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RESORT - REMOTE SERVICE PROVISION FOR RT-SYSTEMS

Paul Panek [1)], Wolfgang L. Zagler [1)], Christian Beck [1)],
Gottfried Seisenbacher [1)], Theodor Isporidi [1)],
Andreas Hochgatterer [2)], Alexander Seebacher [2)],
Nick Hine [3)], Paul Sergeant [3)], Ruud de Vries [4)], Jos van Well [4)]

Abstract

*This paper describes the ongoing RESORT project which is developing a state of the art prototype system for remote service provision for RT (rehabilitation technology) products. RESORT stands for **Re**mote **S**ervice **o**f **R**ehabilitation **T**echnology and is an EU funded R&D project in the TAP sector Disabled and Elderly (DE-4208).*

1. Background

An increasing number of disabled people are using RT systems, helping them to live more independent and self-determined lives. Analysis of the provision process shows that buying and installing an up-to-date RT system is definitively not the end point, but more the starting point of an continuous process of tailoring the system to the needs of the individual user.

In many cases the care persons (teachers, therapists, family members, ...) are key persons in this process. Often a lack of experience in using and configuring RT systems causes a corresponding lack of adaptation and often the total abandonment of Rehabilitation Technology. Generally the actual use of RT systems is much lower than the need. Currently professional support is a complicated and expensive process due to high travel efforts.

The RESORT project aims to developing a PC based system that provides online support for the care person. Whenever a problem arises the care person can establish a multimedia link to a RESORT service centre (RSC) and ask questions, get oral explanation and support, can demonstrate what might not function correctly or can learn by watching the RSC solving problems

1 fortec – Research Group on Rehabilitation Technology
Institute of Industrial Electronics and Material Science, Vienna University of Technology,
A-1040 Wien, Favoritenstraße 11/366-1B, phone: + 43 1 58801-36603, fax: + 43 1 58801-36697
e-mail: resort-info@fortec.tuwien.ac.at , http://www.fortec.tuwien.ac.at/resort

2 Austrian Research Centres, AT

3 Micro Centre, Univ. of Dundee, UK

4 iRv Institute for Rehabilitation Research, NL

on the remote PC via the data link. Within the RESORT project two already existing RT systems (STEP BY STEP [6], a PC-based learning system for motor or learning disabled children, and AUTONOMY [2], a combined environment control and AAC system for severely disabled persons) are used to verify and demonstrate the benefits of the RESORT idea.

2. User Needs Analysis

Each contract partner in the consortium conducted a series of interviews during the period May to August 1998. The English questionnaire was used in Scotland, and was translated into Dutch and German for use in the Netherlands, in Germany and in Austria. Having analysed the responses in the questionnaires, the consortium drew the following conclusions.

1. The distinction between local and remote carers is rather artificial. A more accurate distinction is between primary and secondary carers. The "primary carers" have intensive interactions with and/or responsibilities for an individual or a small case load. The "secondary carers" have a more specific input into the lives of a wider case load.
2. The RESORT system should focus on assisting primary carers in the process of providing RT, including access to information and the management of cases and case conferences. A key element of the RESORT provision should be the improvement in on-going after-care for a user of RT.

Having gathered the information in this way, the project constructed a model showing the relationship between various professionals involved in the life of a disabled person.

This model shows that there are 4 key-sets of professionals involved in the life of a disabled person. In many cases, whilst these professionals interact with the disabled person directly, their involvement is filtered, controlled or monitored by a primary carer. This primary carer is often either a professional or a member of the family of the disabled person.

In addition to these professionals with responsibility for general areas of the life of a disabled person, some professionals have responsibility for dealing with the disabilities that arise from the impairment that the individual has. These disabilities affect a range of activities and areas in the life of the person, and may require assistance from a professional with a very focused set of skills. Again, the involvement of these professionals may be filtered, controlled or monitored by a primary carer.

