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Methodology for developing an educational electronic information environment

JetIQ VNTU

Main Speaker: Olena Kovalenko

Methodology: essence and substance; methods of strategic planning and implementation; environmental life cycle.

Methodology for developing of an educational electronic information environment: features, established methods, and implementations.

Higher Education Institutions.

Distance learning platforms.

Corporate platforms.

Microlearning via short courses and social media.

Electronic space as a web-oriented learning system. A system established through various electronic devices, hardware, and software for managing information and knowledge within a specialized environment.

Strategy for the Development of the Educational Electronic Information Environment

Development Strategy and Digitalization Strategy.

Fragmentation of digitalization tasks.

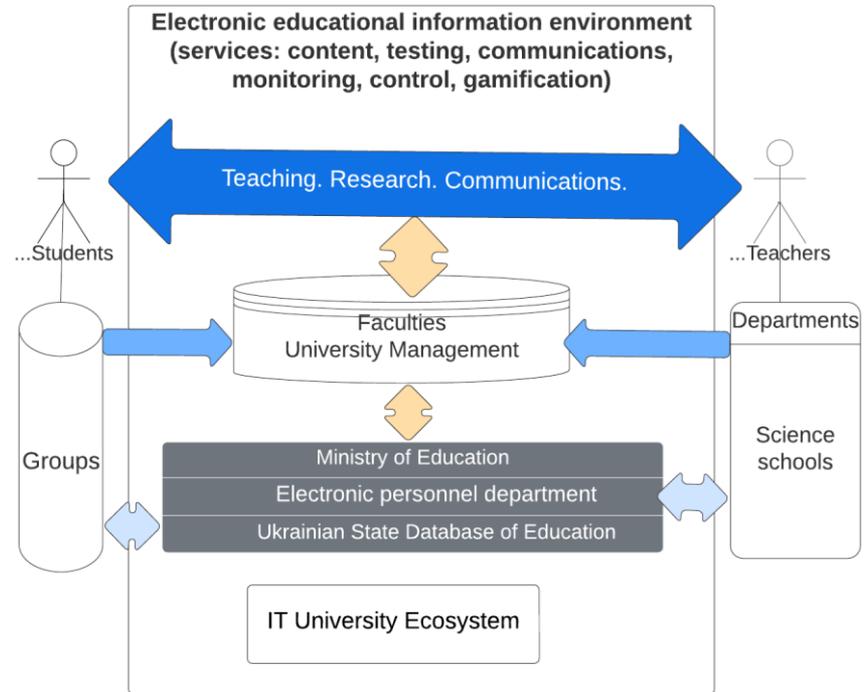
Systemic development strategy based on sociotechnical parameters.

Principles for creating an educational electronic information environment as an ecosystem:

- Single-entry data principle: input once, use multiple times.
- Process optimization over automation: analyze and optimize or replace existing processes with digital-native workflows rather than simply automating them.
- Agent-based and microservice interaction: single process owner per microservice; defined communication protocols; interaction between software modules, process owners, and participants.
- Core information preservation and redundancy.

IT University Ecosystem and its Participants

- students
- teachers
- administration
- services
- state management institutions
- commercial management boards



The mathematical model of the educational electronic information environment can be presented as a specific type of proprietary model of the electronic information environment, structured as a set of circuits.

$$\text{OEIS} = \langle z_p, z_f, z(r_1 \dots r_n), [[z_k, z]]_m \rangle,$$

where z_p is the monitoring and performance control circuit; z_f represents the functional circuits for operational activity; $z\{r_1 \dots r_n\}$ denotes the activity implementation scenario circuits; z_m is the motivational circuit; and z_k is the communication and interaction circuit.

A composite set of agent sets (users or software modules), electronic static and dynamic resources, and communications.

$$Z = \langle A, ER, B \rangle,$$

where A is the set of agents (software modules and users); ER is the set of electronic resources; and B is the set of interactions between agents. The interaction B_{ij} with defined vectors describes the nature of information interaction between agents A_i and A_j ($i = \{1, N\}$, $j = M$).

The mirror concept is based on the definitions of information theory and its classification according to perception, presentation, processes, and the reflection of information by an agent.

$$J_{spr} = R_k (J_p) \quad J_{pr} = R_{ka} (M_{spr}) M_{pr},$$

where J_{spr} is perception information; J_p is presentation information; J_{pr} is process information; M_{spr} denotes measurement indicators of perception; M_{pr} denotes measurement indicators of processes; R_k is the relative content density of electronic resources; and R_{ka} is the relative perception (reflection) of information by an agent.

The informational perception vector can be represented as a Gaussian integral, encompassing the information flow vector over the area of the environment.

$$J_{\text{spr}} = \oint_S [R_k O] dS = \oint_S [O_{\text{spr}}] dS,$$

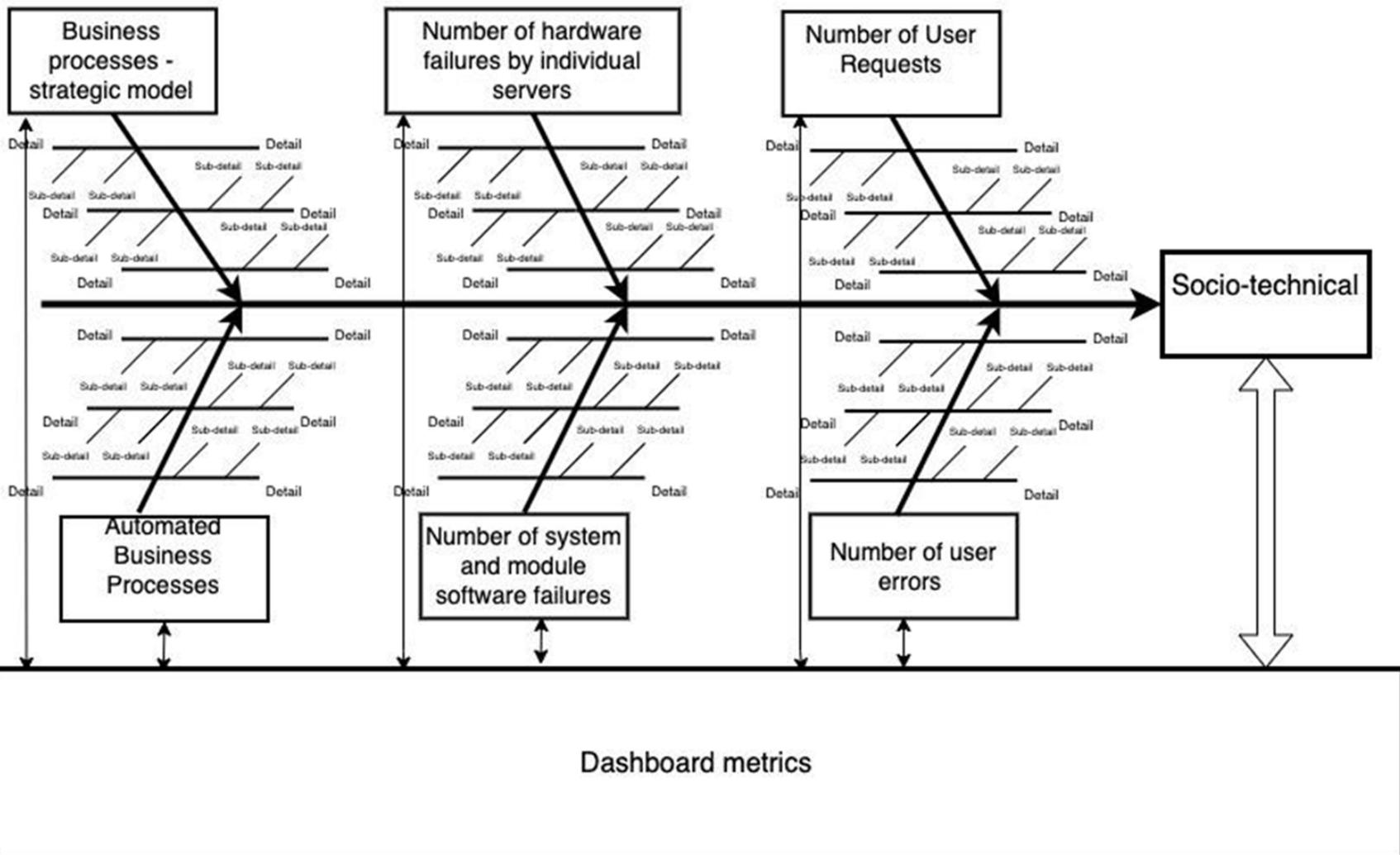
where $O_{\text{spr}} = R_k O$ is the reflection intensity vector; O_{spr} is the coverage vector of educational and managerial activities and their reflection for user perception.

