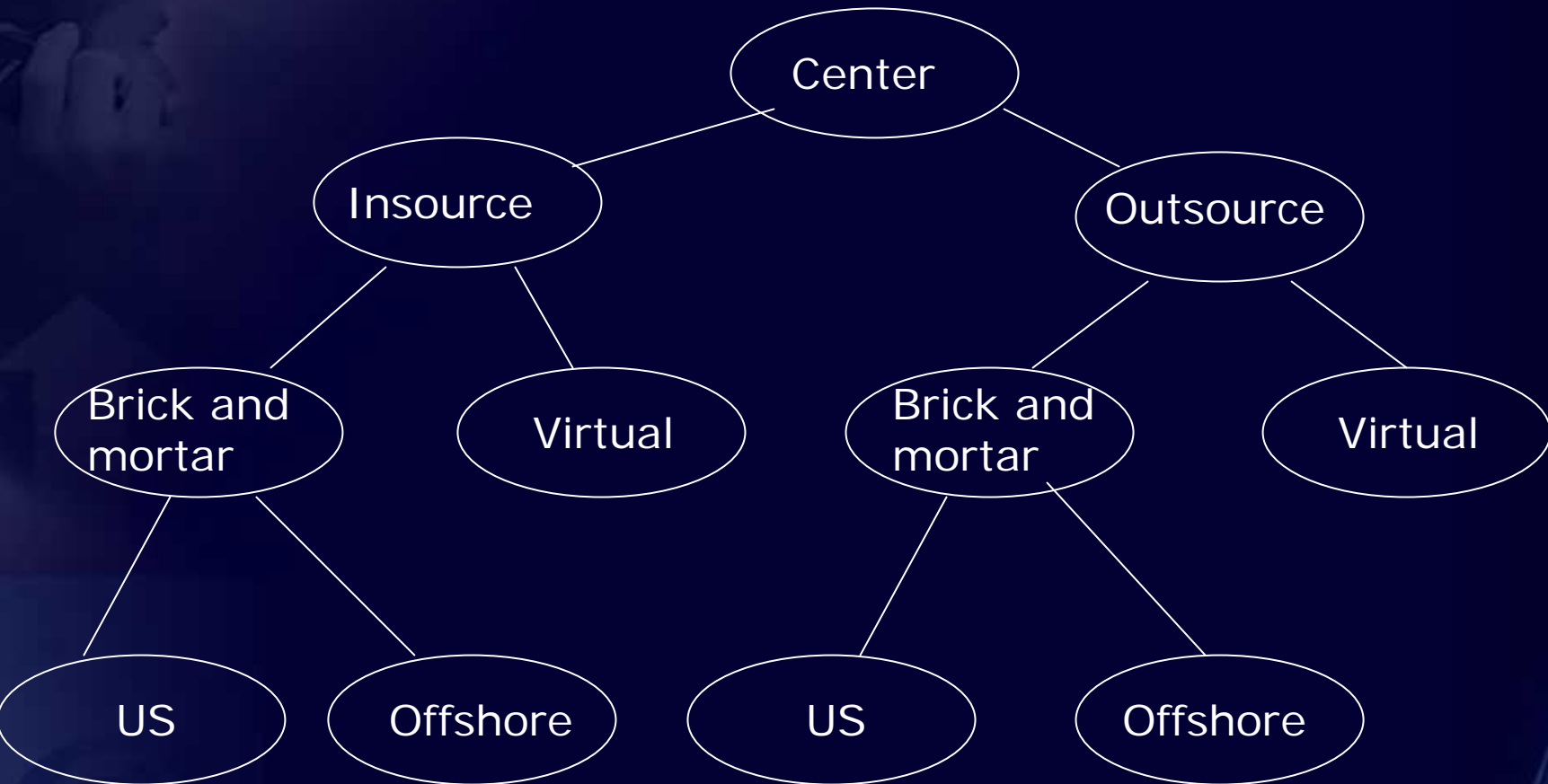
India outsourcing used for routine calls