This model refines the concept of local and remote carer that was defined for the questionnaires. Rather than to distinguish between local and remote carers, the model shows primary carers and facilitators or professionals with specified and restricted responsibilities.

These primary conclusions should be set within a general finding of the questionnaire exercise. It is evident from the responses received that many people within the rehabilitation and care sector have not considered the potential benefit of remote provision of rehabilitation technology. The focus of this field is on care and rehabilitation, not on technology. Some technology is applied within the

field, but generally within administration and only to a lesser extent for the direct benefit of individual disabled people. Little has been done to address the requirements of carers or to apply technology in order to reduce the costs without sacrificing the quality of care.

3. RESORT Concept

The concept of the RESORT system contains a Resort Service Centre (RSC) and several Resort Client platforms which are connected via ISDN, cable, LAN, wireless LAN etc.

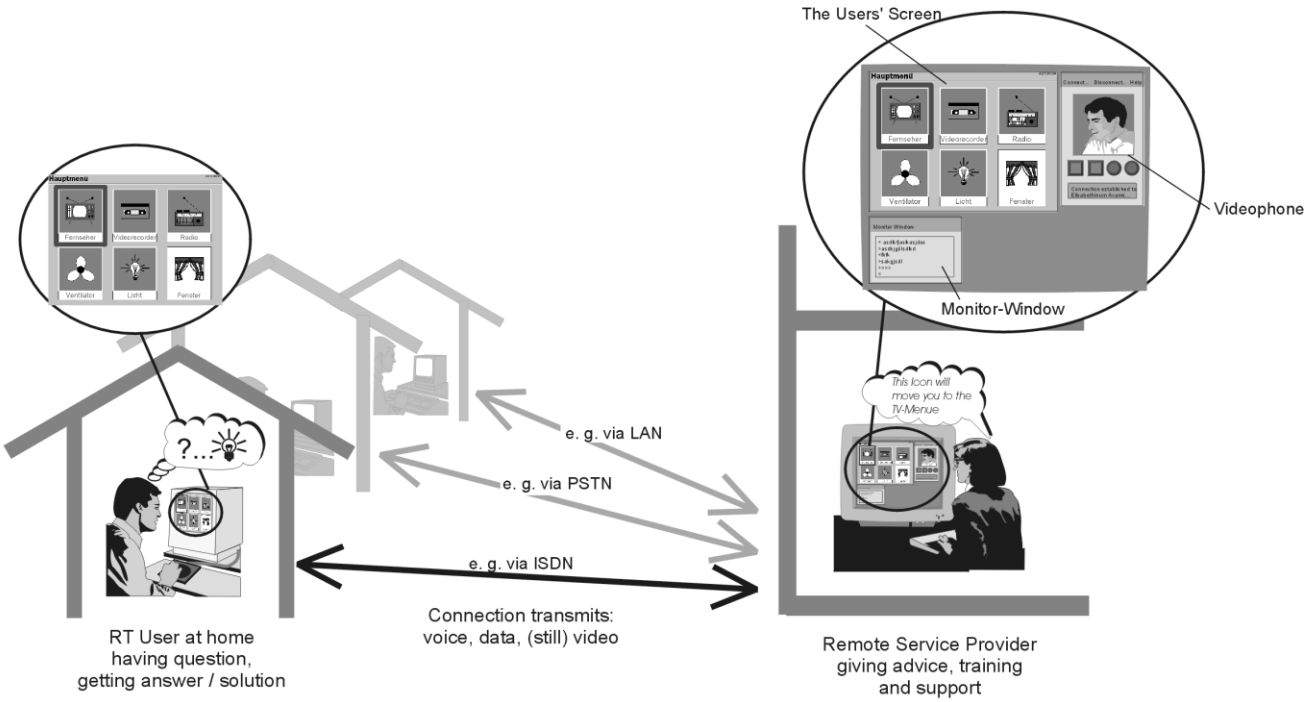

Figure 1. Remote service provision for PC based RT systems in the framework of the RESORT project