A novel methodology for developing an educational electronic information environment is introduced. This methodology encompasses concepts and methods, models of agent interaction within the educational information ecosystem, and educational, managerial, and supporting processes. The approach enhances the quality of the design and implementation of educational electronic information environments and reduces the time required to adapt implementation methods to the specific requirements of individual educational institutions and corporate training programs.

A project management technology for implementing an educational electronic information environment is proposed. This technology enables the identification of requirements for individual modules, verification of agent interactions, assessment of error risks in specific processes, and evaluation of the socio-technical level of the educational information ecosystem. These features collectively reduce the time required to implement new modules and changes within the educational electronic information environment.

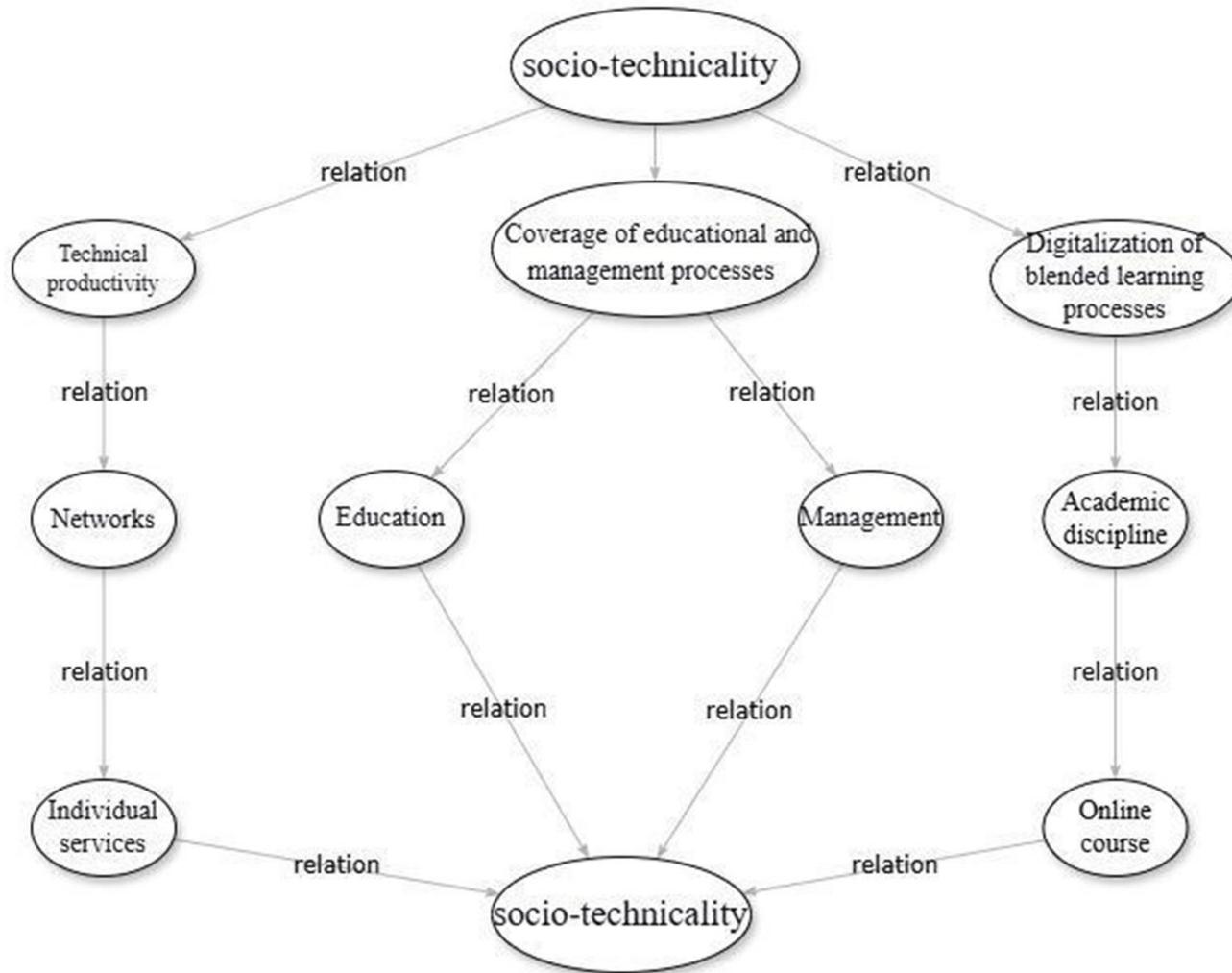
A visual collaboration library is proposed that, unlike existing solutions, employs specialized visual elements to reduce facilitation time and to define requirements for developing an educational electronic information environment. This library also enables rapid visual modeling of educational, management, and support processes.

