



Lisbon School  
of Economics  
& Management  
Universidade de Lisboa



LISBOA

UNIVERSIDADE  
DE LISBOA

Carlos J. costa

# ERP

# ENTERPRISE RESOURCE PLANNING

(2022 version)



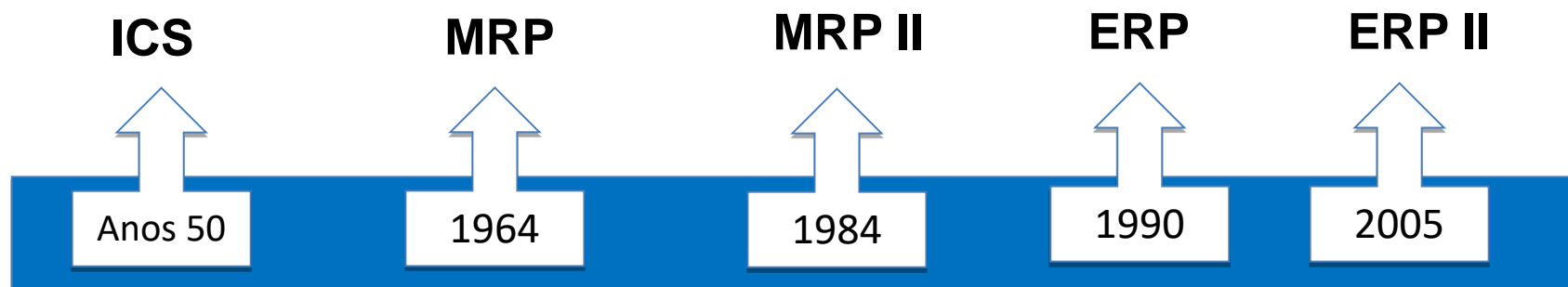
Carlos J. Costa (ISEG)

# Agenda

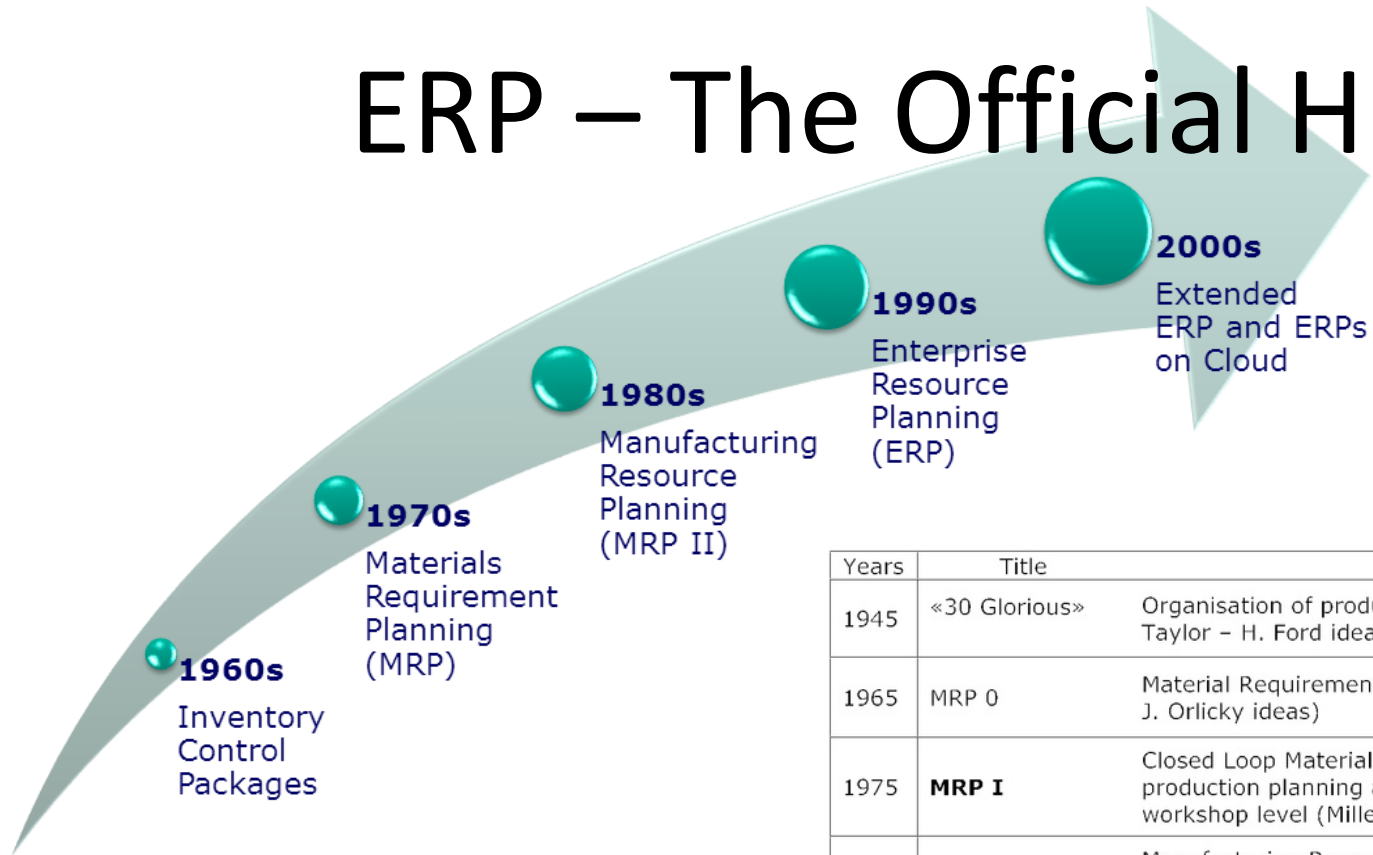
- ERP- The official history
- ERP concept
- ERP- Integrated System
- Advantages to management
- ERP Architecture
- Market
- Open Source
- Law and Tax Issues

# ERP – The Official History

- ICS- Inventory Control Systems
- MRP – Material Requirement Planning
- MRP II – Manufacturing Resource Planning
- ERP – Enterprise Resource Planning
- ERP II- Enterprise Resource Planning II



# ERP – The Official History



Years	Title	Main features
1945	«30 Glorious»	Organisation of production principles (based on F.W. Taylor – H. Ford ideas)
1965	MRP 0	Material Requirements Planning (based on O. Wight – J. Orlicky ideas)
1975	<b>MRP I</b>	Closed Loop Material Requirement Planning, setting of production planning and its execution control on workshop level (Miller-Spregue)
1980	<b>MRP II</b>	Manufacturing Resource Planning based on data from suppliers and customers. Forecasting, planning and production controlling.
1985	MRP II+	Implementing of JIT (Just in Time) concept, weak spot optimisation
1990	<b>ERP</b>	Enterprise Resource Planning, Materials Planning, Order Entry, Distribution, General Ledger, Accounting, Shop Floor Control
1996	Extend ERP	Scheduling, Forecasting, Capacity Planning, e-Commerce, Warehousing, Logistics
2001	ERP II	Project Management, Knowledge Management, Workflow Management, Customer Relationship Management, Human Resource Management, Portal Capability, Integrated Financials

