OMG Software-Based Communication Workshop

A Complete Development and Operating Environment for SDR

14 September 2004, Washington, DC

Prologue

www.visualjokes.com

Observations

- SCA Operating Environments (OE) consist of separately developed pieces integrated together by the Core Framework developer.
- A significant number of radio vendors have created their own Core Framework (CF) implementations.
- No comprehensive portability study to various platforms has been conducted. The jury is still out.
- There is little focus on the SCA “development environments”.

A Perspective

Software Radio Infrastructures need the ability to adapt to new hardware and, subsequently, new markets.

Efficiency is achieved by "pulling out" rather than "putting in", by "melding" boundaries rather than imposing boundaries.

SDR "Development Environments", which include an OE, are a key element to achieving the underlying efficiency goals of the SCA.

The Benefits

- The “Open-Source Experience”.
- Military SDR will benefit, in turn, from commercial SDR market take-up.
- Infrastructure release updates into the product will happen more quickly and with less pain.
- The focus will turn to the application rather than the supporting system.
- The skill sets needed for the problem change.

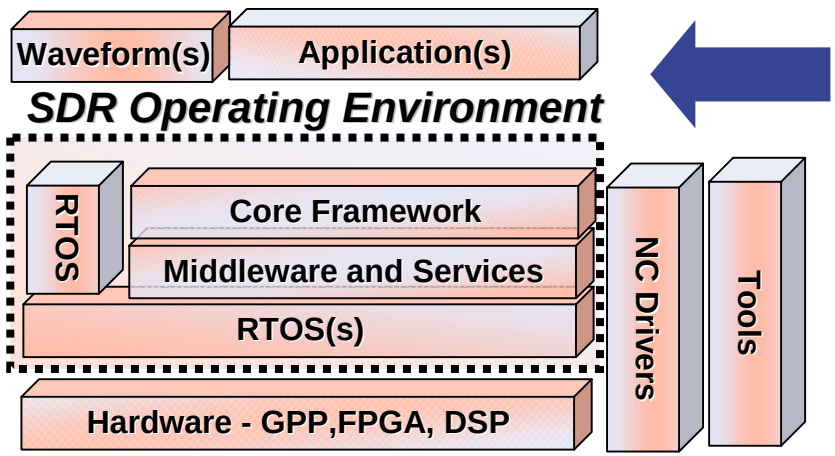
Operating Environment Layers

Additional Criterions for Core Framework

Ease of Use

Additional Criterions for Middleware

Throughput
Adaptability
Integration



Criterions

Standards Compliance
Scalability
Determinism
Stability
Security
Footprint

HW Supplement
(SCA v3.0)

