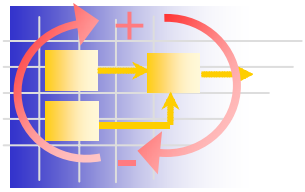
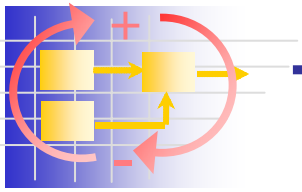
ESD.36J System & Project Management



Case 1:
Software Development Projects

Christos Sermpetis

Massachusetts Institute of Technology

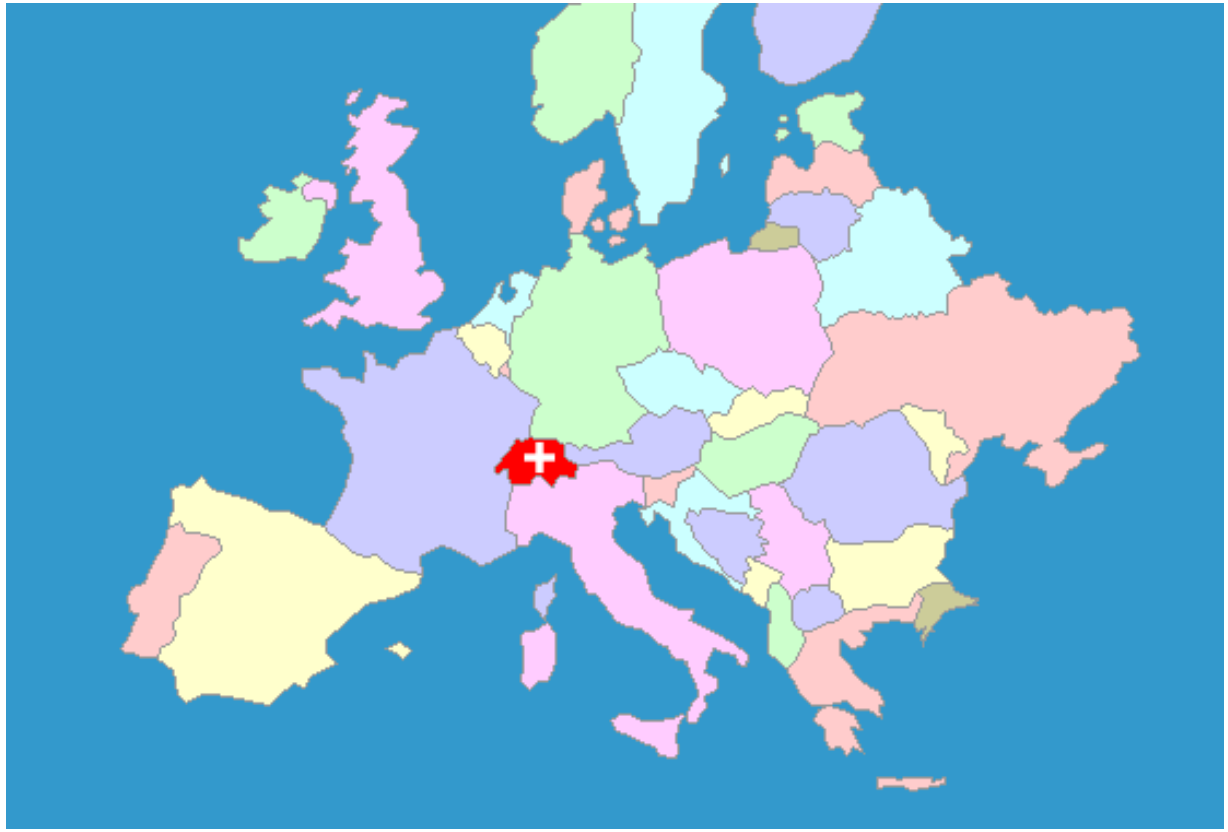


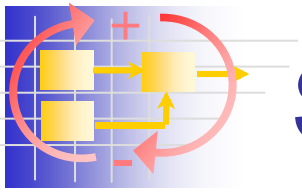
Today's lecture

- Virtual Tourism
- Small scale project
  - Personal experience
  - Banking software project, Geneva, '99-'00
- Large Scale project
  - MS Office 2000, '96 – '99

The heart of Europe…

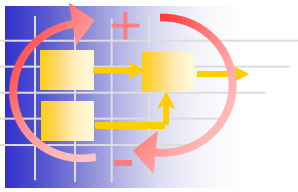
… and "hole" of the EU





Switzerland

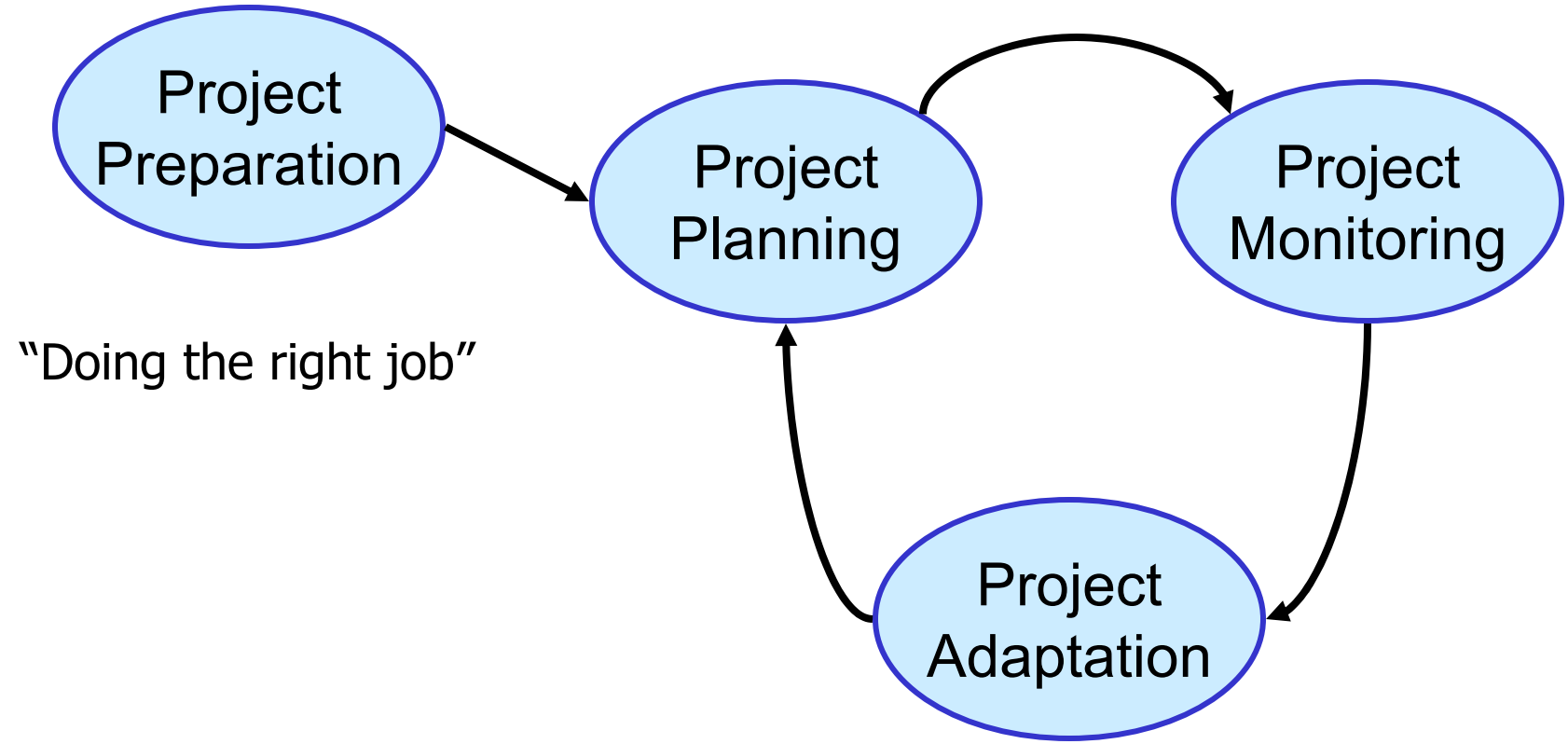
- Country Profile:
  - 41,285 sq. km, 7.25 million people
  - Home of UN, WTO,
    WMO, WHO,
    CERN, etc..
  - Watches, Chocolate,..