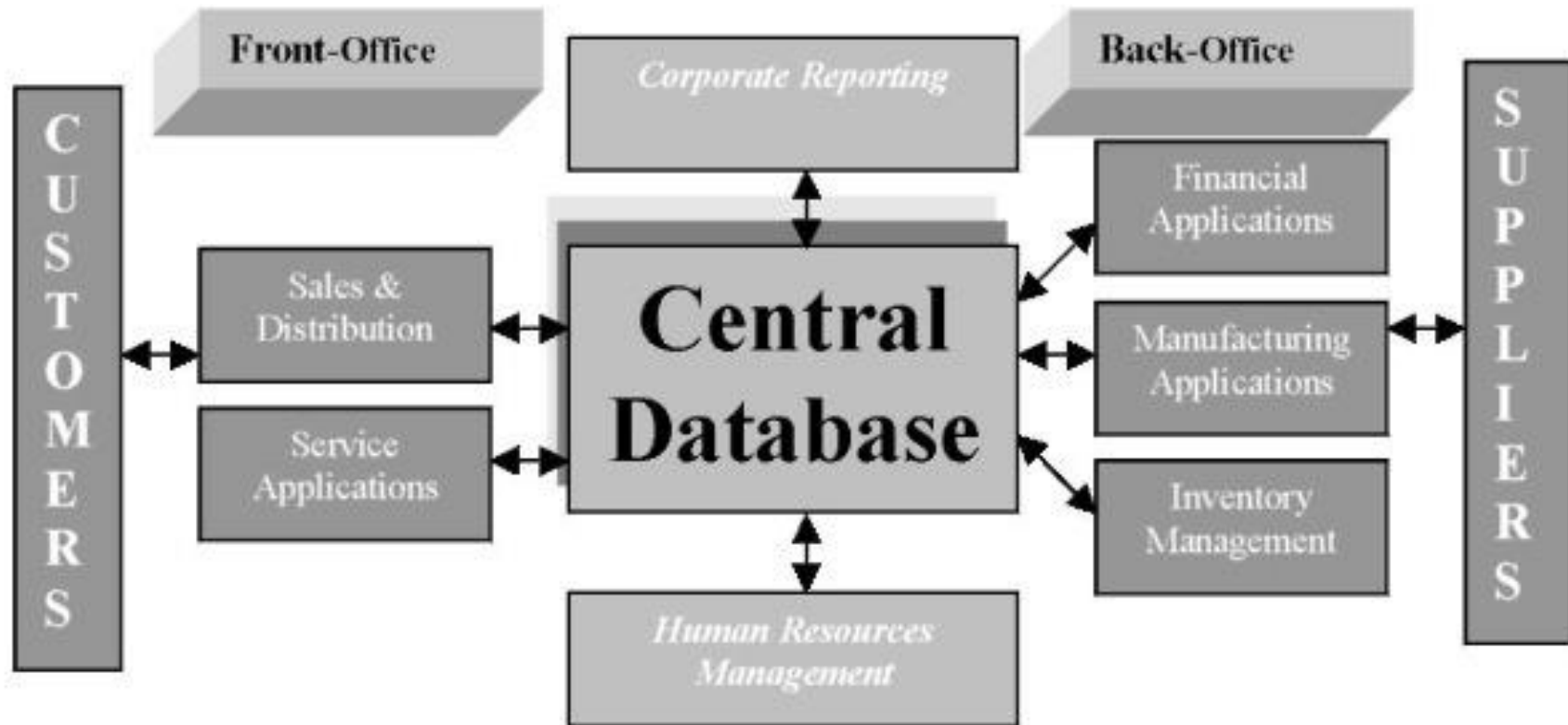
# Concept

- *Enterprise Resource Planning*
- Set of very integrated programs
- Information is introduced just once in the system
- Allows integration of information and processes supported in information
- Is supported in DBMS
- Customizable

# Concept

- Davenport (1988), presented the architecture of a ERP.
- In the center it is database with data from all the modules.
- Each module supports a functional area (Davenport, 1998).

# ERP Architecture



(Davenport, 1998)

# ERP as Integrated System





# ERP II

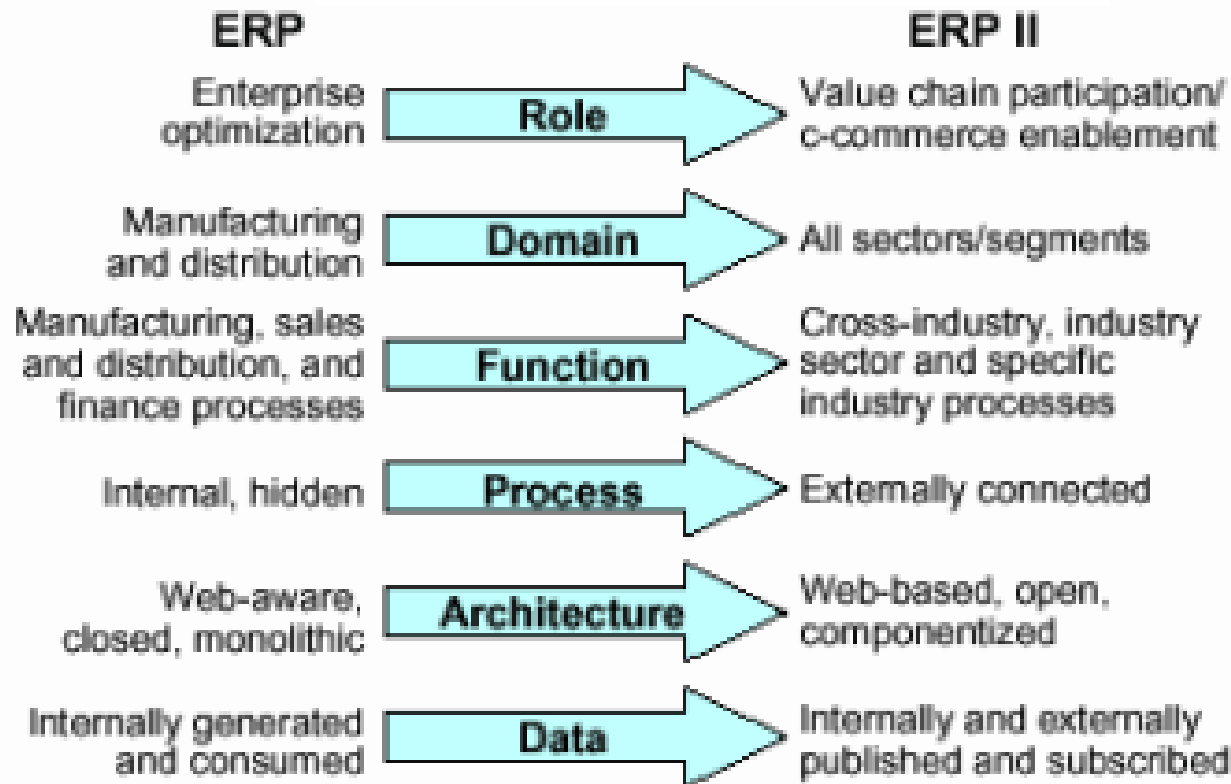
- ERP II is a transformation of ERP into a new generation of enterprise systems.

(Møller, 2005)

- Collaborative tools, (e.g. social networks) available in Web 2.0, have the potentiality to improve business processes and should be considered in the ERP II.

(Grabot, Mayere, Lauroua, & Houe, 2014)

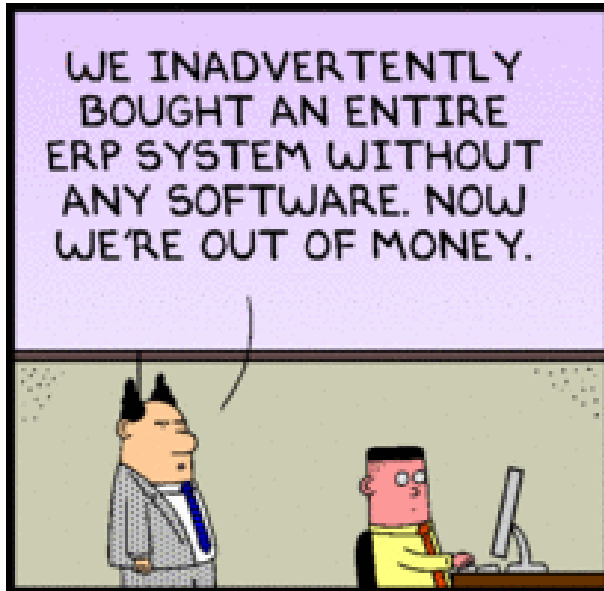
# ERP II



Source: Gartner Research

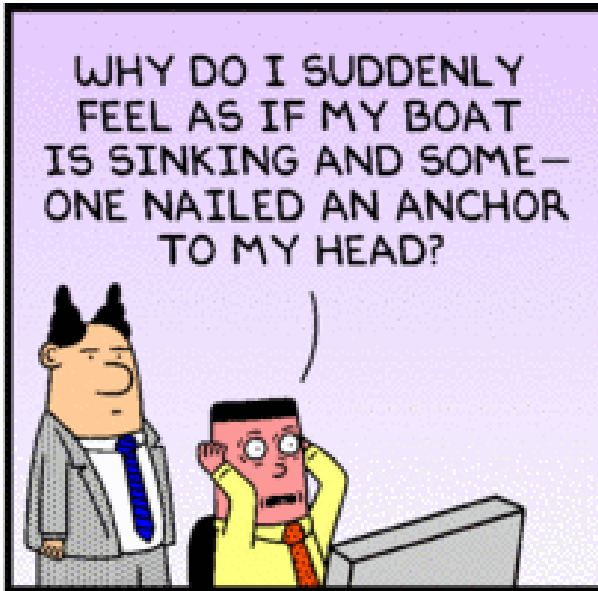
# Advantages of ERP

- Support business growth
- Change Legacy systems
- Improve business processes
- Reduce maintainance
- Reduce administrative Costs
- Prevent input of redundact data
- Decrease stoks maintance costs
- Decrease data entrance errors
- Multi currency systems are possible
- Decrease system operation costs
- Prevent delays and error in client orders
- Integrate applications
- Standardize processes



WE INADVERTENTLY BOUGHT AN ENTIRE ERP SYSTEM WITHOUT ANY SOFTWARE. NOW WE'RE OUT OF MONEY.

www.dilbert.com  
scottadams@aol.com



WHY DO I SUDDENLY FEEL AS IF MY BOAT IS SINKING AND SOMEONE NAILED AN ANCHOR TO MY HEAD?

