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Developing Information Systems with the Low Code Method and a Platform

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Information Systems Analysis and Design

Information Systems Development

DEVELOPING INFORMATION SYSTEMS WITH THE LOW-CODE METHOD AND A PLATFORM

Dr. Sabine Matook
The University of Queensland, UQ Business School
Brisbane - Australia

Overview about the session ‘Train the Trainer in Low-Code’

1. Motivation for teaching students low-code ISD and the low-code method
2. Theoretical knowledge of low-code development
3. Resources for students and educators
4. Curriculum overview and alternative syllabus
5. 2nd session [extra recording] for creating a low-code app



What's the problem?

Worldwide employers face a digital skills gap

- The rapid pace of change in digital technologies combined with the pandemic is bringing a rocketing demand for digital skills.
- Almost two in three Australian workers (64%) currently apply digital skills in their work, and in the next five years, that number is set to reach 90%.
- Every worker will need digital skills now or in the future.
- By 2025, one in 4 jobs created will be for digital technology workers.
- Additionally, by 2030, 653,000 people need to join the tech workforce in Australia to meet the demands
- In the US, basic technological skills are essential for many jobs = in the 12 months to August 2022, 10.7 million job postings required computer literacy in occupations from HR to nursing.

Almost every organization today needs more software development talent

Why are Digital Skills important for students?

How today's students can stay competitive
in a changing job market

Learning Skills



critical thinking



creativity



collaboration



communication

Literacy Skills



information



media



technology

Life Skills



flexibility



leadership



initiative



productivity



social skills

- Digital skills empower students to gain control of their technology use
- For companies -- the digital economy offers new ways of doing business
- Work by MIT Center for ISR (CIRS) by Ross & Weil and colleagues
- Digital skills and advanced digital capabilities enhance workplace readiness
- Employees with digital skills support businesses to be better placed to adopt, adapt and deploy new and emerging technologies



Low-code & No-code Development Method

- Methods provide a **theoretical understanding** of how ISD practices are to be used.
- Methods encompass the **complete range of practices** involved in the process of designing, building, implementing, and maintaining an information system, how these activities are accomplished and managed, the sequence and frequency of these activities, as well as the values and goals of all of the above (Conboy 2009 – ISR)
- **Practices** specify the rules, procedures, techniques, and tools used to develop an information system
- Low-code development method: **a range of practices in which** coding is transformed from textual to visual drawing on model-driven development and drag-and-drop interface



Comparison between no-code and low-code method

No-code platforms use visual-based, drag-and-drop functionality to help you to create basic, but functional apps.

- Simple, visual development environment
- Limited customizations and integrations
- Not suited for legacy system overhauls

Low-code platforms are more flexible — a sort-of middle ground between no-code and full-fledged manual “high” coding.

- Extensions are possible and manual coding or scripting possible
- Open APIs for reusability
- Control over application testing, and quality and performance tooling