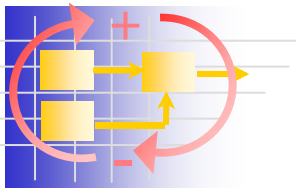


…Banks

- Bank “MMM”, traded in Nasdaq & Frakfurt SE
- Swiss subsidiary (S.A.), 100% owned
- Investment Banking & Asset Management
- Ernst & Young financial auditor
- New Vision, complementary to traditional business:
  - “Become the European leader in trading of American securities…”
  - …by providing an online platform allowing individual investors to trade for a flat rate of $29.5 per transaction”

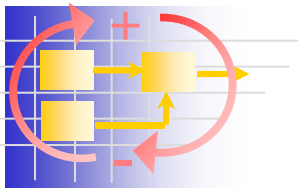
Project Framework





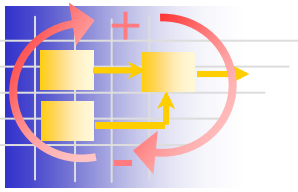
Project Preparation

- Market Opportunity
  - “Underserved, growing market of European investors looking to invest in US markets ”
- Initial Objectives
  - Capture value by providing online trading platform
  - Start a new line of business
- Selling arguments
  - Flat Rate per trade
  - Swiss banking
- 1999: Dot Com era momentum
- Stakeholders: Bank (corporation), CEO, GD, IT.



Project Preparation (cont.)

- One – of – a kind, “functional” project
- Internal Funding
- No structural change (in “development” phase)
- Hidden Dynamics:
  - FBC: Regulators
  - Personal ambitions
    - IT: autonomous new function of the Bank’s business – profit center
    - Visibility: From back-office to Front
    - FVP, CEO: “Technological focus”, visibility within the corporation.