1-18-08 © 2008 Scott Adams, Inc./Dist. by UFS, Inc.

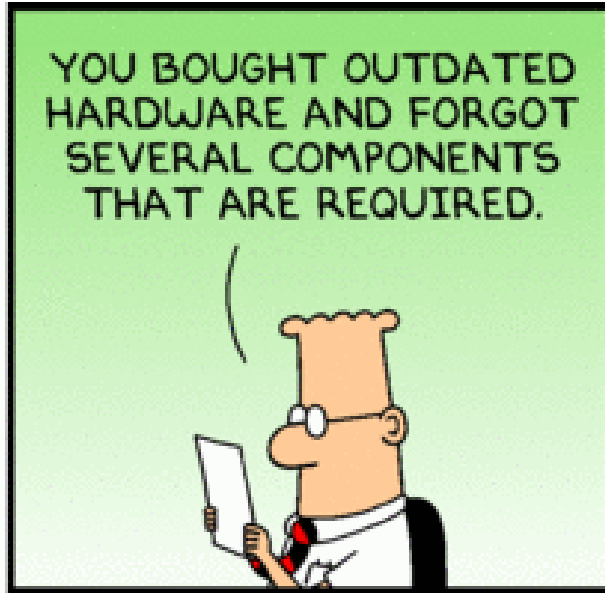


IF ONLY SOMEONE ON MY STAFF COULD WRITE THE SOFTWARE IN HIS SPARE TIME...

GLUB  
GLUB  
GLUB



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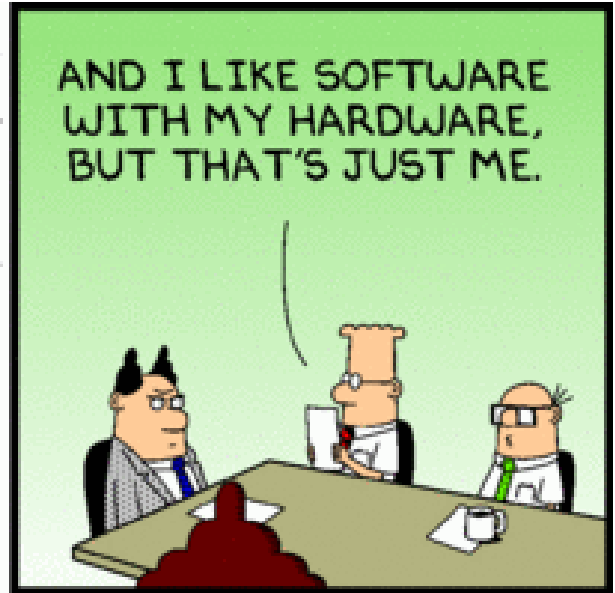


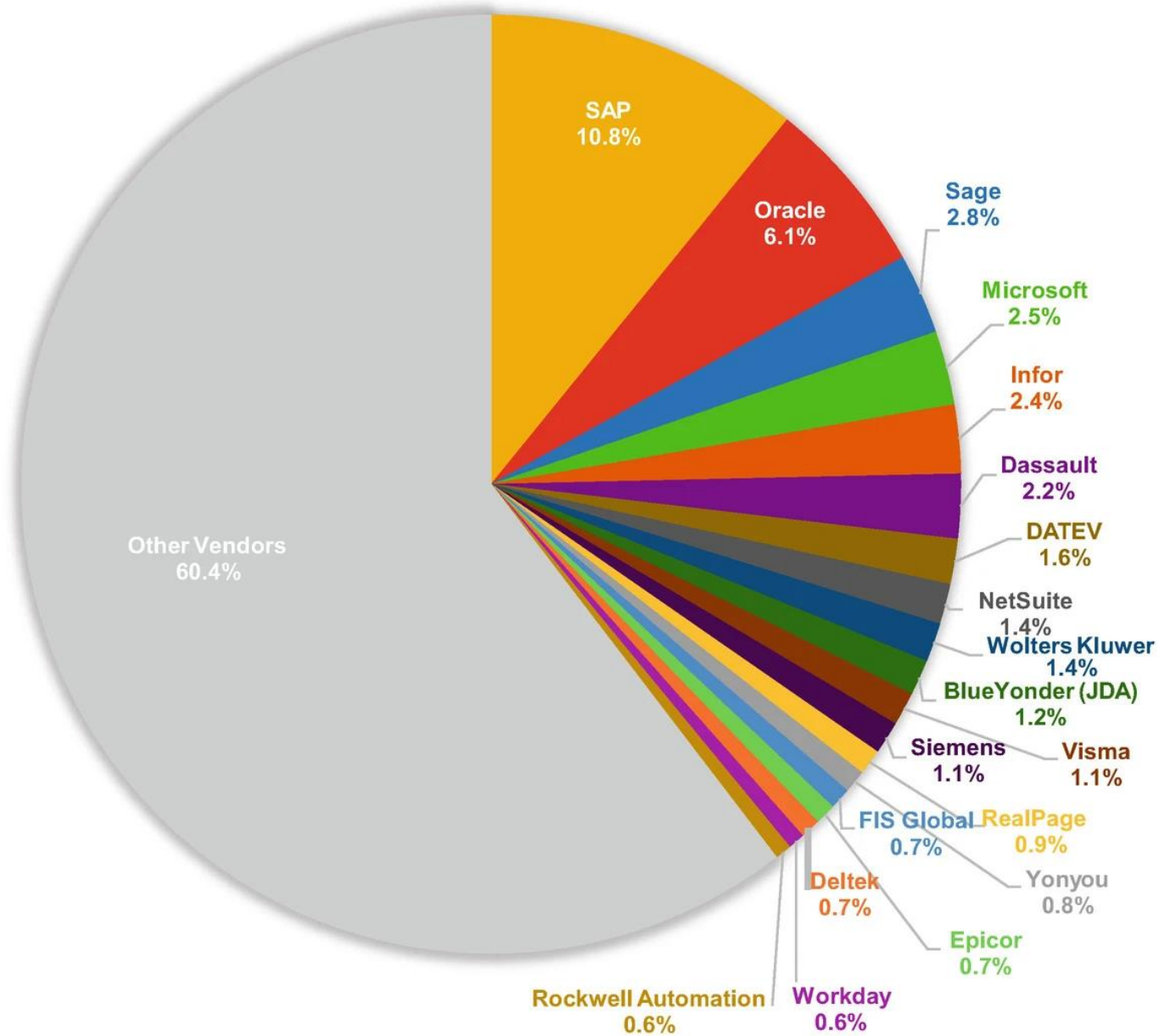
Figure 1: Magic Quadrant for Cloud ERP for Product-Centric Enterprises



Source: Gartner (August 2022)

