



KEEP

KEEPING EMULATION ENVIRONMENTS PORTABLE

Emulation Framework

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OPF Hackathon, Freiburg

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Emulation Expert Meeting - 2006

- Milestone in emulation R&D for Digital Preservation
- Because:
 - Brought together emulation experts in 1 room
 - Acknowledged the need for emulation strategies for long-term preservation
 - Set the scene by defining a roadmap for the years to come...

http://www.kb.nl/hrd/dd/dd_projecten/projecten_emulatie-eemstatement-en.html

Where are we...

Nr	Roadmap step	Achievement
1	Create and demonstrate emulators.	Done!
2	Develop fidelity criteria.	?
3	Develop validation test suites.	?
4	R&D device-independent input/output mechanisms.	Partly done in KEEP, bwFLA
5	Develop methods for capturing and preserving contextual information.	Partly done by Freiburg, PLANETS project.
6	Develop methods for describing, managing, and automatically interpreting information about the versions and configurations of software and hardware needed to render digital artifacts under emulation.	Done bwFLA & KEEP (EF), should be enhanced.
7	Define and develop a long-lived emulation environment (EVM)	Partly done in KEEP project with Emulation Framework and KEEP Virtual Machine.
8	Develop network-based services for providing remote access.	In progress!

I want emulation! But how?

Challenges:

- Only techies can operate emulators
- Data captured on old media carriers
- Original software required
- Legal implications
- Missing manuals & tutorials (how-to's)
- Old environments = for old people

The KEEP project



Facts and Figures:

2009 – 2012

8 partners ranging from libraries and universities to gaming industry

EC funding: M€3 through the FP7 ICT Work





What is the Emulation Framework?

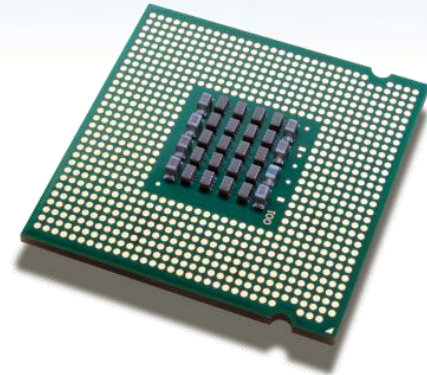
**An integrated approach to long-term
access for any digital object in its original
context**

What is the Emulation Framework?



7 emulators

Dioscuri, Qemu, VICE, UAE,
BeebEm, JavaCPC, Thomson



6 platforms

x86, C64, Amiga, BBC Micro,
Amstrad, Thomson T07

30+ file formats

e.g. PDF, TXT, XML, JPG, TIFF, PNG, BMP, Quark, ARJ, EXE,
disk/tape images

What is the Emulation Framework?

A solution for:

- Managing emulation tools
- Emulation environment decision support
- Automating setup of emulation processes
- Supporting users in operating old computer environments

Can be integrated with existing archiving solutions



How it works...

An overview of the EF workflow

How it works...