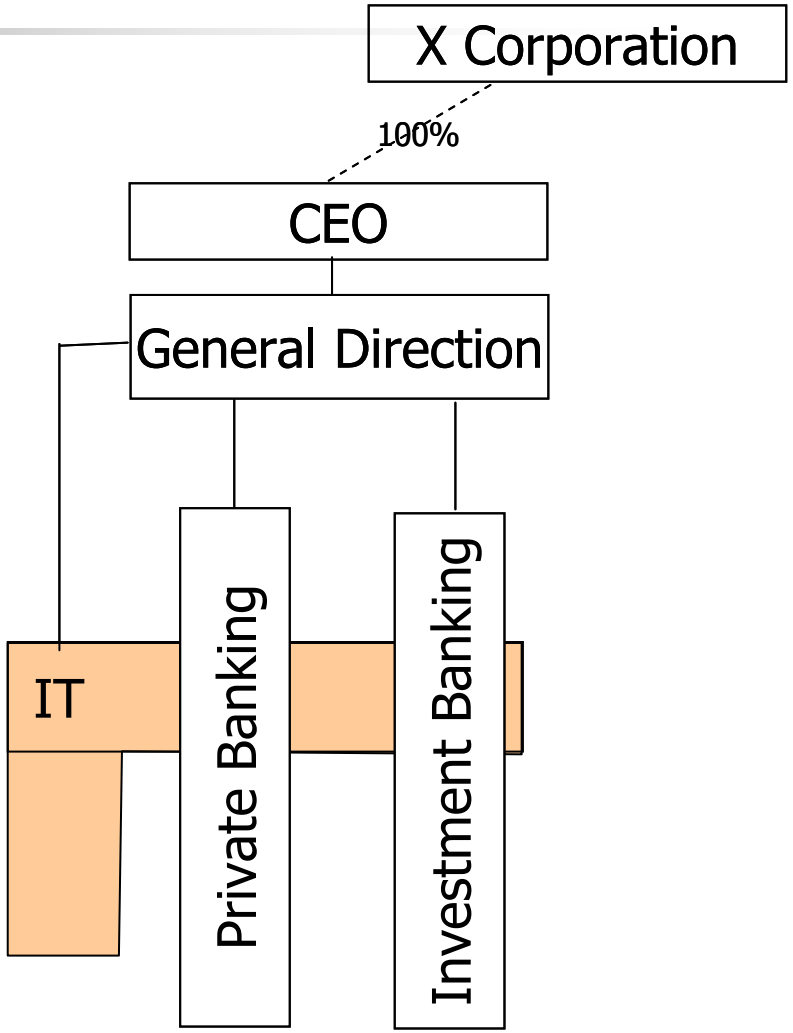


Financial model

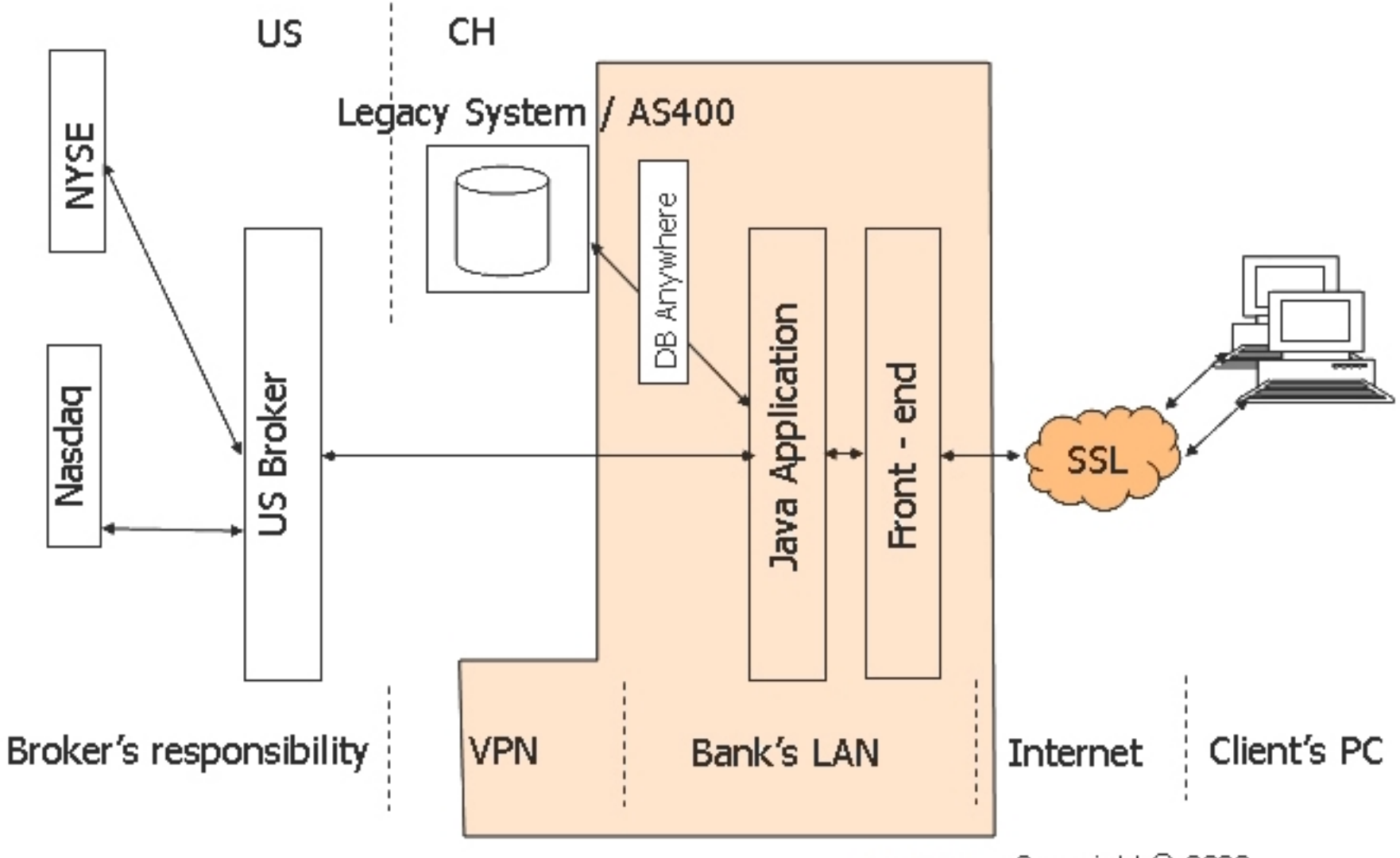
- "To open an account you will need to make a deposit of dollars 5,000 (pounds 3,020). Trades in Nasdaq stock are charged at a flat rate of dollars 29.95. NYSE deals are charged at dollars 29.95 for bargains of up to 2,099 shares. Thereafter each share dealt incurs a dollars 0.0175 charge. There are no ongoing fees but inactive accounts are charged dollars 29.95 per quarter"

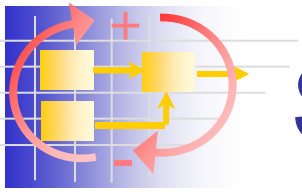
Bank's Structure

- Head of IT
  - Mr. David
- COBOL programmer reincarnated into Java expert
- Reports to General Direction (FVP:Peter)
- No organizational change, although increased spending, hiring



Architecture





Software Methods & Tools

- Software languages

Unstructured
(BASIC, COBOL, ..):
Go To

```
10 IF (_INIT) THEN GOTO 250 ELSE BREAK;
20 NEW;
30 REM "***TREAT ORDER***"
40 ….
…
…
110 GOTO 60
…
…
250 IF (EOF) GOTO 210;
…
…
```

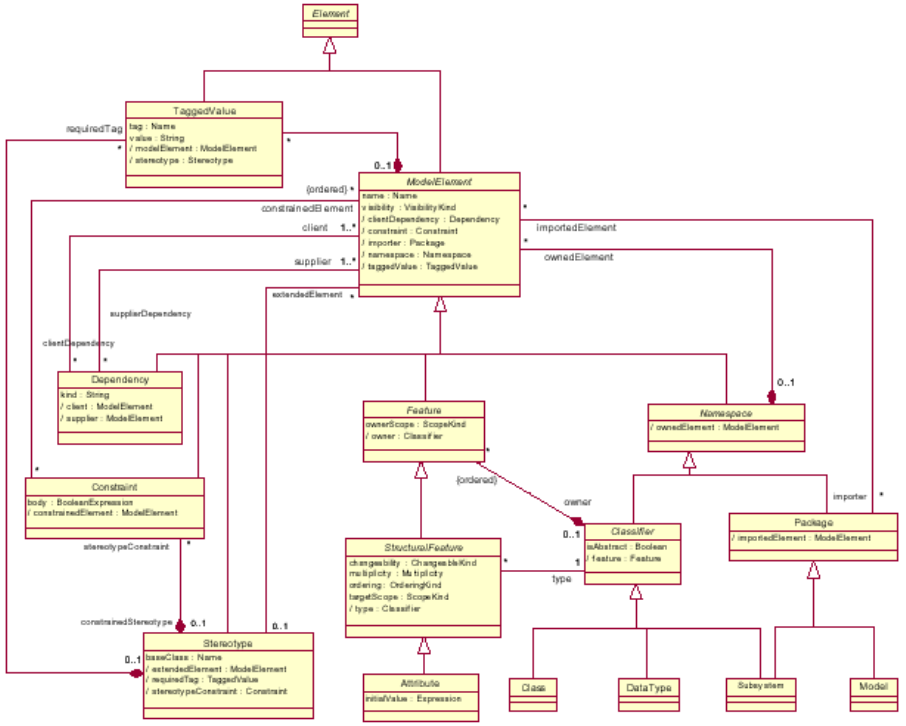
Structured Procedural
(Pascal, C,..):
Nested, Scope, Locality

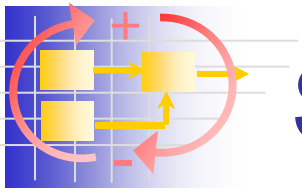
```
IF NOT (_INIT) THEN CALL ABORT(0);
READ INPUT;
CALL CALCULATE_RATE(INPUT);

   FUNCTION CALCULATE_RATE(STRING:INPUT):
                          INTEGER
   local vars
   …
   …
   END FUNCTION;
```

Object Orientation

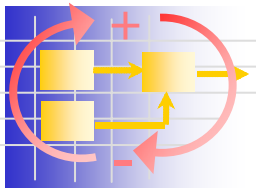
- Abstraction of reality
- Classes, Objects, Data , Methods
- Object Interactions
- C++, Java
- Java: platform - independent