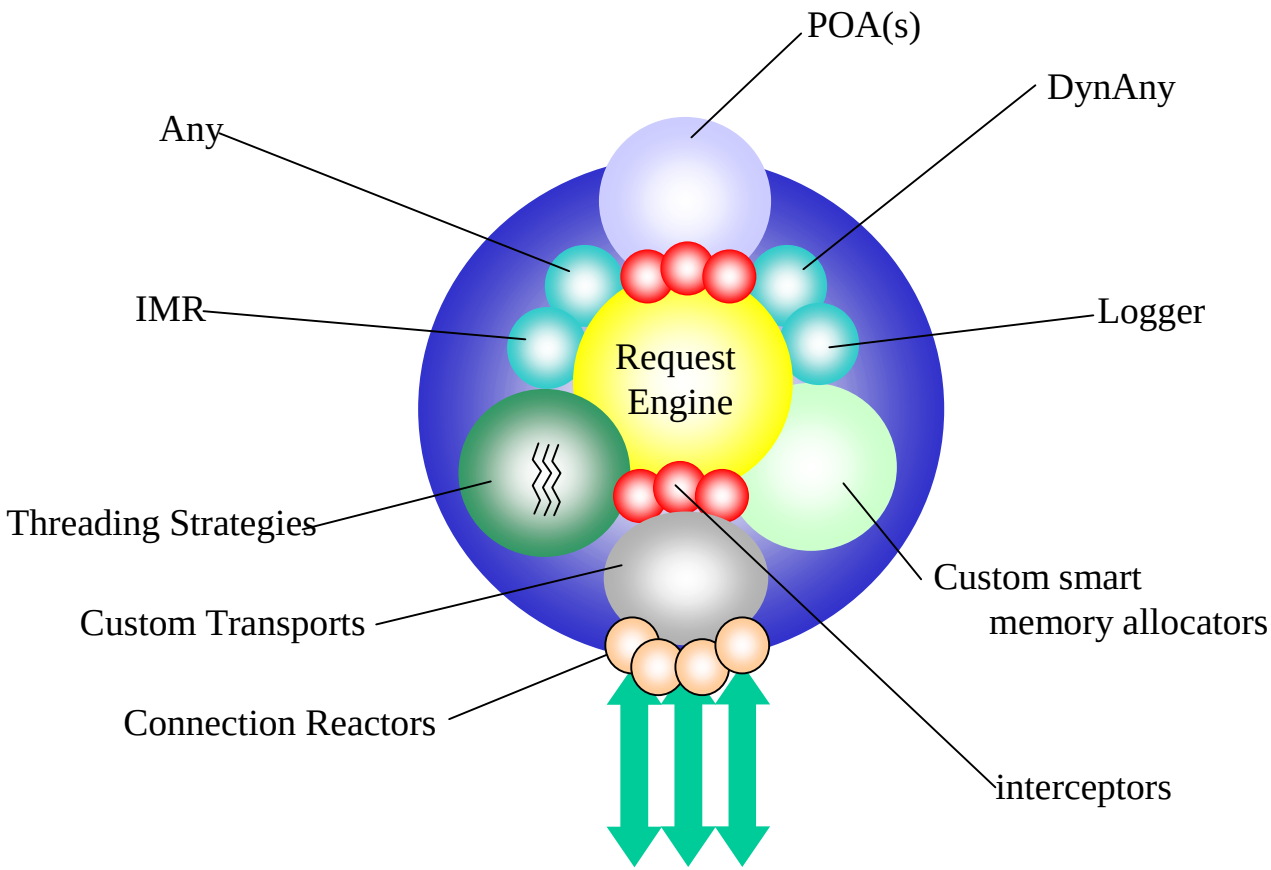
Portability and Scalability

HW Abstraction	Standards	Configurable
- HAL (API, Interfaces) - HLL	- POSIX - CORBA - CF Interfaces	- uKernel - Modular