# WORLD WIDE

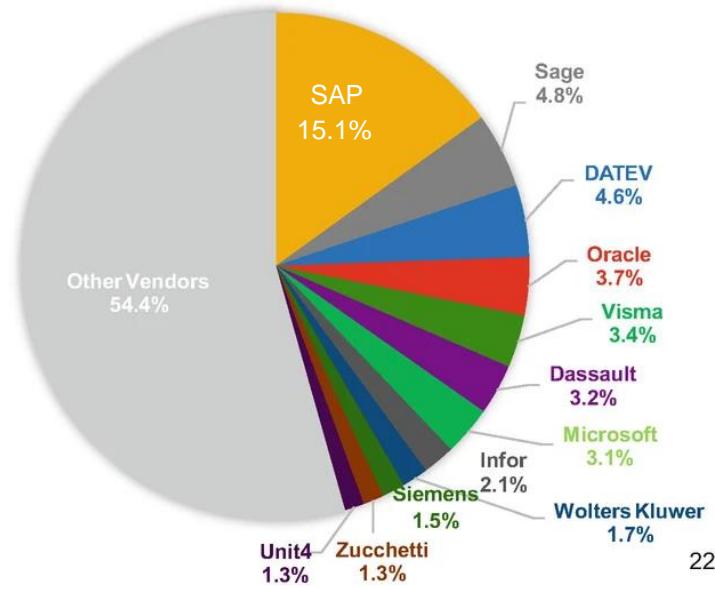
MARKET SIZE: €53B



2019 Source: Sarferaz, S. (2022).

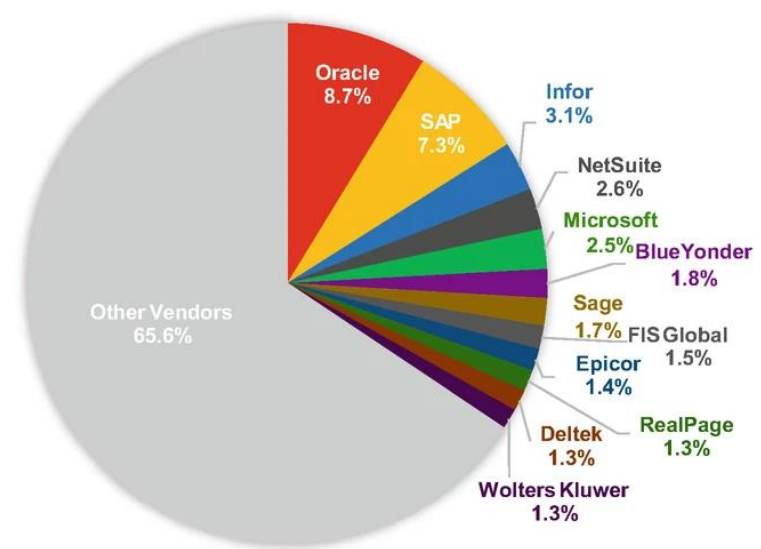
# EUROPE MIDDLE EAST AFRICA

MARKET SIZE: €18B

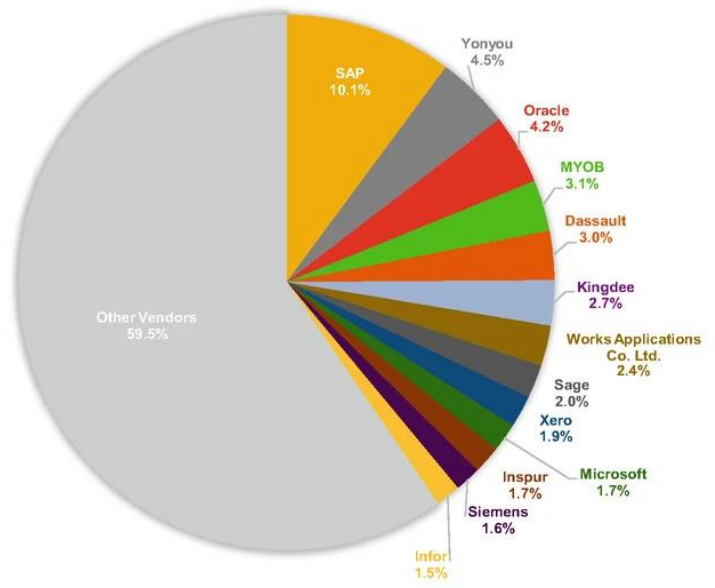


# NORTH AMERICA

MARKET SIZE: €23.5B

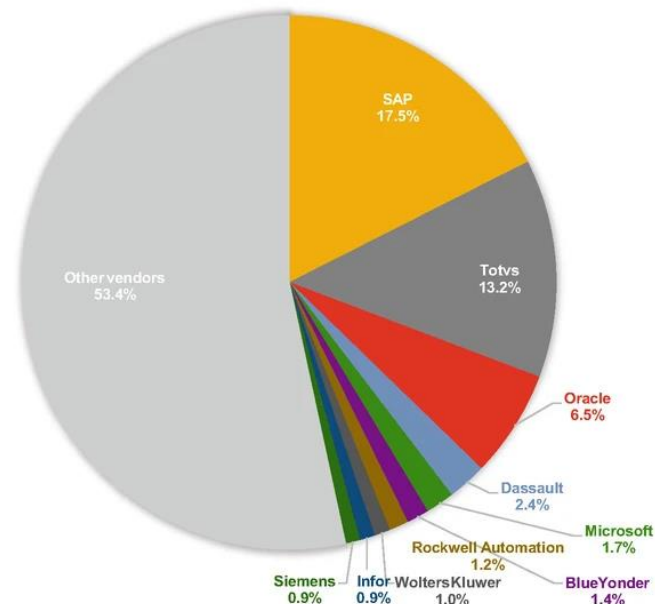


22



MARKET SIZE: €9.4B

# ASIA PACIFIC JAPAN CHINA



MARKET SIZE: €2.0B

# LATIN AMERICA





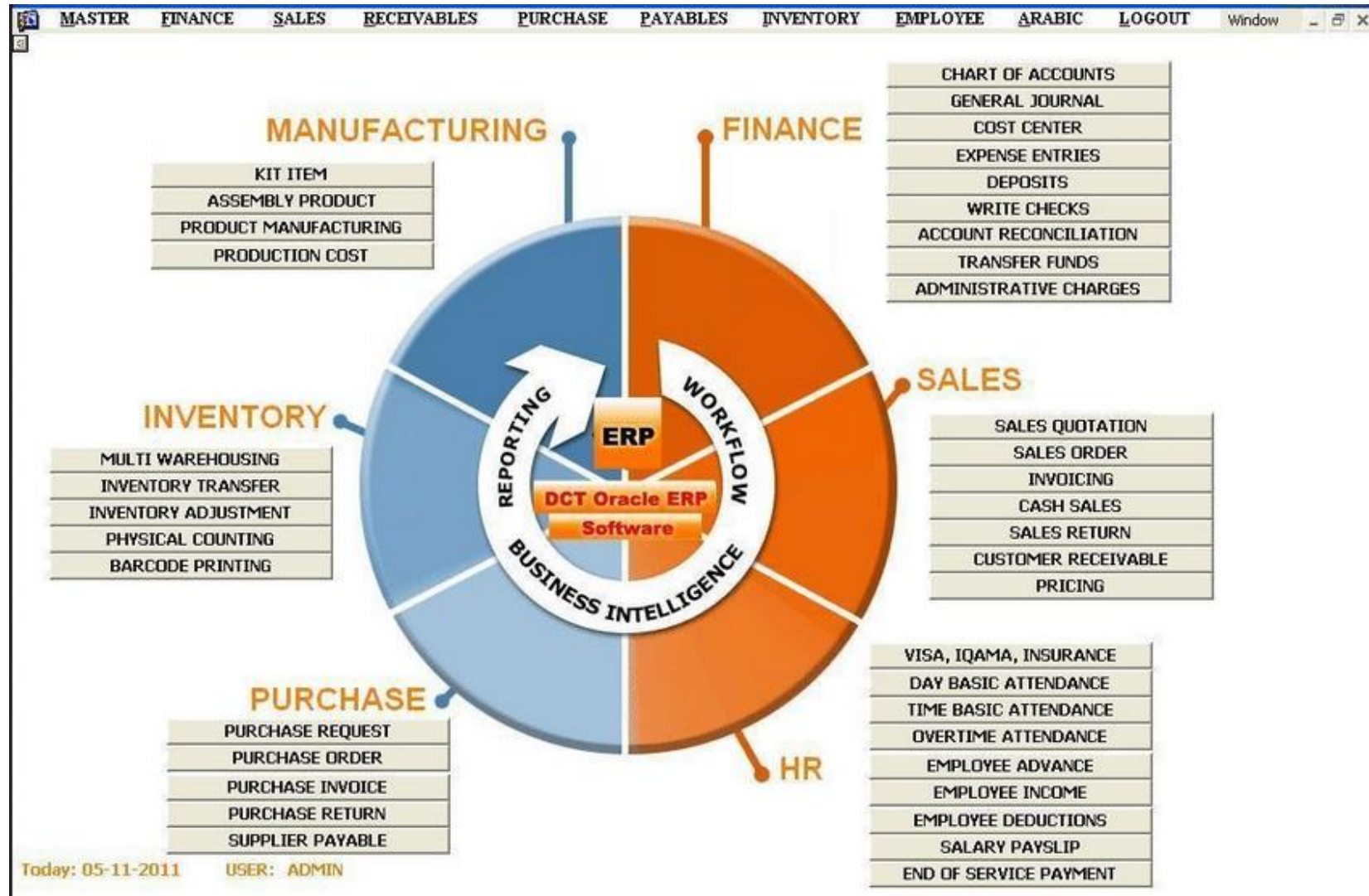
# Firms



# SAP

	Self Services							
Analytics	Strategic Enterprise Management		Financial Analytics		Operations Analytics		Workforce Analytics	
Financials	Corporate Governance		Financial Accounting		Management Accounting		Financial Supply Chain Management	
Human Capital Management	Employee Relationship Management		Employee Lifecycle Management		Employee Transaction Management		Workforce Deployment	
Operations: Value Generation	Purchasing	Inventory Management	Manufacturing		Distribution	Sales Order Management	Service Order Management	
Operations: Support	Product Structure Management		Project Management		Quality Management		Asset Management	
Corporate Services	Travel Management		Environment, Health & Safety		Incentive and Commission Management		Real Estate Management	
Solution and Integration Platform	People Integration		Information Integration		Process Integration		Application Platform	