Software development

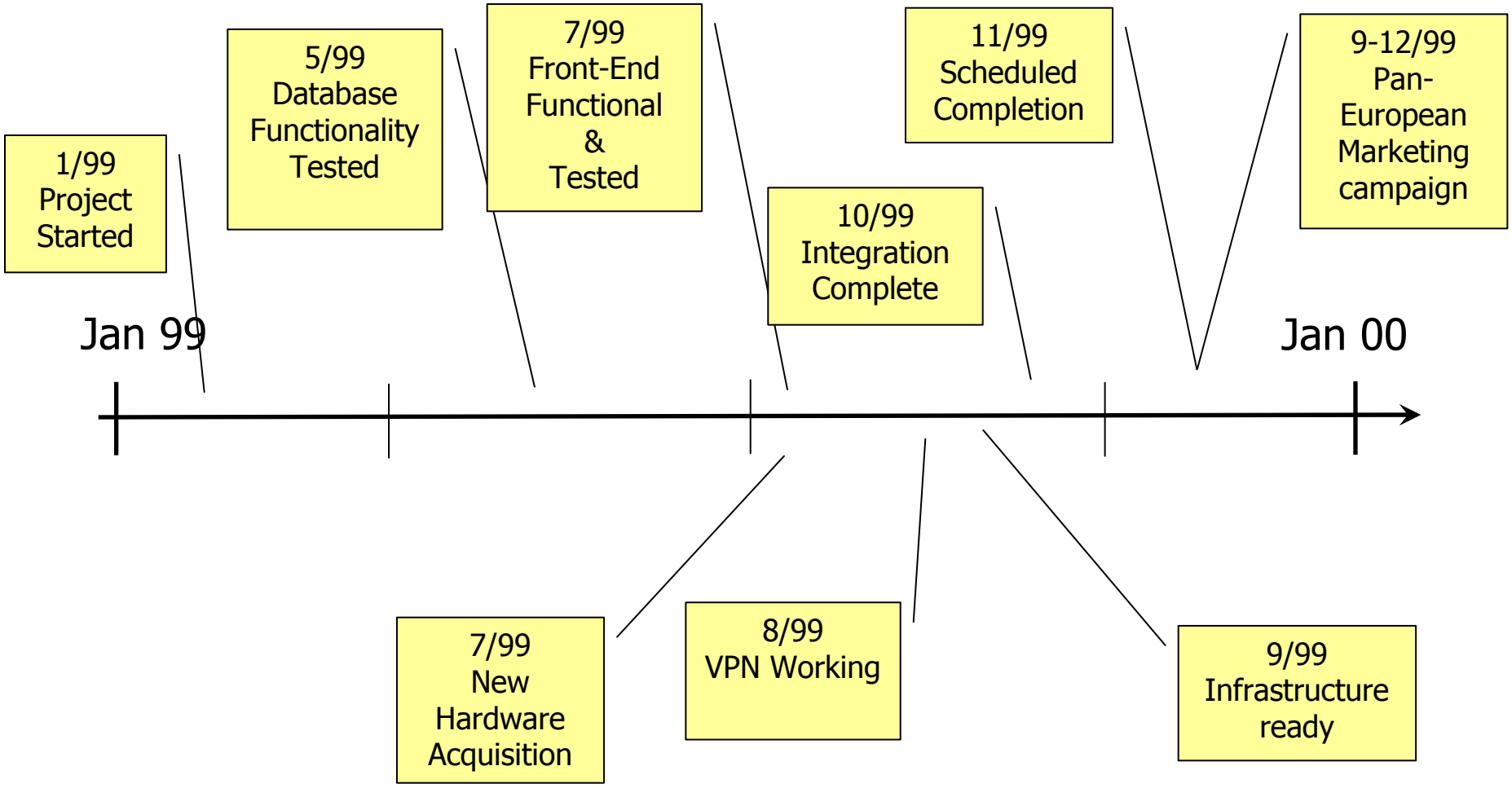
- Importance of relevant experience
  - Language
  - Environment
  - Object libraries – business objects
- Online help – developer communities
- Schedule time for interfacing with..
  - Network
  - Database
  - Web
  - other parties

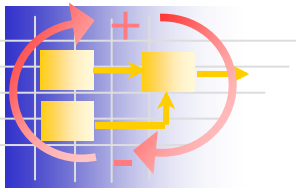


Project planning

- “Light planning”, sense of urgency
- Basic plan:
  - 1/99 Start Application Development (3 people, some Java experience)
  - 3/99 Acquire new software
  - 7/99 Acquire new hardware
  - Target 11/99 “go live”, 2 languages, 2US, 3EU Stock Exchanges
- MS Project for planning
- Mainly serial tasks
- Little coordination necessary
  - Small, collocated team
  - One-man show
  - Small scale project

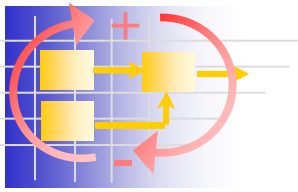
Project Timeline as Planned





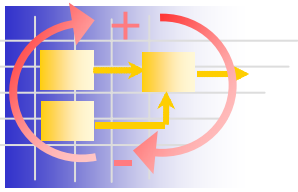
Project Adaptation

- Summer ’99 – Hiring..
  - Took away David’s time
  - Not a team player
  - Technical leadership
- Burning issues:
  - VPN
  - SSL
  - Broker’s feedback analysis (content-dependent format)



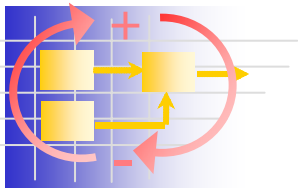
Execution & Monitoring

- Initially, weekly meetings between IT, FVP, CEO
- First press releases 9/99
  - FBC: Every change of a bank's core business has to be certified by auditor
- Financial Auditors (EY)
  - "Potential Significant impact at bottom line"
  - Specific security assessment necessary