The system provides the following functionality:

- RCI (Remote Control Interface) for "real time synchronisation" of RT systems
- easy-to-use scaleable User Interface
- real time communication and interaction (audio & video, H.323 compliant)
- database access
- file transfer
- synchronisation of file systems
- text communication
- platform independency
- security

and offers three different modes of operation:

- In the telephone mode RESORT provides hands free communication between user and service provider. If the bandwidth is large enough an additional video link can be established.
- In the pupil-teacher mode an additional data-link is established. The service provider will load exactly the same RT application as the user is running. The two applications - at the user's site and at the provider's site - will be synchronised via the data link.
- In tele-service-mode the service provider will have the possibility to down- and upload files from and to the user's PC, modify configurations and test the changes he/she has made.

4. System Design

The core of RESORT is implemented in Sun Java 1.2. The system exploits existing technologies for tasks like video / audio transmission according to H.323 specification and desktop/application sharing. These applications are invoked, but not re-developed. Specific new features such as the RCI technology which allows real-time synchronisation between local and remote RT systems (even when using automatic scanning) have been developed.

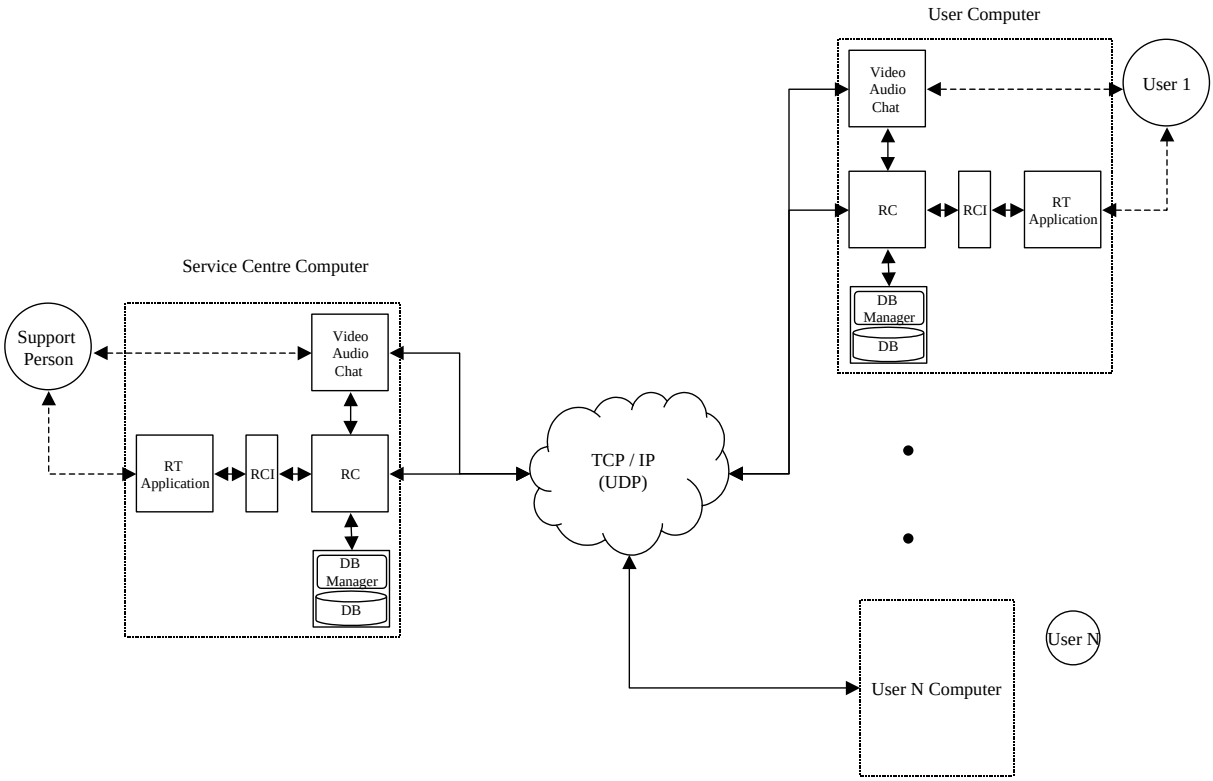

Figure 2. Overview of RESORT system structure: On the left hand side the RESORT Service Centre, on the right hand the RESORT Client PCs (at special schools, at residential areas, private home, ...). In between the Network (LAN, ISDN, cable,...).