Application programs are complex and legacy-based

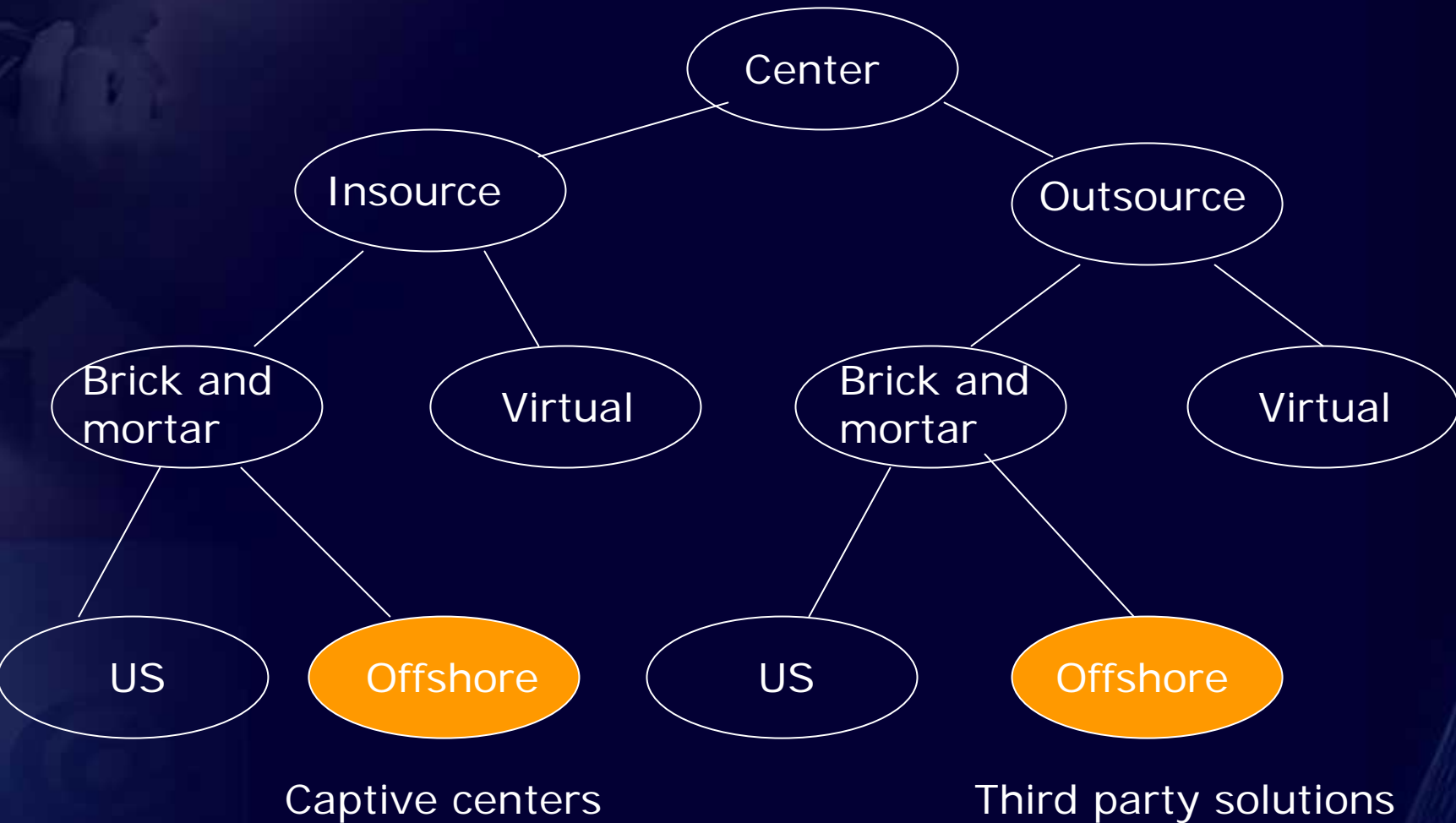
Visualization of The Problem



Service Centers: decision tree



Service Centers: decision tree

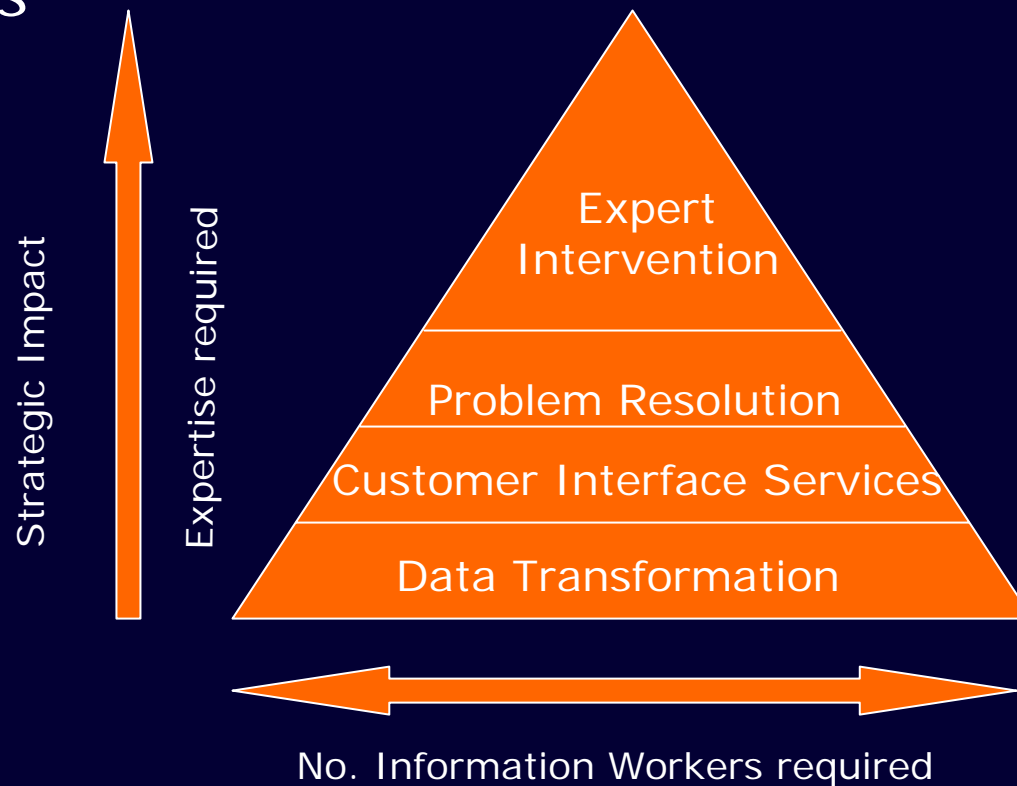


Offshore Facts

- Service Centers have been established in India and other countries by major corporations since early 90's
- Enabling technologies: enterprise systems and data communication
- 100,000 call center operators in India
- Nature of services has evolved from operational to strategic
- <http://knowledge.wharton.upenn.edu/index.cfm?fa=viewArticle&ID=875>