EY's role: ISAAS

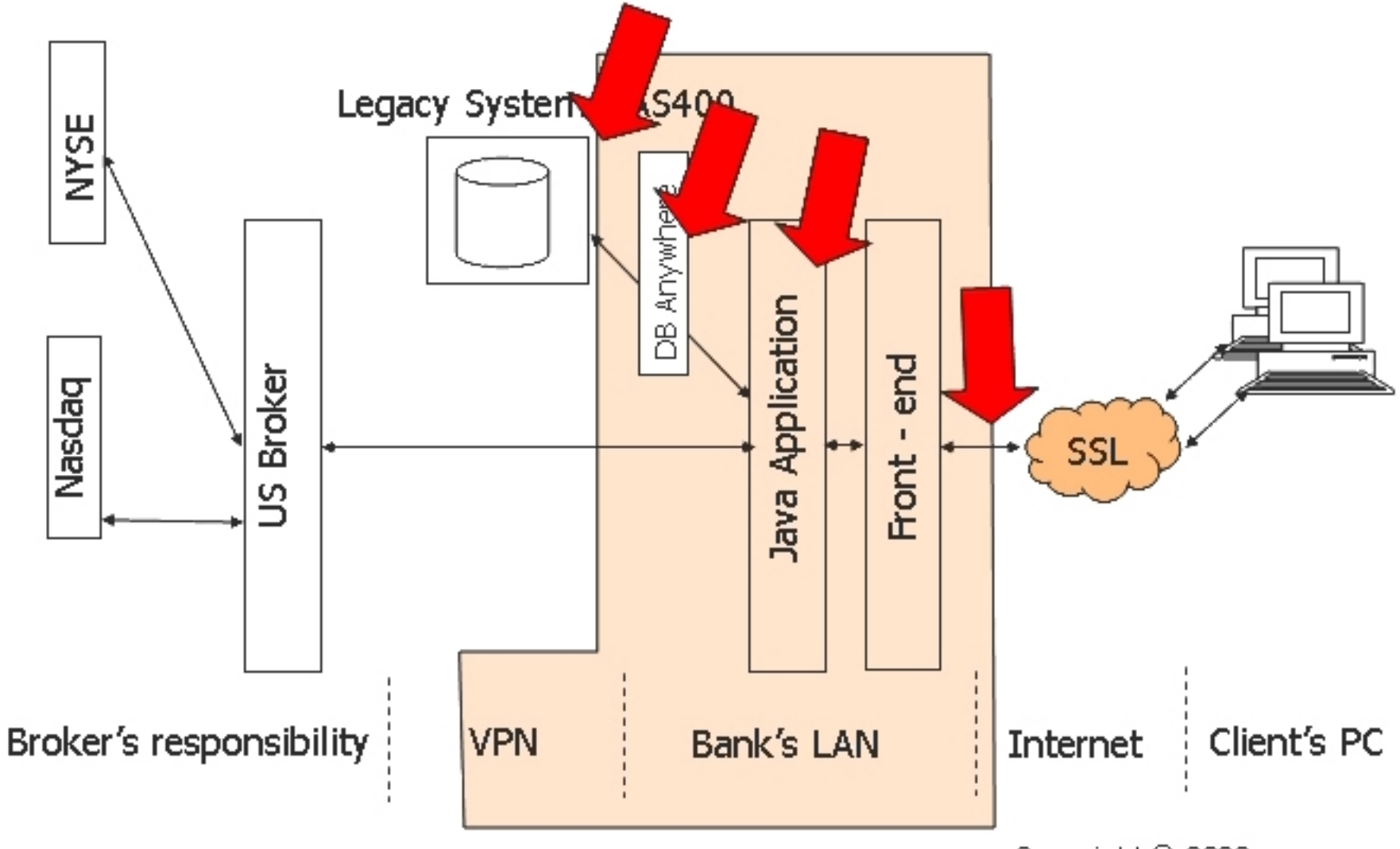
- Called-in: September 99
- ISAAS: Information Systems Assurance & Advisory Services
- Team leader: IPT
- Tools:
  - NT Scanners, ISS portscanners, intra & extra LAN.
  - Memory readers for in-browser memory management
  - Dutch hacker for penetration testing

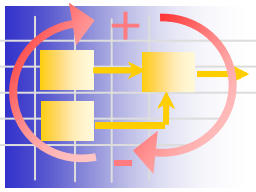


…rework discovered

- Light security “holes”
  - LAN / NT settings
  - Old accounts, guest / visitor accounts
  - Server room physical security
  - Security procedures
- More importantly
  - Cookie-based session management-> Session jumping
  - URL – passed database parameters -> database crashes possible by user
  - Important database information in error messages (table names, software name & version, etc)
  - Passwords for access to the mainframe hardcoded in servlets

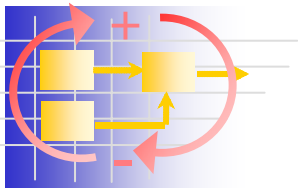
Security issues





Rework

- Corrective actions
  - Easy tasks immediately executed
  - Delays for “bigger” tasks (session management, securization of processes, etc)
  - EY team used as a full-time tester
  - Complications (incremental testing inefficient)
- De-scoping – Gradually from early fall:
  - Multilingual
  - Multi-currency
  - FR, SWx, EU st. markets



Marketing campaign ongoing..

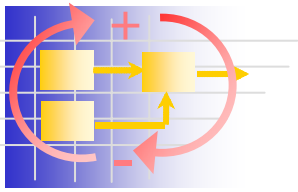
- **Press Releases:**

  GENEVA, Nov. 9 /PRNewswire/

  "Today marks a significant day for MMM," said Michael, President of MMM Ltd. "SwissBanking.com provides an unprecedented combination of a Swiss banking account and on-line access to the world's largest financial markets, and this is only the first step in our plan to offer trading facilities on the European, South and Latin American and Asian exchanges, multicurrency accounts and multi-lingual services."

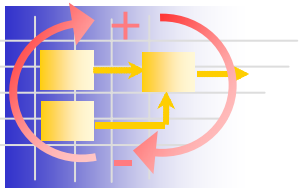
  "SwissBanking.com's September launch was extremely well received by the global marketplace," added Peter, First Vice President, MMM Bank S.A. "The service proved very appealing to our target market, the mid net-worth individual."

  SwissBanking.com offers investors the opportunity to open a private Swiss bank account and to trade securities over the Internet. North American investors are not able to open accounts over the Internet at this time".

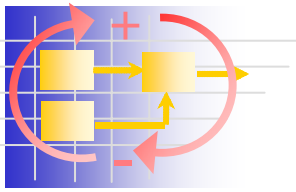


..and going (fall 99)..

- "Our Internet marketing campaign has only recently begun and we are encouraged by the responses." Smith said.
- "With our short-term strategy for **SwissBanking**.com of achieving full multi-lingual and multi-currency capability, our plan is to introduce an investment banking module in the second quarter of 2000, which will greatly enhance the product. We clearly believe our Swiss Internet banking is timely and appropriate, given the current rapid changes in the European financial services sector," S. added.



