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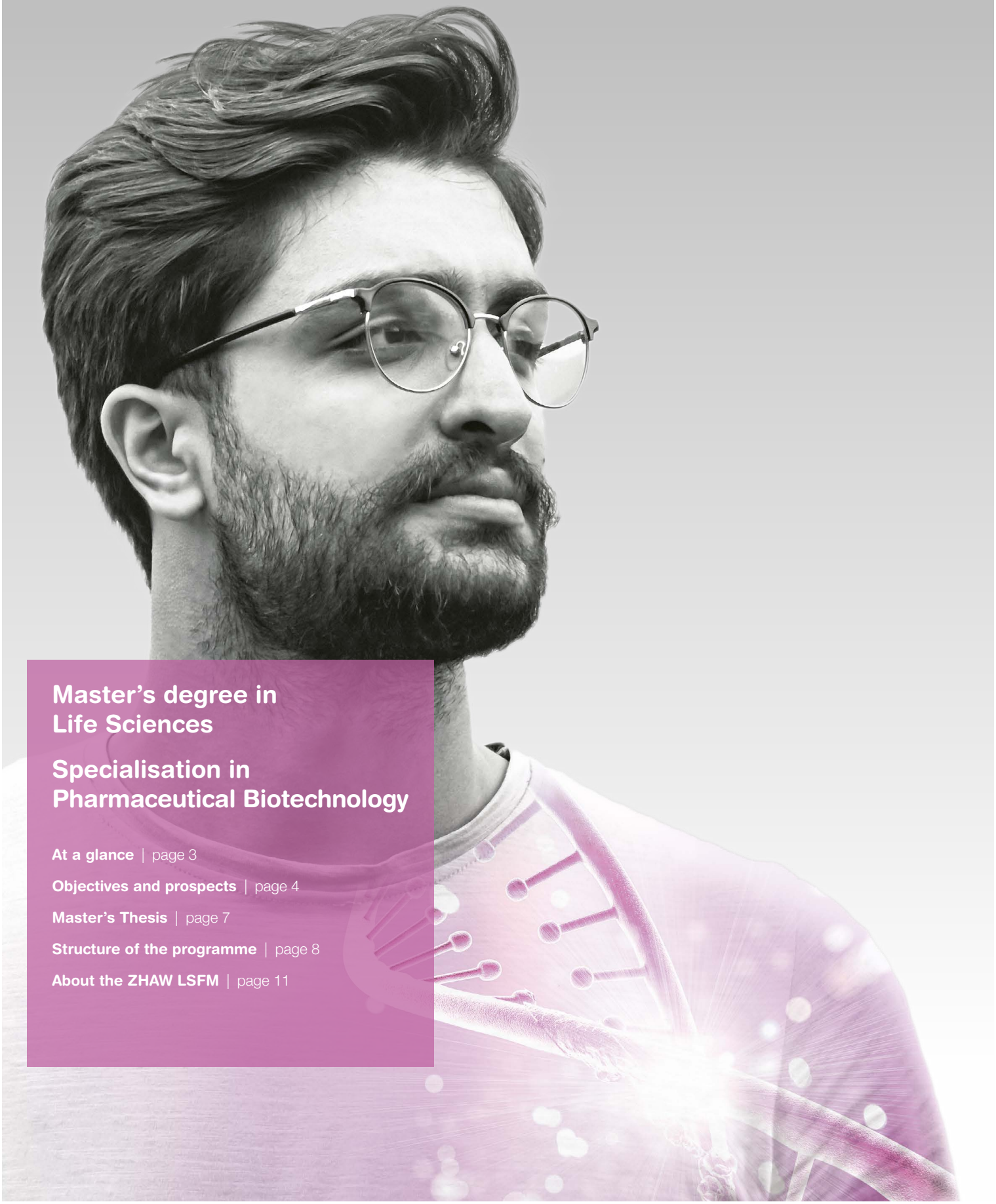
Life Sciences and Facility Management



Master's degree in Life Sciences

Specialisation in Pharmaceutical Biotechnology

Dynamic exchange: in Wädenswil you form part of a research group and study in a creative environment.