1
Prepares all required software, configures emulator and loads object.

2
Emulator is automatically started with the digital object contained.

Digital object

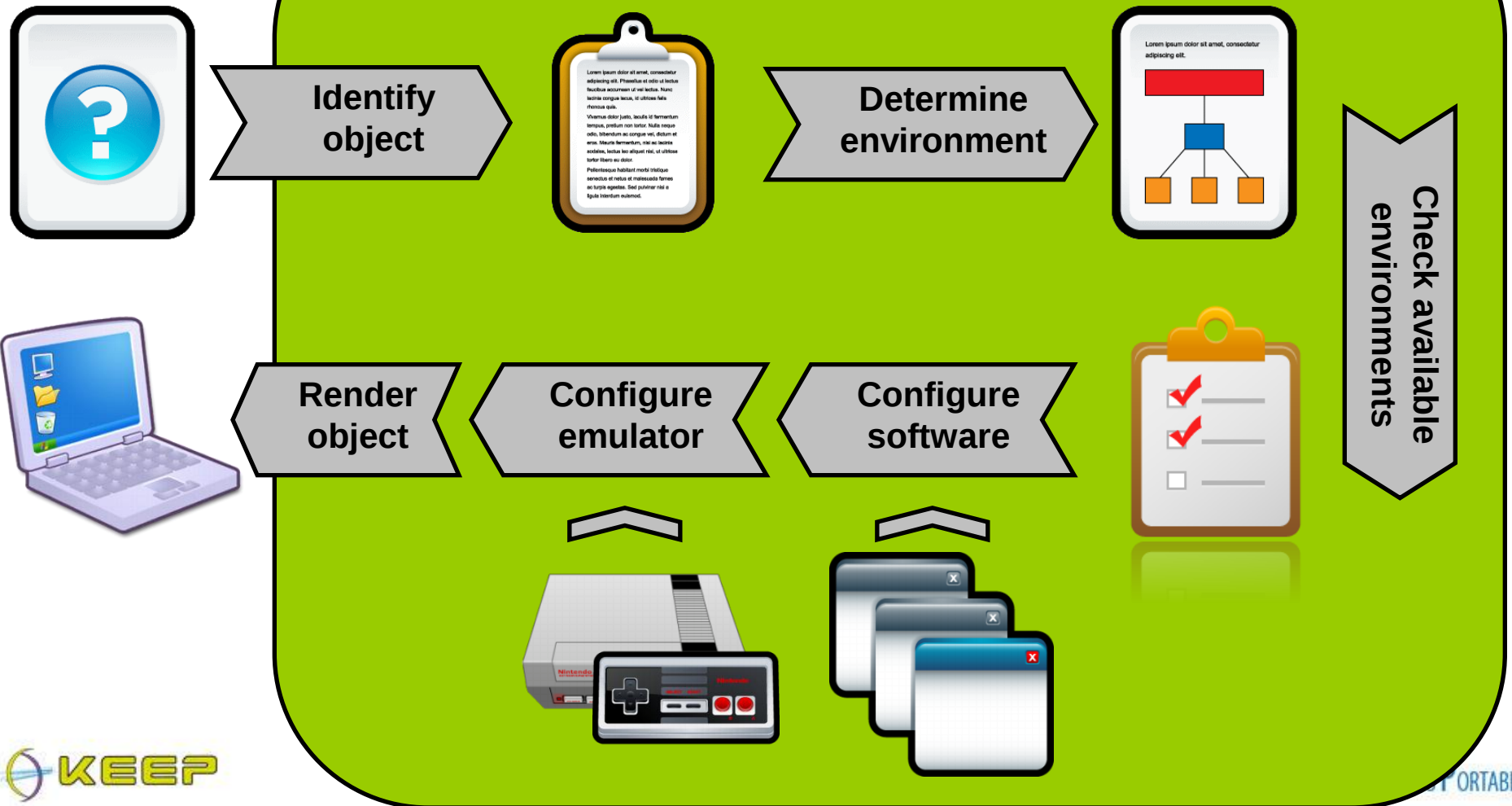
Emulation Framework

Emulator

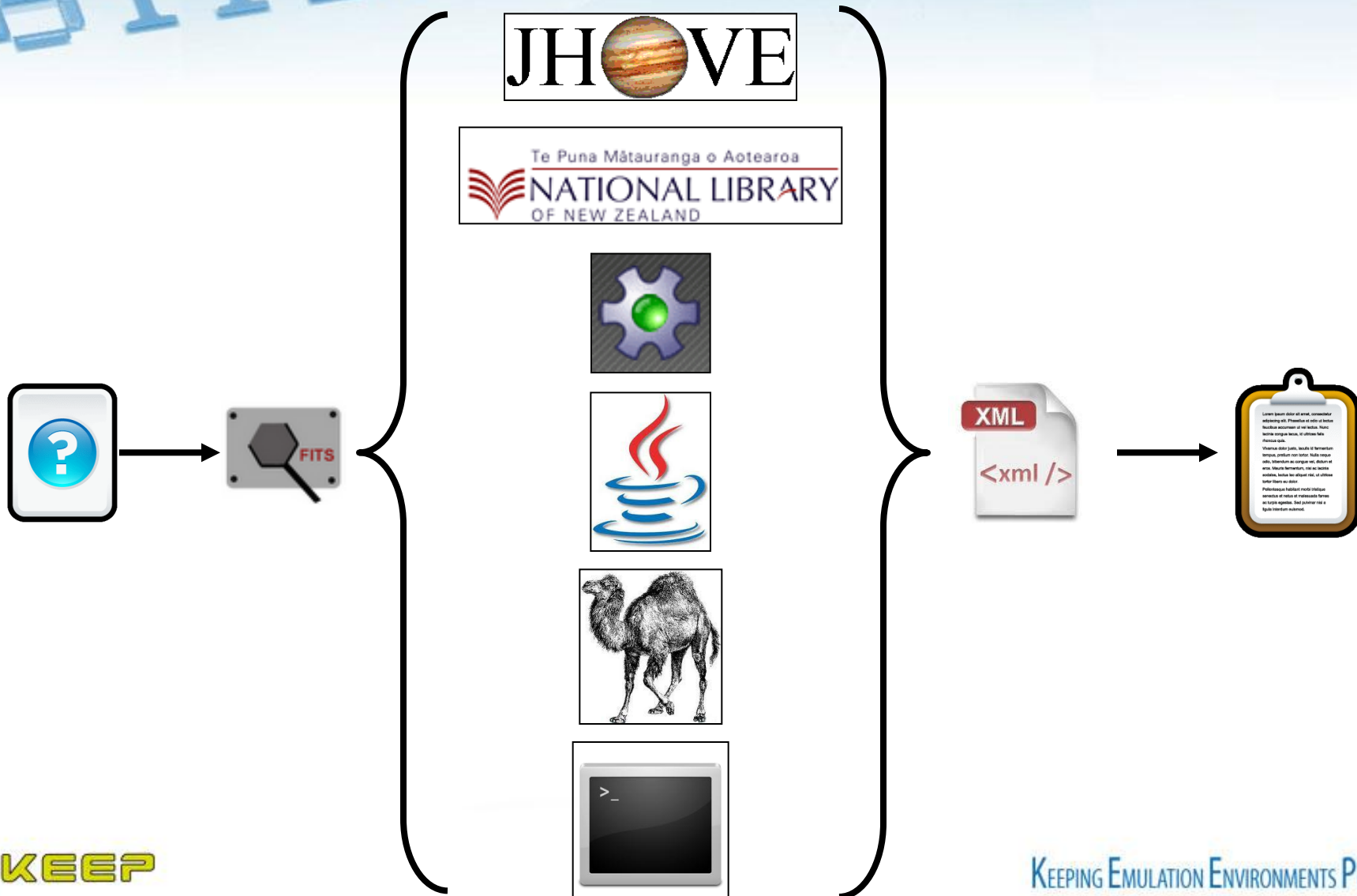