Offshore Considerations

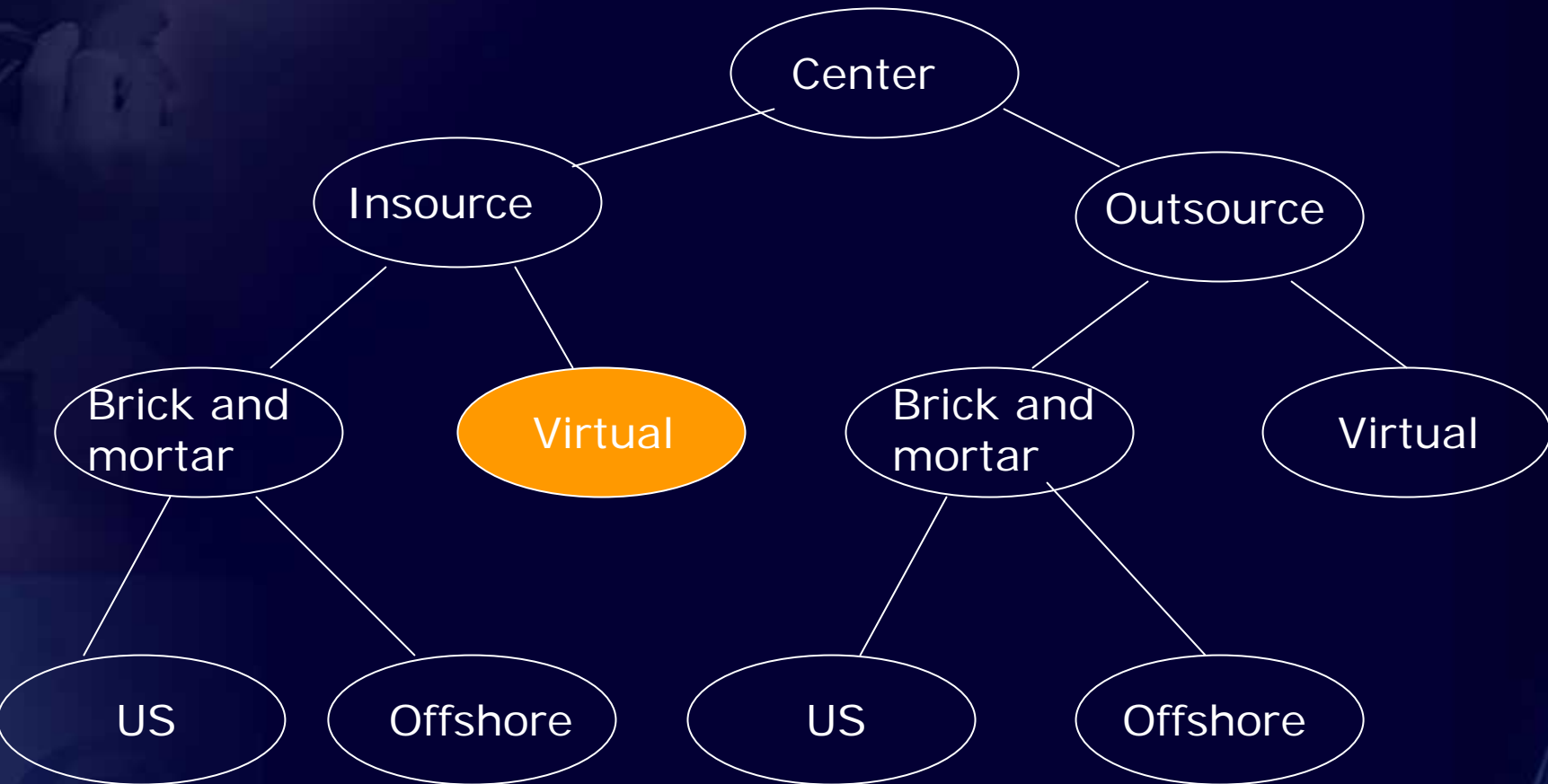
- Revenue Distance
- BPO Types



Offshore options: Captive Centers vs. Market Solutions

| Governance Parameters | Captive Centers | Third Party Solutions |
|--|---|---|
| Funding and ownership | Fully owned by firm Occasional JV | 3 rd party owned, fully or partly financed by firm |
| Strategic Impact | Operational to Strategic | Operational |
| Governance Structure | Employee contracts | Mechanism of price |
| Managerial Control | Head of outsourced hub reports to senior mgmt of firm | SLAs with monitoring |
| Nature of Gains | Labor Costs Scale, Scope and Specialization Reengineering gains | Labor costs Economies of Scale |
| Migration Path | Increasing complexity of processes | Narrowly defined class of processes |
| Information Systems Integration | High Degree | Low Level, limited access to client's system |

Service Centers: decision tree



Virtual Operations

- Telecommuting plus on demand service
- Important technologies
 - IP enabled PBX
 - VoIP
 - Broadband
 - VPN