The Master's degree in **Life Sciences at a glance**

Aim	In the research-based Master's degree programme, you systematically deepen the understanding of your subject and expand your scientific skills. Your application focused Master's thesis is the scientific core of the study programme.
Specialisation	You specialise and graduate in one of four fields: Food and Beverage Innovation, Pharmaceutical Biotechnology, Chemistry for the Life Sciences, Applied Computational Life Sciences.
Title	Master of Science (MSc) ZHAW in Life Sciences with specialisation in Pharmaceutical Biotechnology.
Study agreement	Before your studies begin, an individual study agreement (ISV) is worked out with your supervisor. It includes your personal goals and the subject area of your Master's thesis, and is designed to match your interests, educational background and objectives. **More on page 9**
Cooperation	Students benefit from networking with the four Swiss Universities of Applied Sciences ZHAW, BFH, FHNW and HES-SO. A third of the lessons are taught as part of combined courses run jointly by these different universities. **More on page 9**
Learning concept	Research-based learning with a strong focus on the Master's thesis; combination of independent learning, contact lessons and e-learning.
Duration and workload	3 semesters of full-time study, with part-time also possible: 90 credits (ECTS).
Teaching location and language	Teaching takes place in Wädenswil,Olten or Berne. Block weeks can also be held directly at partner universities. The language of instruction is English or German, depending on the module. **More on page 9**
Study fees	Semester fee CHF 720; for students whose place of residence is not Switzerland when starting the programme, an additional CHF 500 is charged. See the detailed study cost overview at: **www.zhaw.ch/lsfm/master/en.**
Entry requirements	One of the following prior qualifications is required: **Bachelor's degree** from a university of applied sciences with an above average performance (ECTS grade A or B or a mark of at least 5.0). **FH diploma** (forerunner of the Bachelor's degree) with an above average performance (average mark of 5.0 or higher). Recognition of at least 2 years of professional experience and/or of postgraduate studies in a corresponding professional area in agreement with the programme directors. **University/ETH Bachelor's degree** with practice-oriented «passerelle» and 6 months' work experience in the area of your specialisation. Admission «sur dossier» possible with professional experience and prior education in a natural science field.
Start of studies	Every February and September; registration deadline 31 October and 30 April.
Master's Thesis	The Master's thesis is at the centre of your studies and your research. It involves investigating a question from practice or applied research, often in cooperation with national or international research or industry partners. **More on page 7**
More information	Registrar's office +41 58 934 59 61, www.zhaw.ch/lsfm/master/en Info events take place every spring and autumn.

Pharmaceutical Biotechnology

From gene to drug

Safe and effective drugs, produced at high levels of quality and reliability, are one of the foundations of our health care system. Pharmaceutical biotechnology has become established as an independent discipline in recent years. Many drugs today are no longer based on chemically synthesised molecules, but on agents developed and produced in complex biological processes with high specificity for the disease to be treated. In the Pharmaceutical Biotechnology specialisation, you become part of this strongly research-oriented and socially relevant subject area.

In addition to in-depth expertise in your specialisation, you develop analytical skills, leadership competences and a pronounced action orientation. You also come to grips with natural scientific, technological-technical, economic and social issues that are relevant to the life sciences in the areas of health, nutrition and the environment.

Objectives and competences

During your studies you master the entire development process of drugs, from the molecular structure of active pharmaceutical ingredients to the final product. You link scientific findings with the requirements of industrial production in the products you are involved in. You learn how to market these products successfully and are familiar with the regulatory context of drug development. You design work programmes based on research questions, have a good command of methods required for interdisciplinary collaboration, and can write and evaluate research reports. For your Master's thesis, you focus on a specialist field.

Prospects

The Master's programme lays the foundation for your international career at the interface between basic research and the commercial application of new pharmacological agents. You will not only be a sought-after expert in this rapidly growing industry, but also in related fields such as medical diagnostics, food, cosmetics and the environment. In Switzerland global pharmaceutical companies are expanding their research and production capacity. In addition, many successful Swiss start-up companies developing new active ingredients are looking for professionals who understand the manufacturing process, application and characterisation of these substances and are able to develop them in innovative ways.