Emulation Framework workflow

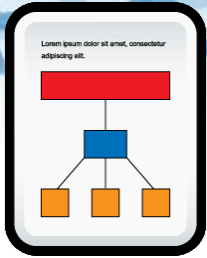
Emulation Framework



Step 1: Identification



Step 2: Determine environment



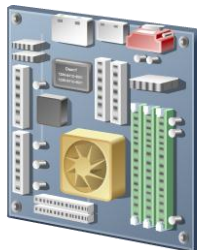
Digital object format



Rendering application



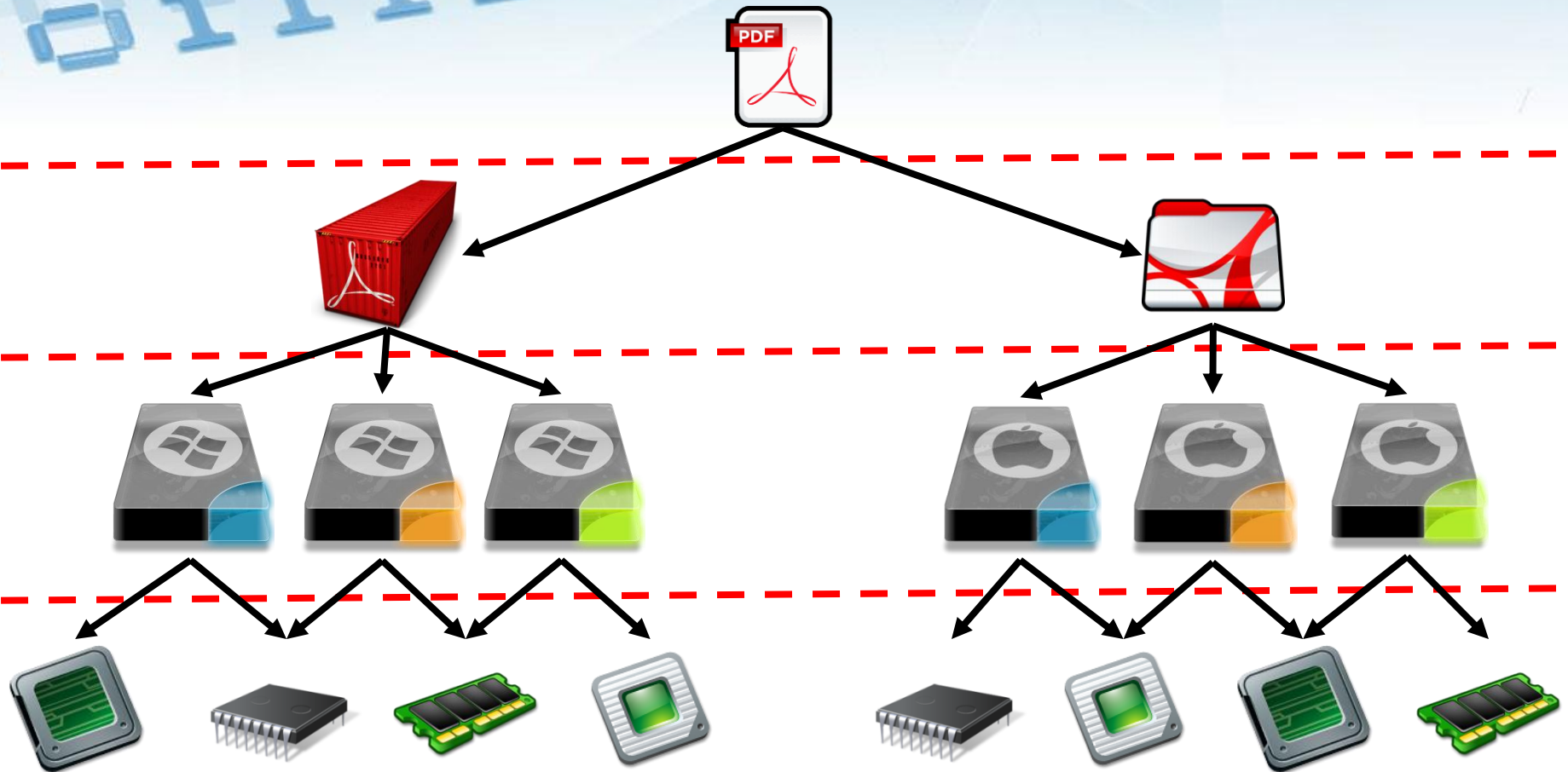
