1 Tasks and Requirements
2 Model-based Solutions
3 Applications 1: On-board Diagnosis
4 Applications 2: FMEA
5 Applications 3: Workshop Diagnosis
6 Applications 4: Authoring Systems
7 Research Topics

GenRad: Generation of Diagnostic Trees

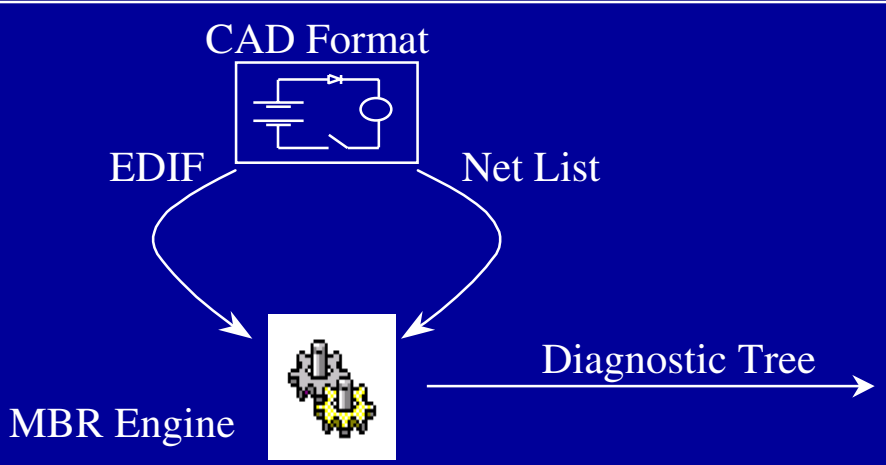
GenRad

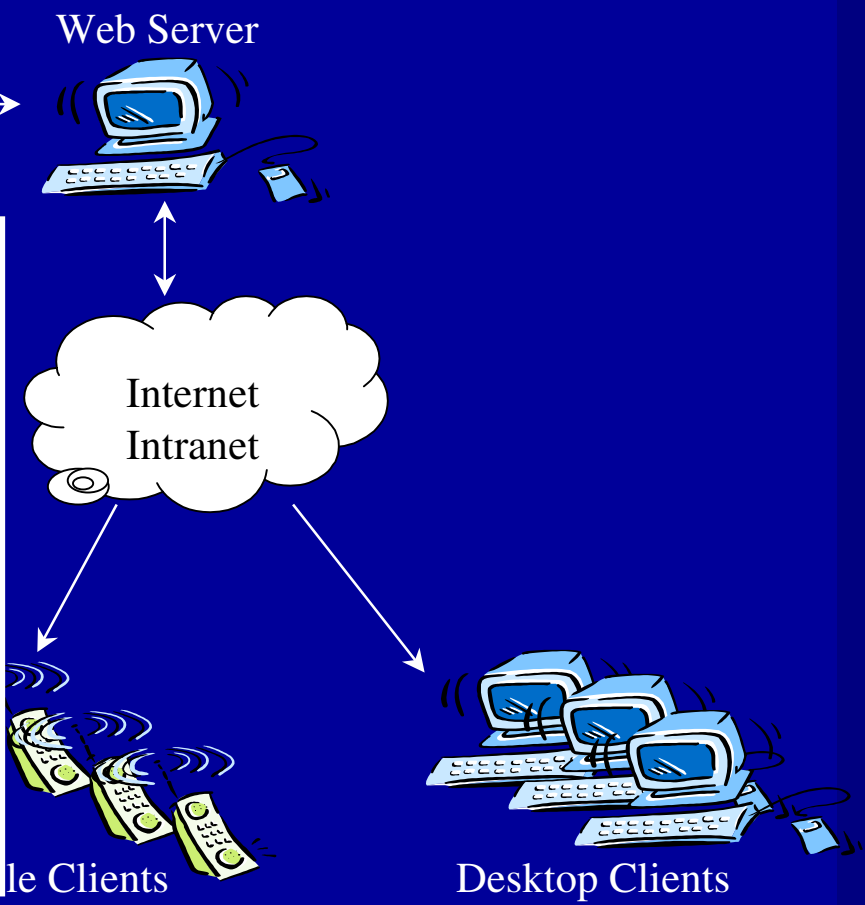
- Provider of testers & guided diagnostic routines
- Executed on portable/hand held test equipment
- Used in vehicle service bays to guide technician
- Diagnose up to 10,000 possible faults per vehicle
- Up to 3,500 vehicle variants per customer
- Delivered in 28 languages to 17,000 dealerships