Graduate portraits
Master's graduates who specialised in Pharmaceutical Biotechnology – where are they now? At **www.zhaw.ch/icbt/master-biotechnology** you can find out what positions they now hold, what they particularly appreciated about the Master's programme, and what tips they have for prospective Master's students.

Studying in a research environment

From the very beginning of your Master's degree, you are part of a research group which is appropriate for the topic of your Master's thesis (more on page 7). You cooperate in various research and development projects, and are embedded in a creative research environment. Focusing on your Master's thesis, which involves application-oriented research, supports your ability to generate innovation, see things from different perspectives, and link entrepreneurial and scientific ways of thinking. Working in a research group not only develops your creativity, resourcefulness and critical faculties, but also your leadership and teamwork skills.

Modules in the specialisation

Expertise in pharmaceutical biotechnology is taught in four modules (more on page 9):

Biodesign
Strategies for drug design at the molecular biological level, their implementation in vector construction and the choice of an expression system. Rational development of recombinant products such as proteins, antibodies, and nucleic acid-based products. Development of selection criteria for a production organism, an expression system and vector construction.

Bioprocessing and Bioanalytics
Selection and qualification of process equipment (including standard and modern single-use equipment), strategies for process control, and bioanalytical methods to control the productivity and quality of a bioprocess. Discussion of potential biological, technological-technical and economic problems in the design of an industrial bioprocess, based on the regulatory framework of the pharmaceutical industry. Creating a business case for innovations.

Downstream and Safety
Processes that lead to a purified active compound. Laboratory work to practise implementation of the necessary chromatographic techniques. Lectures by representatives from industry and your own project work on implementation at the production stage, including further aspects such as logistics and regulatory requirements.

Drug Formulation and Biological Test Systems
Capabilities of drug formulation, delivery and effectiveness to produce a functioning drug from an active substance. Evaluation of in vivo and in vitro test systems in preclinical development as a means of characterising the biological effects of a paticular drug. Basic understanding of the drug approval process in Europe.

Video
In the video, you gain insight into the everyday reality of your studies and the working environment you will afterwards encounter. Speakers in the video include faculty members, graduates and employers. Get a realistic impression of the Master's programme at **www.zhaw.ch/icbt/master-biotechnology**

Working for the future of medicine: in the specialisation of Pharmaceutical Biotechnology specialisation you learn to develop innovative drugs.

Master's Thesis

The heart of your studies

The Master's thesis is the scientific core of your studies: you choose your specialist courses with a view to the topic of your thesis, which you determine before starting your studies. Based on the theoretical foundations of the study programme, you answer a specific question in this research field and work out solutions that are relevant for research, industry and society, often in co-operation with national and international partners. Depending on your topic, you work in a research group at the Institute of Chemistry and Biotechnology in Wädenswil or externally with an industrial or research partner. Through the thesis you not only demonstrate your knowledge and skills, but also the ability to successfully integrate into a research group and expand your knowledge in your specific field of scientific expertise.

Working methods

For the Master's thesis you focus on a particular area of pharmaceutical biotechnology as part of a research group (see next section). You plan and work mainly independently, in consultation with your supervisor and any external research and industry partners. In this way you not only deepen your natural scientific and technological-technical competence, but also gain useful experience of project management. Pursuing a long-term research project successfully tests and trains your flexibility, for example, when scientific hypotheses need to be reexamined or experimental designs have to be adjusted.

Research groups

For your Master's thesis, you can choose to work in one of the following research groups at the Institute of Chemistry and Biotechnology:

- Measurement and Sensor Technology
- Bioprocess Technology
- Bioprocess Engineering
- Molecular Biology
- Pharmaceutical Technology and Pharmacology
- Natural Product Chemistry and Phytopharmacy
- Environmental Biotechnology
- Cell Physiology and Cell Engineering
- Cell Culture Technology

Contact

If you have any questions about the specialisation in Pharmaceutical Biotechnology, please contact us by email.