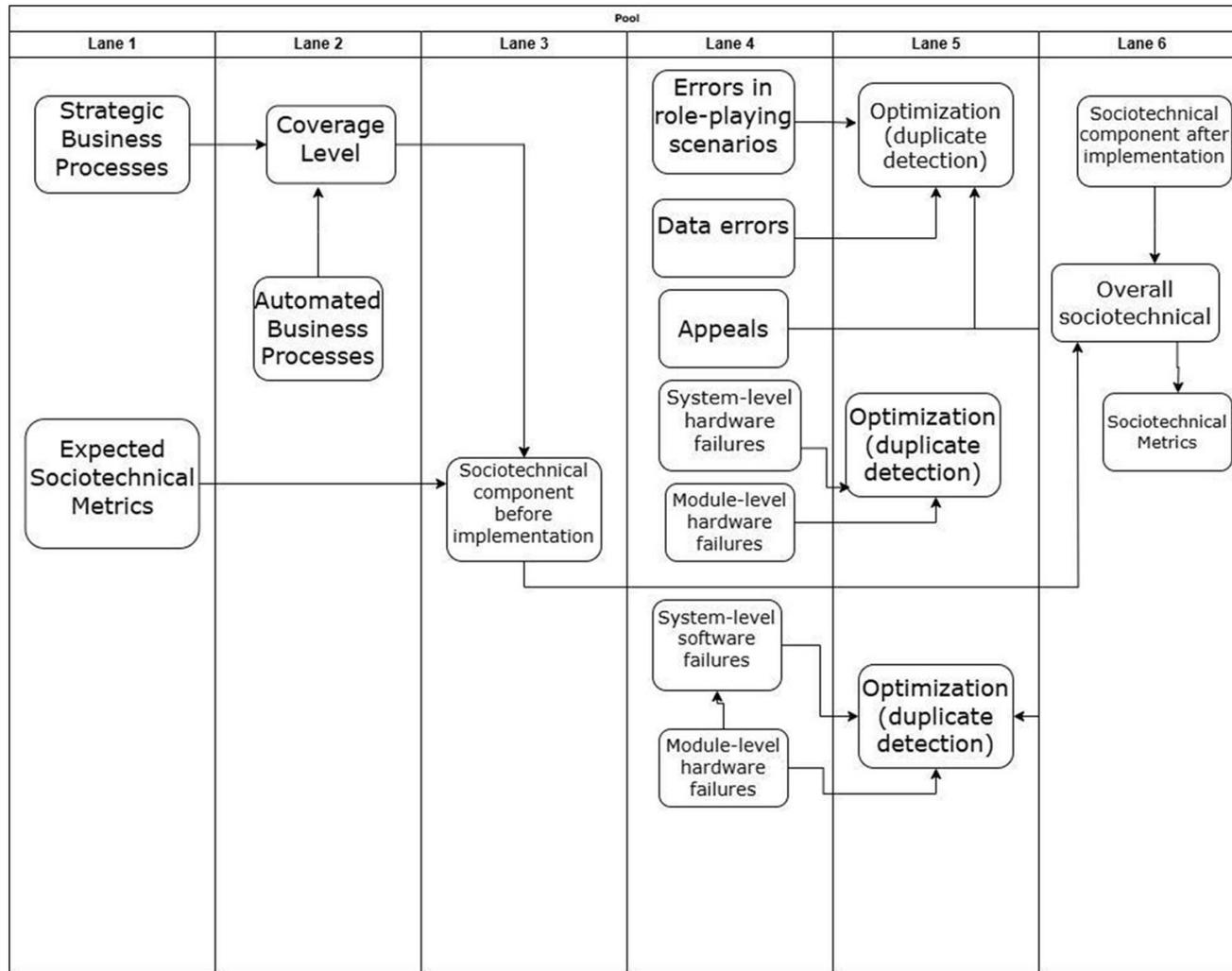
The theory of information reflection for educational electronic information environments has been refined by clarifying post-processing information reflection processes, considering the characteristics of educational, managerial, and auxiliary processes. This refinement enables assessment of the socio-technical level of the information ecosystem at the strategic level and formalizes information flows within individual modules and agent interactions at the contour level. Consequently, input and output information can be structured in accordance with specified requirements and international standards for educational software, facilitating the optimization of the learning space based on defined criteria.



| Process groups | LMS | |
|--|-------|-------|
| | SEL | JetIQ |
| 1. Functional educational processes | 5.75 | 8 |
| 2. Electronic Dean's Office | 7 | 9 |
| 3. Reporting | 4 | 8 |
| 4. General communications | 5 | 5 |
| 5. Integration with external resources | 4 | 6 |
| 6. Document management | 7 | 3 |
| 7. Emotional circuit | 1 | 3 |
| 8. Brand presentation | 3 | 4 |
| 9. Mobile applications | 2 | 4 |
| Total | 38.75 | 51 |

Socio-Technical Ecosystem Mapping Diagram of the "Electronic University"



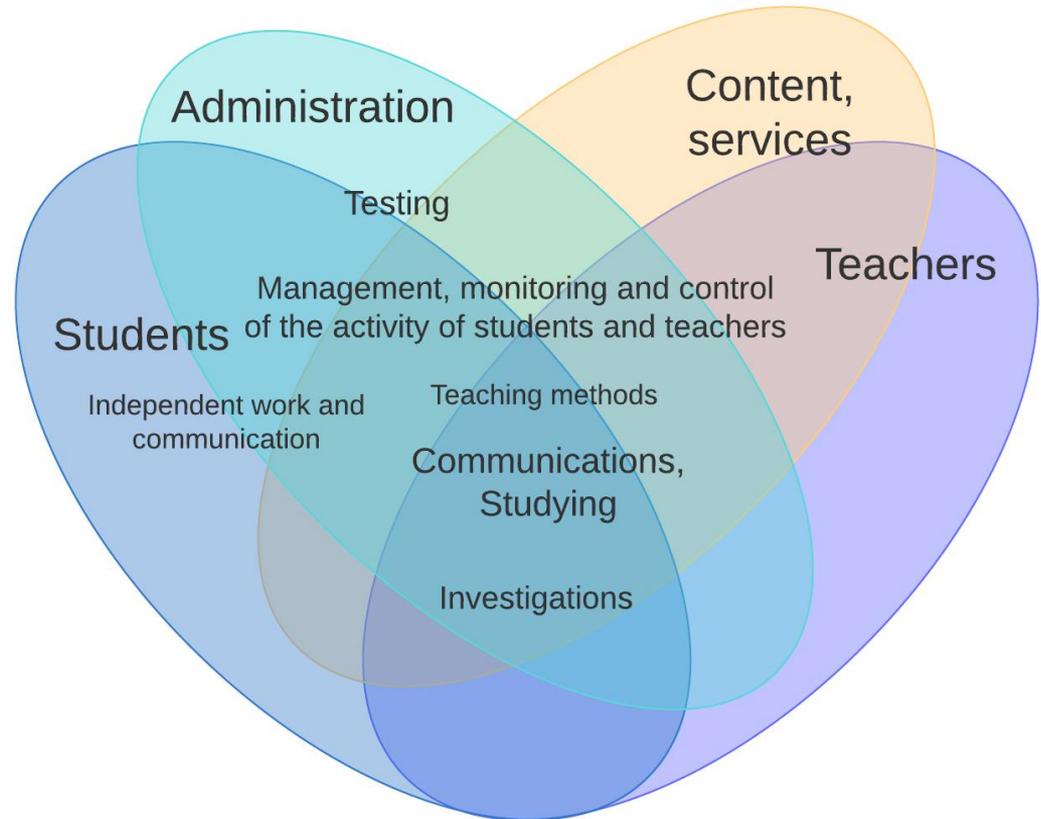


Transition from the existing model to the proposed model

The structural model of the educational electronic information environment has been enhanced to incorporate functional, communication, and motivational-emotional contours within a unified system, distinguishing it from existing models. This approach enables the separation of specific functions, reduces the prominence of the functional contour, and optimizes communication and motivational-emotional processes in accordance with specified criteria.

JetIQ contours

- functional
- emotional and motivational
- meaningful (content)



Contours and formats of interaction in the JetIQ university ecosystem

| Contour/ Format | Traditional | Mixed | Distance | Quarantine/ war | Session |
|--|--|---------------------------------------|--|-----------------------|---|
| Institutional | All processes comply with the Law on Higher Education, the Statute and Regulations on the educational process, distance and mixed learning | | Special orders and regulations to strengthen the distance learning formaty | | Electronic dean's office. Integration systems with the database of the Ministry of Education. |
| Educational | Implementation of the curriculum | | Application of special services | | Processes of final control of knowledge |
| Support of methodical and scientific activity | Traditional communications | Traditional and online communications | Online communications | Providing free access | A built-in system for evaluating educational and scientific activities |
| Technical support | Process automation | | Strengthening the work of technical service centers | | Emphasis on security |
| Emotional | Elements of self-management, self-learning, gamification, introduction of original teaching methods | | Emotional, methodological and technical support | | |
| Training and coaching | Information technologies and pedagogical skills | | | | |

