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Electronic Workplace

The Complete Laboratory Environment

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1. Introduction

Global market trends :

- frequent products innovations
- production costs reduction

Enterprises organisation imperatives :

- outsourcing
- collaboration

digital virtual

IT offers **electronic workplace** as the concept and practice, theory and technology, expectation and salvation from ones tail position at the market.

e-workplace

What about education?

- Is the education an competitive environment?
- Isn't it necessary to implement certain e-workplace components and to promote a spirit of collaboration in a high-level education curriculum?

New teaching and learning paradigm:

Teaching	→	Learning
Teacher	→	Mentor or Coach
Student	→	Learner
Synchronous	→	Asynchronous
Passive	→	Active
Linear	→	Non-linear
Scheduled	→	On-demand
Teaching material	→	Accomplishing a goal

An experiment with the electronic workplace implemented in laboratory environment was performed.

Basic intentions of e - workplace concept implementation:

- to improve education technology;
- introduction into collaborative systems.

2. What is an Electronic Workplace?



A workplace is a room where we can find all kinds of tools needed to solve certain problems.

The main difference is that we do not deal with real tools but with **electronic** tools.

digital
virtual
e-tools



"... the e-workplace could be defined as a set of software to be delivered on the office desktop in as standardized a way as possible..."

S. Hayward, Gartner Inc.

"... the computer desktop rearranged from the original version into one that includes a range of internal and external links representing the business at hand."

"Everything you need to manage your business."

Al Horner, Sierra Systems Group Inc.

Citrix Systems, Inc.



The virtual
environment
business vi
mail, voice
desktops, h
interactive



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Keywords are **business**, **communication**, **digital**
and **desktop**.

3. Why an e-workplace?

In education:

Teaching	→	Learning
Teacher	→	Mentor or Coach
Student	→	Learner
Synchronous	→	Asynchronous
Passive	→	Active
Linear	→	Non-linear
Scheduled	→	On-demand
Teaching material	→	Accomplishing a goal

3. Why an e-workplace?

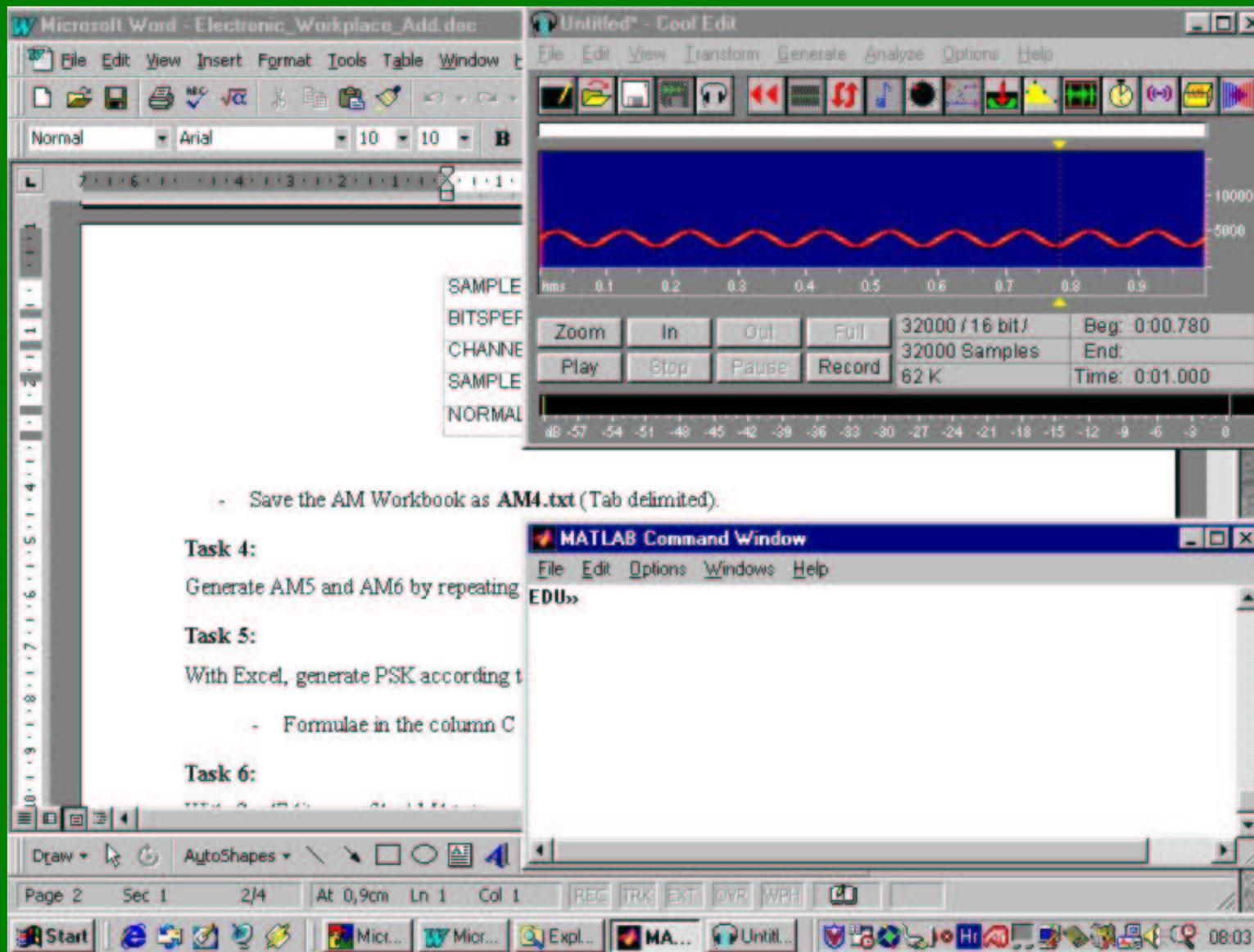
In education:

- overlap certain activities: knowledge adoption and skills training;
- learning based on experience from many examples performed;
- hardware measuring instruments substitution;
- programmable instruments enormous price.

Decision:

implement an e-workplace with

- computer generated or captured signals,
- simulated or real DUT and
- measurement system performed by PC equipped with A/D converter system and appropriate software set.



An electronic workplace multiple windows desktop

Electronic workplace is a template for:

- Data collecting or creating (data input)
- Data editing or modifying (processing)
- Report generating and editing (output)

Electronic Workplace (**EWP**) platform:

- Hardware - multimedia PC
- Software - MS Windows '98

Electronic Workplace (EWP)

Applications

- **MS Office '97:**
 - **MS Word** text editing
 - **MS Excel** data processing
 - **MS Paint** pictures editing
- **Syntrillium's CoolEdit '96** signals generating, recording and reproducing

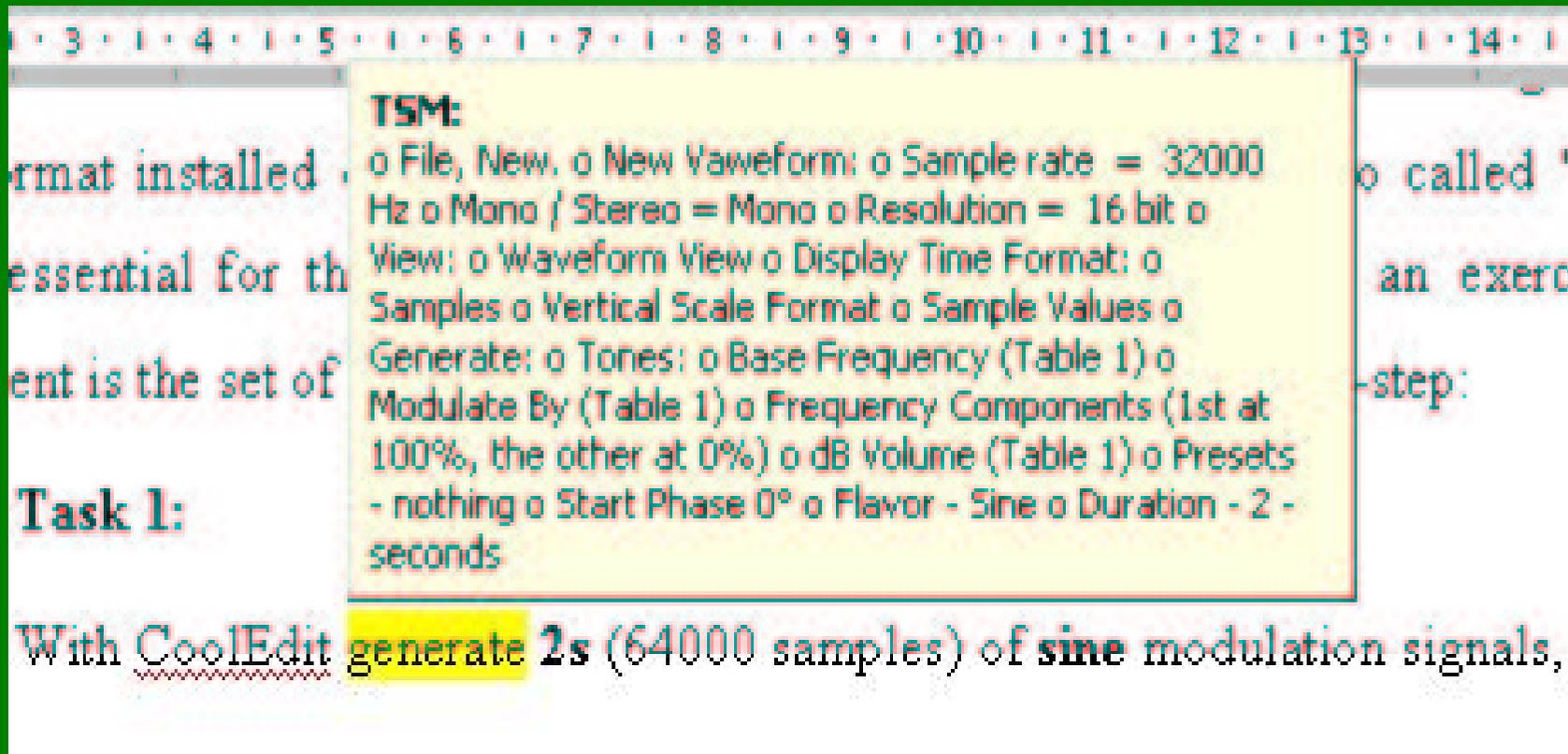
Task 1: Tasks and instructions:

With CoolEdit generate 2s (64000 samples) of sine modulation signals, according to Tab. 1...

Task 3:

- With CoolEdit, generate 2s of AM signal, according to Table 3:
- Start program: Excel
- Open file S5.txt file in the Workbook 1.
- Open file MS1.txt file in the Workbook 2.
- Open a new Workbook for signal generating, name it AM.

Additional, less important and occasionally used instructions are "hidden" in comments:



Format installed .
essential for th
ent is the set of

Task 1:

With CoolEdit generate 2s (64000 samples) of sine modulation signals,

TSM:
o File, New. o New Waveform: o Sample rate = 32000 Hz o Mono / Stereo = Mono o Resolution = 16 bit o View: o Waveform View o Display Time Format: o Samples o Vertical Scale Format o Sample Values o Generate: o Tones: o Base Frequency (Table 1) o Modulate By (Table 1) o Frequency Components (1st at 100%, the other at 0%) o dB Volume (Table 1) o Presets - nothing o Start Phase 0° o Flavor - Sine o Duration - 2 - seconds

o called "
an exerc
-step:

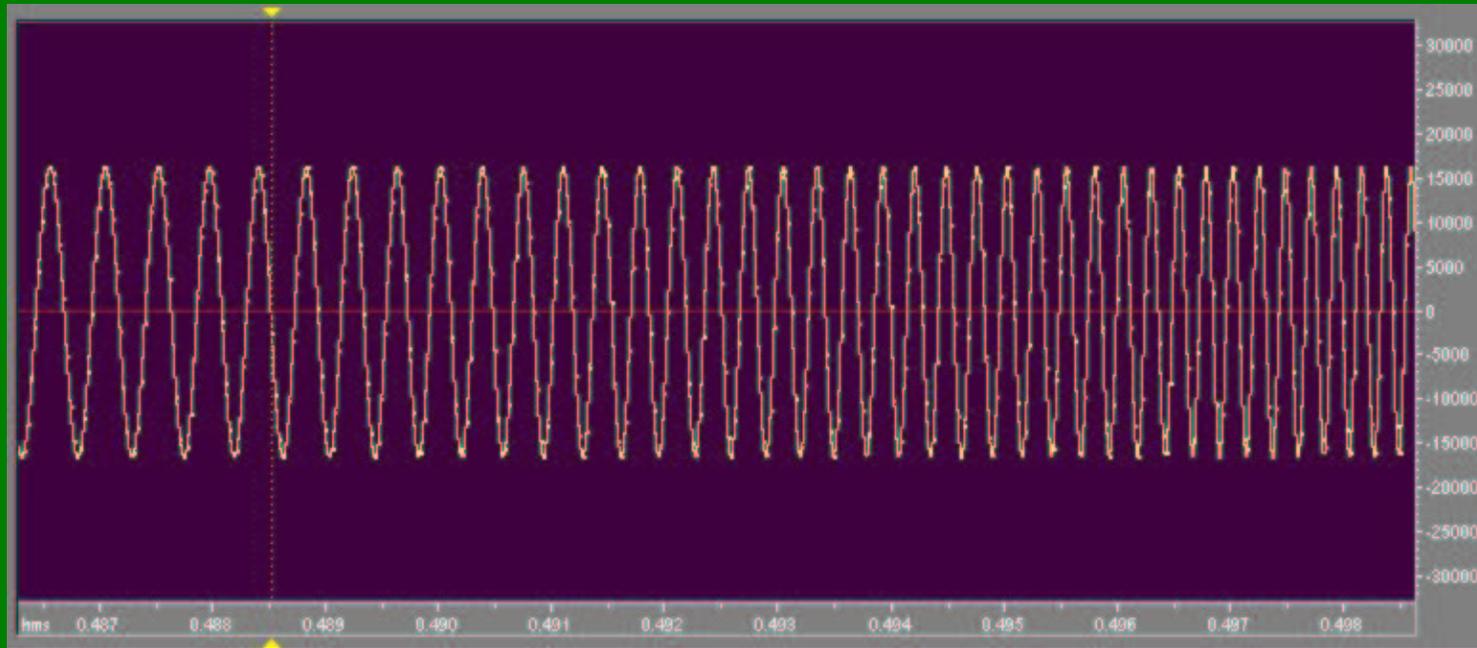
Comment - additional instructions

Reports are electronic forms (MS Word *.doc) with instruction embedded.

Table 2, FM signals generated by CoolEdit:

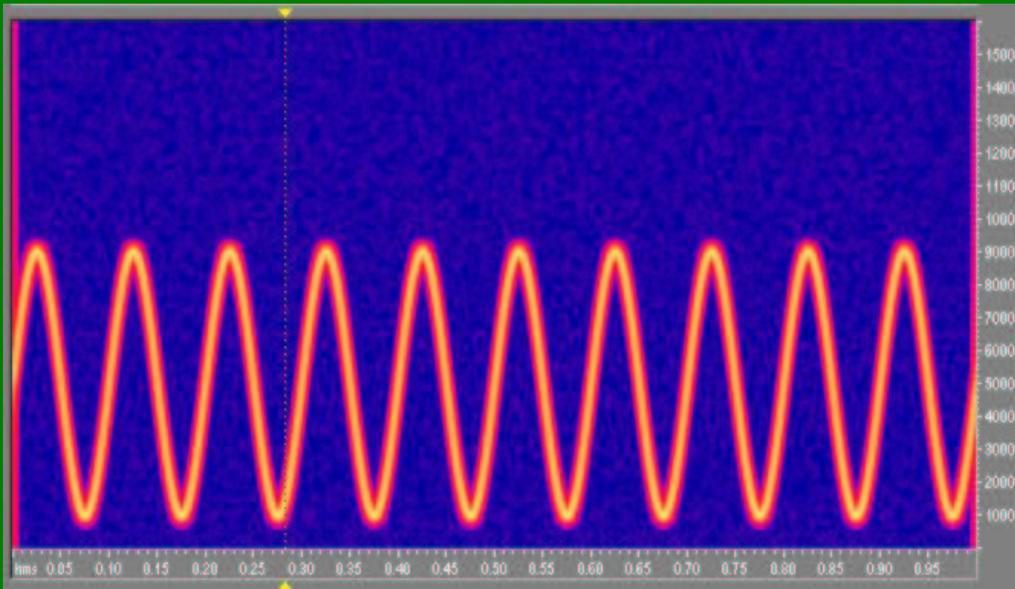
$f_0 = 5kHz$ $A_0 = -6dB$	Carrier signal	Modulating signal	f_m [Hz] Mod. Fr.	Δf [Hz] Mod. by	B [Hz]
1. FM1 	Base Fr. 5000 Hz	internal sine	10	4000	
2. FM2 	Base Fr. 5000 Hz	internal sine	250	1000	
3. FM3 	Base Fr. 5000 Hz	internal sine	250	500	