- Vehicle variant handling
  - Diagnostic strategy vs vehicle data
- Language independence
  - Text is never embedded within application
- Authoring process and tools
- Validation and feedback processes
- Build and release processes
- No adverse effects by using MBR

GenRad®
The Technology of Knowledge

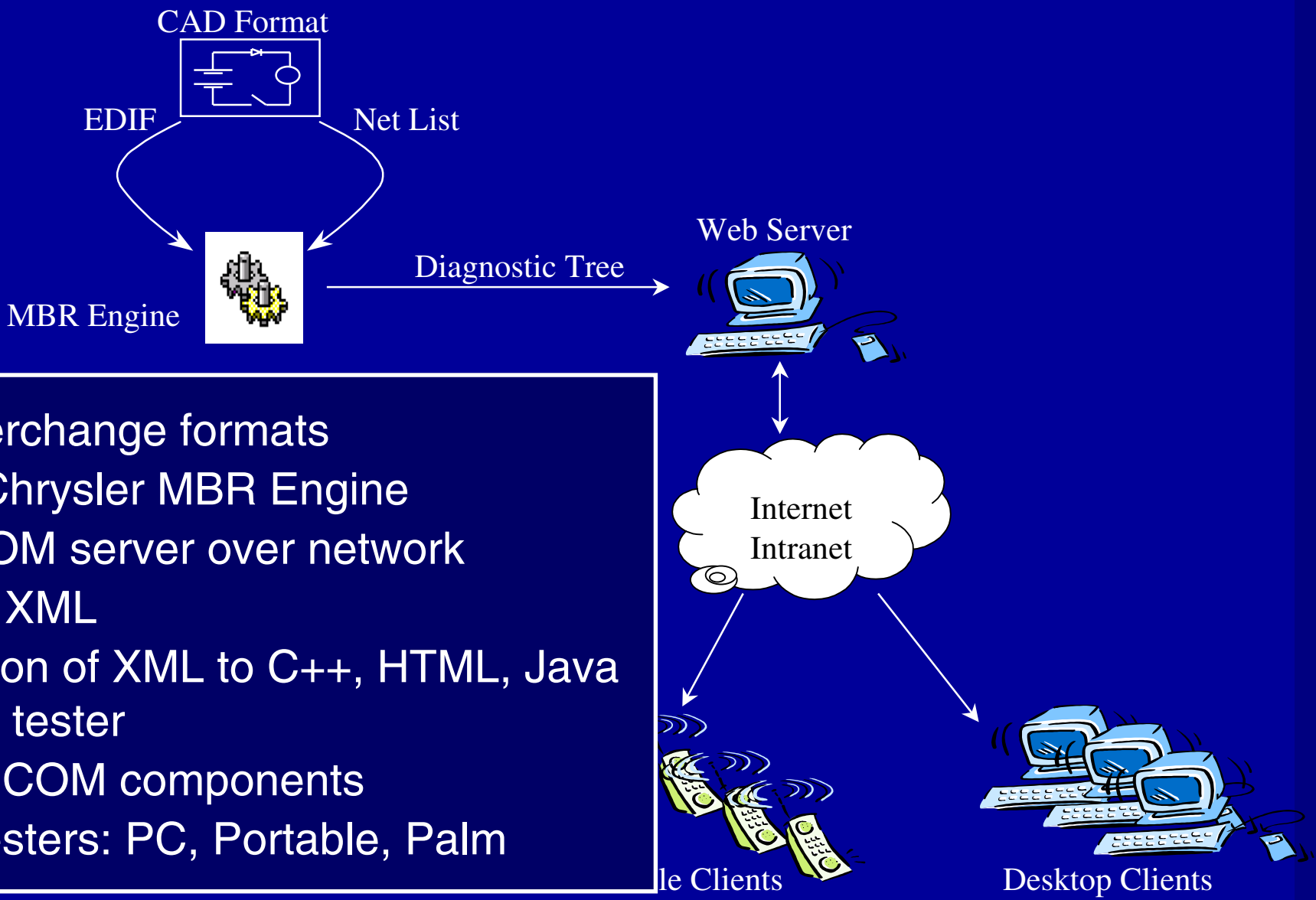
