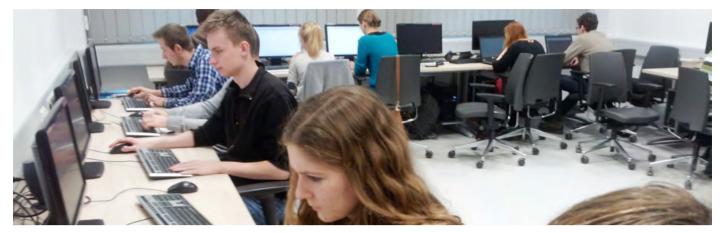# Fostering Next-Generation ICT Expertise

Polish University deploys end-to-end Cisco technology to teach computer networking and promote regional enterprise

EXECUTIVE SUMMARY

Customer Name: AGH University of Science and Technology

Industry: Education

Location: Poland

Number of Employees: 4126

Challenge
- Equip graduates with advanced skills to move into successful careers post-graduation
- Attract more bright students to computer science study from regional schools
- Participate in creation of knowledge-based society, nationally and regionally

Solution
- Cisco Borderless Network and Collaboration Architectures providing cohesive infrastructure both for university's internal use and as live teaching aid for technology students
- Includes Cisco Unified Computing System, TelePresence, Unified Wireless Network with CleanAir technology, and digital signage

Results
- Improved competitive position for graduates in local and global jobs market
- Expansion of cross-border collaborative research projects with businesses and other universities
- Groundwork laid for launch of private cloud educational applications reaching out into local community

Challenge

Founded just short of a century ago as a center of excellence in mining and metallurgy, AGH University has grown into one of Poland's foremost educational establishments. Situated in Kraków, the university has 38,000 students and more than 4000 staff. Its teaching and research programs support the broader evolution of science and technology, covering a wide array of skills across 16 faculties. The AGH Department of Computer Science (in the Faculty of Computer Science, Electronics and Telecommunications) aims to impart a hands-on understanding of advanced ICT. Students gain a clear focus on the fast-changing demands of global enterprise and move on to rewarding careers after graduation.

No less significant are the university's collaborative international research efforts. The university and its Department of Computer Science are keen participants in the European Union Erasmus Program, offering exchange opportunities for students and teachers alike. It also has links with more than two dozen other European higher education institutions, with temporary job placements on offer to private companies (including Cisco) and to supranational organizations such as CERN (the European Organization for Nuclear Research).

To keep its Department of Computer Science fully up-to-date and precisely aligned with its academic aspirations, AGH commissioned a brand-new computing faculty. Housed in its own building, this included a state-of-the-art data center and associated campus network to meet present and future ICT and business challenges.

A best-in-class network was required to function as a live laboratory for demonstration and education purposes, showing students how to build and manage a large enterprise network. It needed a virtual desktop infrastructure to enable central storage with access from any location, including student laboratories, irrespective of endpoint operating system. This infrastructure would be closely coupled to a bring-your-own-device environment, offering secure wireless access to learning and other resources.
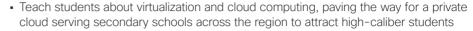
Principal goals of this advanced technology environment were to:

- Provide remote access to lectures and seminars, and import real-time teaching feeds from elsewhere
- Create interactive displays and allow sharing of resources among student project groups
- Showcase the sophisticated video-based collaboration technologies increasingly prevalent in business

‧𝘪𝘭𝘪‧𝘪𝘭𝘪‧
CISCO ™

> "Our ultimate goal is to help create a knowledge-based society in the country and the region, and our Cisco investment is a perfect match for the job."

Professor Krzysztof Zieliński
Head of the Department Of Computer Science
AGH University

- Teach students about virtualization and cloud computing, paving the way for a private cloud serving secondary schools across the region to attract high-caliber students

Although AGH remains vendor-independent, it was an early adopter of Cisco technology. For example, its computer science department was one of the first in Poland to become a Cisco Networking Academy partner in 2000. This made it natural for the university to turn to Cisco in fulfilling its determination to stay at the forefront of Polish technical education.