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Structure of the MSc programme

Four steps to the MSc in Life Sciences

The three semesters of full-time study which lead to your Master of Science in Life Sciences comprise the following three fields of competence plus a Master's thesis, giving a total of 90 credits **(module descriptions at www.zhaw.ch/lsfm/master/en).**

Core Competences – minimum 12 credits

These modules provide you with work-oriented skills. With these core competences you acquire knowledge in the following areas: «Management, Business and Society» as well as «Handling and Understanding Data».

Each module lasts half a semester – approx. ⅔ of the lessons are held online and approx. ⅓ consists of decentralised teaching (accompanied exercises, case studies etc.) directly in Wädenswil. You choose at least three from the following seven modules (each 3 ECTS):

You choose at least another three from the following modules:

- Design and Analysis of Experiments
- Modelling and Exploration of Multivariate Data
- Data and Ethics
- Business Administration for Life Sciences
- Management and Leadership for Life Sciences
- Innovation and Project Management
- Politics and Society

In addition the module 'Handling and Visualising Data' is mandatory.

Cluster-specific modules – minimum 9 credits

Cluster-specific modules (each 3 ECTS) complement the specialisation modules. The specialisation Pharmaceutical Biotechnology is part of the cluster Bio / Pharma. You choose at least three from the following seven modules out of the Cluster Bio / Pharma.

Cluster Bio / Pharma:

- Compound Profiling in Pharmaceutical Drug Discovery
- Physicochemical Principles in Pharmaceutics
- Design of Biopharmaceutical Production Facilities
- Regulatory Affairs
- Physiology and Immunotherapies
- Tissue Engineering for Drug Discovery
- Bioanalytics in a Regulated Environment

In addition to the modules listed above, you can also choose from the following modules from other clusters (each 3 ECTS):

- Modelling of Complex Systems (Cluster Computation)
- Chemistry and Energy (Cluster Chemistry)

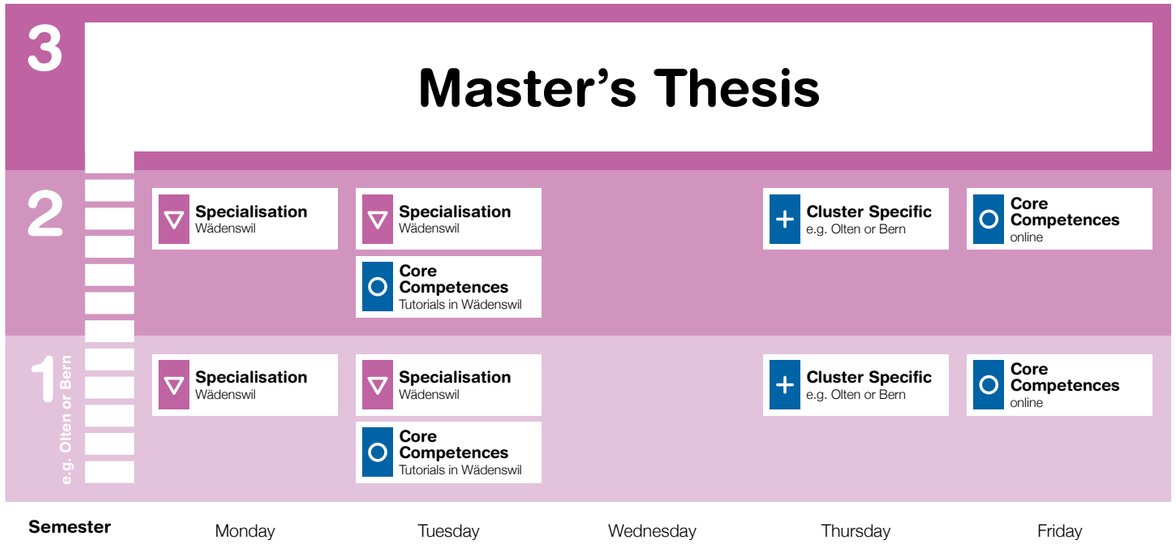
Specialisation Skills – 20 credits

You broaden and specialise your knowledge of pharmaceutical biotechnology by taking all of the following four modules (each 5 ECTS, more information on page 5):

- Biodesign: Ways to active pharmaceutical ingredients (API)
- Bioprocessing and Bioanalytics
- Downstream and Safety
- Drug Formulation and Biological Test Systems

Master's Thesis – 40 credits

A total of eight months is earmarked for work on your Master's thesis, which you can spread over your studies as appropriate (more on page 7).