Telecommuting Lessons

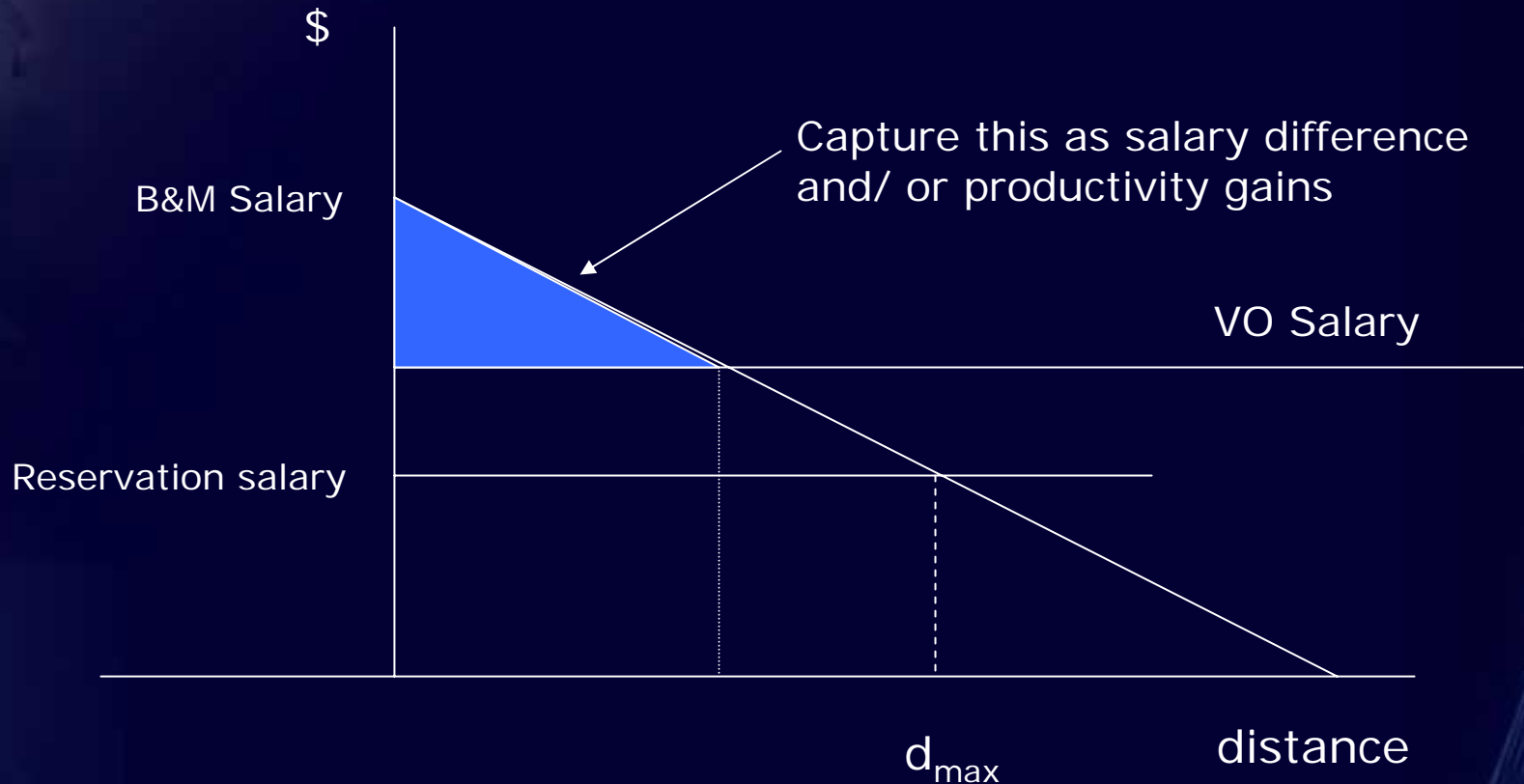
Benefits

- No commute
- Sense of “empowerment”
- Less distractions, less stress, more flexibility
- Higher morale
- Telecommuting option is important
- Increased disposable income

Disadvantages

- Lack of interaction and camaraderie
- Physical meetings
- Opportunity for abuse
- Time management
- Training

Distance-based Model for Telecommuting



Benefits to the Organization

| People | Process |
|---|--|
| <ul style="list-style-type: none">• Traffic (40 minute commute = 7 working weeks)• Attractive to better qualified people• Reduction in turnover (P&G turnover decreased by 14%) | <ul style="list-style-type: none">• Operational Efficiencies• Improved customer satisfaction rating (P&G increased customer satisfaction from 90% to 97%)• Productivity growth (average 15%) |
| Technology | Cost |
| <ul style="list-style-type: none">• Disaster Recovery Strategy | <ul style="list-style-type: none">• Property costs cut• IT costs cut• Reduced emergency leave costs (\$789 per worker per year)• Can be equal/cheaper than offshore outsourcing (\$12-\$18 per hour in India)• Government tax exemptions |

Technology Feasibility

Administration:

Monitoring
system management,
Support
training

Hardware & Software:

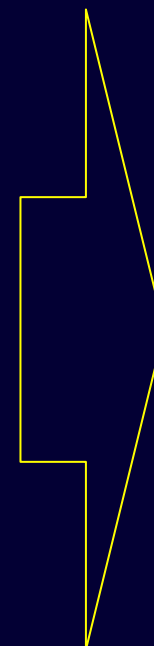
PC, peripheral,
CEF specific software
Standard build software

Security:

VPN access, data encryption

Telecom:

PBX, IVR, Softphone
VPN, Broadband



Prototyping
Virtual Call Center

TCO

Technology Inventory

| Network | Current Solution | Proposed Solution | Feasibility |
|-----------|---|-------------------------------------|--|
| Broadband | LAN | Regional ISP | Available in many regions ✓Positive |
| Security | Employee in GE facility, Behind GE Corporate Firewall | Nortel VPN GE Secure ID/Firewall | Solution Exists ✓Positive |

| Software | | | |
|---------------------------------|---|----------------------------|---|
| Application - specific Software | Client/Server, Standalone run on Client | Same | Will work over Broadband/VPN solution ✓Need Verification |
| Standard-build Software | Pre-loaded on PC | Same | ✓Positive |
| Hardware | | | |
| PC and Peripherals | PC, Shared Peripherals | PC, Standalone peripherals | Efficiency ✓Positive |

Support & System Mgmt

| Support | Current Solution | Proposed Solution | Feasibility |
|------------------------|---------------------------|--|---|
| Help Desk | Phone, In house Staff | Phone, Remote Control Software (PCAnywhere), Additional training | Software via remote control ✓Positive Hardware ✓Need Verification (Training) |
| Management | | | |
| Software distribution | SMS (advertised programs) | Same | Existing system ✓Positive |
| Performance Monitoring | CMS Focus | Same | Existing system ✓Positive |

Telephony

| Telephony | Current Solution | Proposed Solution | Feasibility |
|---------------------|-----------------------|-------------------------------------|------------------------------|
| PBX | Avaya PBX S8700 | Telecommuter | Solution Exists ✓Positive |
| Phone Features | ACD Phone | Soft Phone/ Home Phone | Solution Exists ✓Positive |
| Voice communication | Internal Phone System | PSTN/ Telecommuter Configuration | Solution Exists ✓Positive |

Management Challenges

Processes

- Focus on results
- Set standards to evaluate employees
- Establish policies and procedures
- Provide training (American Express 5-7 weeks in house training)
- Provide access to all key sources of learning and information