The Model-based Contribution





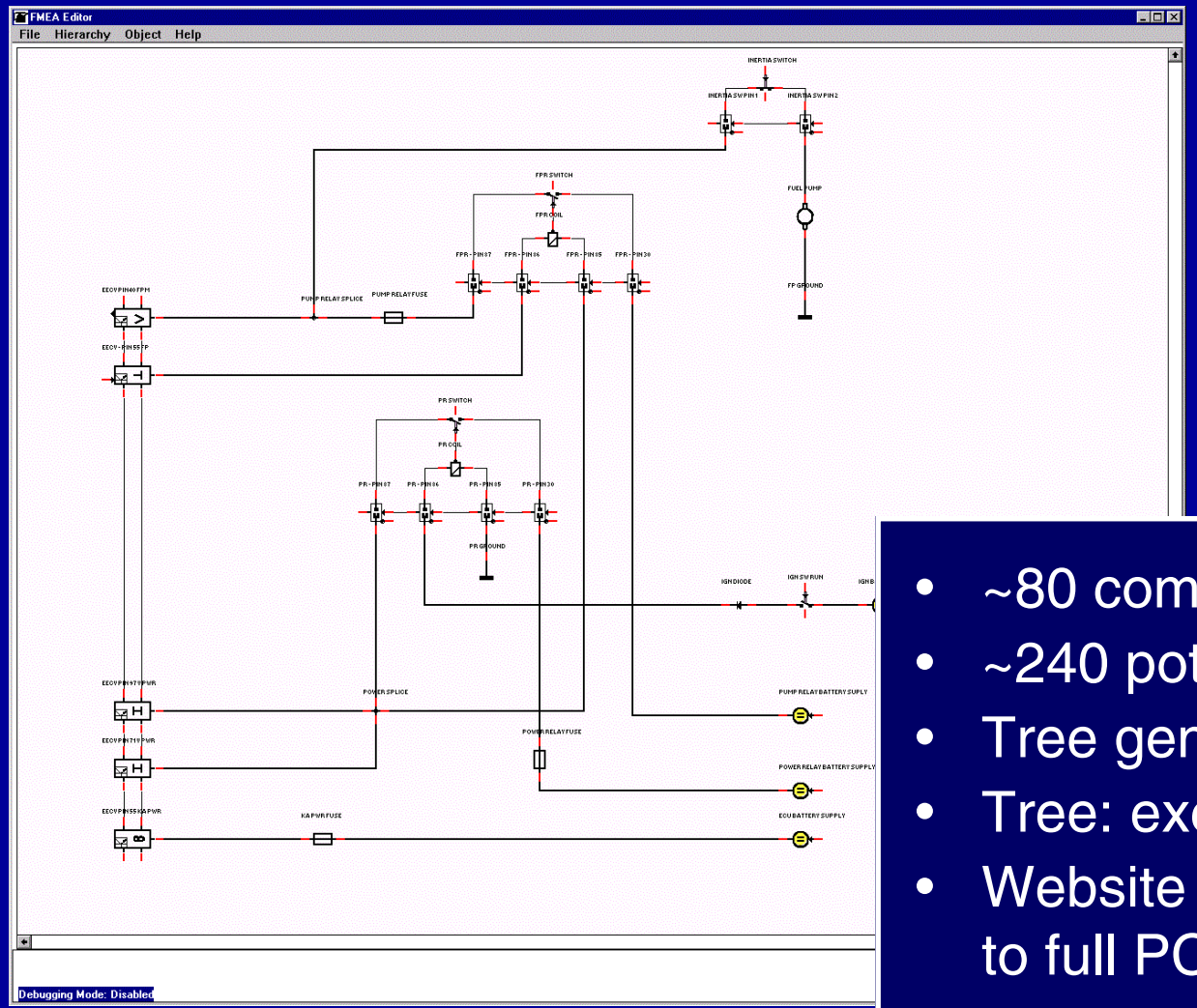
- Load CAD harness/system designs
- Determine possible faults
- Simulate effect of each individual fault
- Compare results
- Determine useful tests
- Build diagnostic tree (cost vs benefit)
- Converts tree into executable code for tester