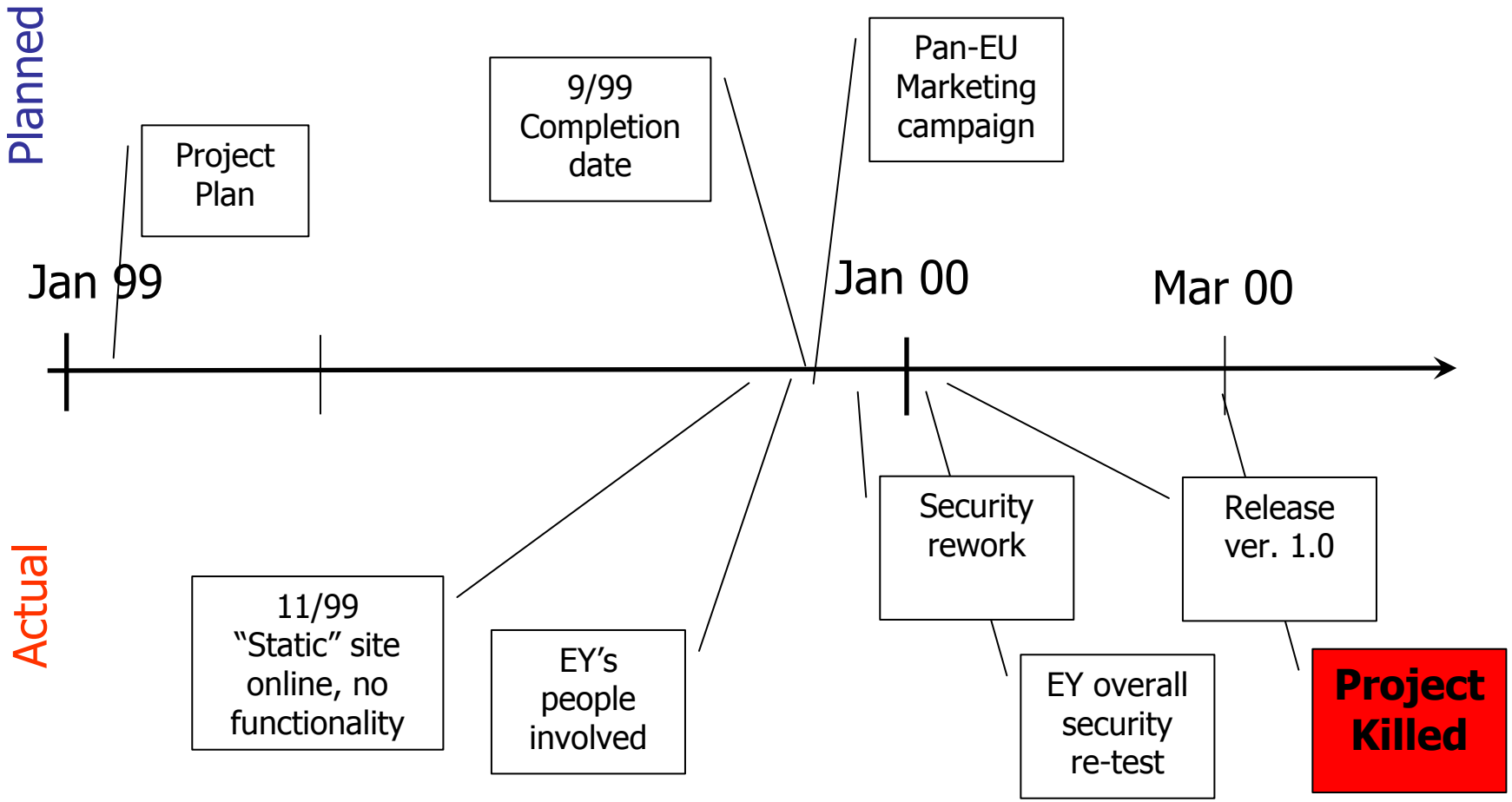
- All securities listed on the **New York Stock Exchange, Nasdaq, the American Exchange, the Pacific Coast Stock Exchange and the Boston Stock Exchange could be traded via www.swissbanking.com**, MMM Bank said in a statement.
- Before the end of the year, **online options trading on the Chicago Board Options Exchange (CBOE), the Philadelphia Coast Stock Exchange, the Pacific Coast Stock Exchange and the American Exchange would be added**.
- MMM Bank said it would **extend online trading to German exchanges in January 2000, with other major European, Asian and Latin American markets to be added in the course of the year. Online underwriting would also be included.**
  [Source: Reuters]

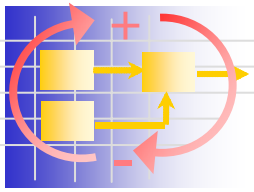


User Interface

- Jan'00:
  - Poor response from potential clients
    - Hits: 2 orders of magnitude from projected
  - User interface:
    - Incepted by IT people
    - No usability analysis
    - No Customer interaction
  - More rework discovered
    - Good architecture should decouple user interface from underlying application
    - In reality: sequence of user inputs & control checks rendered the interface very inflexible.

Project Timeline, Planned Vs Actual



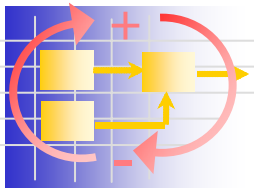


R.I.P…

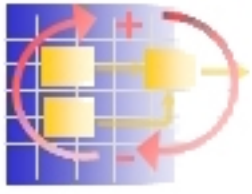
- **MMM Ltd. to Focus on Finance and Banking Businesses**
  March 30, 2000

  MMM Ltd. announced that it would no longer pursue the development of its start-up Swissbanking.com Internet site and instead focus its capital and resources on growing its established corporate finance and banking businesses. The Company stated that the closure of the Website, first introduced in late 1999, would not result in any write-downs or loss of customers.

  [From MSN money]



Why?



This should be an SDM case..

System Architecture

Poor statement of goals

Not all features can be added (easily & efficiently) after design is frozen

System Engineering

No top-down approach

No design for usability

System Project Management

No interfacing between business – IT worlds

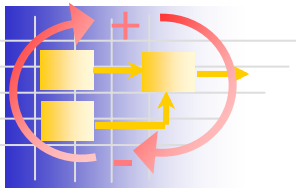
No segregation of roles: Project staff doing project management

No team IQ to minimize idiosyncratic biases (over-optimism)

Poor preparation: Unidentified stakeholder (FBC)

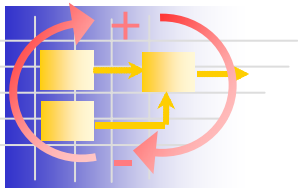
No buffer for hidden rework (security, interface)

Importance of learning curve in software projects



Next Case

- Virtual Tourism
- Small scale project
  - Personal experience
  - Banking software project, Geneva, ’99-’00
- Large Scale project
  - MS Office 2000, ’96 – ’00
    - Project Organization
    - PDP



Background

- Microsoft
  - ’75 by Gates & Allen
  - ’80 MS-DOS

Early corporate culture

Pool of developers” – no product specialization

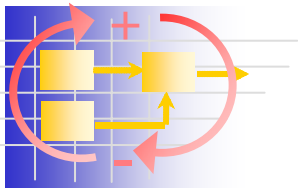
Poor scheduling

No formal SDM (software development methodology)

Individual “Superstar” programmers

No client feedback

“I write user interfaces to please an audience of one”



MS Office

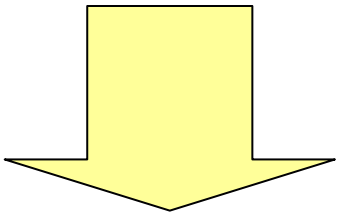
- MS Office for Mac
  - Word, Excel, Powerpoint, MSmail – 1989
- Office 3.0 (Windows)
  - Loosely integrated – 1992
- Office 4
  - Late release
    - 4.2 – April 1994
  - Success
    - 4.2c – October 1994
- Office 95-97
  - 32-bit applications
  - 97: Organizational problems