Solution

The AGH Department of Computer Science chose a Cisco® cross-architectural solution, combining Cisco Borderless Network agility with the flexibility of Cisco Collaboration applications.

Both are underpinned by a powerful data center built on the Cisco Unified Computing System™ (UCS®) for optimal functionality. This comprises thirty-two UCS B200 M2 Blade Servers housed in four B5108 chassis coupled with a storage area network built from Cisco Nexus® 7000 and Nexus 5500 Series Switches to offer a comprehensive one-platform solution for the data center network. With VMware running on the UCS servers, the department has also made a strong start on replacing standalone PCs with virtual desktops, and plans to continue deploying this virtual desktop infrastructure (VDI) in future.

The old computer science campus network had half-a-dozen discrete local area networks, spread across two floors, with 10 access switches and a single core switch for Ethernet connectivity. This network was replaced with a single platform based on Cisco Catalyst® 6500 Series Switches in the core, with 10Gbps fiber-based connectivity, plus Cisco Catalyst 3750 Series Switches in the distribution layer and Catalyst 2960-S Series Switches in the distribution layer. A Cisco ASA 5585 Series Adaptive Security Appliance helps to ensure network security.

The university center invested heavily in Cisco video collaboration technologies. These are seen by leading academic staff as critical to the university's mission to prepare students for the challenges of the corporate environment post-graduation, as more businesses adopt them to reduce executive travel and keep costs down.

In its lecture halls, AGH chose Cisco TelePresence®. The system uses 52-inch high-definition dual video screens to create an immersive, face-to-face experience for remote meetings and presentations, especially adept at capturing the finer nuances in a remotely-delivered lecture. These screens were placed in large rooms, capable of seating 200 participants, to accommodate the potential pressure of student demand. The AGH TelePresence system employs a Cisco Unified Videoconferencing 3515 Multipoint Control Unit, providing a high-definition multimedia conferencing bridge with a versatile easy-to-use interface, along with modern codecs. The system is connected to the Internet by Cisco ASR 1000 Series Aggregation Services Routers to provide crystal-clear signal delivery at both ends.

The Cisco solution also supports the university's digital signage system. This includes an encoding platform to handle multiple formats, and a digital media player, controlling display and playback of interactive digital media, including high-definition live broadcasts or on-demand video. The addition of the Cisco Media Experience Engine Series 3310 provides video search facilities and analytics.

The building is also equipped with a Cisco Unified Wireless Network, using the current 802.11n wireless standard to create a self-healing, self-optimizing wireless environment. This is managed by Cisco 5500 Series Wireless Controllers, coupled with the Cisco 3300 Mobility Services Engine to optimize multi-service delivery. Some 40 Cisco Aironet 3500e wireless access points are deployed with Cisco CleanAir® technology to eliminate radio interference.

"The key benefits are reflected in major improvements to the university's educative and research potential. We have the opportunity to teach professionals at the highest levels, while our students have the opportunity to acquire specific knowledge that makes them very competitive in local and global jobs markets."

Professor Krzysztof Zieliński
Head of the Department Of Computer Science
AGH University

Results

The new AGH computer science center, opened in spring 2012, received a top award in a competition jointly organized by the Polish Association of Building Engineers and Technicians, the Ministry of Infrastructure, and the General Office of Building Control. The center was singled out in the awards as a construction project of outstanding accomplishment.

The new center provides ample space for lectures and seminars, offering well-equipped laboratories and research facilities, along with up-to-date technical and administrative areas. It means AGH computer science students can now go beyond laboratory simulations and explore advanced networking practice. The new network offers live demonstration of technologies such as multi-protocol label switching, virtual routing and forwarding, virtual switching systems, dynamic routing using both IPv4 and IPv6 protocols, multicast, quality of service functionality, virtual PC, data center bridging, and network security.