Operating system



Hardware platform



Step 3: Construct environment

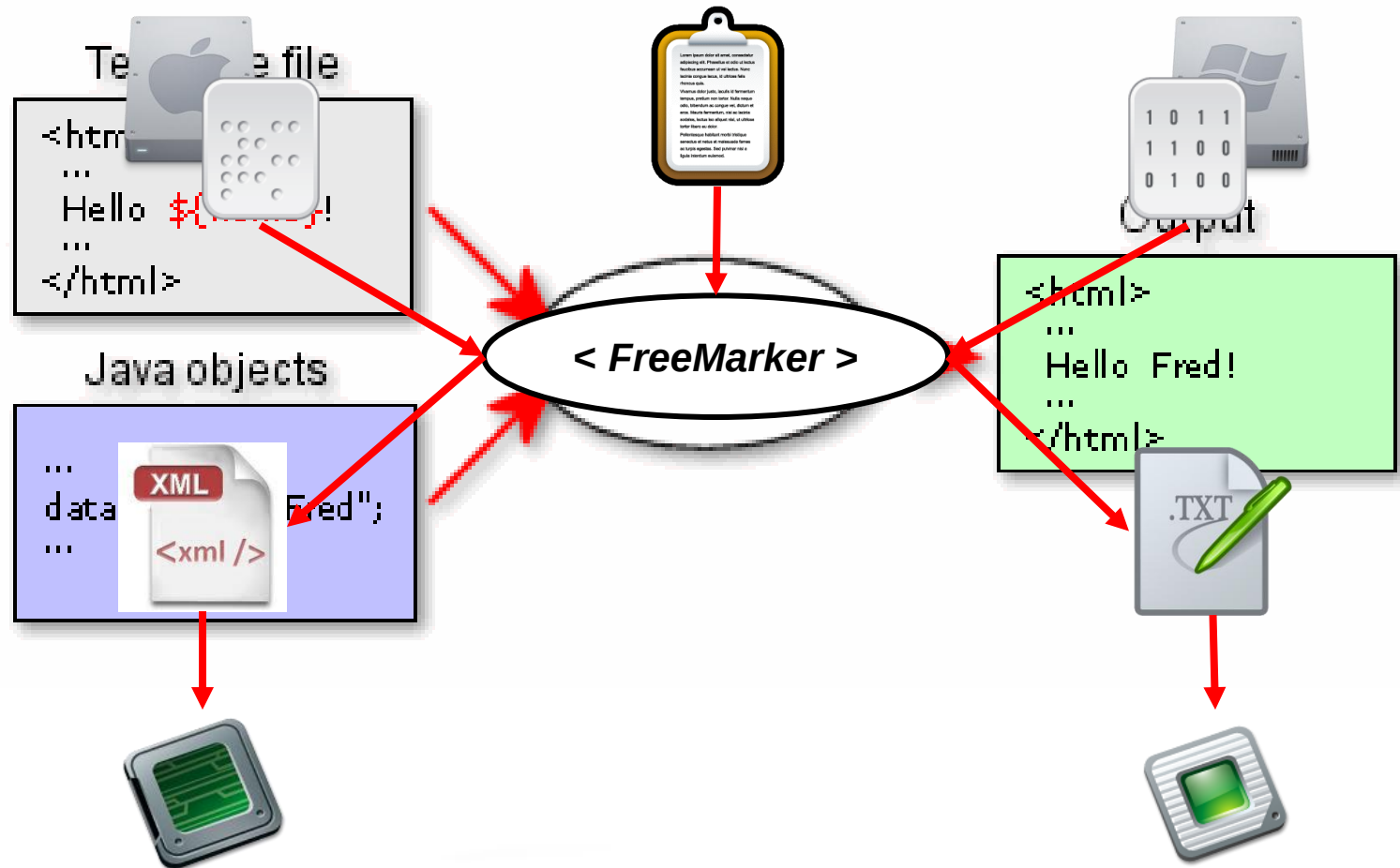


The **technical** registry
PRONOM

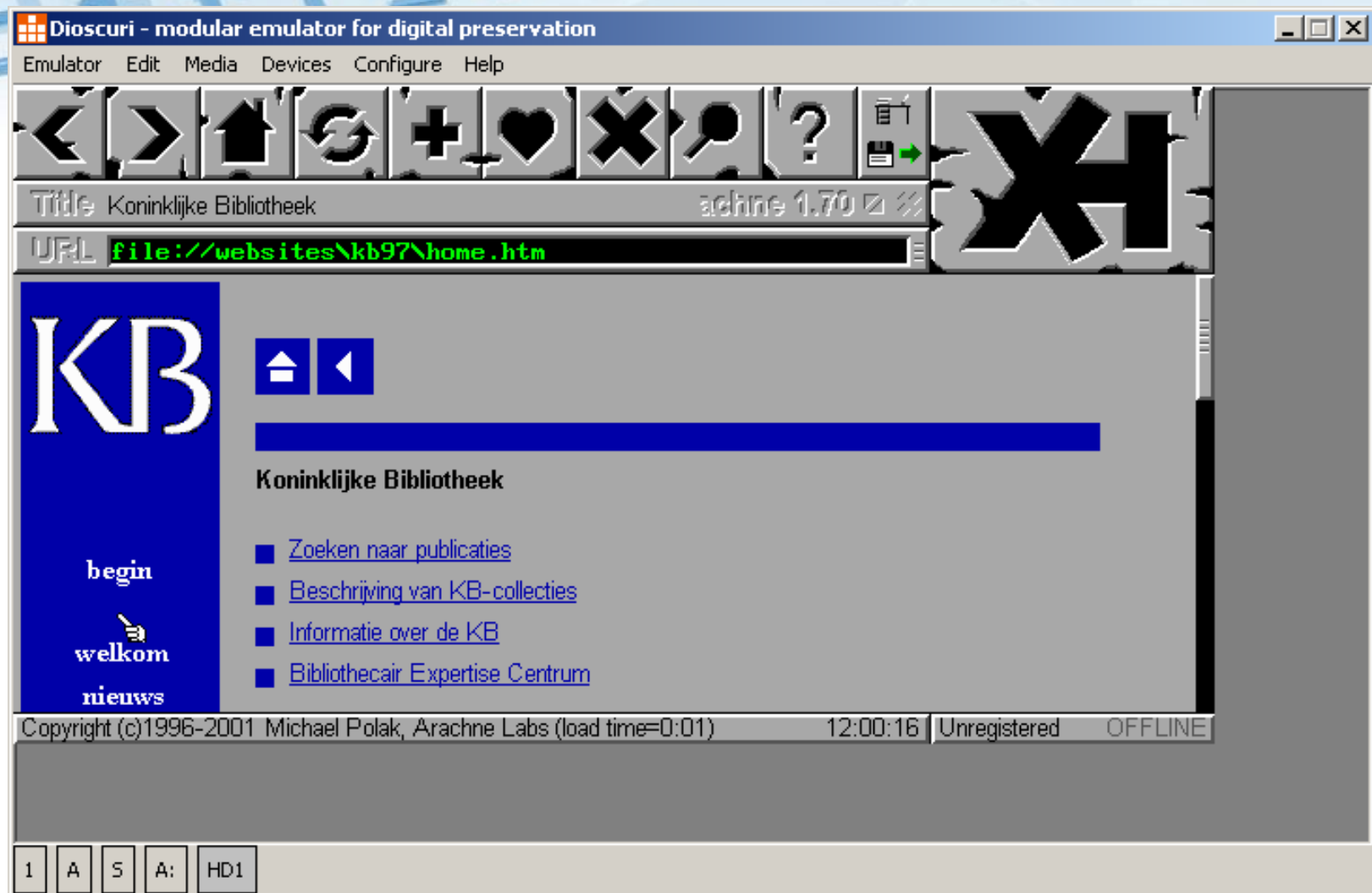
**KEEP technical
metadata database**