# ORACLE



# SAGE

Sage ERP Accpac - Windows Internet Explorer

http://bcr512188/SageERPAccpac/portal60a/portal.html

DevTrack Web user Steph... Sage Accpac (603dev08 ex... Sage Accpac (603dev08) http--bcr512188-crm-eware Sage Accpac (bcr512188) vpn.na.sage

Sage ERP Accpac

Welcome Administrator | This Session: 09/13/2020 SAMINC | Help | Change Password | Sign Out

Tasks Reports Inquiry

My Shortcuts

Customize Shortcuts

G/L Batch List G/L Journal Entry A/R Invoice Batch List A/R Invoice Entry A/R Receipt Entry A/P Invoice Batch List A/P Invoice Entry

Home

Add Snapshots

Getting Started

- What's New in this Version?
- Customize Your Home Page
- Get Started with Snapshots
- Create a Query
- Visit the Sage ERP Accpac Community
- Search the Learning Center
- Browse Video Tutorials
- Browse Courses at Sage University
- Tell Us How to Improve this Product

Aged Payables

Aged As Of 09/13/2020 (By Due Date)

Total: 54,010

Balance Sheet

As Of 09/30/2020

Assets

Liabilities & Shareholders' Equity

Cash and Cash Equiv... Accounts Payable  
 Accounts Receivable Other Current Liabil...  
 Inventory Long Term Liabilities  
 Other Current Assets Other Liabilities  
 Net Fixed Assets Share Capital  
 Other Assets Shareholders' Equity  
 Net Loss

View Balance Sheet

Aged Receivables

Aged As Of 09/13/2020 (By Due Date)

Total: 28,825

Days Payables Outstanding

As Of 09/13/2020

Payables Outstanding: 194 days

Annual Purchases: 100,168  
 Ending A/P Balance: 53,146

Income Statement

For 9 Periods Ending 09/30/2020

Revenue

Local intranet | Protected Mode: Off

# Microsoft Dynamics

The screenshot displays the Microsoft Dynamics AX 1 - SoREnigma Inc. interface with several key components:

- Left Navigation Pane:** Shows a tree view for 'ARP (dm2)' with categories like 'My projects (assignments)', 'Project management', 'Resource planning', 'Workflow', and 'Setup'.
- (dm2) Capacity overview:** A central chart showing capacity utilization over time. Below the chart is a table:
 

	1	2	3	4	5
40010	0.00	0.00	0.00	0.00	0.00
40120-6	0.00	0.00	0.00	0.00	0.00
90005	879.00	207.00	0.00	0.00	0.00
- (dm2) Project manager:** A table listing tasks with columns for H, C, C, T, T, Title, Prede..., Workflow..., Start, Finish, %..., and Dur...:
 

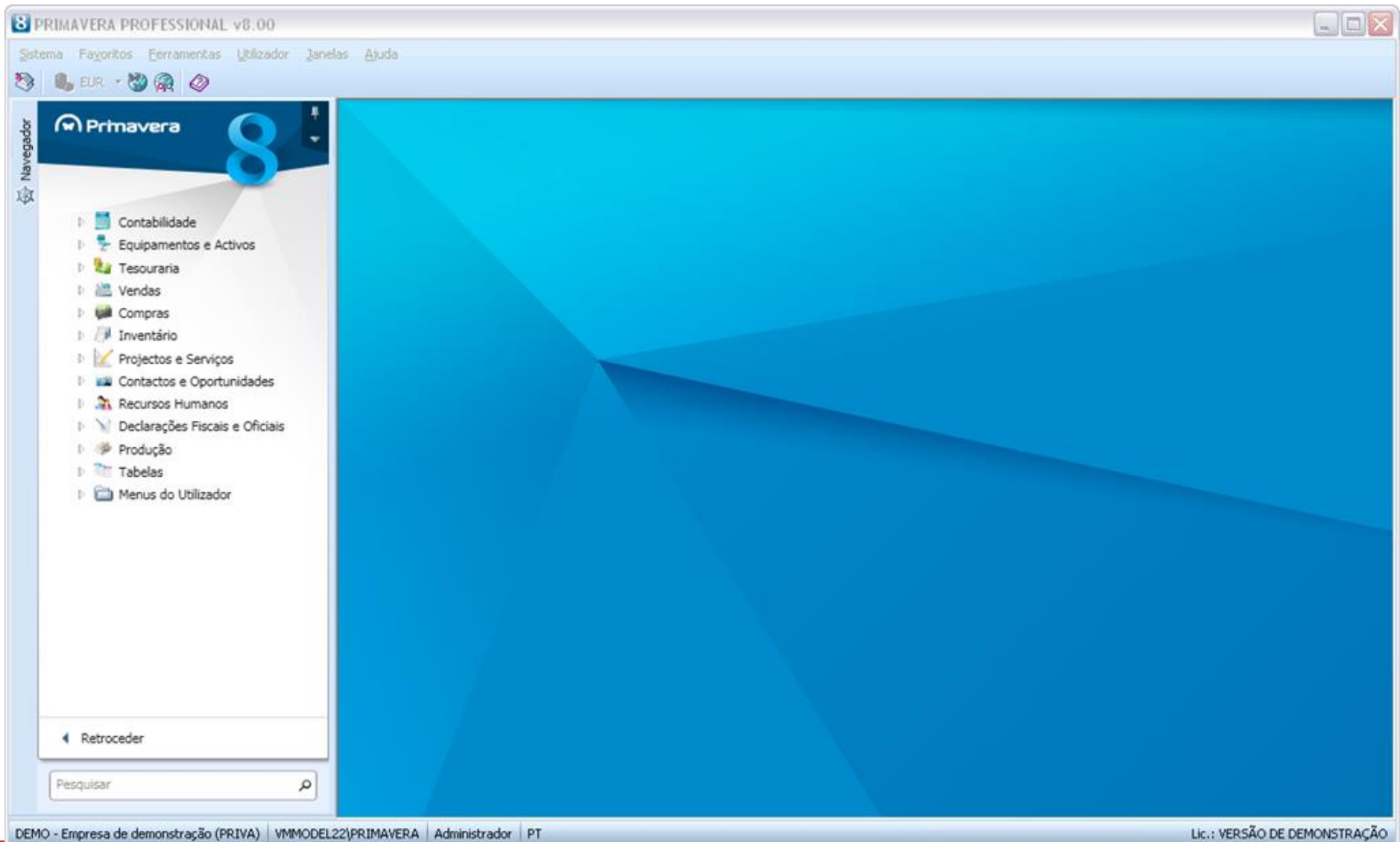
H	C	C	T	T	Title	Prede...	Workflow...	Start	Finish	%...	Dur...
			0		MSP: crane demo rev ...		WA (waitin...	Tue 09/01/09	Mon 10/05/09	0	206h
			1		Engineering		WA (waitin...	Tue 09/01/09	Tue 09/08/09	0	59h
			2		Product Specs se...		WA (waitin...	Tue 09/01/09	Tue 09/01/09	0	2h
			3		Engineer designs ...	2	WA (waitin...	Tue 09/01/09	Wed 09/02/09	0	12h
			4		Crane designs se...	3	WA (waitin...	Wed 09/02/09			
			5		Custom mfn/parts		WA (waitin...	Tue 09/01/09			
- (dm2) Project status, running model (RUN) - Project: 90005:** A Gantt chart showing project progress across quarters from 2007 to 2009. Below it is a table for capacity:
 

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Planned demand	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total capacity	0.00	0.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
- Bottom Panel:** A table listing project details (ID, Project, and quarterly status) and a 'Project setup' panel with buttons like 'Start project workflow', 'Clear schedule', and 'Schedule project'.