Office team organization

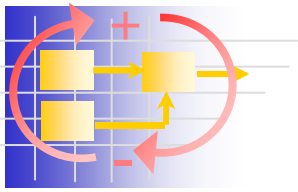
Office 4x

- Toolbar height
- Cascading menus

- Competition: Workgroup software



- Uniform Timeline
- New Organization

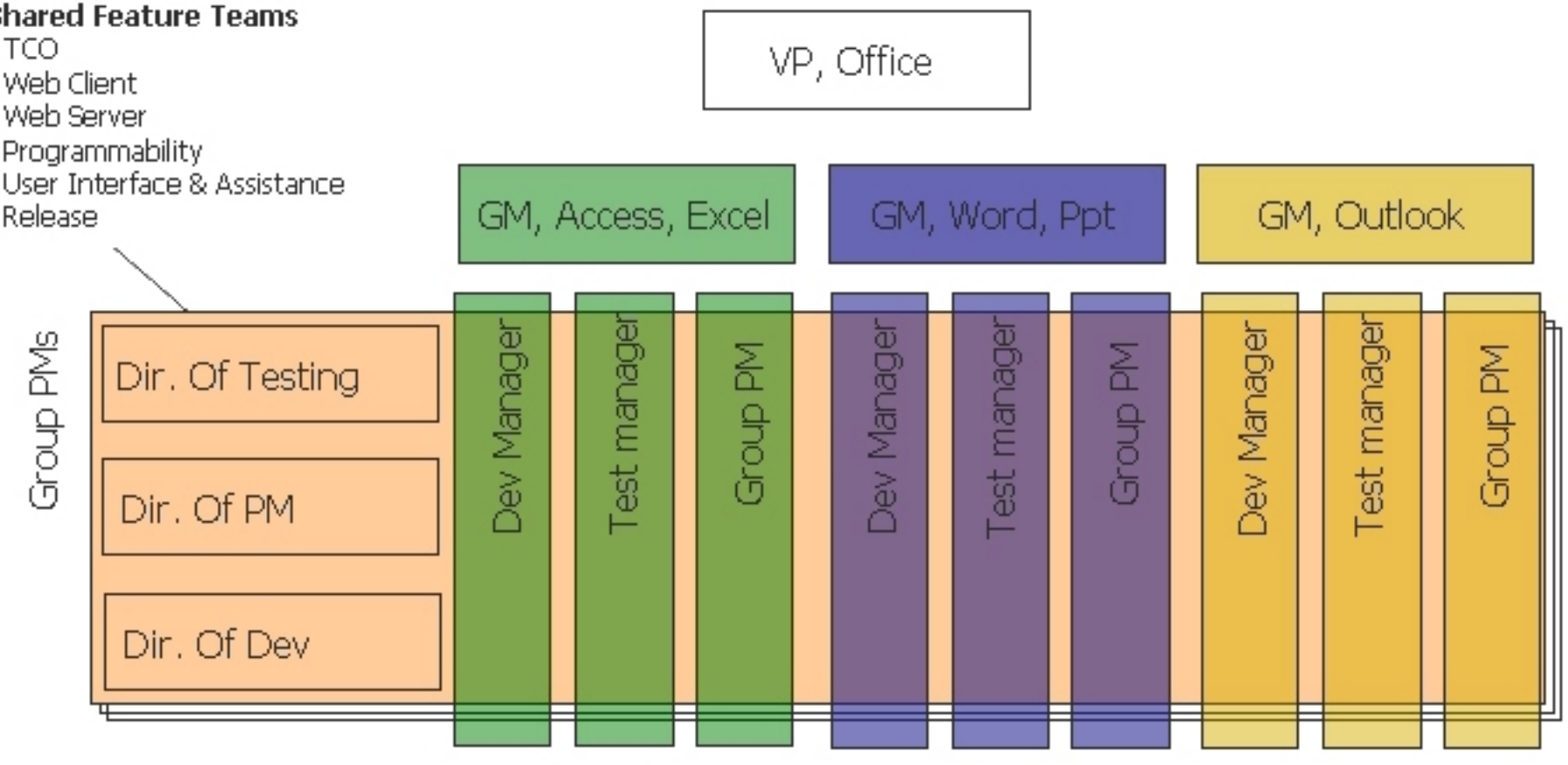


Integration Challenges

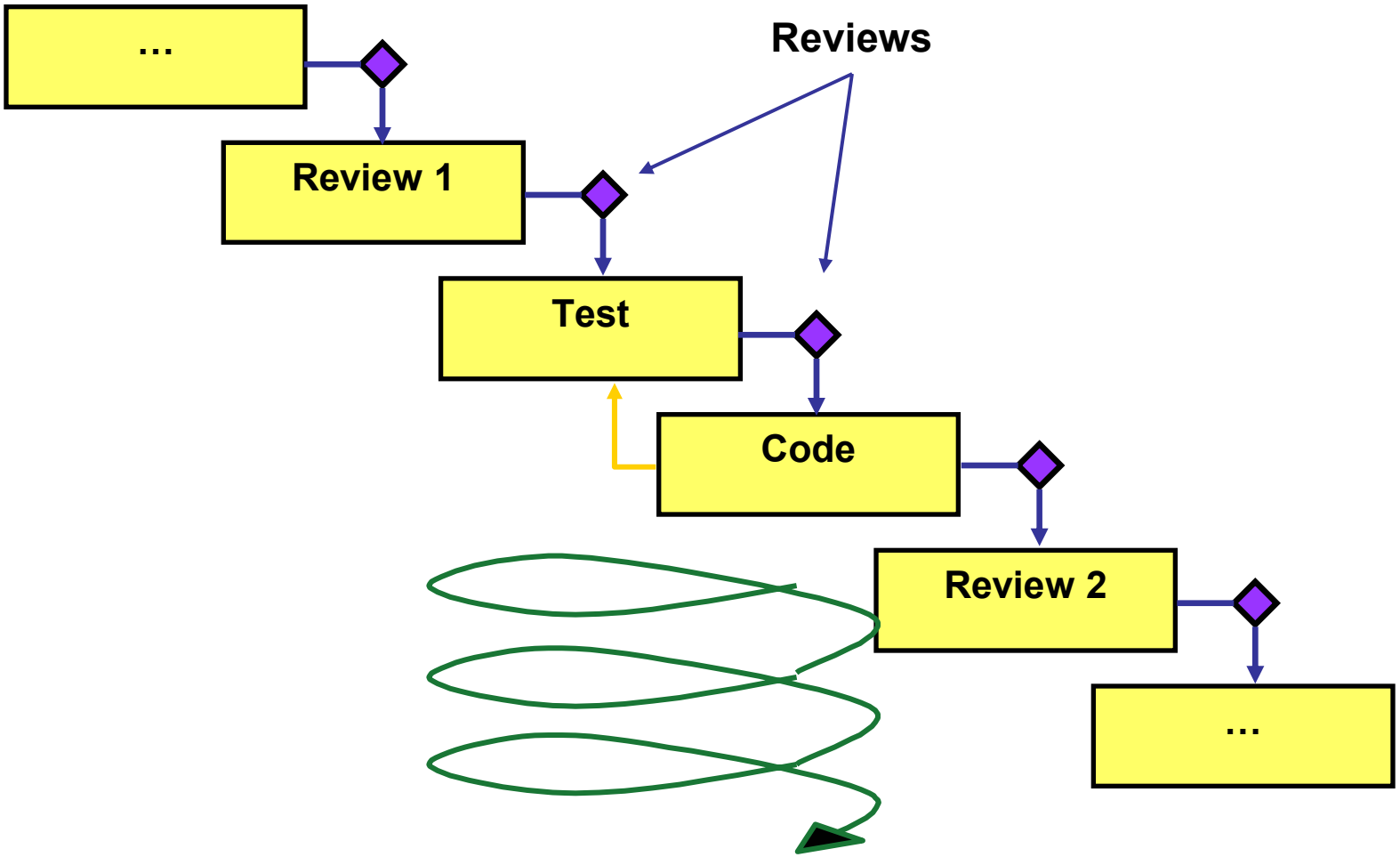
- Office Product Unit Vs Specific PUs
  - No shared vision for Office
    - OPU's role tactical – operational but NOT strategic
  - Cultural – Political
    - Strong PU culture – long history, common vision
    - Features "imposed" by others
  - "Friction" with PUs
    - Different priorities given to shared features
    - Partial integration
    - Different timing