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Step 4: Configuration



Step 5: Rendering

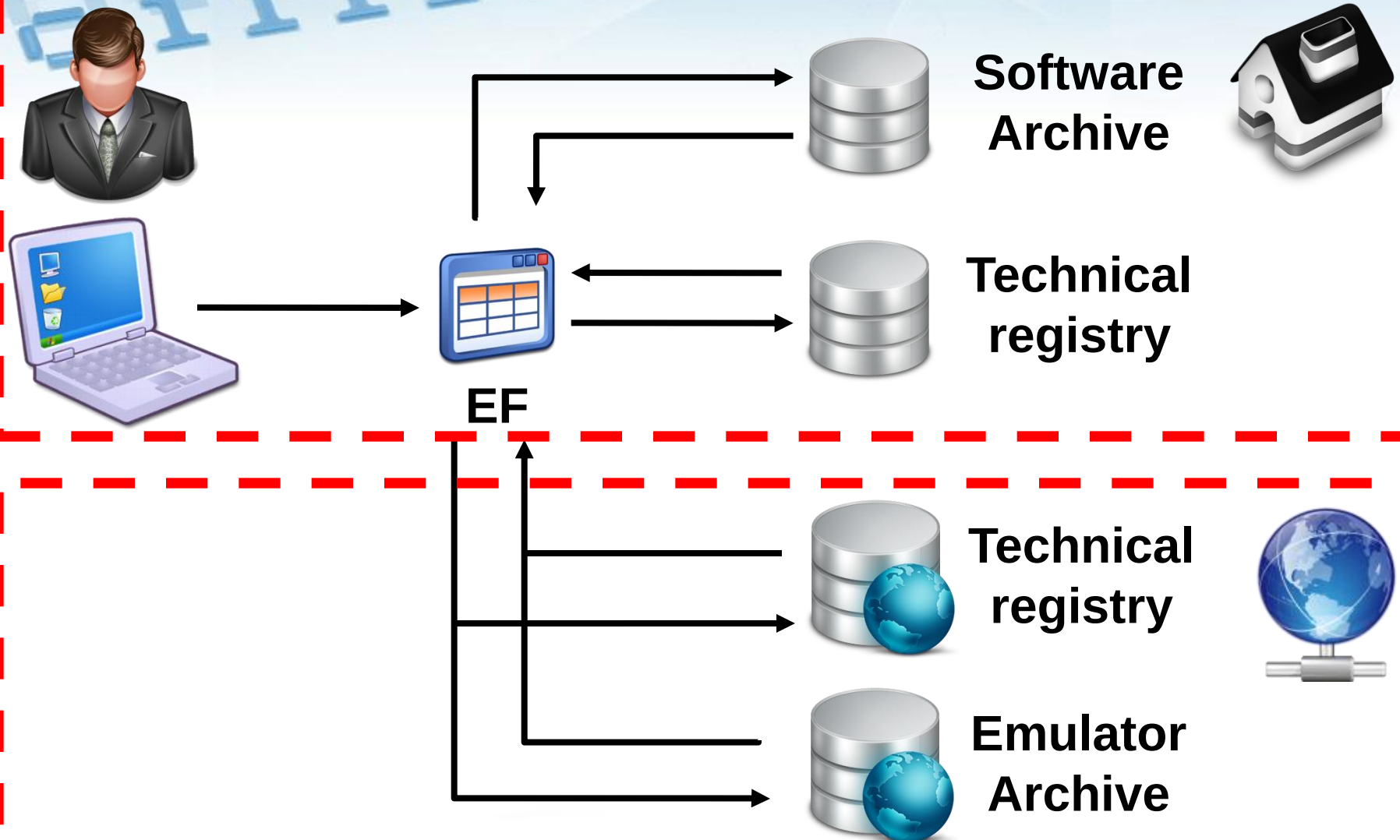




Architecture

How the EF is scalable to any need

Architectural overview



Two web services

**Emulator
Archive service**



**Software
Archive service**



SOAP messages



SOAP messages



Emulation Framework Demo

(Version 2.1.0 – April 2012)



Users

Who is using the EF?

Who already benefits from the EF

- Bibliothèque nationale de France
- Computerspielmuseum Berlin
- Tessella
- National Library of the Netherlands