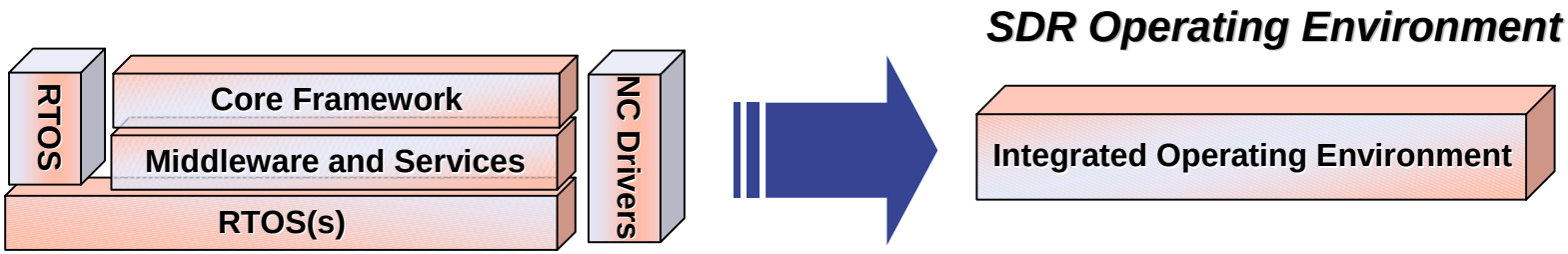
→ **Reduction! Then Profiling.**

→ **Simplification of Boundaries.**

Minimum CORBA Profiling



Vertical Integration



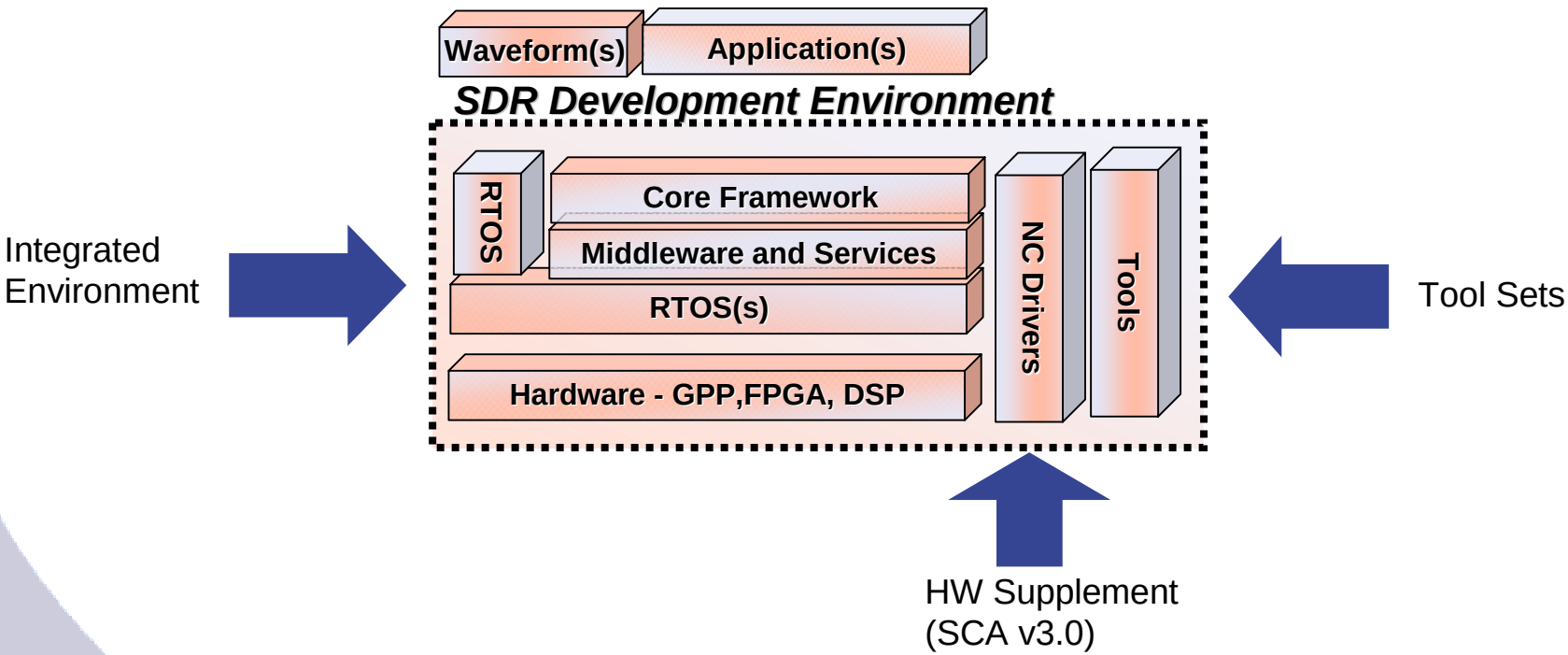
-uKernel Approach

-Profiles (Comm, OS, Services)

Benefits

- Speed/Scaling/Portability
- Ease of Use/Time to Market
- Economy of Scale
- Lower cost before and after

SDR Dev Environment



The SDR DE

- Porting Phase
  - Adapt/Reconfigure OE for an OE profile.
    - *Waveform, hardware*
  - Domain Profile creation
    - *XML generation, patterns*
- Application Development Phase
  - Pre-built Interfaces.
  - Waveform Languages.
  - Application Simulation.
- Debugging and Test.
  - Timing, thread management.
  - Environment Management.
  - Regression testing tools, processes.
  - Monitors.

Summary (Points to Remember)

- OE Layers should be built for portability, scalability and acceptance in the larger SDR market.
  - Build from small to large
  - Modular/Pluggable
- There are many integration points when developing and SCA OE.
  - Move toward smoothing the boundaries between the layers of the OE.
  - Simplify the interfaces.
- SDR Development Environments should not be overlooked.