Professor Krzysztof Zieliński, head of the department of computer science, says: "We want to teach computer networks to our students, not just by showing them synthetic configurations based on lab scenarios." In fact, the university wants to build a research environment to study specific aspects of the network, and plans to create a subnet dedicated exclusively to training and research. "Students will be able to refer to a living, state-of-the-art network, seeing how the technologies link together and complement each other to provide bandwidth, reliability, and security," adds Zieliński. "For example, measuring the actual network parameters and observing the behavior of devices during overload."

Cisco TelePresence systems at the center help enable research groups to hold meetings with counterparts at other universities, or with distant research and industry bodies. Speakers can deliver lectures remotely to AGH students, while AGH in-house lectures can be broadcast more widely—to a nearby lecture theatre or another university. One Cisco TelePresence unit is exclusively for student use, providing an opportunity to work with the system in the lab.

Events in AGH videoconferencing locations can be recorded for later reference, transmitted to up to 10 screens in the corridors, or made available through Cisco Show and Share®. Used mostly by the computer science department, videoconferencing can be accessed by other departments on request, extending the benefits of collaboration.

Where possible, standard PCs have been replaced by virtual desktops. This allows efficient resource usage, a reduced failure rate, lower power consumption and costs, and greater ease of management. The longer-term plan is to make virtual desktops available over the department's wireless network, and subsequently to wireless users outside the computer science center building.

The AGH Department of Computer Science has also implemented a bring-your-own-device environment, providing staff and students with wireless access to network and storage resources over smart phones, tablets, laptops, and personal digital assistants. The wireless network is currently used by the center's employees and students for fast Internet access; in future the range of mobile applications will be enriched by instant access to stored Show and Share videos, for example.

The Cisco solution is also bringing a number of administrative benefits to the AGH computer science center. These include, for example, connection of building management systems to the Cisco network, bringing cost savings and greater ease of management, while also facilitating the future introduction of Cisco EnergyWise technology.

"The key benefits are reflected in major improvements to the university's educative and research potential," says Zieliński. "We have the opportunity to teach professionals at the highest levels, while our students have the opportunity to acquire specific knowledge that makes them very competitive in local and global jobs markets."

The new capabilities will also accelerate the participation of the university in Europe-wide research projects that will, in turn, yield significant social and economic benefits. EU-linked research projects under way at AGH include ambient assisted living for aging populations; distributed service-oriented architectures; multi-scale simulations in biology, engineering and nano-science; service level management improvements in grid computing; and online integration of urban flood warning systems.

"Our ultimate goal is to help create a knowledge-based society in the country and the region," concludes Zieliński, "and our Cisco investment is a perfect match for the job."

Next Steps

The next key step for AGH will be to extend the benefits of the Cisco solution to other departments (for example, videoconferencing, bring-your-own-device access, and the sustainability benefits of Cisco EnergyWise™) by integrating the center's Cisco local area network with a campus-wide internal service provider-style network.

For More Information

To learn more about the Cisco architectures and solutions featured within this case study, please go to:

www.cisco.com/go/borderless

www.cisco.com/go/collaboration

www.cisco.com/go/datacenter

Product List

Data Center Solutions

· Cisco Unified Computing System (UCS)

 – Cisco UCS B200 M2 Blade Servers in four B5108 chassis

Applications

· VMware

Routing and Switching

· Cisco Nexus 7000 and 5500 Series Switches

· Cisco Catalyst 6500, 3750, and 2960-S Series Switches

· Cisco ASR 1000 Series Aggregation Services Routers

Security

· Cisco ASA 5585 Series Adaptive Security Appliance

Video

· Cisco TelePresence

· Cisco Unified Videoconferencing 3515 Multipoint Control Unit

· Cisco Media Experience Engine Series 3310

Wireless

· Cisco 5500 Series Wireless Access Controller

· Cisco 3310 Mobility Services Engine

· Cisco Aironet® 3500e Access Points with CleanAir technology