{ BnF

computerspiele
museum

 Tessella
Technology & Consulting

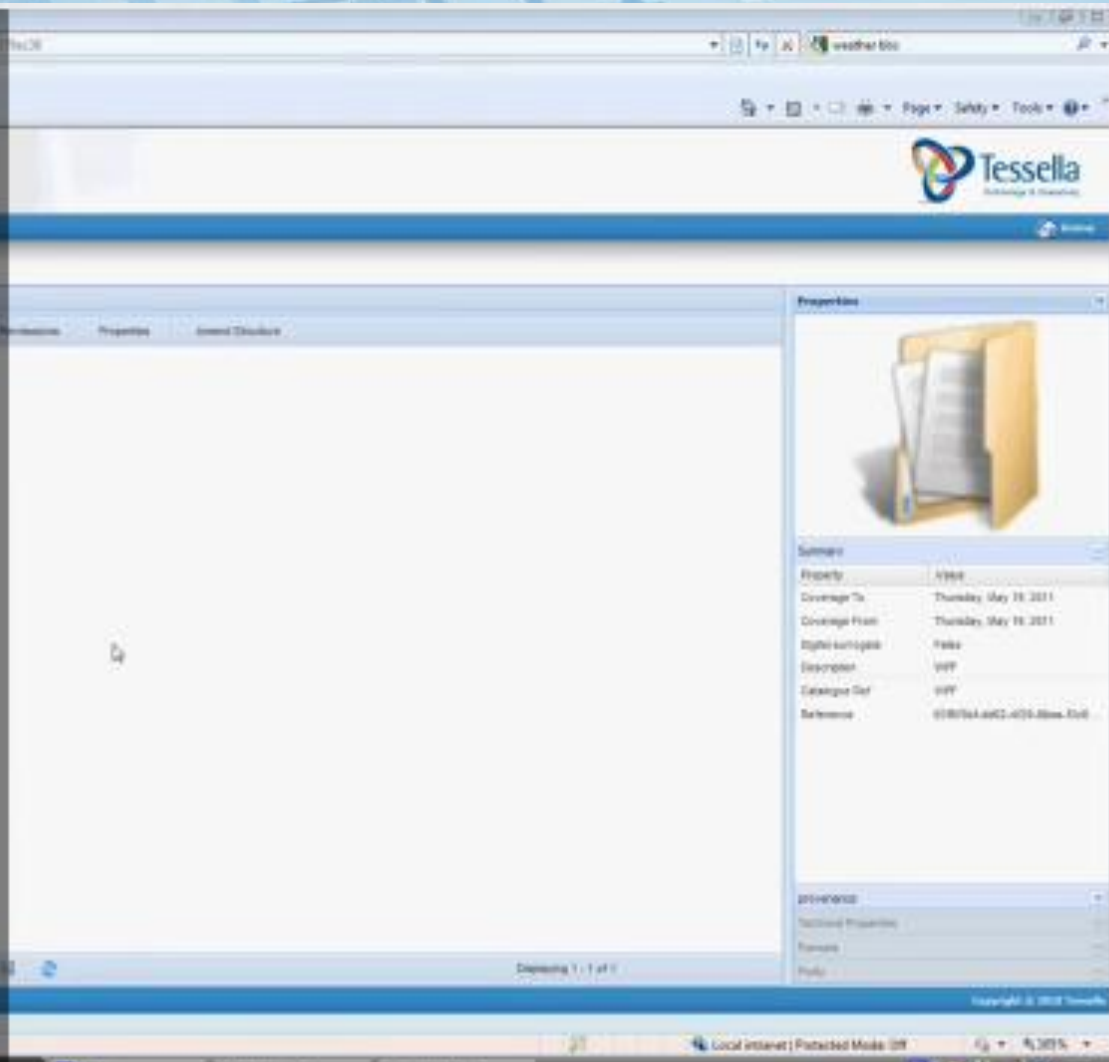
KB

- BnF has a database system for access to audiovisual publications.
- The Emulation Framework has been integrated within this system to provide a new analysis tool and emulator launcher.
- The EF is particularly adapted to help researchers with file and image formats that were previously unknown by the BnF platform. It also proved useful to analyse individual files extracted from the publications' images.

- A private museum for interactive digital entertainment. The collection includes about 23,000 games for almost every videogame console and computer system, from the 1970s until today.
- The preservation strategy of the museum is based on emulation.
- With the Emulation Framework the customization of emulators and mounting of image files has become unnecessary

- Tessella's Safety Deposit Box (SDB) delivers a range of services for storing and preserving critical digital information in a highly reliable yet accessible manner.
- As a PoC, the engine (core) of the Emulation Framework has now been integrated with SDB, providing an emulation accessibility pathway for those objects that are difficult to migrate.

Emulation Framework integration with Safety Deposit Box (SDB)