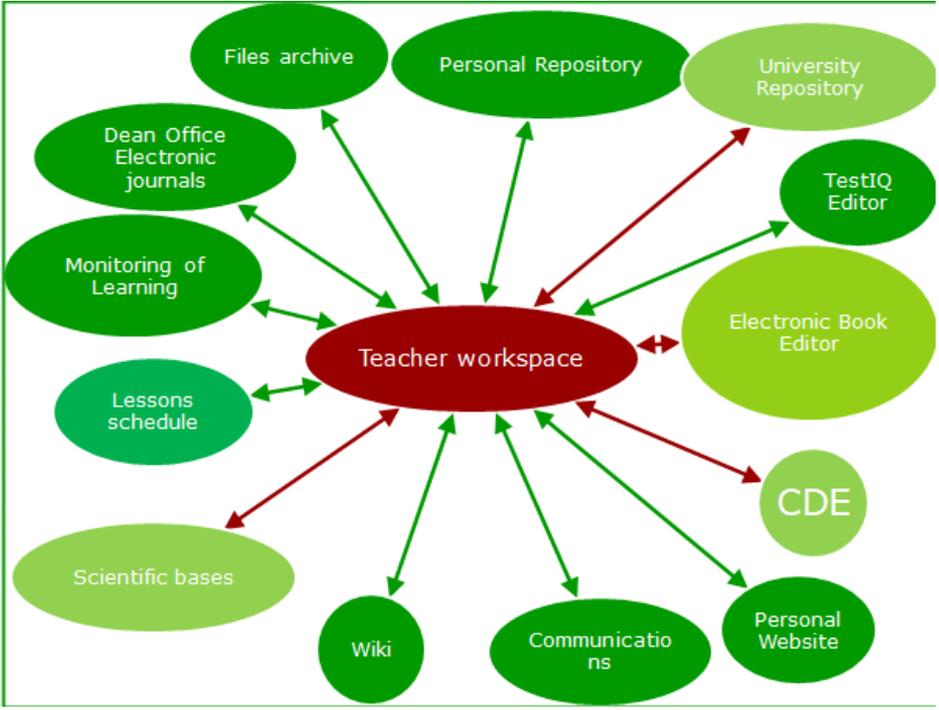
| <i>Levels of Management and Use</i> | | What | How | Where | Who | Why | Motivation | <i>Models</i> |
|--|---------------|--|---|---|---|--|---|---------------------------------------|
| Heads of the institution and the project "Electronic University" | Head | Educational Plans and Objects | Educational and management processes | Internal network, external public portal; territorial placement | Key departments and individuals | According to the curricula and timetables of the departments | Target benchmarks of the educational development strategy | Scope, context |
| | Scheduler | Conceptual Data Model | Educational and Management Process Model | Logistics Information Scheme Cxema | Target Users | | Information Mirrors of the | Model "Electronic University" |
| Users | Student | Electronic resources communications, presentations monitoring of results of activity | Through personal electronic cabinet; public portal; | Internal network external public portal | Specialist Administrators with a certain level of access and capabilities in the system | | | Convenient, accessible, fast, modern. |
| | Teacher | | | | | | | |
| | Specialist | | | | | | | |
| | Methodist | | | | | | | |
| | Administrator | | | | | | | |
| | Dispatcher | | | | | | | |
| Leader | | | | | | | | |
| | | | | | | | | |

Components of teacher workspace.

The screenshot shows the JetIQ web interface for a teacher's workspace. At the top, there are navigation tabs: ГОЛОВНА, СТРУКТУРА, ВИПАДАЧА, СТУДЕНТСКА, РЕСУРСИ, ПОШКА, ВІДП. Below this, the user's name "Робочий стіл Коваленко Олена Олександрівна" is displayed next to a profile picture. The main area contains several widgets: "Мій репозиторій", "Мій архів файлів", "БД. Універсальна вибірка", "Тест IQ", "Мітроніторинг і фідбек", "Занепокоєні", "Розклад навчальних курсів", "Курси", "Мій науковий статистика", "Наука", "Навчальні ресурси", and "Ранок". Below these widgets, there is a table titled "Інвентар навчальних ресурсів дисципл. Випадач Коваленко Олена Олександрівна".

| № | Дисципліна | Сем. | Курс | Сем. | Мес. | Датум | Випусковий бал | Курс | Результат | Роз. |
|----|--|------|------|-------|------|----------|----------------|----------|-----------|------|
| 1 | Програмування даних: введення в курс | A | 5 | месца | 10 | 15.08.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 2 | Системні операції: програмування | 79 | 2 | месца | 4 | 20.10.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 3 | Системні операції: введення | 79 | 3 | месца | 1 | 07.11.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 4 | Системні операції: введення | 79 | 2 | месца | 2 | 10.11.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 5 | Архітектура та програмування даних | 79 | 2 | месца | 4 | 20.10.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 6 | Архітектура та програмування даних | 8 | 1 | 79 | 2 | месца | 2 | 10.11.18 | 100.000 | 2018 |
| 7 | Архітектура та програмування даних | 79 | 3 | месца | 8 | 10.11.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 8 | Архітектура та програмування даних: введення | 79 | 3 | месца | 10 | 10.11.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 9 | Архітектура та програмування даних: введення | 79 | 2 | месца | 4 | 20.10.18 | 100.000 | 20.100 | 100.000 | 2018 |
| 10 | Системні операції: введення в курс | 79 | 2 | месца | 4 | 10.11.18 | 100.000 | 20.100 | 100.000 | 2018 |

Below the table, there is a section titled "Конструктор навігатора навчальних ресурсів дисципліни: 'Об'єктно-орієнтоване програмування'". It includes fields for "Спеціальність", "Семестр", "Випусковий", "Вид", "Метод", and "Додати до навігатора навчальні матеріали з цієї дисципліни".



The model for developing an educational electronic information environment for microlearning has been enhanced using the modules "Electronic book" and "Navigator of academic disciplines." Unlike existing models, it incorporates SMART elements that improve communication and motivational-emotional contours by increasing the number of short motivating messages for independent student work, utilizing test tasks, and automating the evaluation of student work results, thereby reducing teacher workload.