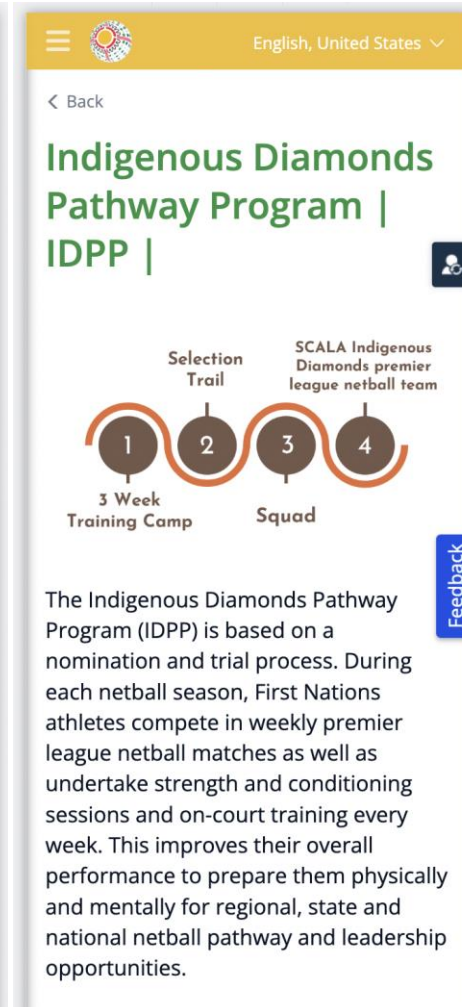
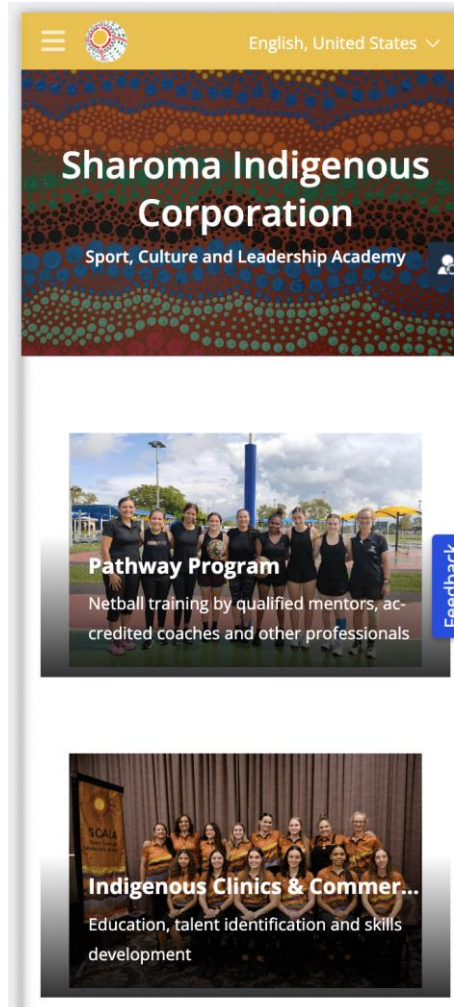


<https://www.cuelogic.com/blog/low-code-platform>

No Code Vs Low Code

Whats The Difference ?

Features	Low Code	No Code
Primarily Server	Developers	Business Users
Primarily Objective	Speed of Development	Ease of Use
Coding Need	Low but present	No Coding Required
Customization	Total Customization Available	Pre-built templates can be customized
End - to - end Development	All Platforms provide end-to-end development	Some platforms provide only limited capabilities
App Complexity	Can create complex apps	Can create simple apps
Purpose	Next Gen Rapid application development tools for professional developers	Self-service application for business users



Student apps from The University of Queensland (2023)

Low-code platforms and the rise of citizen development

Low-code platforms enable users without programming skills to create applications, develop UI, set up business processes and automation, and customize data structure.

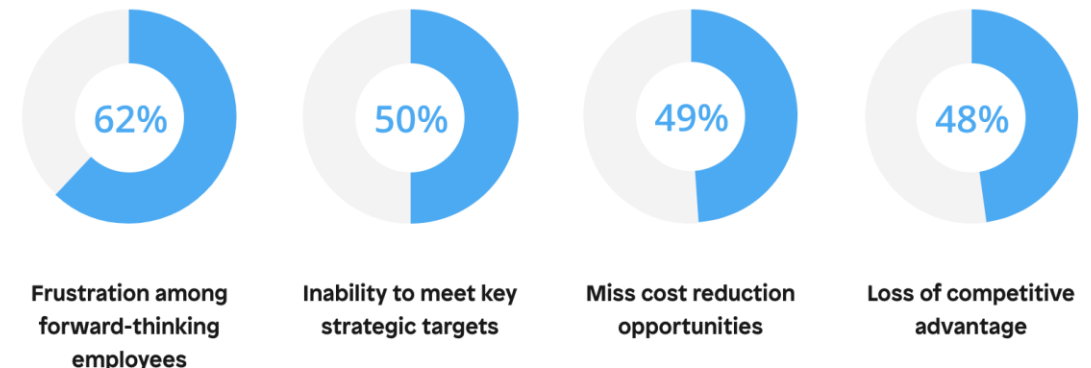
Citizen developers are business users with little to no coding experience to build applications with IT-approved technology.

Benefits

- 1) Meet the growing need for apps
- 2) Address shortages of skilled developers
- 3) Govern shadow IT
- 4) Boost IT and business productivity
- 5) Break down silos

IT needs versus Business needs

How is the business impacted when IT is not able to deliver new IT solutions in a timely way?