Sample of a multimedia e-workplace report



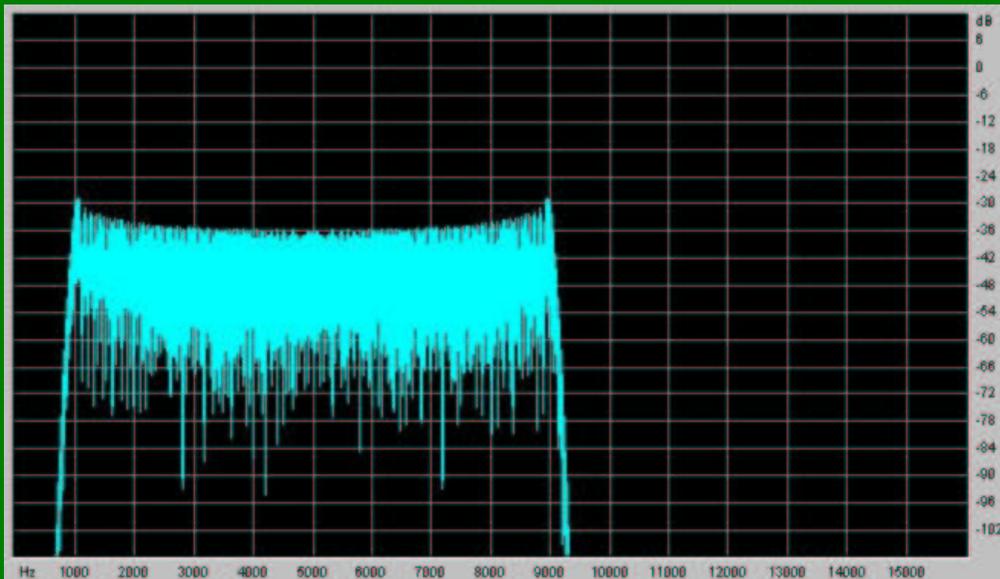
Graph of FM1 signal

Sample of a multimedia e-workplace report



Graph of 3D spectrum for FM1 signal

Sample of a multimedia e-workplace report

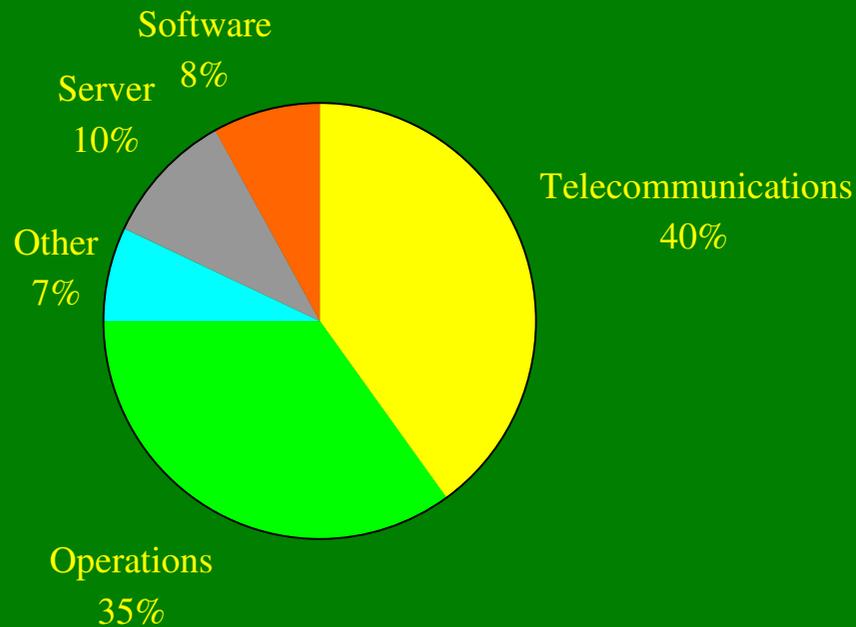


Graph of 2D spectrum for FM1 signal

4. Cost effectiveness

I think I'd also be wary of the vendor that offers me a Cadillac solution to a Volkswagen problem. I would choose a reliable resolution rather than one that almost meets my requirements but includes a range of functions I don't really need.