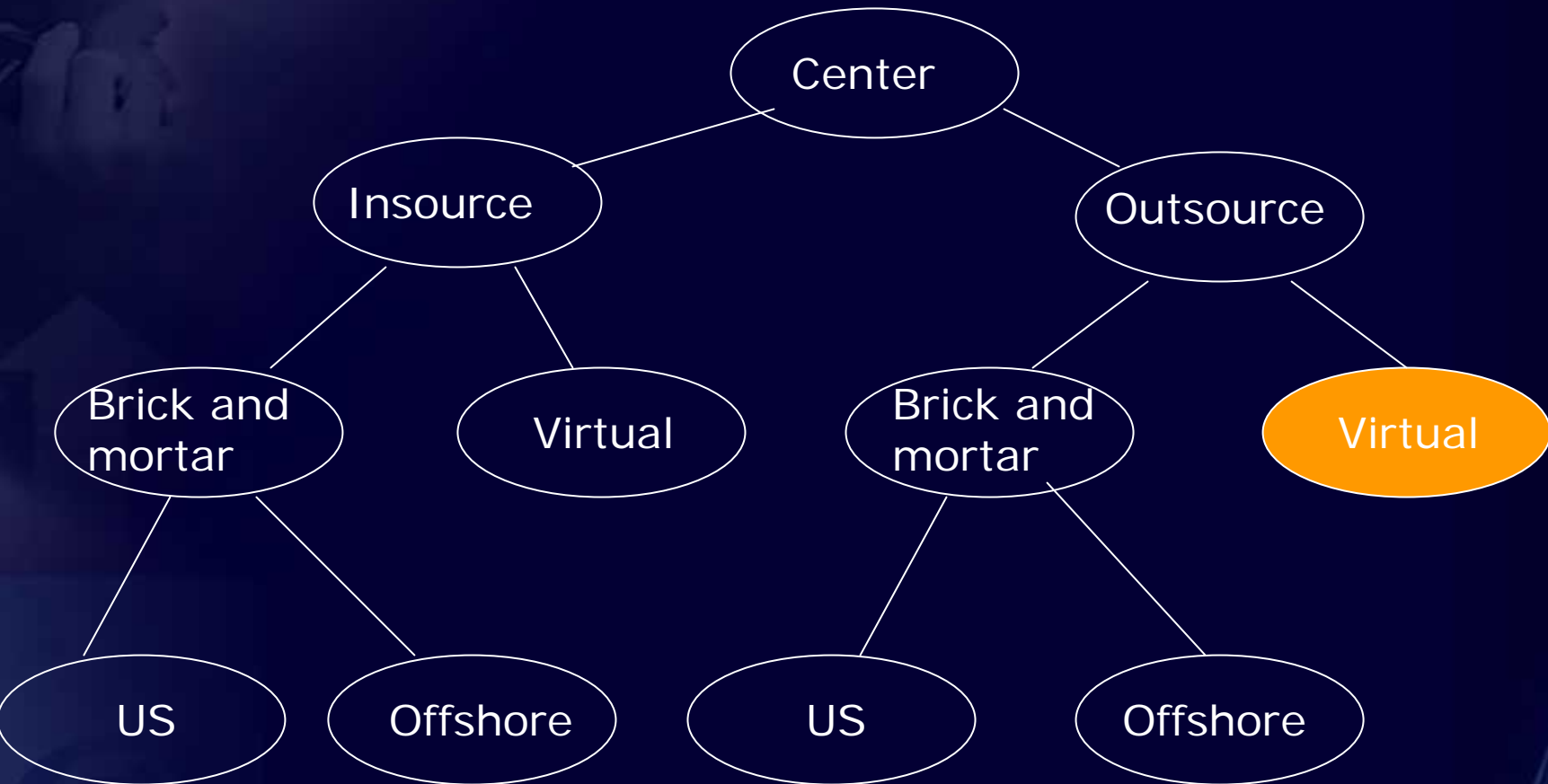
Technology

- Use IT to enable remote communication
- Provide high-level of technical support (CMP Media – costs 30% more to support home workers)

People

- Self-discipline, dependability
- Enhance communication, deal with disagreements
- Drive to fix their own problems, including technology problems (\$100 per hour for third-party repairman)
- Has worked in the company for at least 6 months and been in the position for at least 3 months
- Sets realistic goals and meets deadlines