Technologies Involved



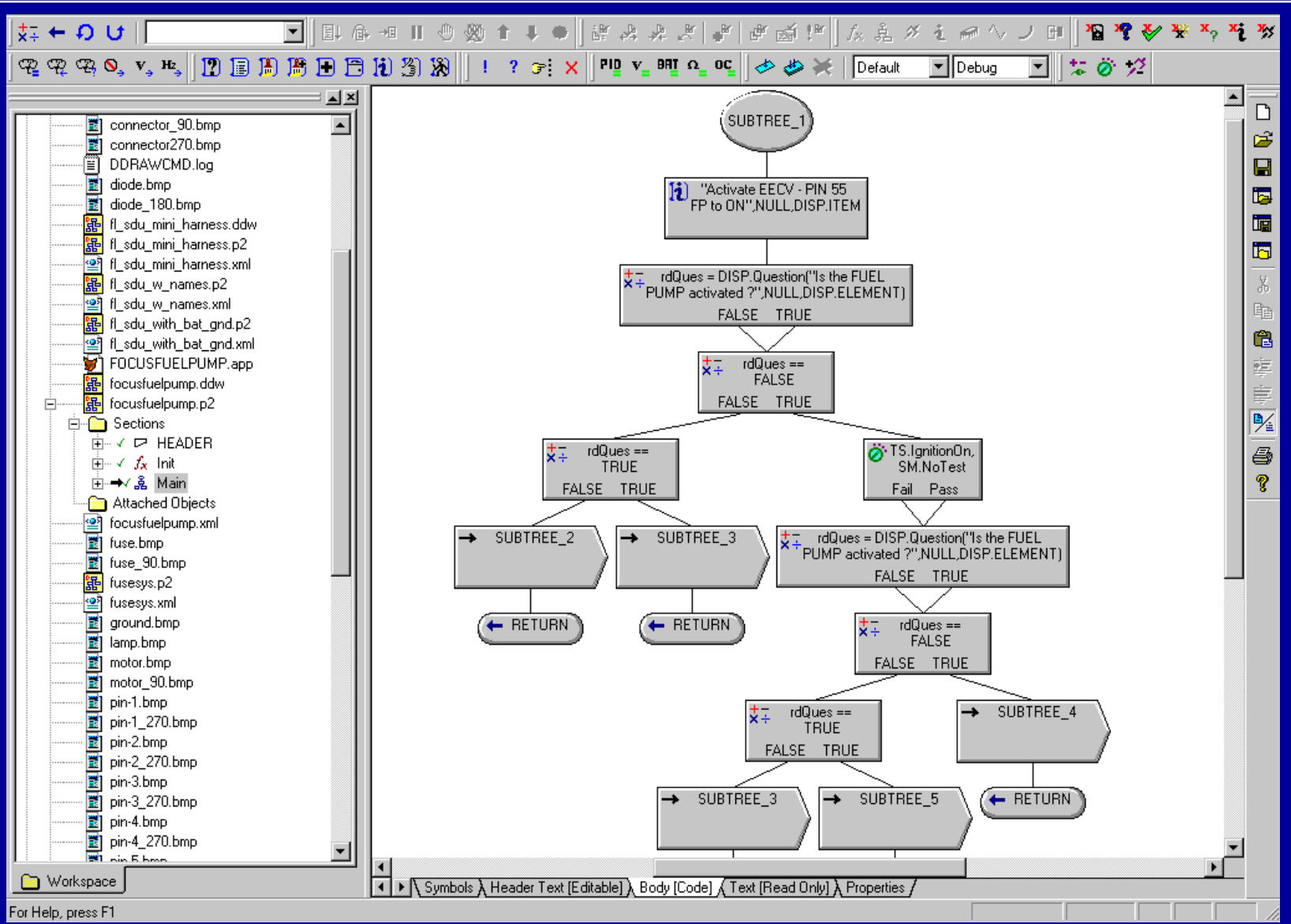
- CAD Interchange formats
- DaimlerChrysler MBR Engine
- as a DCOM server over network
- Tests as XML
- Conversion of XML to C++, HTML, Java to run on tester
- Done by COM components
- Target testers: PC, Portable, Palm

Example: Fuel Pump Control System



- ~80 components
- ~240 potential failures
- Tree generation: ~10 Minutes to
- Tree: executable or website
- Website runs on very thin client up to full PC
- Validation on vehicle: tree correct

Generated Tree in Authoring Environment



Model-based Reasoning: Benefits

- Re-use of existing CAD data
- Faster turn-around of diagnostic production
- Automation: consistent and error-free code
- Reduction of manual authoring = Lower cost of diagnostics = lower cost of vehicle ownership
- More satisfied customer, greater customer loyalty

- Three working modes:
  - Interactive diagnosis (not yet fully IDE integrated)
  - FMEA (not yet fully IDE integrated)
  - Tree generation (integrated)
- GenRad has sole licensing agreement
- DCOM interface fully implemented for all services
- Currently integrating remaining services into GUI