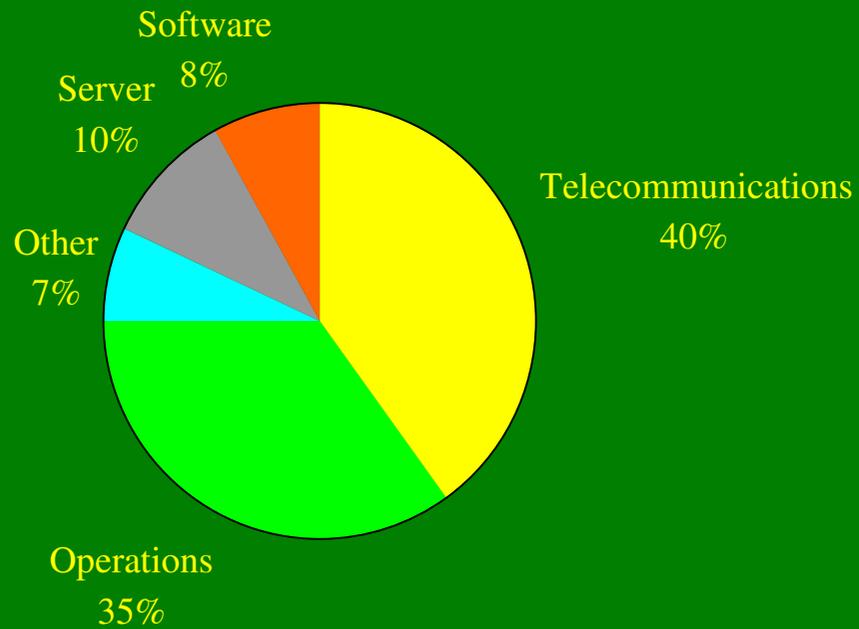
Al Horner, Sierra Systems Group Inc.



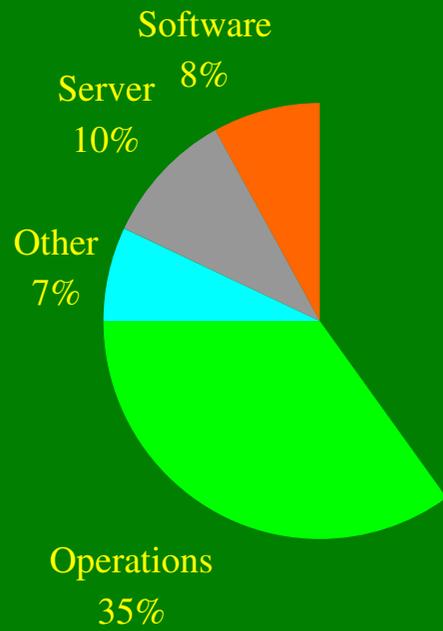
e-workplace cost distribution

S. Hayward, Gartner Inc.

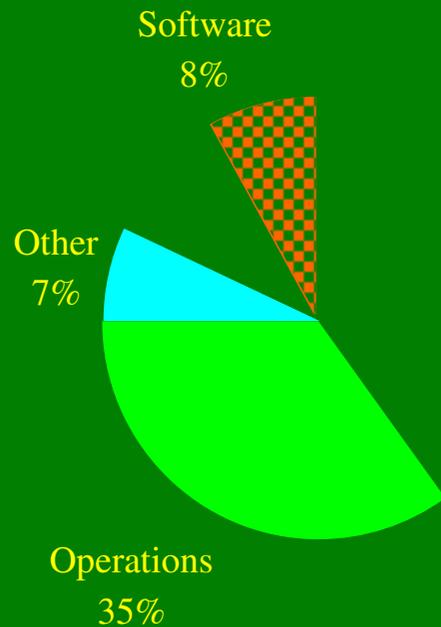
Note Number: COM-15-6673



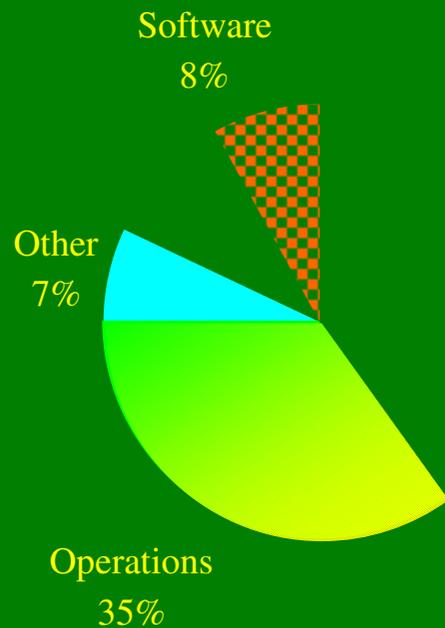
Eliminate telecommunications,
no distance work



Eliminate server,
individual PCs



Software cost reduced by adopting already installed software (MS Windows, Office and shareware, tool free version of CoolEdit, and student versions of MatLab or Tina).



Operation cost dispersion:

- students,
- educator and
- existing system engineer.