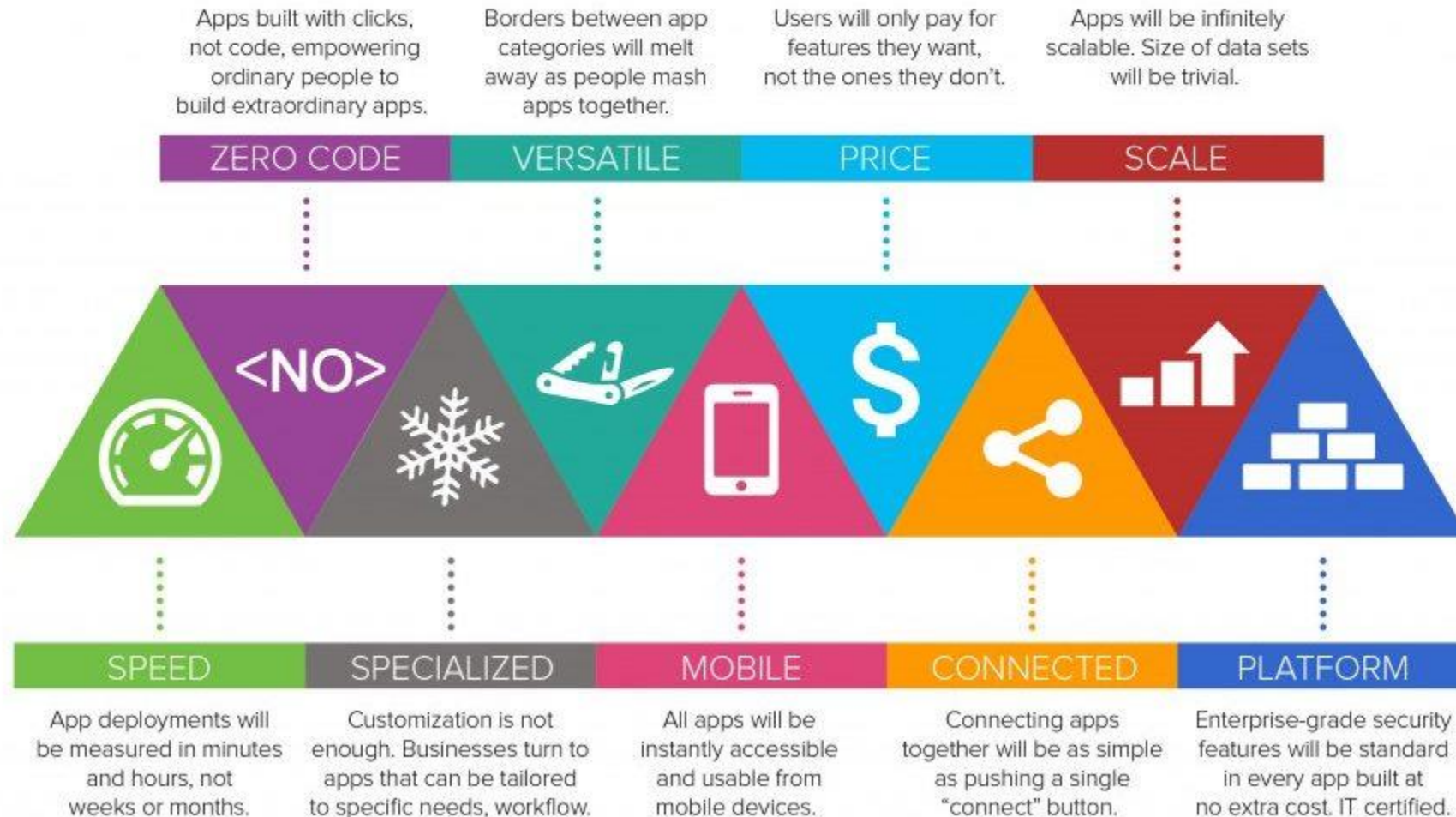


Citizen Developer Success Model

The next generation of business applications

Source

<https://techgenix.com/citizen-developer-enterprise-it-security/>



Statistics about low-code development

1. Low-code hits the mainstream

Low-code is now in use in 77% of organizations.

2. Low-code empowers diverse groups to work with IT

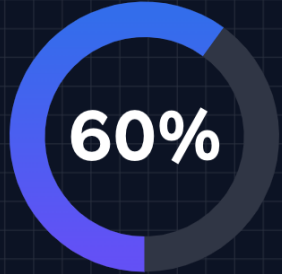
40% of IT leaders say their IT department will become more diverse because of low-code.

