

# CENTER FOR HEALTHCARE OPERATIONS IMPROVEMENT & RESEARCH CHOIR

**CHOIR IS THE DUTCH KNOWLEDGE CENTER IN THE FIELD OF HEALTHCARE LOGISTICS / OPERATIONS MANAGEMENT IN HEALTHCARE.**

**THROUGH RESEARCH, EDUCATION AND VALORIZATION, CHOIR HELPS HEALTHCARE PRACTITIONERS FACE THEIR COMPLEX LOGISTICAL CHALLENGES.**

## WHO WE ARE?

CHOIR is a research center within the University of Twente. It is currently one of the most active and productive research groups in the field of Operations Research and Management in Healthcare.

## WHAT WE DO?

The mission of CHOIR is to help healthcare organizations to improve the efficiency, quality of care, and quality of labor through redesigning and optimizing their processes.

CHOIR is a multi-disciplinary research center that combines several fields including:

- Operations Research (OR)
- Logistics
- Operations Management (OM)
- Health Sciences
- Business Analytics
- IT Management
- Quality & Safety Management



CHOIR researchers have expertise based on a fruitful tradition of research and innovation in industry and ICT.

Since 2003, we have been generating innovations by developing knowledge and applying it in our three pillars: research, education and valorization. Research is needed to develop answers for the complex challenges healthcare faces. Education is needed to disseminate the knowledge and train professionals who can support healthcare providers. Valorization is needed to support implementation of complex organizational interventions, and to develop decision support tools and dashboard applications.

## RESEARCH

The research agenda of CHOIR is almost exclusively driven by the healthcare sector. Placing our PhD candidates at healthcare organizations enables us to be in close contact with problem owners, and helps us to identify challenging research topics. In particular, we target problems that are experienced by various care providers at the same time, and problems which encompass the entire patient care path – rather than single resource / department problems.

In close collaboration with the healthcare sector, we take on their complex logistical challenges regarding the efficient and effective organization of healthcare delivery processes. We use a scientific approach to design and/or optimize the planning and control of processes, and take into account each stakeholder's perspective. We believe



that optimizing healthcare operations for all the stakeholders involved is an essential condition for successful implementation. This not only involves optimizing the efficiency of processes, but also the quality of care and quality of labor. Typical problems we solve are related to waiting time, access time, cancellations, workload pressure, overtime, utilization, combination appointments (one-stop-shop), inventory costs, and transportation distance.

When studying organizational interventions, and new approaches for planning and control in the healthcare context, it is risky and undesirable to experiment in practice. We therefore use mathematical (OR) models and (computer) simulation to prospectively assess organizational interventions in a realistic but safe environment, under various scenarios and a long horizon.

Our quantitative approach helps healthcare practitioners and administrators to objectify decision making, in a context where subjective decision dominates.

Through a series of more than 200 MSc projects since 2003 and 8 completed PhD projects since 2010, CHOIR has demonstrated the immense potential

for operations management in logistical improvement.

CHOIR researchers frequently publish in the international scientific literature, in the domains management science, mathematics / operations research, and health systems. We are active in the major international scientific networks, such as EURO-ORAHs, INFORMS Healthcare and MSOM Healthcare, and we regularly organize national and international conferences with a focus on research as well as implementation.

## EDUCATION

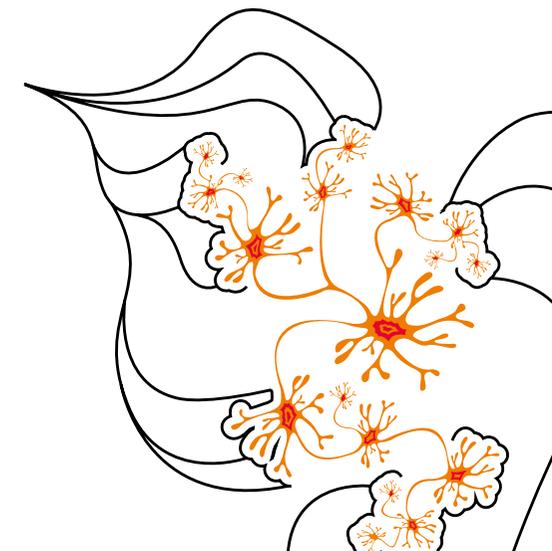
CHOIR develops and provides education in various programs within University of Twente (UT), and for healthcare practitioners.