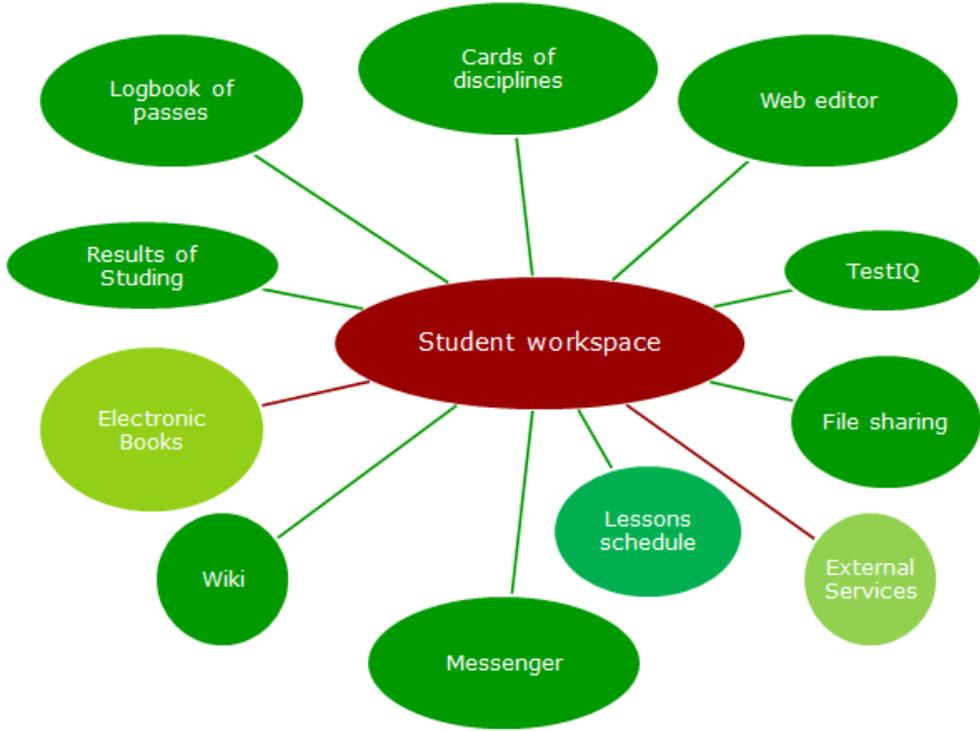
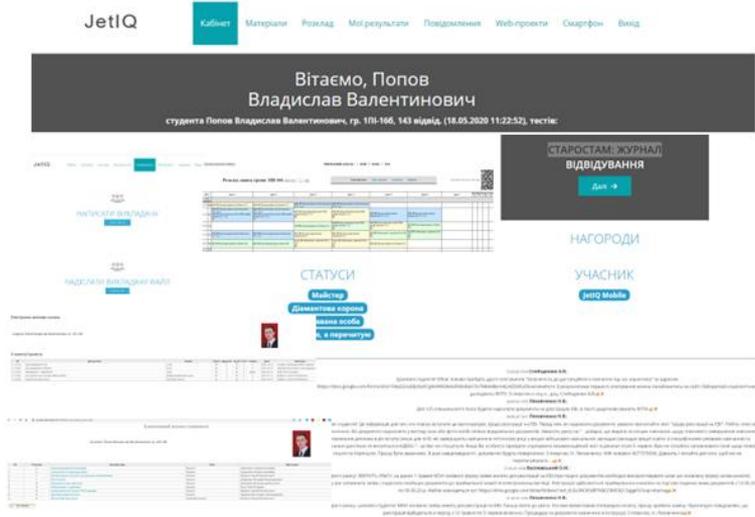
$$\begin{aligned}
 K_{elbook} = \{ & K_{fteach} (\text{Learnin}_{strteach}; \text{Cr}; \text{Content}; \text{Plan}_m; L_{sms}; \text{Tests, Val}; \\
 & \text{Tasks}; \text{Exterlinks}); K_{fst} (\text{Learnin}_{strst}; \text{Read}_{st}; \text{Not}_{st}; \text{Tasks}_{st}; \text{Tests}_{st}; \text{SMS}_{st}; \\
 & \text{Forum}_{st}); K_{fSM} (\text{Track}_{st}; \text{Auto-} \\
 & \text{SMS, Gam}); K_{fSI} (\text{Integer}_{navigator}; \text{Integer}_{testresults}; \text{Integer}_{communication teacher}; \text{Integer}_{sms}; \\
 & \text{Integer}_{sendfile}; \text{Integer}_{forum}); K_{fSecurity} \}
 \end{aligned}$$

- **Instructor's functional actions** $K_{f\text{teach}}$ (functions for studying instructions on how to work with the "Electronic Book" module Learn_{instr teach}; creation Cr; populating Content; management action plan Plan_m; message library for the student action monitoring system L_{sms}; embedded tests with assessment evaluation Tests, Val; assignments Tasks; list of external links Exterlinks);
- **Student's functional actions** K_{fst} (functions for studying instructions on how to work with the "Electronic Book" module Learn_{instr st}; reading electronic resources Read_{st}; bookmarks and notes Not_{st}; completing assignments Tasks_{st}; taking embedded tests Tests_{st}; generating messages SMS_{st}; and navigating to the discussion forum Forum_{st});
- **Monitoring system functions** K_{fSM} (tracking student actions Track_{st}; generating automated messages Auto-SMS; connection with the gamification system Gam);
- **Integration system functions** K_{fSI} } for integrating the electronic book with other modules of the JetIQ VNTU information ecosystem (integration with the discipline navigator Integer_{navigator}; generating test result reports; capabilities for semi-automatic entry of grades into the electronic journal Integer_{test results}; connection with the instructor notification system Integer_{communication teacher}; sending files Integer_{sms}; Integer_{sendfile}; Integer_{forum})

The **security contour** is supported by the JetIQ VNTU information ecosystem login system K_f Security and the instructor's own tools for granting access to electronic learning resources to specific groups of students, as well as the use of protection tools for various electronic resource formats.

Student workspace.

Components of student workspace



Components of Dean Office workspace.

Монитор навчального процесу, 8 сем. 2019-2020

18С-188

| № | Назва | Датум початку | Акт (11) | ВР | КІ | ВР | С.12.1 | С.12.2 | С.12.3 | С.12.4 | С.12.5 | С.12.6 |
|---|--|---------------|----------|----|----|--------------|--------|--------|--------|--------------|--------|--------|
| 1 | Міністерство і керівник (Розуміння) | 14.04 (2019) | | | | | | | | | | |
| 2 | Базисна ВРЗ (розуміння) | 15.04 (2019) | | | | | | | | | | |
| 3 | Кваліфікаційна система знань (інформаційні технології, управління, управління, судова (Додаток)) | 23.04 (2019) | | | | 58.05 (2019) | | | | 23.04 (2019) | | |
| 4 | Розкладна таблиця (Розуміння) | 17.05 (2019) | | | | | | | | | | |

18С-189

| № | Назва | Датум початку | Акт (11) | ВР | КІ | ВР | С.12.1 | С.12.2 | С.12.3 | С.12.4 | С.12.5 | С.12.6 |
|---|--|---------------|----------|----|----|--------------|--------------|--------|--------|--------------|--------|--------|
| 1 | Технічне програмування (Курсові) | 11.05 (2019) | | | | | 13.04 (2019) | | | | | |
| 2 | Базисна ВРЗ (розуміння) | 17.04 (2019) | | | | | 17.04 (2019) | | | | | |
| 3 | Кваліфікаційна система знань (інформаційні технології, управління, управління, судова (Додаток)) | 23.04 (2019) | | | | 58.05 (2019) | | | | 23.04 (2019) | | |
| 4 | Розкладна таблиця (Розуміння) | 17.05 (2019) | | | | | | | | | | |

18С-188

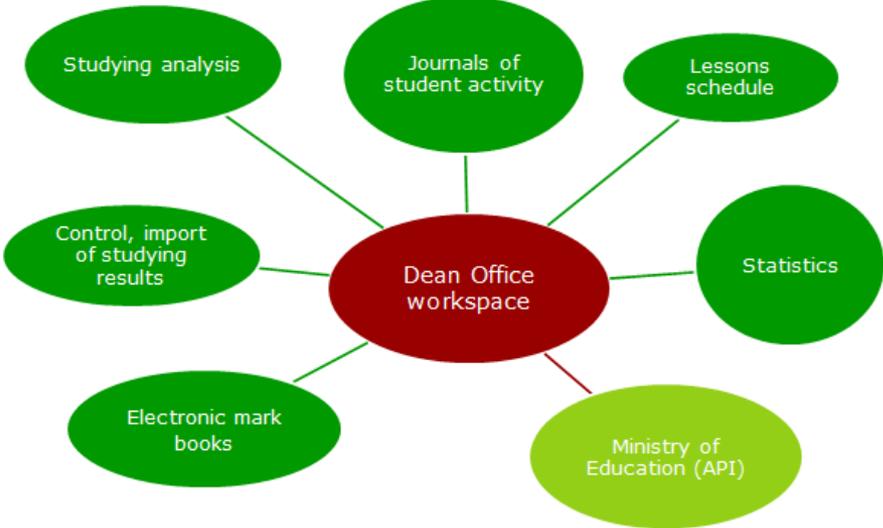
| № | Назва | Датум початку | Акт (11) | ВР | КІ | ВР | С.12.1 | С.12.2 | С.12.3 | С.12.4 | С.12.5 | С.12.6 |
|---|--|---------------|----------|----|----|--------------|--------|--------|--------|--------------|--------|--------|
| 1 | Міністерство і керівник (Розуміння) | 13.04 (2019) | | | | | | | | | | |
| 2 | Базисна ВРЗ (розуміння) | 15.04 (2019) | | | | | | | | | | |
| 3 | Кваліфікаційна система знань (інформаційні технології, управління, управління, судова (Додаток)) | 21.04 (2019) | | | | 21.04 (2019) | | | | 21.04 (2019) | | |
| 4 | Кваліфікаційна система знань (інформаційні технології, управління, управління, судова (Додаток)) | 24.04 (2019) | | | | 24.04 (2019) | | | | 24.04 (2019) | | |
| 5 | Розкладна таблиця (Розуміння) | | | | | | | | | | | |