Service Centers: decision tree

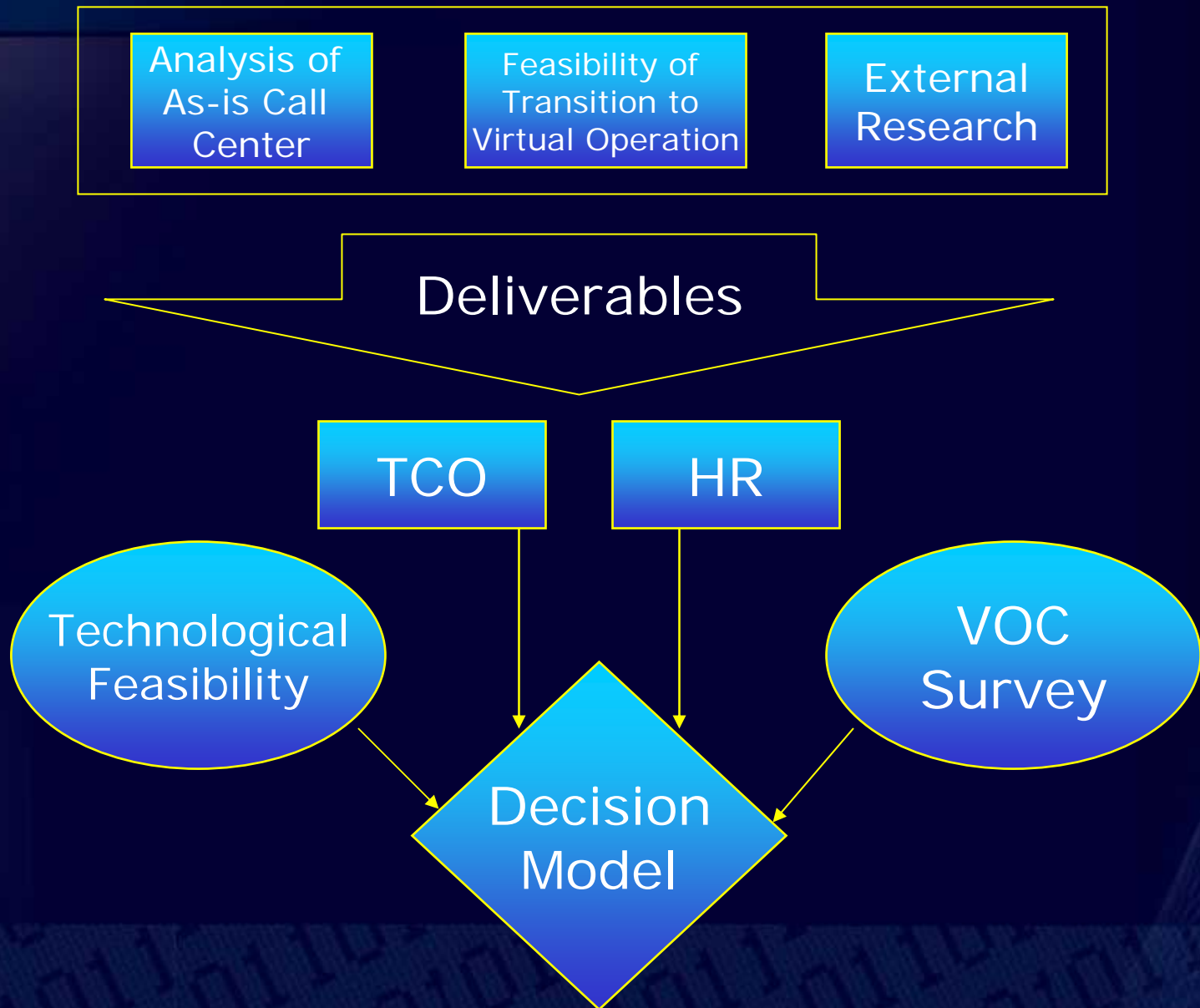


Outsourced Virtual Centers

Some Players

- Willow
- White Pajamas
- Alpine-access
- Zoyto

Project Approach



Call Center Project Lessons Learned and Future

- Technology considerations were the **easy part**
- Process reengineering should precede virtualization effort
- Lack of good process data and process maps
- Need to be clear about CTQs – current VOC effort going on

- Process simulation tool will be used to assess new call center configurations and worker compensation schemes

Project II

*Seamless Mobility – Feasibility Analysis
Joint Project with Vendor*

Agenda

- Project Overview
- Technology Overview
 - SM phone capabilities and Implementation of solution
 - Industry Specifics
- Cost/Benefit Model Overview
 - Structure and Methodology
 - Results and Conclusions
- Case Study Review and Findings
- Project Methodology
- Recommendations
- Summary
- Q&A

Project CTQ's

- Technology: Voice switching technology
 - Feasibility study
- Financial: Impact on GE's bottom line
 - Transfers some high cost cellular calls to a lower cost wireless VoIP

Project Methodology

How did we get here?

- **Technology Due Diligence (What is it? How does it work?)**
- **Comprehensive Cost/Benefit model (Baseline potential user community and current telecomm costs)**
- **Sample use cases - applied the model to identify potential users**
- **Model validated**
- **Completed analysis of potential pilot**
- **Development/Implementation Recommendations**

TECHNOLOGY OVERVIEW

Key Components of Seamless Mobility Technology

- **GSM Technology**
- **GPRS (General Packet Radio Service) Packet Data**
- **802.11 Technology**
- **Smart Network Sensing with WLAN to WAN Handovers**
- **Session Initiated Protocol Support for On-Site Features**
- **Large 176 x 220 Active Color Display**
- **Second External Display for Caller Line Identification**
- **Win CE-Based Operating System**
- **WAP 2.2-Enabled Micro-Browser**

Conditions for “Seamless” transfer

- If the call is received inside the WLAN then user roams outside – transfer is made to cellular network (possible to roam back into the WLAN)
- If the call is received outside the WLAN then SM phone connects to the cellular network – transfer can be made if user roams back into the WLAN
- If the call is initiated on the cell network then user roams back into the WLAN than no transfer is made
- If the call is initiated within the WLAN and user is talking to another GE facility – call remains on the WLAN

As long as the call involves the PBX than a seamless transfer can be made.

Technology Overview: Industry Outlook

- **More practical and comprehensive approach for combined enterprise and carrier based convergence of user mobile communication at both the network and handheld device levels.**
- **The interaction between Wi-Fi and cellular network technologies is expected to be a win-win-win benefit for individual users, the enterprise and the wireless carriers.**
- **Users will have the benefit of manageable, multi-modal, "always-on" communication access at all times.**

This type of technology is going to create a new industry standard for enterprises.