3. Collaboration is where low-code shines.

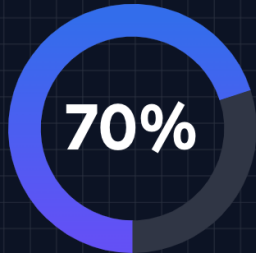
59% of projects using low-code are a collaboration between IT and business teams.



Low-Code Statistics II

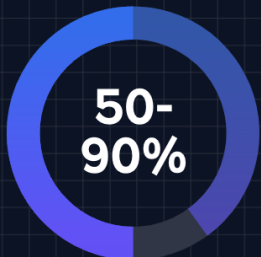


60% of apps are now built outside of the IT department

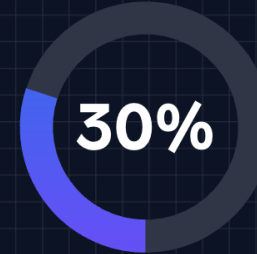


By 2025, 70% of apps will be built using no-code/low-code technology

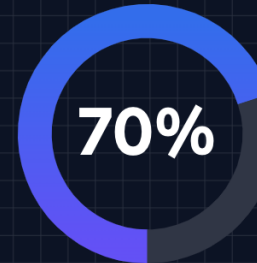
Gartner



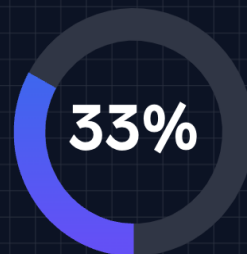
Low-code platforms can reduce development time by 50% to 90%



33% of organizations plan to use no-code/low-code to build better digital customer experiences



70% of users with no development experience learned low-code in 1 month



Organizations with citizen developers score 33% higher on innovation measures

McKinsey&Company

Benefits for a Teaching Partner in a Low-Code App Development Course

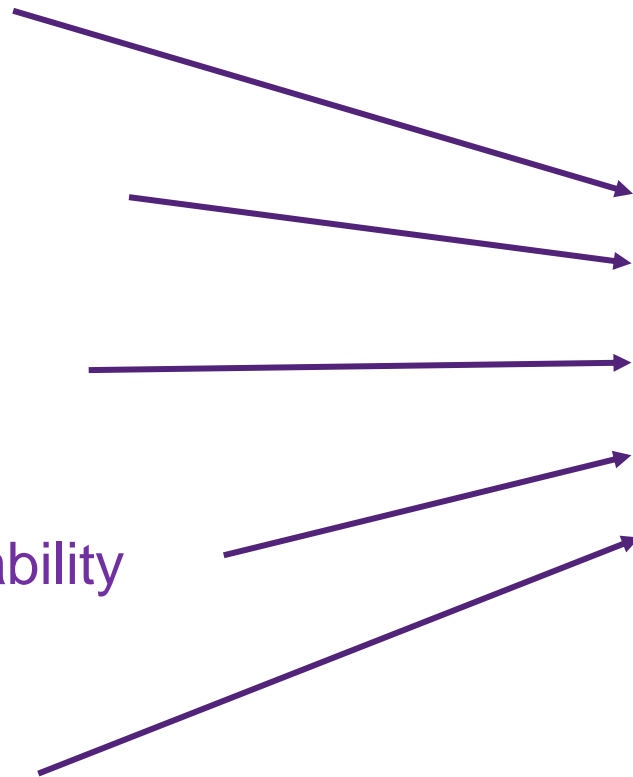
Better customer experiences

Speed of delivery

Friction-free legacy modernization

Flexibility and scalability

Communication and collaboration



Work Integrated Learning (WIL) – Practice-based learning

- Practice-based learning is an **instructional and curricular learner-centered approach** that empowers learners to integrate theory and practice and apply knowledge and skills to develop a viable solution to a defined problem (Kennedy et al. 2015)
- WIL is an **educational approach** that “integrate[s] theory with the *meaningful practice of work as an intentional component of the curriculum*” (Wood et al. 2020, p. 331).
- A typical WIL experience often includes; placements, **industry projects, work simulations**, field experience, entrepreneurship/enterprise, and reflection on current employment.
- Educators **transfer agency to the students** while they become mediators and facilitators of knowledge rather than a single transmitter (Matzembacher et al. 2019)
- Teaching and Learning produce knowledge that is situated and embedded (Gherardi 2009)
- Need for reflection and reflective practices to create **metacognitive capabilities** (Matook et al., 2023)
- Improves motivation, student satisfaction, employability, problem-solving skills, and self-factors



How does it work?