Structure of the programme

The diagram shows the general structure of a full-time Master's programme. You determine the actual sequence and focal points yourself (see the Study Agreement section).

Study Agreement

Before your studies begin, you decide on your personal educational goals, define the topic of your Master's thesis, and select your individual plan of study from the selection of modules together with your supervisor. Your personal study programme is based on your educational background, your interests and your objectives. Not only at this stage, but also throughout your studies, you profit from fruitful interaction with your supervisor. The Study Agreement, a learning tool covering independent learning, contact lessons and e-learning, enables you to create your own contemporary learning context, which includes a high degree of flexibility.

Cooperation

The Master of Science in Life Sciences is a cooperative venture run by the ZHAW together with three other Swiss Universities of Applied Sciences:

- The Berne University of Applied Sciences BFH
- University of Applied Sciences and Arts Northwestern Switzerland FHNW
- University of Applied Sciences and Arts Western Switzerland HES-SO

In the cooperation modules you benefit from the expertise of all four partners, create a broad network, and participate in interdisciplinary exchange. In the Core Competences and cluster-specific modules, classes take place in English (required language level C1).

About us

The ZHAW

The ZHAW (Zurich University of Applied Sciences) is one of the leading universities of applied sciences in Switzerland. Teaching, research, continuing education, consulting and other services are scientifically-based and practice-oriented. The ZHAW comprises eight schools at three locations (Wädenswil, Winterthur, Zurich). Currently, over 14 000 students are enrolled at the ZHAW.

The School of LSFM

The School of Life Sciences and Facility Management (LSFM) is located in Wädenswil on the left shore of the Lake of Zurich. Teaching and research are carried out in the fields of environment, nutrition/food, health and society. The degree and continuing education programmes include Bachelor's degree programmes, Master's degree programmes, and a wide range of continuing education courses. Around 1800 students are currently enrolled at the LSFM in Wädenswil.

Environment | Food | Health | Society
Our competences in Life Sciences and Facility Management.

Study and continuing education

The Bachelor's degree programme provides practically-oriented knowledge, general education and training in work methodology, and leads to a professional qualification. The consecutive Master's degree programme allows you to specialise within your chosen field and acquire an additional professional qualification. Four Master's degree programmes are offered at the ZHAW campus in Wädenswil: Preneurship for Regenerative Food Systems, Life Sciences, Real Estate & Facility Management and Environment and Natural Resources. Engaging in ongoing education and keeping your skills and know-how up to date are important for ensuring professional success. The ZHAW offers customised, practice-oriented courses, symposiums and continuing education programmes.

Research and development

Working in conjunction with businesses, public agencies and associations, our institutes engage in applied research and provide services for third parties. Close collaboration with external parties ensures the transfer of knowledge and technology between the academic realm and professional practice. Our technical installations and equipment are state-of-the-art. In our modern laboratories and testing and production facilities, applied research and development projects can be conducted to the highest professional and practical standards.

Study and research in Wädenswil: practically-oriented, creative, passionate and reflective

The ZHAW is one of the leading Swiss universities of applied sciences. The School of Life Sciences and Facility Management currently has around 1800 students and employs more than 600 people. The educational programme comprises Bachelor's and Master's degree programmes as well as a broad range of further training and education courses.

Our expertise in life sciences and facility management in the areas of the environment, food and health enables us to make a vital contribution to solving social challenges and improving quality of life. Our success is based on dynamic institutes with extensive competence in research, development and services in the disciplines of applied computational life sciences, biotechnology, chemistry, food and beverage innovation, natural resource sciences and real estate & facility management.

Environment | Food | Health | Society
Our competences in Life Sciences and Facility Management.

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