RCI stands for Remote Control Interface which implements a link between the RT system and the so called RESORT controller (RC). The RCI and the RESORT protocol allow synchronisation in

real time. This is possible as only small data messages are transferred instead of changed screen contents. This method dramatically reduces the required bandwidth [1] and enables the RESORT system to provide real time monitoring of single switch users.

The Resort controller module (RC) is linked to (a) communication modules for video, audio and chat, (b) to the database, (c) to the RT system and (d) via network interface to the remote RC.

As network protocol IP is used. TCP/IP for control messages, UDP mainly for audio and video. In order to test and demonstrate the benefits of the system 2 existing RT systems have been equipped with a Resort interface.

In order to ensure a high level of flexibility several internal interfaces were introduced. The outcome is a highly modular system which allows to exchange specific parts without the need of adapting other parts. This increases the independence from 3rd party products for audio, video, application sharing, desktop sharing, etc.

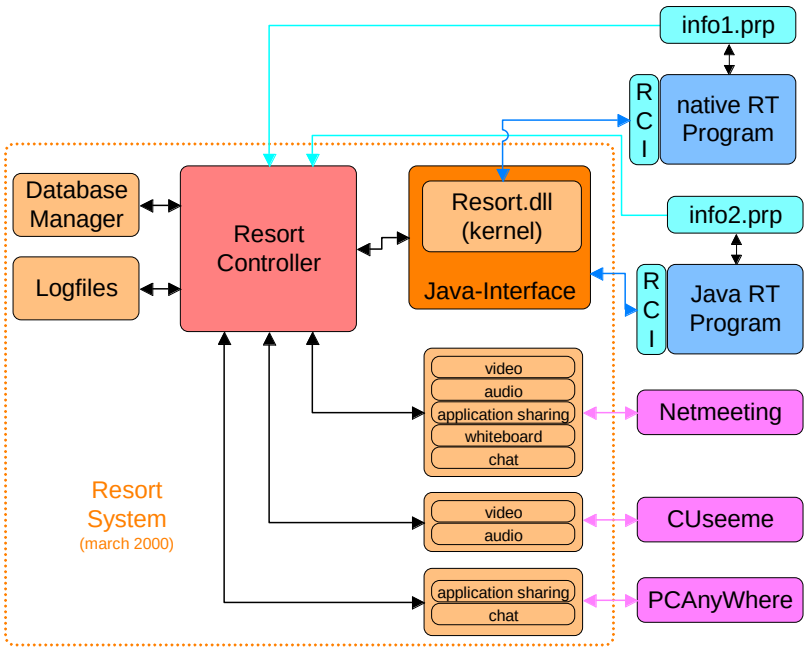

Figure 3. Internal Interfaces of the RESORT system on the local machine.

5. Adapting existing RT systems to make them RESORTable

AUTONOMY, an existing ECS[5] / AAC[6] system [3],[7],[9] currently is being adapted to serve as an example of a RESORTable RT system. The AUTONOMY32 Runtime Program is designed to communicate with input devices (e.g. keyboard, mouse, joystick) and command devices (e.g. infrared sampler, EIB bus system) by the use of so called AUTONOMY32 drivers. These drivers

[5] Environmental Control System

[6] Augmentative and Alternative Communication

implement a standardised interface allowing the Runtime Program to use different input and output devices without changing the code of the program itself.