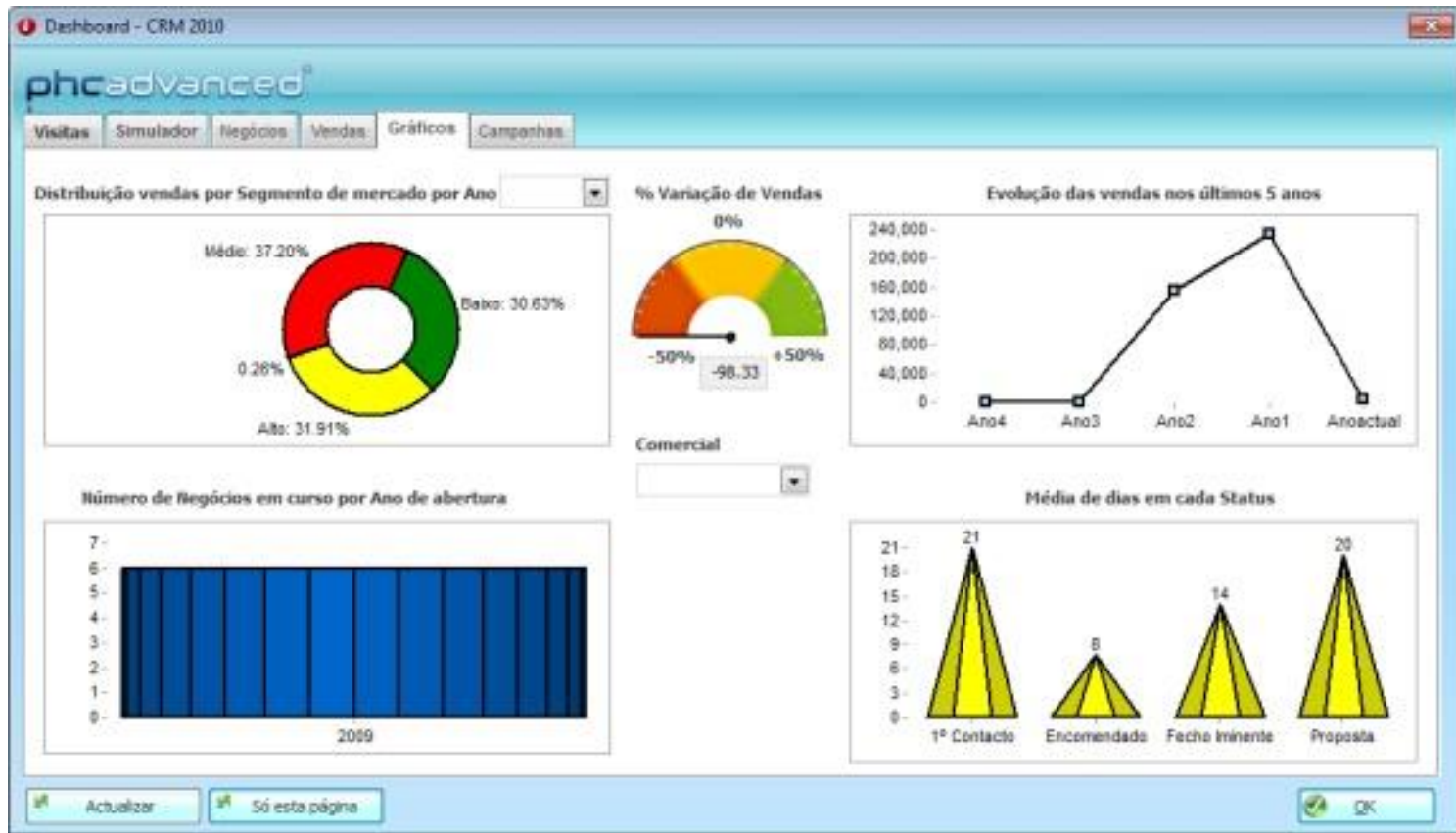
# National Market



# Primavera



# PHC





# Open Source

odoo

Dolibarr<sup>ERP/CRM</sup>

openbravo<sup>®</sup>

Tryton

ERP5

ofbiz<sup>™</sup> The Apache Open for Business Project

COMPIERE



weberERP

erpnext



FrontAccounting<sup>ERP</sup>

Kwa  
Moja

# WEBERP

The screenshot displays the webERP user interface. At the top left, it shows the user 'weberdemo' as 'Demonstration user'. The top right contains navigation links: 'Main Menu', 'Customers', 'Items', 'Suppliers', 'Manual', and 'Logout'. The main menu is divided into three columns: 'Sales', 'Transactions', and 'Inquiries and Reports'. The 'Sales' column lists various business functions like 'Receivables', 'Payables', 'Purchases', 'Inventory', 'Manufacturing', 'General Ledger', 'Asset Manager', 'Petty Cash', 'Setup', and 'Utilities'. The 'Transactions' column lists actions such as 'Enter An Order or Quotation', 'Enter Counter Sales', 'Print Picking Lists', 'Outstanding Sales Orders/Quotations', 'Special Order', 'Recurring Order Template', and 'Process Recurring Orders'. The 'Inquiries and Reports' column lists numerous reports including 'Order Inquiry', 'Print Price Lists', 'Order Status Report', 'Orders Invoiced Reports', 'Daily Sales Inquiry', 'Sales By Sales Type Inquiry', 'Sales By Category Inquiry', 'Top Sellers Inquiry', 'Order Delivery Differences Report', 'Delivery In Full On Time (DIFOT) Report', 'Sales Order Detail Or Summary Inquiries', 'Top Sales Items Report', 'Worst Sales Items Report', and 'Sales With Low Gross Profit Report'. Below these lists are sections for 'Standard Reports and Forms' and 'Custom Reports', both indicating 'There are no reports to show!'. A 'Maintenance' column on the right lists 'Select Contract' and 'Create Contract'. The footer includes the webERP logo, version information (4.09), copyright (2004-2012), the website (weberp.org), and the date/time (Saturday 6 October 19:11).

weberdemo Demonstration user

Main Menu Customers Items Suppliers Manual Logout

### Main Menu

- Sales
- Receivables
- Payables
- Purchases
- Inventory
- Manufacturing
- General Ledger
- Asset Manager
- Petty Cash
- Setup
- Utilities

#### Transactions

- Enter An Order or Quotation
- Enter Counter Sales
- Print Picking Lists
- Outstanding Sales Orders/Quotations
- Special Order
- Recurring Order Template
- Process Recurring Orders

#### Inquiries and Reports

- Order Inquiry
- Print Price Lists
- Order Status Report
- Orders Invoiced Reports
- Daily Sales Inquiry
- Sales By Sales Type Inquiry
- Sales By Category Inquiry
- Top Sellers Inquiry
- Order Delivery Differences Report
- Delivery In Full On Time (DIFOT) Report
- Sales Order Detail Or Summary Inquiries
- Top Sales Items Report
- Worst Sales Items Report
- Sales With Low Gross Profit Report

Standard Reports and Forms

There are no reports to show!

Custom Reports

There are no reports to show!