18С-189

| № | Назва | Датум початку | Акт (11) | ВР | КІ | ВР | С.12.1 | С.12.2 | С.12.3 | С.12.4 | С.12.5 | С.12.6 |
|---|-------------------------|---------------|----------|----|----|----|--------|--------|--------|--------|--------|--------|
| 1 | Базисна ВРЗ (розуміння) | 15.04 (2019) | | | | | | | | | | |

Монитор навчального процесу, 8 сем. 2019-2020

| № | Назва | Датум початку | Акт (11) | ВР | КІ | ВР | С.12.1 | С.12.2 | С.12.3 | С.12.4 | С.12.5 | С.12.6 |
|---|--|---------------|----------|----|----|--------------|--------|--------|--------|--------------|--------|--------|
| 1 | Міністерство і керівник (Розуміння) | 14.04 (2019) | | | | | | | | | | |
| 2 | Базисна ВРЗ (розуміння) | 15.04 (2019) | | | | | | | | | | |
| 3 | Кваліфікаційна система знань (інформаційні технології, управління, управління, судова (Додаток)) | 23.04 (2019) | | | | 58.05 (2019) | | | | 23.04 (2019) | | |
| 4 | Розкладна таблиця (Розуміння) | 17.05 (2019) | | | | | | | | | | |



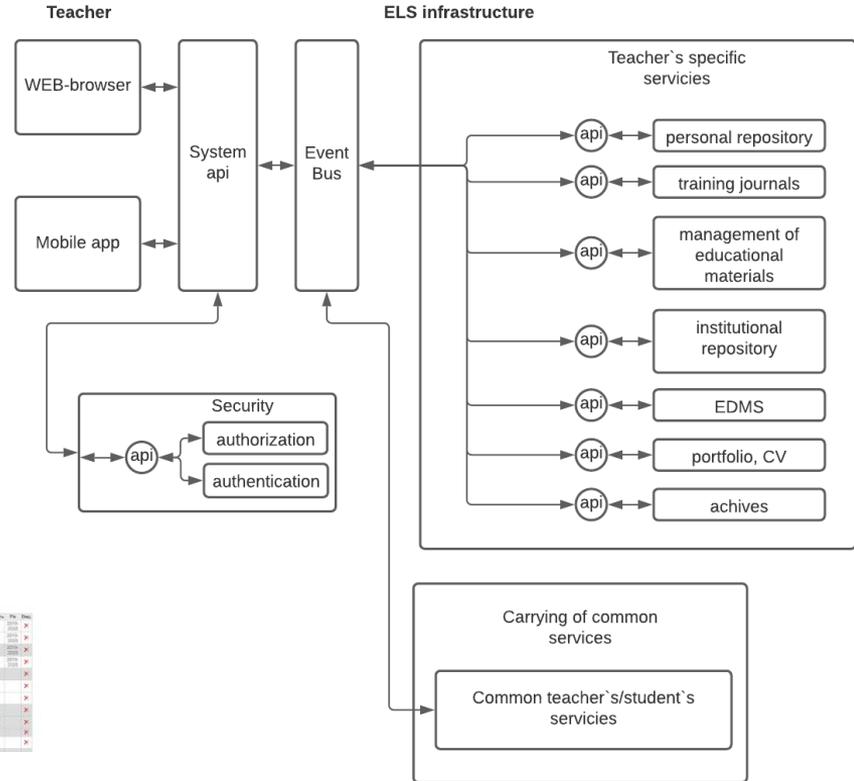
Microservice architecture of teachers workspace.

The screenshot shows the JetIQ web application interface. At the top, there are navigation tabs: ГОЛОВНА, СТРУКТУРА, ВИКАДАЦЬКА, СТУДЕНТСЬКА, РЕСУРСИ, ПОШУК, ВИКІД. Below the navigation, the user's name and profile picture are displayed: Робочий стіл Коваленко Олена Олександрівна.

The main area contains several service tiles:

- Мій репозиторій**: My repository with 60 items.
- Мій журнал**: My journal with 16 items.
- Ел. журнал викладача**: Teacher's electronic journal with 46 items.
- "Тест-іО"**: Test-iO with 37 items.
- Мультимедіа і файли**: Multimedia and files with 17 items.
- Комунікації**: Communications with 46 items.
- Ресурси каб.літоділля**: Resources for the club.
- Куратору**: Curator's resources.
- Моя наукова статистика**: My scientific statistics.
- Наука**: Science resources.
- Наочальні ресурси**: Visual resources.
- План**: Plan for the month.
- "Jet-book"**: Jet-book with 1 item.
- "EDMS.доп-леніо"**: EDMS.доп-леніо with 1 item.

At the bottom, there is a table with columns: N, login, ПІБ, a1, a2, a3, a4, Ч1, 5, b1, b2, b3, b4, Ч2, 5, Сум, Рейт., Доп. The table contains data for various teachers and their scores.



Microservice architecture of student workspace.

Кабинет | Матеріали | Розклад | Мій результат | Повадження | Мій інстру

Вітаємо, **АБМОВЦЕВ**
Олексій **Александрович**
гр. 11СТ-22 73 вікна, 11.02.2023 11:08:45
01-22-31-00@vntu.vtu.ua



| Курс | Група | Формат | Дати | Викладач | | |
|------|-------|--------|------|----------|------------|-------------------------------|
| 180 | 6 | 75 | С | 4 | 2020-01-12 | Михайлик Володимир |
| 90 | 3 | 95 | Д | 5 | 2020-01-18 | Шибя Євгеній Володимир |
| 120 | 5 | 40 | С | 3 | 2020-01-18 | Кашинська Валерія Валеріївна |
| 120 | 4 | 80 | С | 3 | 2020-01-22 | Корнійчук Євгеній Валерійович |
| 90 | 3 | 90 | А | 4 | 2020-01-22 | Стороженко Костянтин |
| 90 | 3 | 90 | В | 4 | 2020-01-09 | Руденко Тетяна Сергіївна |
| 90 | 3 | 90 | С | 3 | 2020-01-23 | Руденко Тетяна Сергіївна |

