ExtraPlanT as a Multi–Agent System for Extra–Enterprise Collaboration

Jiří Vokřínek
Czech Technical University in Prague, Czech Republic

Jiří Hodík
Czech Technical University in Prague, Czech Republic

Michal Pěchouček
Czech Technical University in Prague, Czech Republic

Petr Bečvář
Certicon Corp., Czech Republic

Jiří Pospíšil
Certicon Corp., Czech Republic

SYSTEM INTRODUCTION

The ExtraPlanT system addresses the concept of the extra-enterprise production planning in order to manage efficient resource allocation not only within the enterprise, but also at the company external environments (e.g., suppliers, co-operators involved in the supply chain, or virtual organization environments). ExtraPlanT demonstrates the ability of multi-agent systems to improve business processes on the extra-enterprise level and to bring the virtual organization ideas to the real industrial environment. ExtraPlanT (Hodík, Bečvář, Pěchouček, Vokřínek, & Pospíšil, 2005; Vokřínek, Říha, Pěchouček, & Mařík, 2002) is an

Figure 1. ProPlanT extra-enterprise architecture implemented by ExtraPlanT
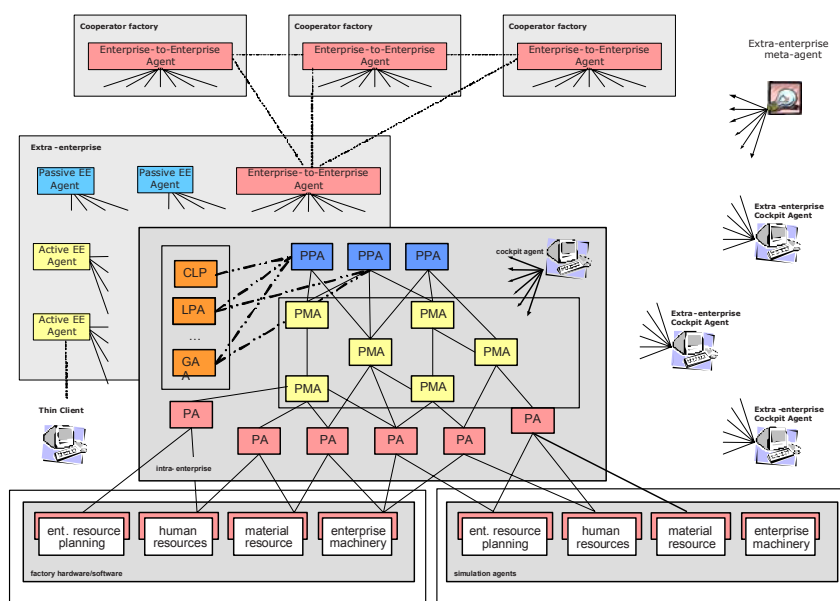
extension of the intra-enterprise multi-agent planning system ExPlanTech (Pěchouček, Říha, Vokřínek, Mařík, & Pražma, 2002; Pěchouček, Vokřínek, & Bečvář, 2005) that implements ProPlanT technology (Mařík, Pěchouček, Štepánková, & Lažanský, 2000).

The main idea of ExtraPlanT is to extend the intra-enterprise planning system by the integration of a co-operation and collaboration tool to the extra-enterprise level (Figure 1 shows the advanced extra-enterprise architecture). The main architecture of intra-enterprise part of the system consists of production planning agent, production managing agent, production agent, and set of optional heavy-duty planners. The cockpit agent provides the user interaction with the system. The extra-enterprise architecture is based on extra-enterprise agent, enterprise-to-enterprise agent, remote cockpit, and extra-enterprise meta-agent.

Extra-Enterprise Agent

As the foundations for extension over the boundaries of the enterprise, the extra-enterprise agent (EEA) was designed. Extra-enterprise agents allow an authorized access to the system from outside the enterprise. We recognize two classes of extra-anterprise agents—passive and active agents. The passive EEA can only read the data from the system; active EEA can fully operate as they are running inside the enterprise. As the environment outside the enterprise is variable, the technology for extra-enterprise access must also be very flexible and platform independent. To satisfy this requirement, an extra-enterprise agent has been integrated with application server that allows the system to be accessible via a WEB browser or a WAP-enabled phone (see Figure 2 for screenshots of WEB and WAP access examples). Secure connection protocol and system of user access rights provided by XSecurity component (Novák, Rollo, Hodík, & Vlček, 2003) protects the system against an unauthorized access.