Facilities

- Inputs:

- Facility area and number of floors
- Number of employees
- Type and number of devices

- [back](#)

Device Costs

- **Inputs:**
 - **Device pricing/user (current and additional)**
 - **CF occurrence frequency**
- **Outputs:**
 - **Net benefit CFs**
- *back*

Infrastructure Costs

- **Inputs:**
 - **Additional infrastructure pricing/user**
 - **MAC charges**
 - **CF occurrence frequency**
- **Outputs:**
 - **Net benefit CFs**
- ***back***

Call Patterns

- Inputs (%):
 - Cell minutes used inside premise vs. outside
 - Segregation of these to incoming vs. outgoing
 - Segregation of outgoing to local vs. LD
- *back*

Calling Costs

- **Inputs:**

- Average cell rate/min
- Average ground LD rate/min
- Average monthly cell minutes/user

- **Outputs:**

- Net benefit CFs

- *back*

Financial Results

- Inputs:
 - Discount rate
- Outputs:
 - NPV
 - Payback
 - IRR
- *back*

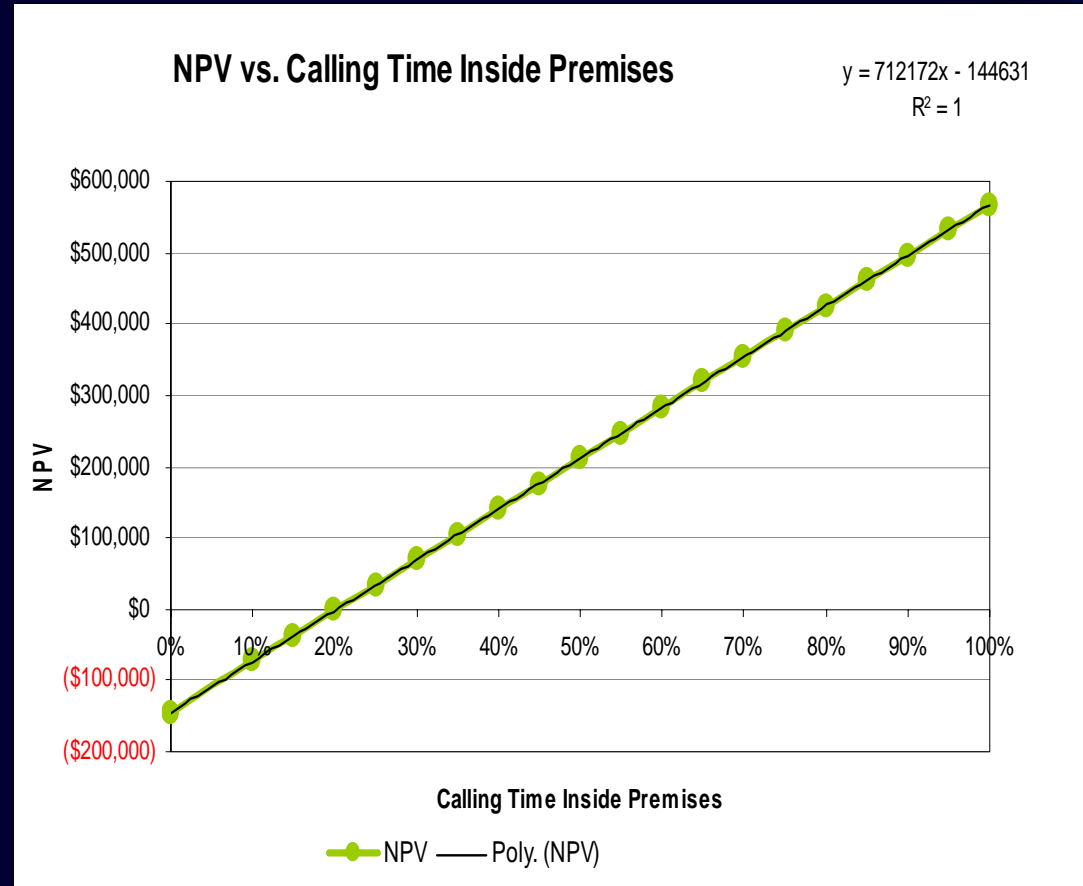
Analysis Assumptions: case study

- 100 SM phone users (IT professionals)
- **Implementation**
 - No need for new IP PBX
 - Infrastructure (capital investment) configured for 100 users
- **Costs**
 - SM Pricing: per seat pricing
- **Benefits**
 - Saving from reducing cell phone minutes
 - Saving from reducing MAC charges
- **User Profile**
 - Cell minutes/month and average cell rate

Sensitivity Analysis: Calling Pattern Vs. NPV

| Calling Pattern Sensitivity | | |
|--------------------------------|-------------|---|
| % calling time Inside Premises | NPV | NPV Function Projection $y = 712172x - 144631$ |
| 0% | (\$144,631) | (\$144,631) |
| 10% | (\$73,414) | (\$73,414) |
| 15% | (\$37,806) | (\$37,805) |
| 20% | (\$2,197) | (\$2,197) |
| 25% | \$33,412 | \$33,412 |
| 30% | \$69,020 | \$69,021 |
| 35% | \$104,629 | \$104,629 |
| 40% | \$140,237 | \$140,238 |
| 45% | \$175,846 | \$175,846 |
| 50% | \$211,455 | \$211,455 |
| 55% | \$247,063 | \$247,064 |
| 60% | \$282,672 | \$282,672 |
| 65% | \$318,280 | \$318,281 |
| 70% | \$353,889 | \$353,889 |
| 75% | \$389,498 | \$389,498 |
| 80% | \$425,106 | \$425,107 |
| 85% | \$460,715 | \$460,715 |
| 90% | \$496,323 | \$496,324 |
| 95% | \$531,932 | \$531,932 |
| 100% | \$567,540 | \$567,541 |