Student's work is a part of their education and training - the time spent isn't a cost at all.

Further cost analysis is possible through the similarity with on-line teaching programs.

Cost categories are:

- Development
- Presentation
- Technical overhead

Educator's additional engagement on an e-workplace based lectures development is normal and expected teacher's activity.

Do we agree?

Development time per teaching hour is:

- face-to-face lecture 2-10 hours;
- e-workplace (on-line) material 5-23 hours;

Testing!

Experience!

Presentation and technical overhead costs are correlated with the specific conditions.

If the resource needed exist and is available to be exploited, then there is no additional cost.

If communication line or web-site space are to be rented, or new laboratory to be equipped, then it is obvious that further cost will arise.

5. How to choose and complete e-workplace software bundle?

- Already know and previously well trained;
- General purpose rather than specialised;
- Few simple tools instead of one integrated and complicated;
- The simplest available version;
- Maximally reduced options installed.

The question possible is about the easiest way:
one integrated or few partial software tools?

Integrated tool is the better choice if it will be
used many times during study.

Specialised tool is more productive.

General purpose tools are “recyclable”.

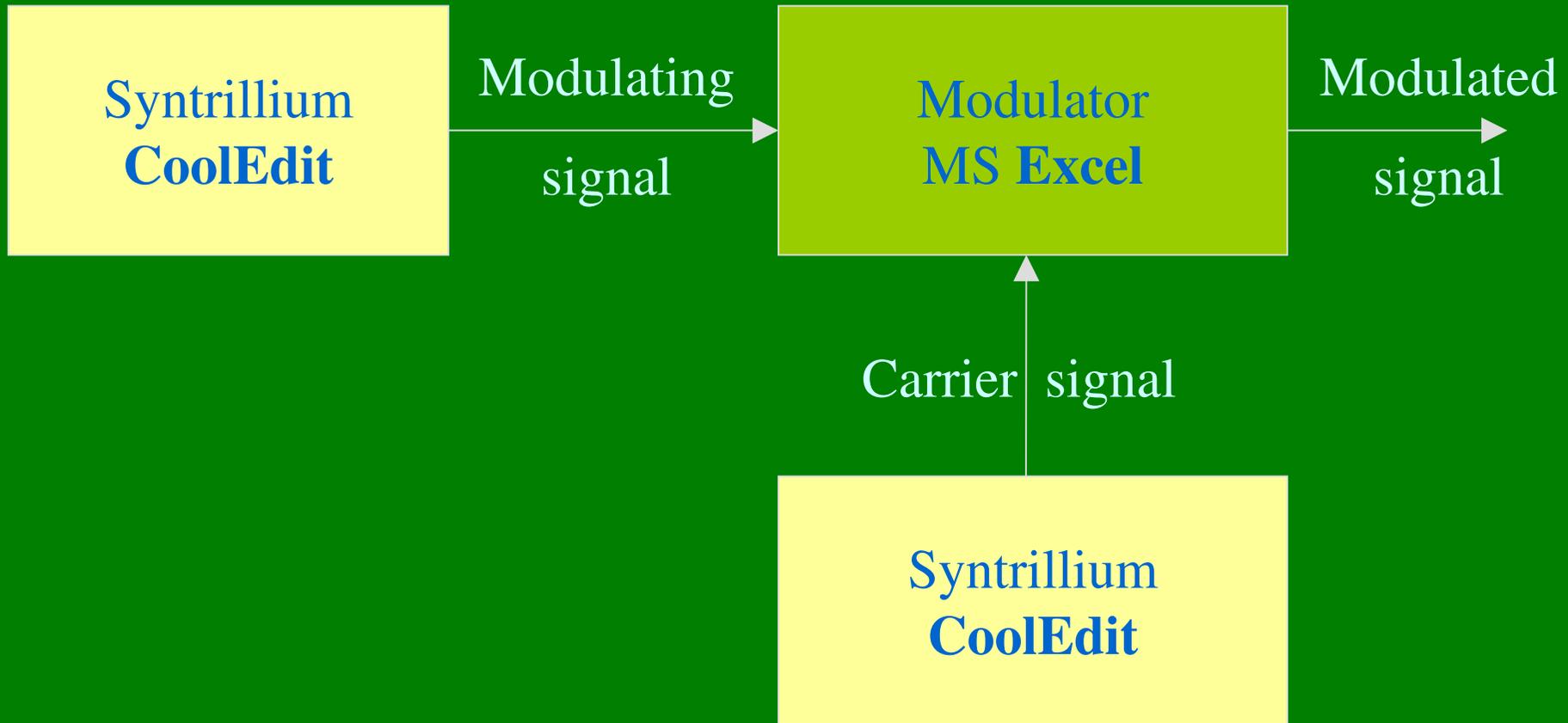
So, I prefer a set of GP software tools.

