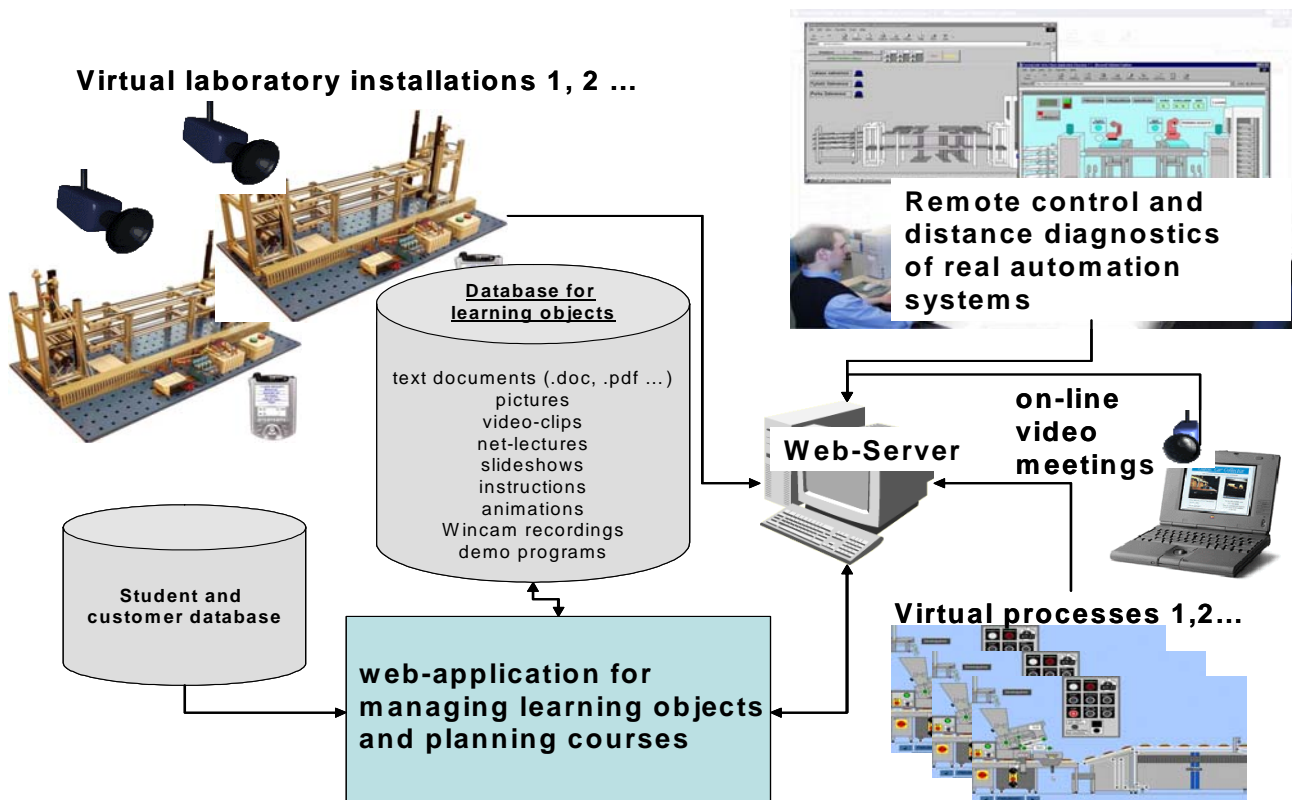
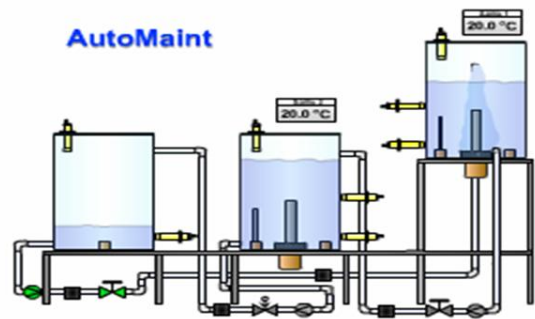
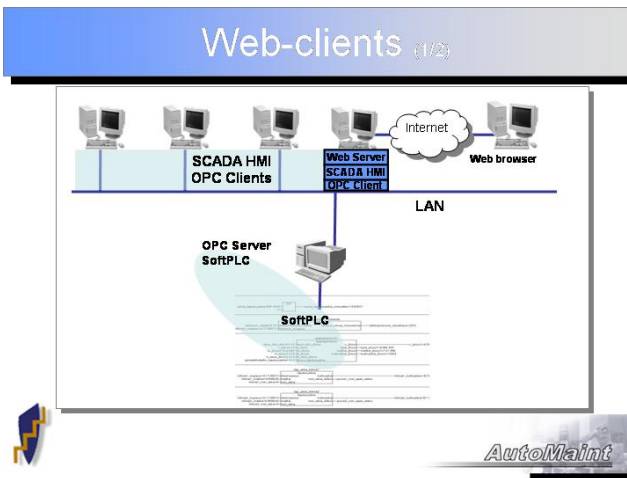


# Virtual models in the PBL of production automation

- *With different models we can improve student's motivation and orientation.*
- *With models students can also make experiments which are based on their theoretical knowledge.*
- *students can also evaluate and control their learning process.*
- *Usually the main purpose for using virtual models in training of production automation is to improve student's motivation, orientation and understanding.*



# Virtual processes



- *Web-based interactive exercises*
- *e-learning environments for PLC-programming*
- *In virtual processes there is no real process; the model of process is running in our server and it can be controlled via web.*
- *Simple (but maybe interactive) Flash 2D-animations can be used especially in practice instructions.*

The figure is divided into two parts. The left part shows a mobile phone connected to a physical robotic system (a wooden frame with various components) via a LAN. The right part is a detailed network diagram. It shows a mobile phone connected via Bluetooth to a 'hot spot'. The hot spot connects via HTTP to a 'web server & http/opc gateway'. This gateway connects via Ethernet to 'real hardware 1' and 'real hardware 2' (both robotic systems) and 'virtual process 1' (a software interface). The connections between the gateway and the hardware/processes are labeled 'opc'.

- *In virtual laboratory applications a student can control real laboratory equipment via web by using remote control methods.*
- *With virtual laboratory installations we could improve students ability to continue with more independent practices with real automation systems.*