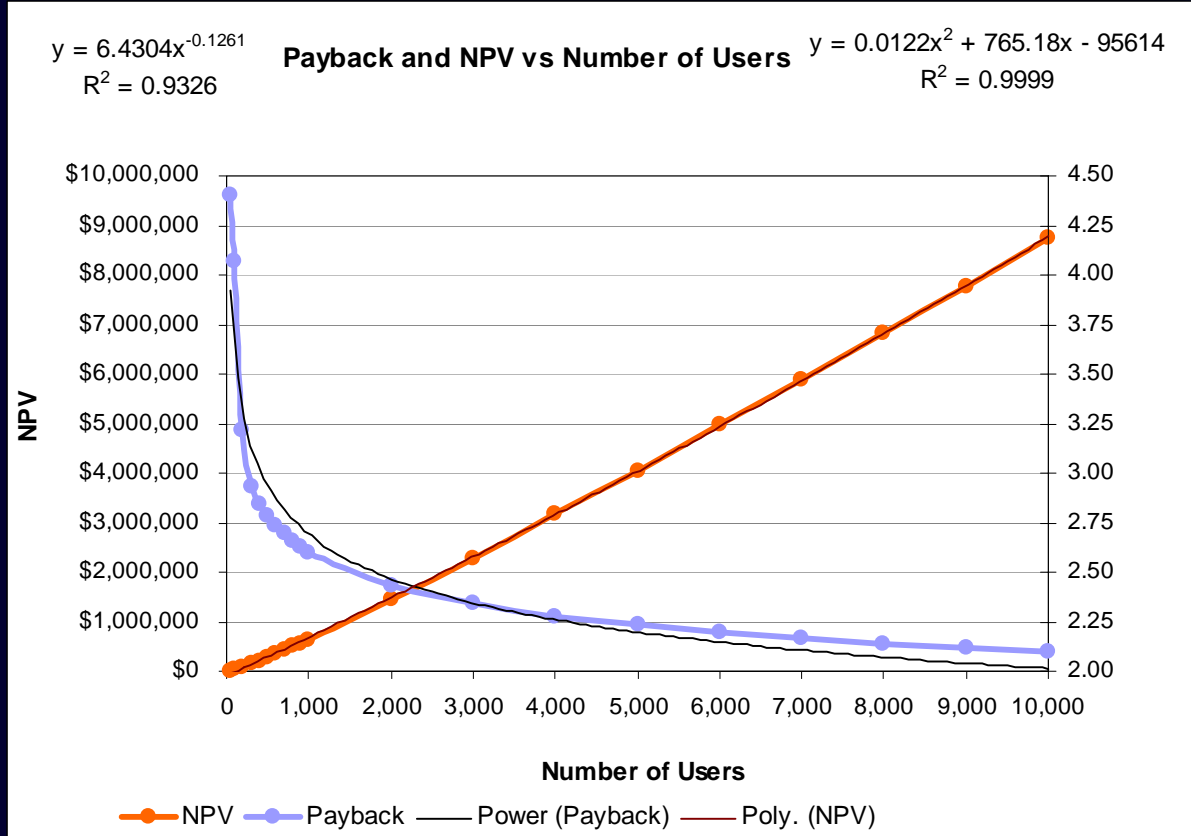
* Break-even % = 20%



>20% of cell phone calls need to be made inside premises to justify cost!

Sensitivity Analysis: Number of Users Vs NPV & Payback Period

| Number of Users | NPV | Payback (in year) |
|-----------------|-------------|-------------------|
| 50 | \$10,957 | 4.40 |
| 100 | \$33,412 | 4.07 |
| 200 | \$87,578 | 3.22 |
| 300 | \$148,203 | 2.93 |
| 400 | \$212,783 | 2.85 |
| 500 | \$280,193 | 2.78 |
| 600 | \$349,794 | 2.73 |
| 700 | \$421,175 | 2.69 |
| 800 | \$494,052 | 2.66 |
| 900 | \$568,215 | 2.63 |
| 1000 | \$643,504 | 2.60 |
| 2000 | \$1,439,057 | 2.43 |
| 3000 | \$2,283,168 | 2.34 |
| 4000 | \$3,157,232 | 2.28 |
| 5000 | \$4,052,828 | 2.23 |
| 6000 | \$4,965,151 | 2.20 |
| 7000 | \$5,891,105 | 2.16 |
| 8000 | \$6,828,530 | 2.14 |
| 9000 | \$7,775,840 | 2.12 |
| 10000 | \$8,731,820 | 2.10 |



“Go” or “No Go” Decision

- Positive NPV for specific user group
- Realized cost savings simply based on cellular minutes
- See a need for Seamless Mobility capabilities on campus
- Have all of the necessary components to implement the technology
- IT department eager to pilot technology on campus

This is a “Go” Decision and a good candidate to pilot the technology.

Recommendations

- **Cost savings are found for specific campuses and/or departments in cellular minutes saved on campus**
- **GE has a wide variety of businesses whose communication processes and patterns vary from business to business**
- **Efficiency gains might be found in the businesses where hard cost savings are not found**
- **Data collection and negotiation with specific businesses is necessary in order to roll-out technology**

For GE the cost savings are found in cellular minutes saved while on campus and not in the "Seamless" transfer.

The edgelab Food Chain

High Value

Low Value

NPI, product vision, strategic planning, workforce engineering, etc.

M&A Strategies, process re-engineering, market-entrance strategies, etc.

Website design, marketing campaigns, usability studies, etc.

Software evaluation, website critique, log analysis, etc.

Vision-oriented projects

Strategic / long-run projects

Tactical / Initiative-oriented projects

Implementation / operational projects

Businesses serviced by edgelab to date

Card Services

Global Consumer Finance

GE Corporate

Industrial Systems – Interlogix

Commercial Real Estate

Capital Corporate

Capital OTC

Global Computer Operations

Industrial Systems – M&ST

GE Consumer Finance

Specialty Materials

Capital Global Risk Management

Rail Services

Transport International Pool

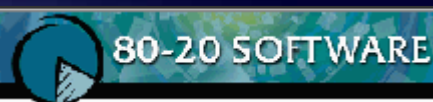
Commercial Finance

Structured Finance Group

Capital Equity

Vendor Financial Services

Technology Partnerships



Edgelab Partnership Reflections

- Unique partnership – a “business lab” not replicated anywhere (so far!)
- Two very different cultures but willingness to succeed and overcome obstacles
- Win-win-win situation

Questions?

Discussion