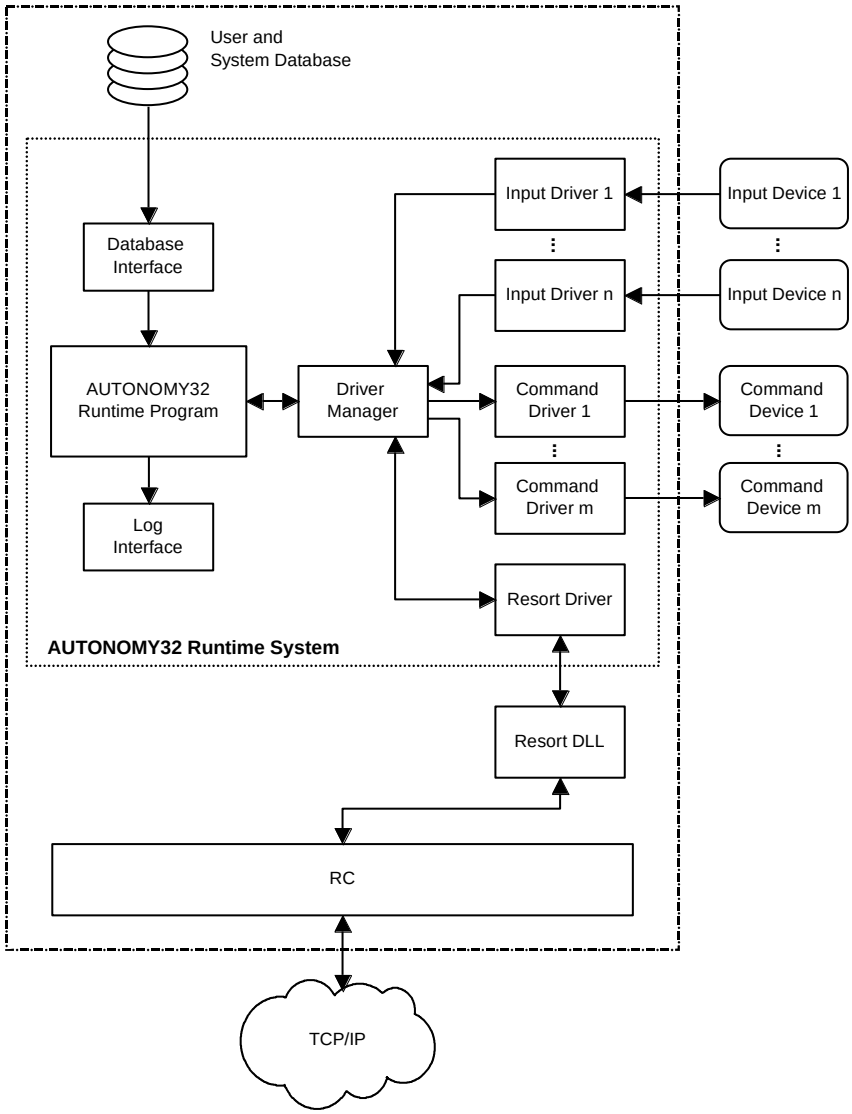

Figure 4. The AUTONOMY system for AAC and environmental control currently is being equipped with an RCI to make it RESORTable. A local and remote RT system can be synchronised is real time even over low bandwidth channels.

This driver concept is applicable to implement the remote control capability of synchronising AUTONOMY32 on two machines as well. Using the idea of working with an application defined protocol to exchange data on a data channel provided by the RC system the runtime program can use an algorithm independent from the remote control system used. All RCI dependent functions are hidden in a remote service driver.

The current implementation of the AUTONOMY32 Resort driver uses the data channel of the RESORT controller to transfer all relevant user input from the master to the slave system. The driver guarantees that no data package is lost within the runtime program by monitoring the

reactions of the program. On the assumption that no data package is lost on the transfer from the master to the slave system synchronisation is guaranteed.