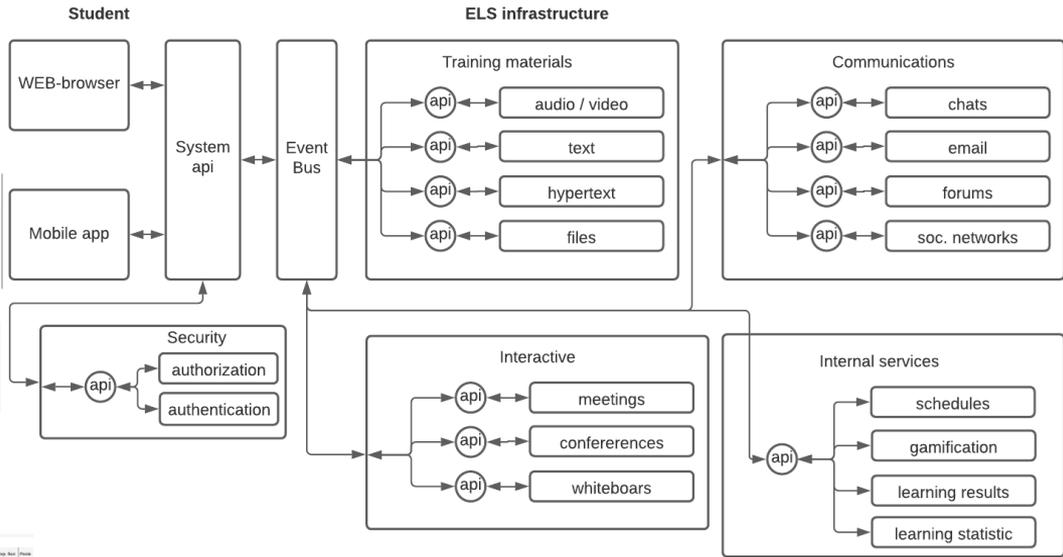
2 семестр/тримістер

| № | Назва | Курс | Група | Формат | Дати | Викладач |
|---|--------------------|--------|--------|--------|------|----------|
| 1 | Введення | урок 4 | урок 5 | урок 6 | | |
| 2 | Зачислення | | | | | |
| 3 | Фізика | | | | | |
| 4 | Математика | | | | | |
| 5 | Навчальна практика | | | | | |
| 6 | Сторож | | | | | |
| 7 | Навчальна практика | | | | | |
| 8 | Інформація | | | | | |

3 семестр/тримістер

| № | Назва | Курс | Група | Формат | Дати | Викладач |
|---|------------|------|-------|--------|------|----------|
| 1 | Введення | | | | | |
| 2 | Зачислення | | | | | |
| 3 | Фізика | | | | | |
| 4 | Математика | | | | | |

| № | Назва | Курс | Група | Формат | Дати | Викладач |
|---|---------------------------|------|-------|--------|------|----------|
| 1 | Експериментальний тест ІС | 3 | В | С | | |
| 2 | Академія І | 0 | 0 | 0 | | |
| 3 | Академія І | 0 | 0 | 0 | | |
| 4 | Академія І | 0 | 0 | 0 | | |



Microservice architecture of dean office workspace.

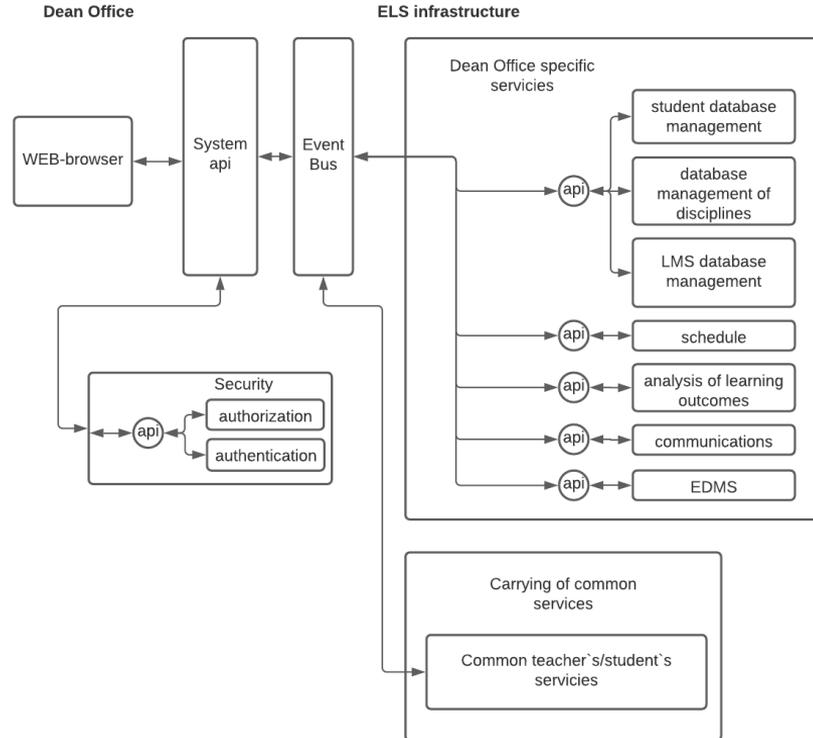
| 100-160 | | | | | | | | | | | |
|---------|---|------------|-------------|----|-------------|----|-------------|--|--|--|--|
| № | Тема | Дисциплина | Акт (№) | АР | КП | КР | Е(Д)С | | | | |
| 1 | Мониторинг и маркетинг (Грудкин) | | 14.04 (221) | | | | 14.04 (221) | | | | |
| 2 | Безопасность WEB-ресурсов (Клигерштейн) | | 13.04 (221) | | | | 13.04 (221) | | | | |
| 3 | Комплексные системы защиты информации: проектирование, внедрение, сопровождение (Дздральце) | | 23.04 (221) | | 08.05 (220) | | 23.04 (221) | | | | |
| 4 | Передаточные тракты (Лунач) | | 17.05 (220) | | | | | | | | |

| 100-160c | | | | | | | | | | | |
|----------|---|------------|------------|----|------------|----|------------|--|--|--|--|
| № | Тема | Дисциплина | Акт (№) | АР | КП | КР | Е(Д)С | | | | |
| 1 | Технология программирования (Каптур) | | 11.05 (60) | | | | 13.04 (60) | | | | |
| 2 | Безопасность WEB-ресурсов (Клигерштейн) | | 17.04 (60) | | | | 17.04 (60) | | | | |
| 3 | Комплексные системы защиты информации: проектирование, внедрение, сопровождение (Дздральце) | | 22.04 (60) | | 08.05 (60) | | 22.04 (60) | | | | |
| 4 | Передаточные тракты (Лунач) | | 17.05 (60) | | | | | | | | |

| 100-160 | | | | | | | | | | | |
|---------|---|------------|-------------|----|-------------|----|-------------|--|--|--|--|
| № | Тема | Дисциплина | Акт (№) | АР | КП | КР | Е(Д)С | | | | |
| 1 | Мониторинг и маркетинг (Грудкин) | | 13.04 (250) | | | | 13.04 (250) | | | | |
| 2 | Шаблоны проектирования программного обеспечения (Войцковская) | | 16.04 (250) | | | | 16.04 (250) | | | | |
| 3 | WEB-программирование (Войцковская) | | 21.04 (250) | | | | 20.04 (250) | | | | |
| 4 | Коды членства кафедры (Заваченко) | | 24.04 (225) | | 24.04 (232) | | 24.04 (225) | | | | |
| 5 | Передаточные тракты | | | | | | | | | | |

| 100-160c | | | | | | | | | | | |
|----------|---|------------|-------------|----|----|----|-------------|--|--|--|--|
| № | Тема | Дисциплина | Акт (№) | АР | КП | КР | Е(Д)С | | | | |
| 1 | Шаблоны проектирования программного обеспечения (Войцковская) | | 16.04 (220) | | | | 16.04 (220) | | | | |