Enterprise-to-Enterprise Agent

Enterprise-to-enterprise (E2E) agent is the key component of the ExtraPlanT system. This agent makes the ExtraPlanT-based system accessible for external software systems. The main mission of the E2E agent is to support extra enterprise cooperation and collaboration by proactive connection of external agents (such as E2E agents in partner enterprises or agents of material resources suppliers), exchanging data with them, and using them for decision support. This technique helps to find possibilities of tasks' outsourcing in case of

Figure 2. Example of WEB-based interface and simulation of WAP-enabled cell phone
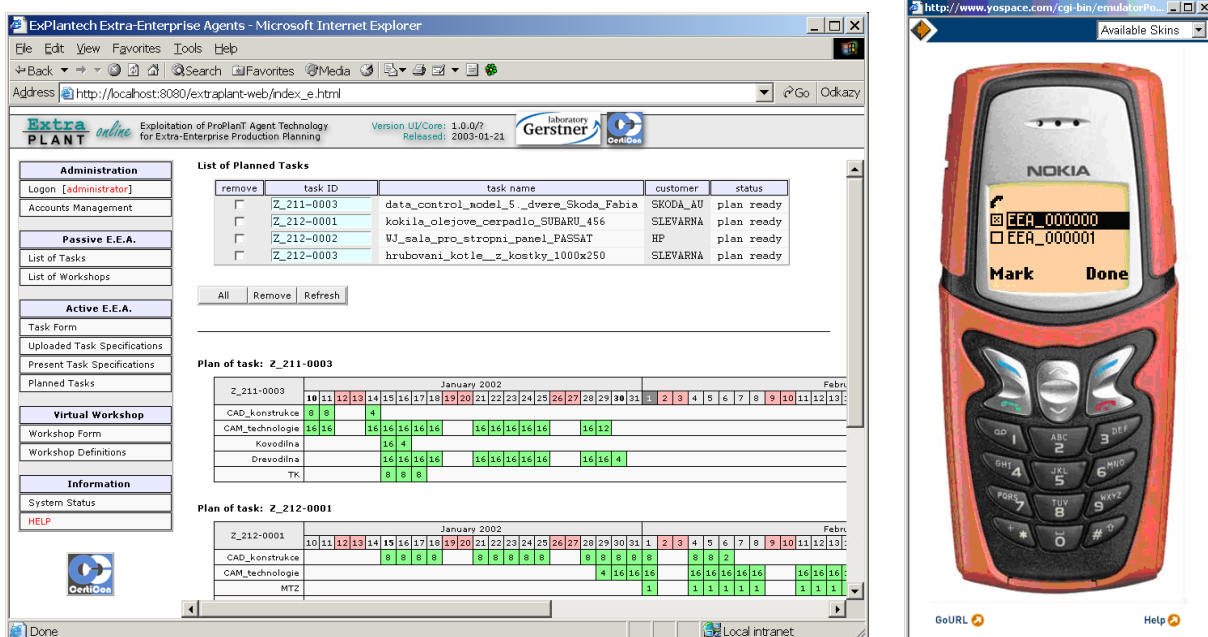
Related Content

Advanced Visual SLAM and Image Segmentation Techniques for Augmented Reality
Yirui Jiang, Trung Hieu Tranand Leon Williams (2022). *International Journal of Virtual and Augmented Reality (pp. 1-28).*
www.irma-international.org/article/advanced-visual-slam-and-image-segmentation-techniques-for-augmented-reality/307063

Thinking in Virtual Spaces: Impacts of Virtual Reality on the Undergraduate Interior Design Process
Elizabeth Poberand Matt Cook (2019). *International Journal of Virtual and Augmented Reality (pp. 23-40).*
www.irma-international.org/article/thinking-in-virtual-spaces/239896

A Virtual-Reality Approach for the Assessment and Rehabilitation of Multitasking Deficits
Otmar Bock, Uwe Drescher, Wim van Winsum, Thomas F. Kesnerusand Claudia Voelcker-Rehage (2018). *International Journal of Virtual and Augmented Reality (pp. 48-58).*
www.irma-international.org/article/a-virtual-reality-approach-for-the-assessment-and-rehabilitation-of-multitasking-deficits/203067

Design Principles for an Intelligent-Augmented-Reality-Based M-Learning Application to Improve Engineering Students' English Language Skills
Derya Bozdogan, Buket Kasapand Utku Köse (2018). *Virtual and Augmented Reality: Concepts, Methodologies, Tools, and Applications (pp. 378-395).*
www.irma-international.org/chapter/design-principles-for-an-intelligent-augmented-reality-based-m-learning-application-to-improve-engineering-students-english-language-skills/199695

Virtual Worlds and Well-Being: Meditating with Sanctuarium
Laura L. Downeyand Maxine S. Cohen (2018). *International Journal of Virtual and Augmented Reality (pp. 14-31).*
www.irma-international.org/article/virtual-worlds-and-well-being/203065