6. Verification of prototype system

The prototype system is currently subject to verification in order to come up with a prototype ready for the demonstration phase which is planned to be carried out from August 2000 until November 2000. Interested parties are invited to participate [8].
Different usage scenarios have been developed in close co-operation with care persons, teachers, occupational therapists, disabled persons and will be used to verify the benefits remote support will bring to the users in order to reduce existing barriers and bottlenecks.

Figure 5. Screen shot of one of the early RESORT prototypes showing a Client PC (left hand ECS / AAC system, above the RESORT controller UI).

7. Demonstration and Exploitation

From August until November 2000 the demonstration phase with workshops (held on national and European level) will take place. The RESORT idea and interface will be demonstrated to manufacturers of RT systems and they will be invited to add the RESORT interface to their products in order to gain additional value and to participate in the benefits of the RESORT system: diminishing existing barriers in using RT, accelerating market growth and assisting disabled persons and care persons in getting more autonomy in their daily life.
Therefore, the RESORT project wants to get into close contact and collaborate with a variety of RT manufacturers to discuss the RESORT protocol and interface to evaluate its functionality and to

guarantee an easy to implement interface for integrating the RESORT concept and interface into third party products. Interested RT manufacturers are asked to get in contact with the RESORT consortium.

One relevant output of the demonstration phase used for exploitation will be to evaluate and discuss the process of RESORTing itself (i.e. how a specific situation – e.g. a care centre – will introduce the RESORT concept and system and how it will adapt to the new way of service provision) and identify steps, key people and barriers.

The RESORT project has opened a working collaboration with the DE-4004 CUSTODIAN project [4]. The objective of the CUSTODIAN project is to enable the successful integration of a wide range of assistive technologies, general consumer electronics products and systems around a home network (home system, smart house).

A parallel activity of the RESORT project is to work with the European Installation Bus Association (EIBA, [5]) within CUSTODIAN to identify key industrial and commercial interests in the RESORT approach. This association is in the process of merging with the other primary home bus associations in Europe in order to converge and harmonise the technologies. In this way, the RESORT system will anticipate the technological evolution as the home systems market expands. Contact and co-operation with key home systems manufacturers and component manufacturers will ensure that the architecture of RESORT can be exploited in this market place. The following end products and exploitation paths are envisaged:

End Products	**Target Groups**	**Comments**	**Exploitation Plans**
RESORTable RT Packages (AUTONOMY and Step by Step 3.0)	End Users and Carers	SW, prime examples promoting further use of the RESORT concept	Product to be sold
RESORT Service Centre Software	Distributors and Service Providers (technical and therapeutic)	SW-Tool for running a Service Centre and Remote Support	Product to be sold
RESORT Protocol and Concepts	RT Software Manufacturers	Documentation	Licensing Strategy – ensuring widespread use

For the exploitation it is crucial to identify how the various markets function (social insurance or charity model) and to take into account that the market will mainly be generated and stimulated by offering support itself (by setting up and running RESORT Service Centers).

Licensing models are currently in development and if ready at the conference the models will be introduced. Licensing models will take into account the results gained from the market survey and the user needs analysis where it significantly often was stated that the end users may not be burdened with the major costs.

The SME REHAKOMM from Germany being part of the consortium will as an RT provider try to introduce the RESORT concept and system into their daily business and will demonstrate the use of the RESORT system from an RT provider's point of view. Further the Austrian Research Centers are involved in two advice centers for technical aids for people with disabilities and run an Internet platform for handicapped people called IntegraNET (http://www.integranet.at). Since the RESORT idea strongly addresses the networking idea (e.g. between RT providers and their customers or between therapists and their clients) there is an obvious link to the IntegraNET idea. For exploitation it might, therefore, be a sensible strategy to integrate RESORT into IntegraNET or to implement interfaces.
For further information concerning RESORT see: http://www.fortec.tuwien.ac.at/resort

8. Acknowledgement

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9. Literature

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