| Журнал выполнения успеваемости в семестр 2019-2020 учебного года. Группы 100-160 | | | | | | | | | | | | | |
|--|----------------------------------|-------|-------|---|-------|-------|---|-------|-------|-----------------------------|-------|-------|--------|
| Баллы (100%) | Мониторинг и маркетинг (Грудкин) | | | Безопасность WEB-ресурсов (Клигерштейн) | | | Комплексные системы защиты информации: проектирование, внедрение, сопровождение (Дздральце) | | | Передаточные тракты (Лунач) | | | Средн. |
| | Баллы | Оцен. | Проц. | Баллы | Оцен. | Проц. | Баллы | Оцен. | Проц. | Баллы | Оцен. | Проц. | |
| 30 | 3 | 34 | 5 | 34 | 5 | 35 | 3 | 78 | 4 | - | - | - | |
| 45 | 5 | 29 | 4 | 29 | 4 | 20 | 2 | - | - | - | - | - | |
| 30 | 3 | 26 | 3 | 26 | 3 | 21 | 2 | 75 | 4 | - | - | - | |
| 45 | 5 | 20 | 2 | 20 | 2 | 23 | 3 | - | - | - | - | - | |
| 30 | 3 | 29 | 4 | 29 | 4 | 21 | 2 | 75 | 4 | - | - | - | |
| 45 | 5 | 31 | 4 | 31 | 4 | 21 | 2 | - | - | - | - | - | |
| 30 | 3 | 35 | 5 | 35 | 5 | 33 | 4 | 92 | 5 | - | - | - | |
| 45 | 5 | 35 | 5 | 35 | 5 | 34 | 4 | - | - | - | - | - | |
| 30 | 3 | 36 | 5 | 36 | 5 | 36 | 5 | 90 | 5 | - | - | - | |
| 45 | 5 | 36 | 5 | 36 | 5 | 33 | 4 | - | - | - | - | - | |
| 30 | 3 | 26 | 3 | 26 | 3 | 26 | 3 | 75 | 4 | - | - | - | |
| 45 | 5 | 18 | 2 | 18 | 2 | 29 | 4 | - | - | - | - | - | |
| 30 | 3 | 36 | 5 | 36 | 5 | 34 | 5 | 92 | 5 | - | - | - | |
| 45 | 5 | 34 | 4 | 35 | 5 | 35 | 5 | - | - | - | - | - | |
| 30 | 3 | - | - | - | - | - | - | - | - | - | - | - | |
| 45 | 5 | - | - | - | - | - | - | - | - | - | - | - | |



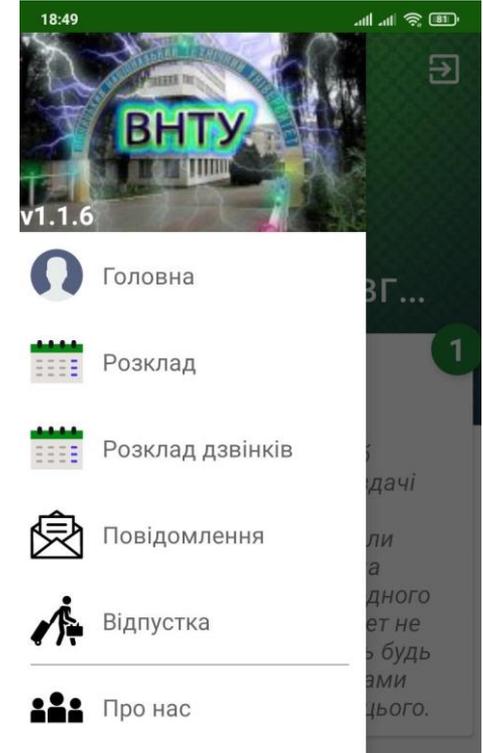
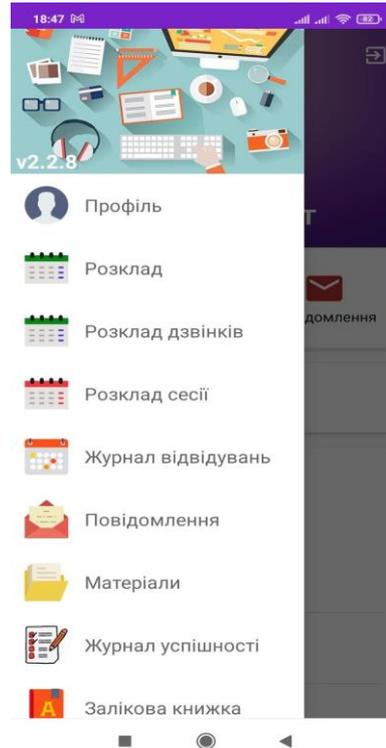
Flexibility, scalability, cloud technologies

Mobile applications:

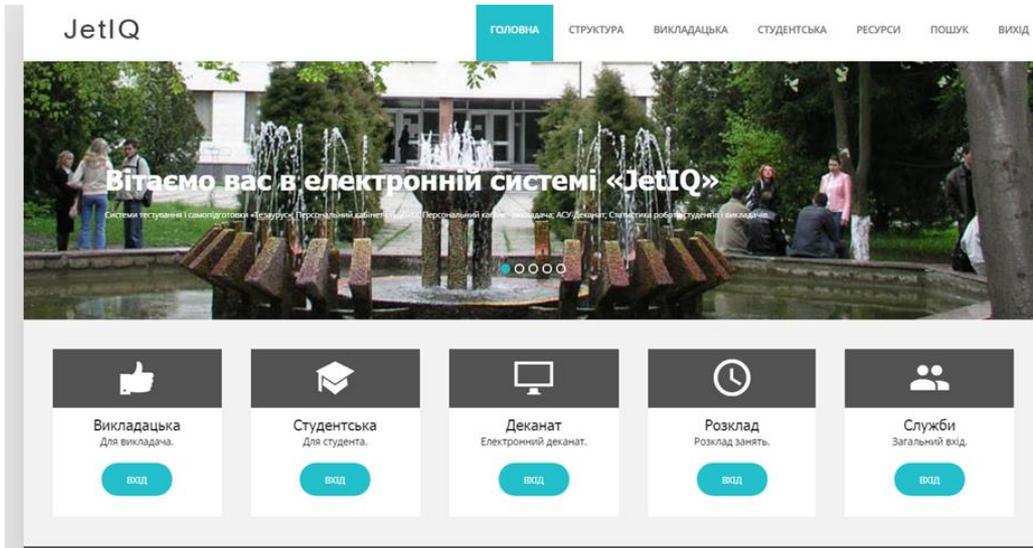
- JetIQ Student
- JetIQ Teacher

Cloud technologies:

- Google Workspace for Education
- Microsoft 365



Basic statistical data of JetIQ (VNTU, 2026)



Users:

Students: 5943 [16153]

Student groups: 543 [2137]

Teachers/employees: [1804]

Resources:

Navigators of educational resources:

5703

Electronic tests (TestIQ): 5885

Educational materials: 30691

Scientific publications: 38342

Documents: 5240

Dean Office:

Examination lists: 60730

Grades: 600838

Electronic class schedule:

Lessons: 60494

Classrooms: 467

Faculties: 9

Mobile applications (users):

JetIQ Student: 6121

JetIQ Teacher: 210

The model for development an educational electronic information environment for clients has been improved, in contrast to educational spaces in CRM systems. This adaptation of the contour model of training is designed to enhance client loyalty.

The general methodology is applicable to any educational institution and can be further adapted to meet specific needs. Additionally, methods for developing open educational courses are proposed, including microlearning and mobile application development. The methodology facilitates the identification of correspondences among pedagogical theories, methodologies, and technologies to create an educational electronic information environment based on a multi-agent information ecosystem. This approach enables the parallel adaptation of technologies during implementation.

The proposed concepts and models can be utilized to enhance JetIQ, Sokrat, SEL, and other existing platforms for learning and institutional management. Furthermore, they can be applied to the development of educational electronic spaces for educational institutions, corporations, and individual distance learning courses, as well as for training clients, software users, development teams, and other stakeholders.

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