0:03 / 1:48



In overview

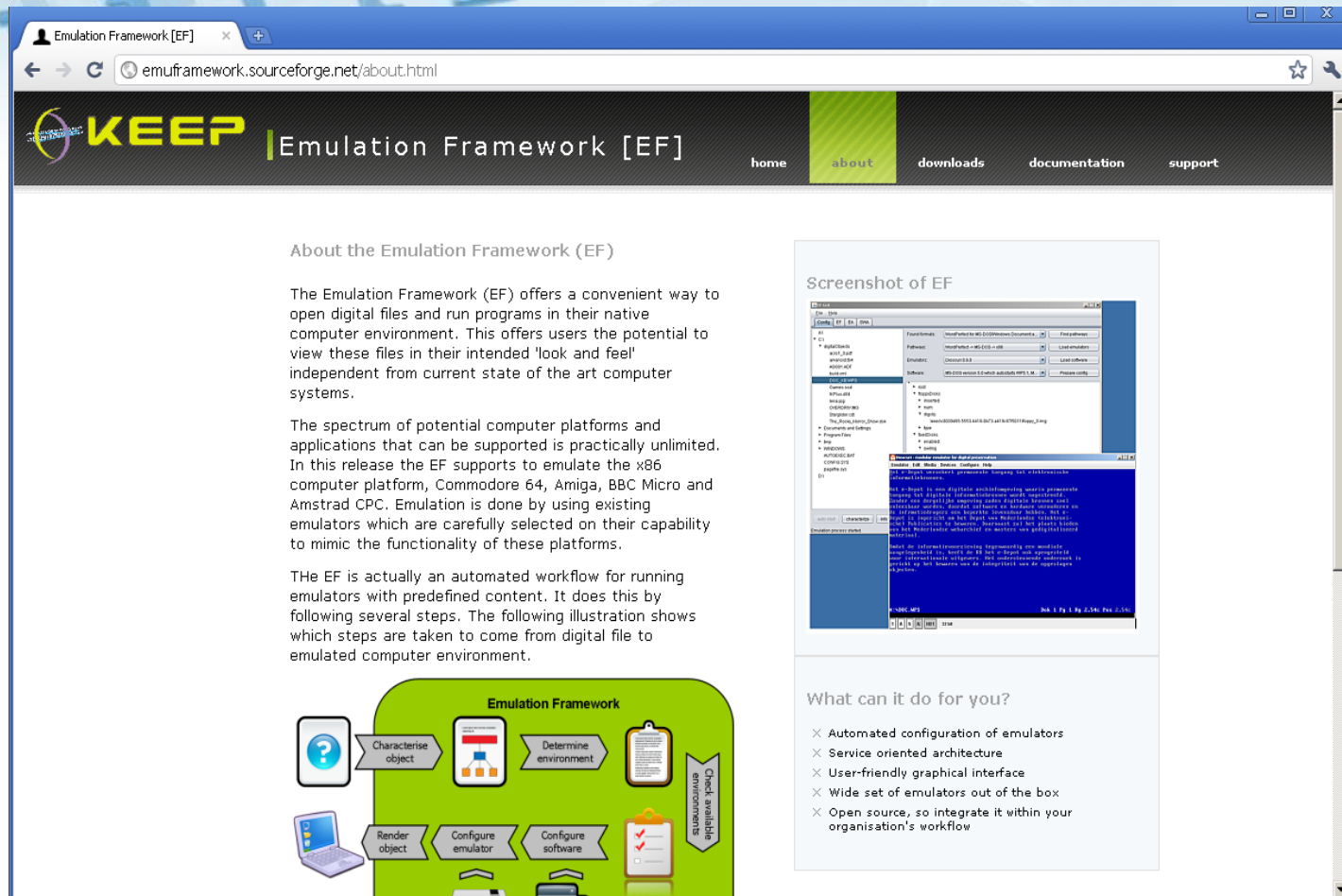
- ...at least 6 computer platforms via emulation
- ...access to at least 30 file formats
- ...no headache setting up the emulation environment
- ...an organised way to store your software and emulators
- ...support in operating the environment

What the hack!

Improvements for EF:

- Adding new file formats  
- Adding emulators   
- Extend metadata of emulators & software 
- Updating FITS   
- Adding new languages in GUI 

http://emuframework.sf.net



The screenshot shows the Emulation Framework (EF) website. The browser address bar displays `emuframework.sourceforge.net/about.html`. The website header features the KEEP logo and the text "Emulation Framework [EF]" with navigation links for home, about, downloads, documentation, and support. The main content area is titled "About the Emulation Framework (EF)" and describes the framework's purpose and capabilities. A "Screenshot of EF" section shows a graphical interface for configuring emulators. A "What can it do for you?" section lists the framework's features. At the bottom, a diagram illustrates the workflow from characterizing an object to checking available environments.

Emulation Framework [EF]

home about downloads documentation support

About the Emulation Framework (EF)

The Emulation Framework (EF) offers a convenient way to open digital files and run programs in their native computer environment. This offers users the potential to view these files in their intended 'look and feel' independent from current state of the art computer systems.

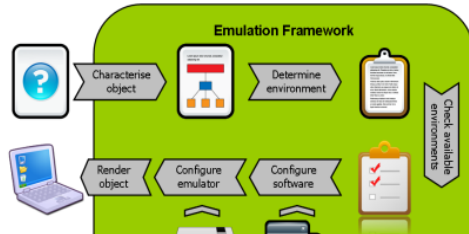
The spectrum of potential computer platforms and applications that can be supported is practically unlimited. In this release the EF supports to emulate the x86 computer platform, Commodore 64, Amiga, BBC Micro and Amstrad CPC. Emulation is done by using existing emulators which are carefully selected on their capability to mimic the functionality of these platforms.

The EF is actually an automated workflow for running emulators with predefined content. It does this by following several steps. The following illustration shows which steps are taken to come from digital file to emulated computer environment.

Screenshot of EF

What can it do for you?

- × Automated configuration of emulators
- × Service oriented architecture
- × User-friendly graphical interface
- × Wide set of emulators out of the box
- × Open source, so integrate it within your organisation's workflow



```
graph LR
    A[Characterise object] --> B[Determine environment]
    B --> C[Check available environments]
    C --> D[Render object]
    D --> E[Configure emulator]
    E --> F[Configure software]
    F --> G[Emulated computer environment]
```

Thank you! Questions?