Example:

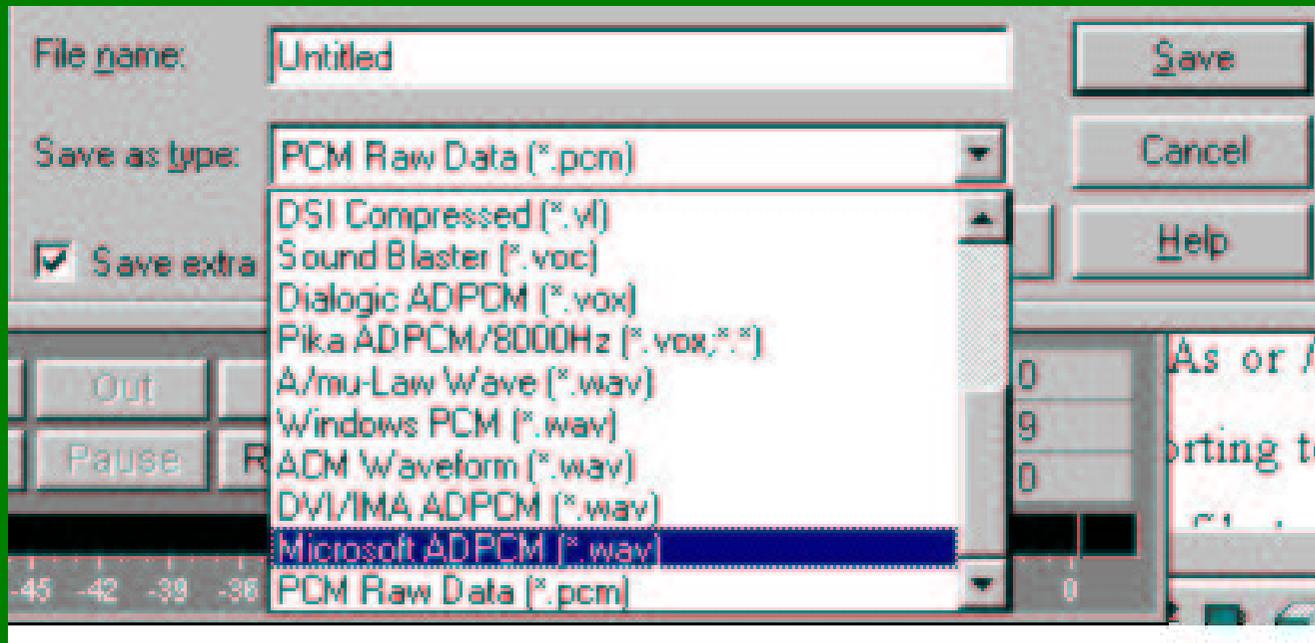
MS Excel instead of MatLab, or

MatLab instead of Mathematica and so on.

Modulation process block diagram



If few simple tools are implemented, problem of their interfacing is the critical one.



*Some of CoolEdit and MS
Excel data formats*

Task 3:

With CoolEdit, generate 2s of AM signal ...

...

- Save the AM Workbook as AM4.txt (Tab delimited).

Task 6:

With CoolEdit open file AM4.txt, reproduce signal, save it as AM4.wav (Microsoft ADPCM).

Interfacing instructions

Data formats:	AM4.txt	202 kB
	AM4.wav	16 kB

6. Conclusion

EWP - tool for the off-line signal processing in educational application.

Step-by-step digital signal processing - a real substitute for (complement to) the hardware measurement

With objects and hyperlinks inserted, MS Word *.doc grows up into a multimedia report.

Tools exploited and skills needed are well known.

Implementing e-workplace and new teaching concept, education process becomes “forward-backward” reversed.

Learning starts as synchronous, but individual work and student specific pace, transform the process to the asynchronous one.

Suitable and attractive for students, although cumbersome and sometimes frustrating for the educator

Natural and spontaneous student-to-student and teacher-to-student collaboration.

Report's graphic design may be domain of student's creativity, individuality and artistic freedom.

So far, e-workplace promises to be a viable, didactically acceptable learning technology.