#### Maintenance

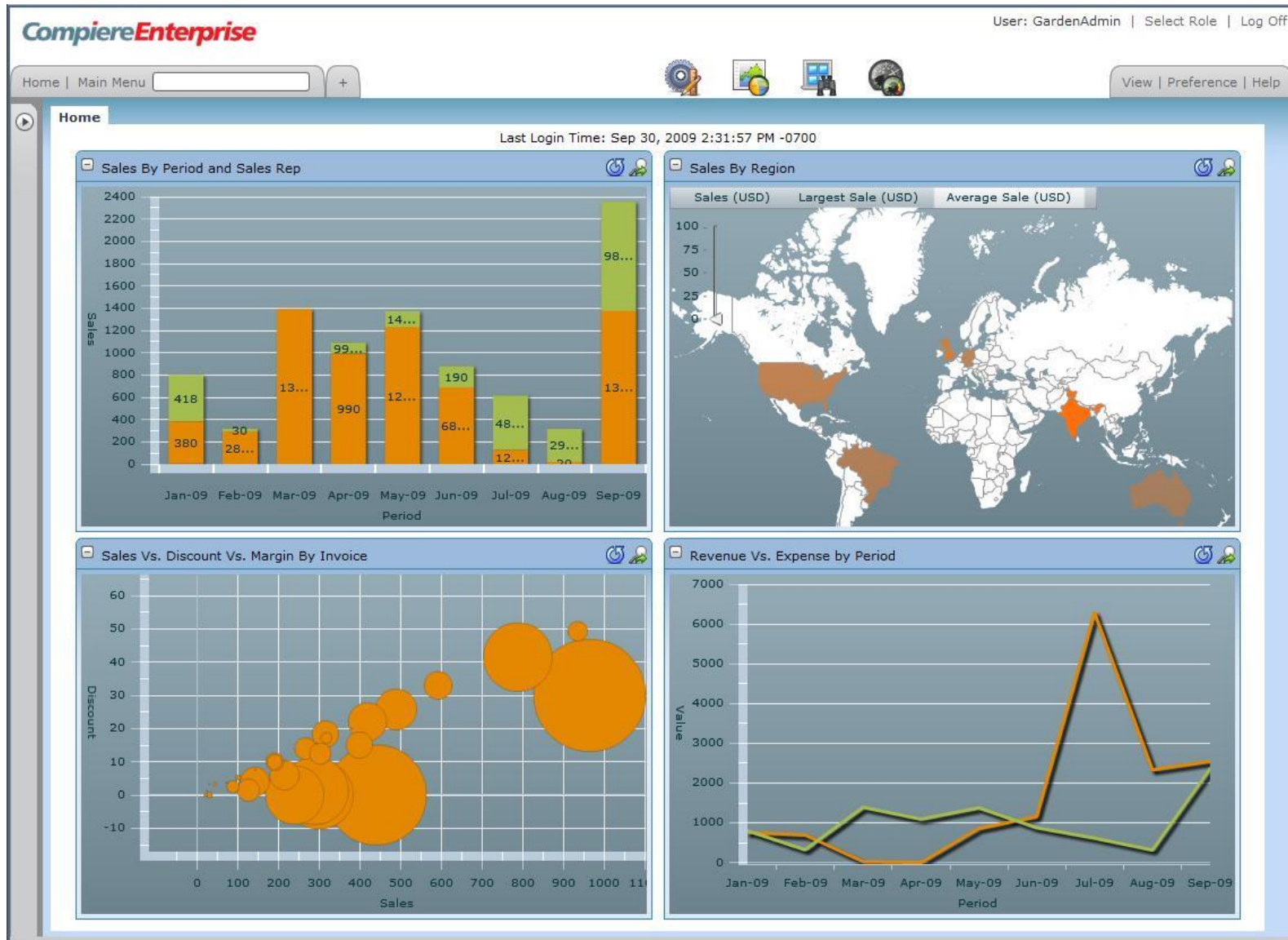
- Select Contract
- Create Contract

webererp webERP version 4.09 Copyright © 2004 - 2012 [weberp.org](http://weberp.org) Saturday 6 October 19:11

# OpenBravo

The screenshot displays the OpenBravo web application interface. At the top, the header includes the company name "yourCOMPANY", navigation links for "Sales Management", "Analysis Tools", and "Sales Dimensional Report", and the OpenBravo logo. A left-hand navigation menu lists various system modules such as "General Setup", "Master Data Management", "Sales Management", and "Financial Management". The main content area is titled "Sales Dimensional Report" and contains several filter sections: "Primary Filters" with date and amount fields, "Secondary Filters" with dropdown menus for Organization, Warehouse, Business Partner Group, Product Group, Business Partner, Product, Commercial Document, and Commercial File, "Dimensions" with a list of dimensions and a selection box, "Sort" with radio buttons for Standard, By Ascending Amount, and By Descending Amount, and "View Results" with buttons for HTML and PDF formats. A red error message states "\* This value is required." next to the "Amount Greater Than" field.

# Compiere



# FrontAccounting

Sales Purchases Items and Inventory Manufacturing Dimensions Banking and General Ledger Setup

Monkeypantz | localhost | Administrator Preferences Change password Logout

## Company Setup

- Company Setup
- User Accounts Setup
- Access Setup
- Display Setup
- Forms Setup
- Taxes
- Tax Groups
- Item Tax Types
- System and General GL Setup
- Fiscal Years
- Print Profiles

## Miscellaneous

- Payment Terms
- Shipping Company
- Points of Sale
- Printers
- Contact Categories

## Maintenance

- Void a Transaction
- View or Print Transactions
- Attach Documents
- System Diagnostics
- Backup and Restore
- Create/Update Companies
- Install/Update Languages
- Install/Activate Extensions
- Install/Activate Themes
- Install/Activate Chart of Accounts
- Software Upgrade

06/10/2011 | 06:17 pm

# ADempiere

The screenshot displays the ADempiere web interface in a browser window. The address bar shows the URL <http://www.testadempiere.com/webui/>. The user is logged in as SuperUser@System.\*. The main menu includes 'Menu (10)', 'Window, Tab Field', and 'Table and Column'. The 'Table and Column' window is active, showing configuration for the 'AD\_AccessLog' table. The table is associated with the 'System' client and 'Access Audit' window. The description is 'Log of Access to the System'. The table is active and records are deletable. The data access level is 'System+Client'. The table has six columns: AD\_Column\_ID, AD\_Client\_ID, AD\_Column\_ID, AD\_Org\_ID, AD\_Table\_ID, and Created.

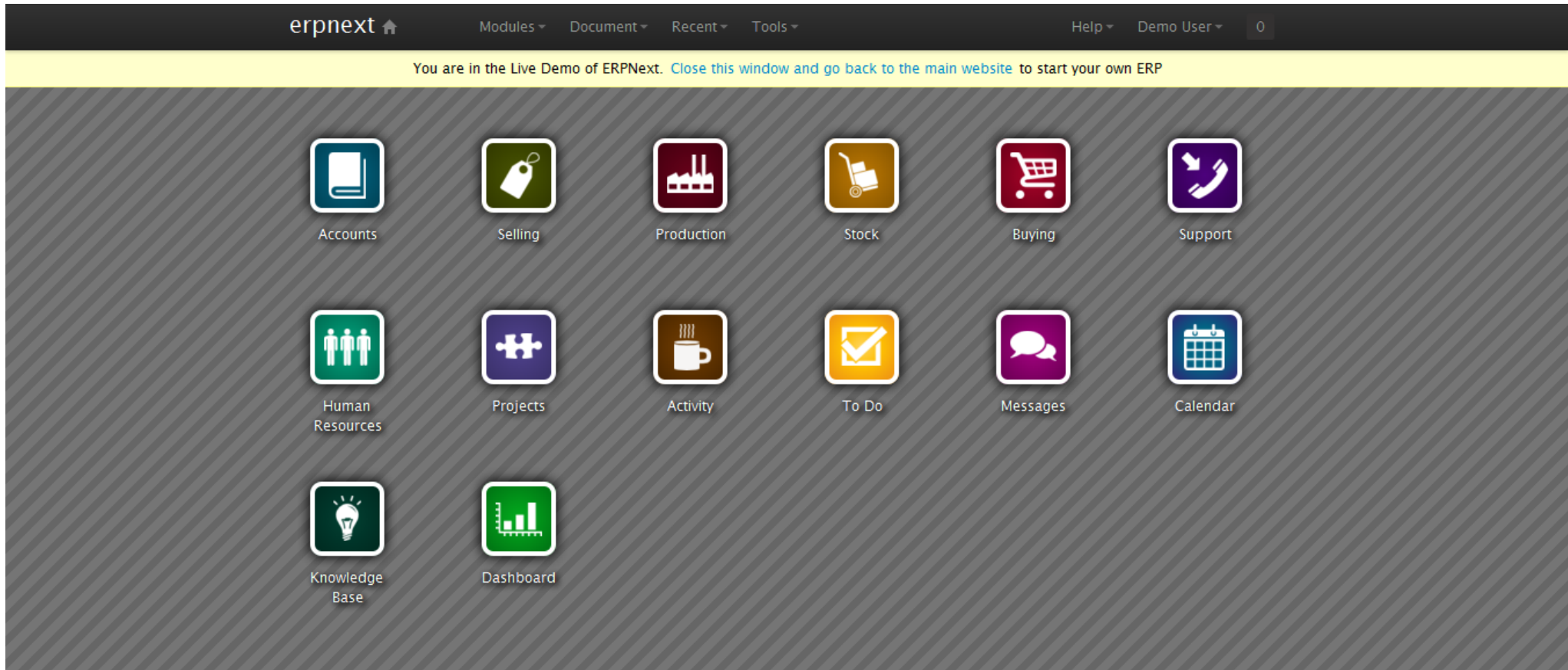
**Table Configuration:**

- Client: System
- Organization: \*
- DB Table Name: AD\_AccessLog
- Name: Access Log
- Description: Log of Access to the System
- Comment/Help: (empty)
- Active:
- View:
- Maintain Change Log:
- Data Access Level: System+Client
- Window: Access Audit
- PO Window: (empty)
- High Volume:
- Records deletable:
- Entity Type: Dictionary

**Column Configuration:**

Client	Organization	Table	DB Column Name	Column SQL
System	*	AD_AccessLog_Ac...	AD_Column_ID	
System	*	AD_AccessLog_Ac...	AD_Client_ID	
System	*	AD_AccessLog_Ac...	AD_Column_ID	
System	*	AD_AccessLog_Ac...	AD_Org_ID	
System	*	AD_AccessLog_Ac...	AD_Table_ID	
System	*	AD_AccessLog_Ac...	Created	

# ERPNext



# Invoice software certification (Portugal)



- Law:

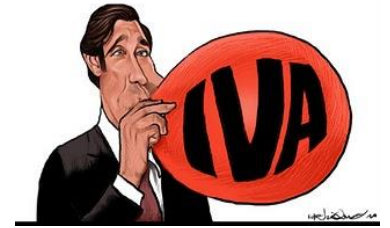
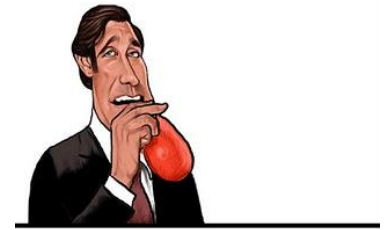
- Portaria n.º 363/2010, de 23 de Junho
- Portaria n.º 22-A/2012, de 24 de janeiro
- Portaria n.º 340/2013, de 22 de novembro
- Especificação dos requisitos técnicos – Despacho n.º 8632/2014 de 03 de julho, do Diretor-Geral da AT
- [http://info.portaldasfinancas.gov.pt/pt/apoio\\_contribuinte/CertificacaoSoftware.htm](http://info.portaldasfinancas.gov.pt/pt/apoio_contribuinte/CertificacaoSoftware.htm)

- List of certified software

- <https://www.portaldasfinancas.gov.pt/pt/TC/Out/consultaProgCertificadosM24.action?&pagina=22>



# Invoice



- *Invoice*
- Legal definition(**código art. 36º CIVA**)
  - [http://info.portaldasfinancas.gov.pt/pt/informacao\\_fiscal/codigos\\_tributarios/civa\\_rep/iva36.htm](http://info.portaldasfinancas.gov.pt/pt/informacao_fiscal/codigos_tributarios/civa_rep/iva36.htm)
- Issuing of copy of invoice till 5 days after transaction
- Data and numbers sequential order
- Name of company, Address and Tax Number
- Quantities and Item names
- Price without taxes and tax rate applied
- Date where itens were supplied to client

# e-fatura



- <https://faturas.portaldasfinancas.gov.pt/>



# Electronic Invoice



Electronic Invoice = *Fatura Electronica*

*E-Fatura* != *Fatura Electronica*

# Integrating eGov and eBanking

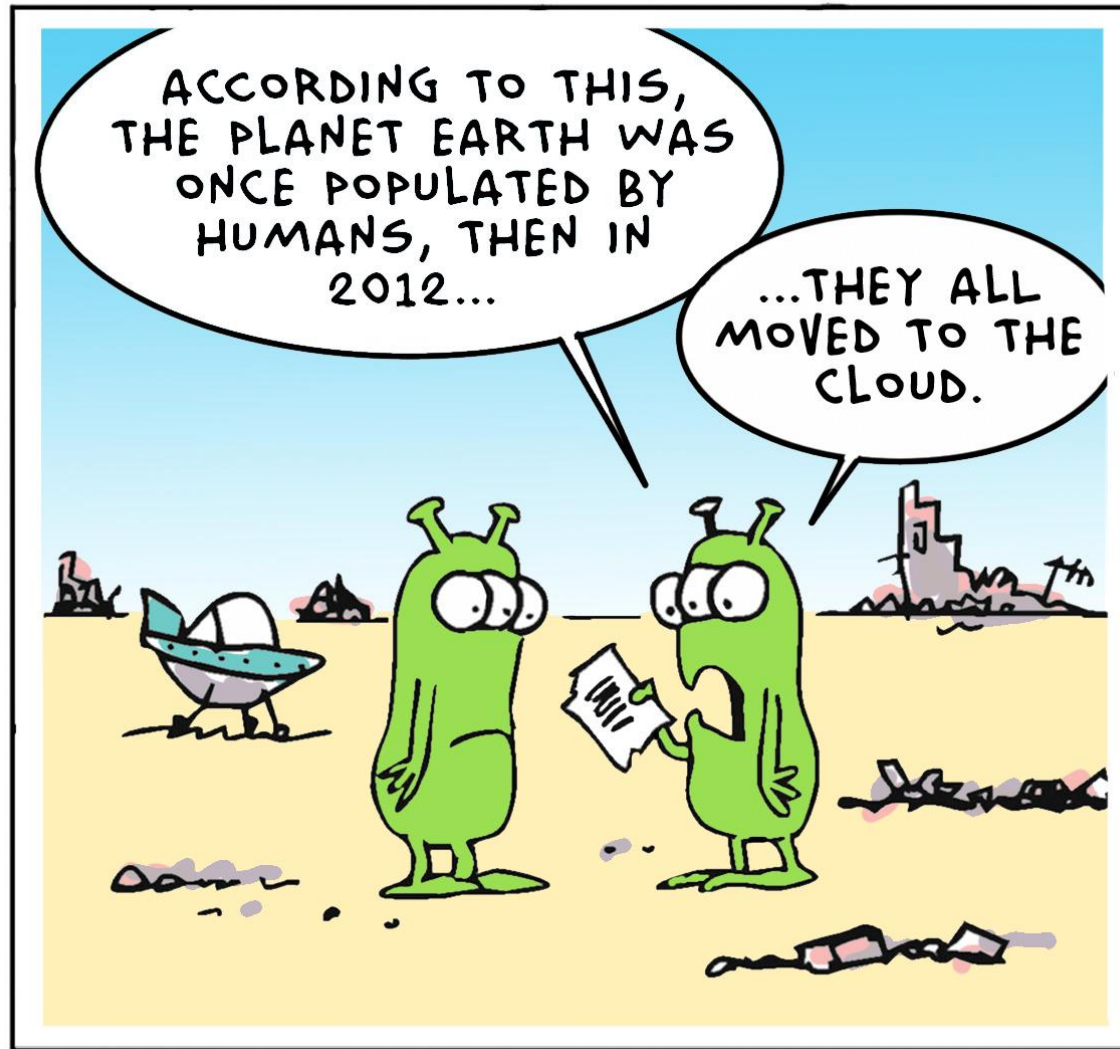


## The joy of e-Government:



© 1997 by Randy Glasbergen. E-mail: [randyg@norwich.net](mailto:randyg@norwich.net)  
<http://www.norwich.net/~randygtoon.html>





# Sites

- Associação de Empresas de Software de Open Source de Portugal (<http://www.esop.pt/>)
- Associação Portuguesa de Software (<http://www.assoft.org/>)
- Dynamics (<http://www.microsoft.com/en-us/dynamics/>)
- OdoO (<https://www.odoo.com/>)
- Oracle  
(<https://www.oracle.com/applications/enterprise-resource-planning/>)
- PHC (<http://www.phc.pt/>)
- PrimaveraBSS (<http://www.primaverabss.com>)
- Sage (<http://www.sage.com/>)
- SAP (<http://www.sap.com>)
- Tryton (<http://www.tryton.org/>)

# Some References

Ana Duarte and Carlos J. Costa. 2012. Information systems: life cycle and success. In Proceedings of the Workshop on Information Systems and Design of Communication (ISDOC '12). ACM, New York, NY, USA, 25-30. DOI=10.1145/2311917.2311923 <http://doi.acm.org/10.1145/2311917.2311923>

Carlos J. Costa and Manuela Aparicio. 2011. ERP and assistance systems. In Proceedings of the 11th WSEAS international conference on Applied informatics and communications and Proceedings of the international conference on Computational engineering in systems applications (AIASABEBI'11), Myriam Lazard, Andris Buikis, S. Yuriy Shmaliy, Roberto Revetria, and Nikos Mastorakis (Eds.). World Scientific and Engineering Academy and Society (WSEAS), Stevens Point, Wisconsin, USA, 216-221.

Carlos J. Costa, Edgar Ferreira, Fernando Bento, and Manuela Aparicio. 2016. Enterprise Resource Planning Adoption and Satisfaction Determinants," *Comput. Hum. Behav.*, vol. 63, no. C, pp. 659–671, Oct.

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Carlos J. Costa. 2010. Testing usability of ERP open source systems. In Proceedings of the Workshop on Open Source and Design of Communication (OSDOC '10). ACM, New York, NY, USA, 25-30. DOI=10.1145/1936755.1936763 <http://doi.acm.org/10.1145/1936755.1936763>

Costa, C.J., Aparicio, M. and Raposo, J., 2020. Determinants of the management learning performance in ERP context. *Heliyon*, 6(4), p.e03689.

Mario Batista, Carlos J. Costa, and Manuela Aparicio. 2013. ERP OS localization framework. In Proceedings of the Workshop on Open Source and Design of Communication (OSDOC '13). ACM, New York, NY, USA, 1-8. DOI=10.1145/2503848.2503849 <http://doi.acm.org/10.1145/2503848.2503849>

Nuno G. Lopes and Carlos J. Costa. 2008. ERP localization: exploratory study in translation: European and Brazilian Portuguese. In Proceedings of the 26th annual ACM international conference on Design of communication (SIGDOC '08). ACM, New York, NY, USA, 93-98. DOI=10.1145/1456536.1456555 <http://doi.acm.org/10.1145/1456536.1456555>

Siar Sarferaz, 2022. ERP Market Analysis. In: *Compendium on Enterprise Resource Planning*. Springer, Cham. [https://doi.org/10.1007/978-3-030-93856-7\\_2](https://doi.org/10.1007/978-3-030-93856-7_2)