Office 2000 Organization

Shared Feature Teams
- TCO
- Web Client
- Web Server
- Programmability
- User Interface & Assistance
- Release

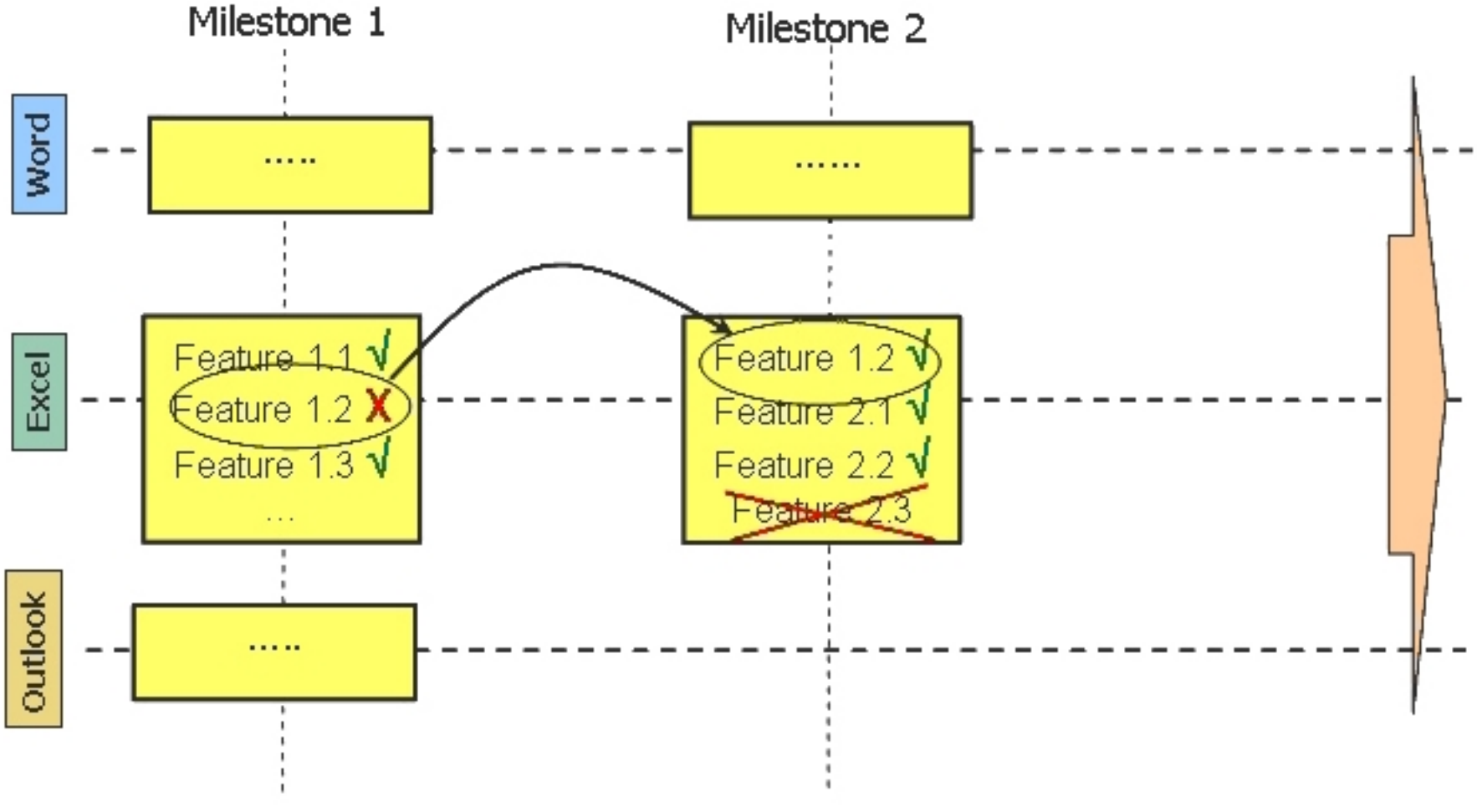


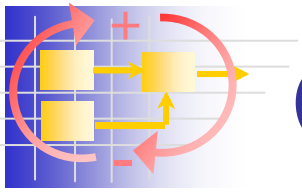
Stage Gate PD Process



Adapted from: Robert Cooper, *Winning at New Products 3rd ed.*, 2001.

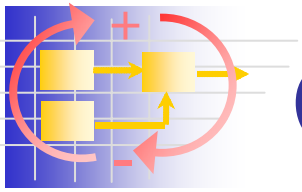
Microsoft stage-gate process





Conclusions

- Idiosyncrasies of Software Projects
  - Cost driven by people / skills – not capital equipment
  - Capacity and schedule determined by number & skill of project staff
  - Experience in programming language, tools & common libraries is paramount
  - Fast, cheap changes -> cheap rework, rapid prototyping (Spiral)



Conclusion (cont.)

- High complexity: Failure modes “never” thoroughly explored (ask Microsoft)
- Interfaces (between program modules or with other applications) are critical – schedule buffer time.
- Bits, not atoms -> IPTs across geographic / time zone barriers
- Software not “patentable”: No barriers to entry - speed is the only protection.