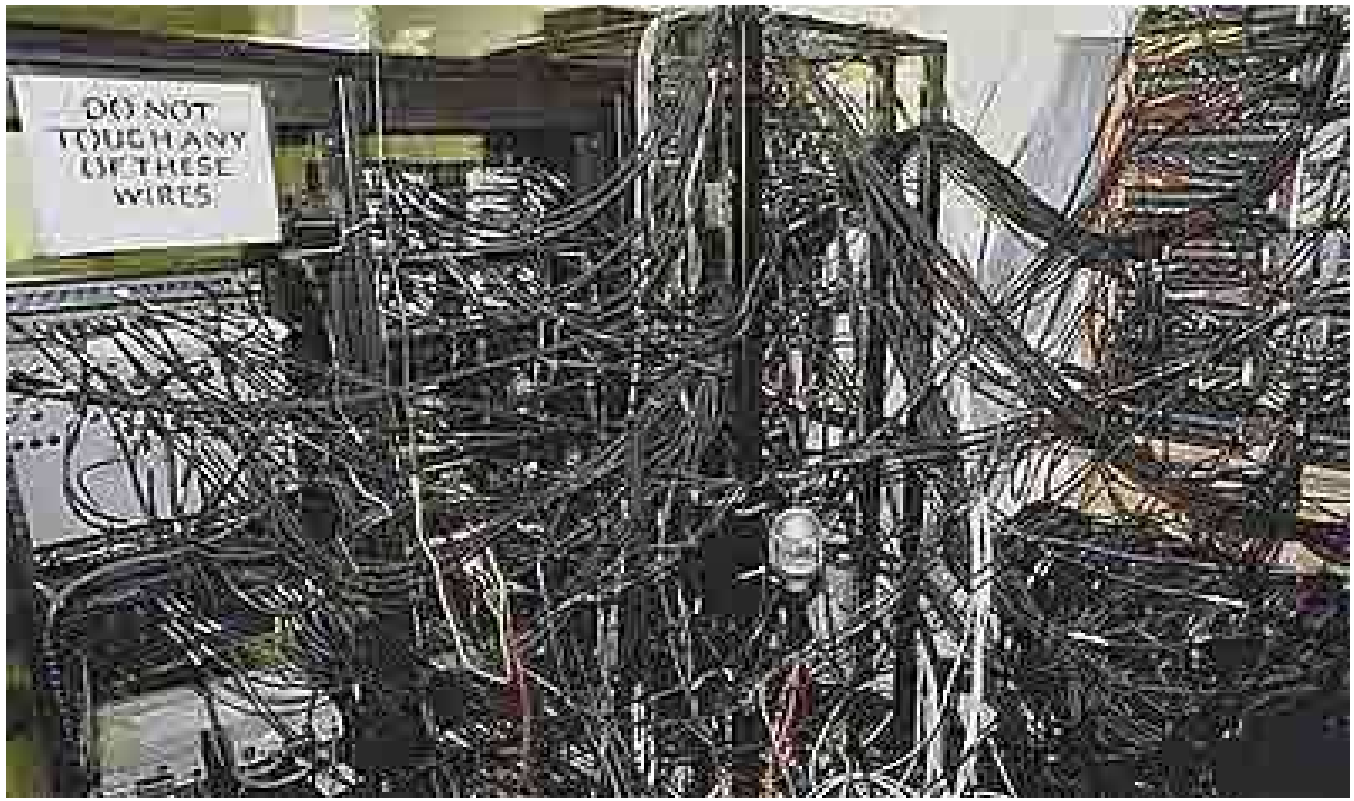
Recommendations

- Create each layer starting from a minimalist view.
  - Yea to Lightweight Services!
- Build the OE product as an Integrated Product Team.
  - Reduce the boundaries.
  - Combine industry domain knowledge with technical domain knowledge.
- Spend as much time on the tools as the OE.
- Rethink your buy/build.

Epilogue

There is always a better way.

- Thomas Edison



www.visualjokes.com