We offer healthcare logistics courses at UT on undergraduate and graduate levels within the Industrial Engineering & Management, Applied Mathematics, and Health Sciences programs. Students from these programs also perform graduation projects within healthcare organizations, under supervision of CHOIR staff or PhD candidates. Hereby, they contribute to CHOIR's research and valorization activities. Since 2003, more than 200 students have performed their graduation projects in this manner. Many alumni remain to work in healthcare after their graduation.

We also provide a two-year post-master PDEng program in Healthcare Logistics. Its focus is on the design of high-end and innovative solutions for complex multi-disciplinary logistics problems

in healthcare. The program combines academic research in an industrial context with taught modules in a range of related subjects.

Since healthcare operations management is lacking in medicine education, many healthcare managers lack education in this domain. We therefore provide tailored in-company training programs for healthcare managers, administrators, and also clinicians. Doing these courses in-company allows discussing the organization's current logistical problems within the course. We address topics such as hierarchical planning, integral capacity management, stochasticity and variability, elementary queuing theory, and planning and scheduling. Participants are provided with free tools to bring the concepts to practice. The course duration is anywhere from 0.5 to 8 days. In its most extensive form, participants perform a logistics project parallel to the course, under supervision of CHOIR staff.



## VALORIZATION

As expressed in UT's slogan "High Tech, Human Touch", valorization is in our DNA. In several ways, we strive to implement our research in practice.

From the research and education activities provided by CHOIR, we increasingly receive requests from healthcare institutions to implement the latest developments in healthcare business operations. The founders of CHOIR provide this service through the spin-off Rhythm, which gives us the opportunity to put our research results directly into practice.

Rhythm is a collaboration between CHOIR and ORTEC, one of the largest global providers of decision support software, with headquarters in the Netherlands. Rooted in CHOIR's research, Rhythm provides access to the latest research insights and innovations for optimization of healthcare services. Through services like consultancy, decision support software development, and business analytics, Rhythm helps healthcare providers to innovate their processes in order to deliver high quality care services efficiently and effectively.

In symbiosis, CHOIR's research feeds Rhythm with state-of-the-art knowledge, algorithms, models and techniques for implementation and dissemination in healthcare. Rhythm's activities also feed CHOIR with complex problems that drive scientific research.

Every 2-3 months, CHOIR organizes seminars and symposia to disseminate research results to practitioners, and to jointly discuss new topics of research. Symposia are called "CHOIR on Tour" – these take place at one of the collaborating healthcare organizations.

## WHICH OPPORTUNITIES WE SEE?

Healthcare institutions deal with major challenges through a constantly changing market. Both medical and technological innovations have driven a shift from inpatient to outpatient care, and increased the opportunities for healthcare delivery and thereby increasing the demand for care.

Comparing healthcare with industry, we found it striking that in recent decades the industry was able to deliver products of increasing quality, at lower cost and with greater diversity. Product and process innovation are now vital for production and there is no production company that can exist without. By making these spectacular developments in industry, society demands more cost effective (competitiveness) healthcare. As an answer, the Netherlands developed and implemented the managed care market. The question now is whether healthcare institutions, particularly hospitals, can manifest themselves on the market in

## FOUNDERS OF CHOIR



Prof.dr. Richard Boucherie is professor Stochastic Operations Research



Prof.dr.ir. Erwin Hans is professor Operations Management in Healthcare

such a way that this will eventually result in cost reductions, increasing quality and stimulates innovation.

Answering this question is not so simple. In addition to the principals of a free market (supply and demand), the managed market has more dimensions such as accessibility, solidarity and the separation of service and payment. In addition, the nature of the product as a service to people and the dependent relationship between customer and supplier results in a skewed distribution of knowledge and experience. Furthermore, healthcare institutions are characterized as knowledge centers, with self-operating teams. This may complicate change and adaptation of innovations.

## MORE INFORMATION

Please contact us for more information about our research, education, or valorization activities via the contact details below.

E: [choir@utwente.nl](mailto:choir@utwente.nl)  
T: +31534893523 / 3432

Linkedin:  
[linkedin.com/groups/1587437](https://www.linkedin.com/groups/1587437)

Website:  
<http://www.utwente.nl/choir>

Newsletter:  
Subscribe via [choir@utwente.nl](mailto:choir@utwente.nl)

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