Each student creates
an app for a real-world
client on a real-world
business case with a
real-world technology

The collage illustrates the development process of the Variety QLD Youth Ambassador App. It includes:

- A video call with students Sabine Matook, Maggie Wang, and Samuel Cho.
- A preview of the app's welcome screen: "Welcome to Variety QLD Youth Ambassador App".
- A sign-up form for the event with fields for Sign up ID, Sign up Date, Event Name, First Name, Last Name, User's Phone, and User's Email.
- A mobile app interface showing a calendar and event details.
- A UML class diagram showing the relationships between Events, User, and Sign_up.
- A flowchart showing the process flow from Sign_up to Sign_up_Event.
- A Miro board for a sprint retrospective with various sticky notes and diagrams.
- A final app preview showing the Variety QLD Events APP interface.

Low-Code Platforms -- Compared

- Many different platforms
- Mendix among the market leaders, subsidiary of Siemens
- Strong market presence in North America and Europe, developing presence in APAC
- Strength is the community orientation and educational support
- Features: visual modelling, pre-built components, automation, one-click deployment, assistance bots, and built-in monitoring.



Learning Outcomes for Students

- Real-world learning in a simulated IT consulting project
- Clear understanding of what digital skills are and why they are **important**
- **Introduction to low-code method and Mendix**, the Siemens low-code platform
- Basic or advanced **experiences** in using the Mendix low-code platform
- Future **direction and resources for continued learning** to improve digital skills using low-code platforms



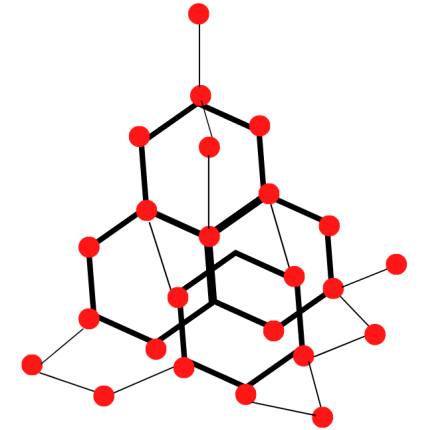
Structure for a Low-Code ISD Method Course

1 unit = 90 minutes with students undertake development work mainly in classrooms

Type	Short Introduction	Substantial Learning	Semester-long Project
Focus	<ul style="list-style-type: none"> • Definition of low-code method • Introduction to platform features • Team building and requirements activities • Creation of a multiple-page app 	<ul style="list-style-type: none"> - Everything from the first type plus: <ul style="list-style-type: none"> • Rich pages • Simple microflows • Data management 	<ul style="list-style-type: none"> - Everything from the previous type plus: <ul style="list-style-type: none"> • Dynamic elements • Advanced microflows
Lengths	3 units	5 units	10 units
Learning outcomes	<ul style="list-style-type: none"> • Introduction to low-code ISD method • Awareness of citizen development 	<ul style="list-style-type: none"> • Guided app development with some advanced features • Basic low-code skills with the option to grow further 	<ul style="list-style-type: none"> • Good low-code capabilities • Independent working to create app • Mendix Certification possibility

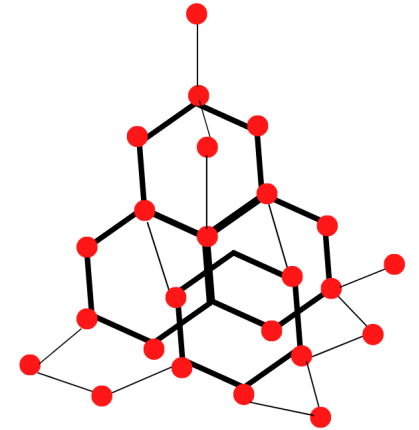
Structure for a “short” Low-Code ISD Method Course

Type	Short Introduction
Lengths	3 units
Focus	<ol style="list-style-type: none"> 1) Definition of low-code method 2) Introduction to platform features 3) Team building and requirements activities 4) Creation of a multiple-page app
Topics	<p>1 unit – Theory introduction</p> <p>2 units – Simple pages</p>
Learning goals	<ul style="list-style-type: none"> • Introduction to the low-code method • Awareness of citizen development



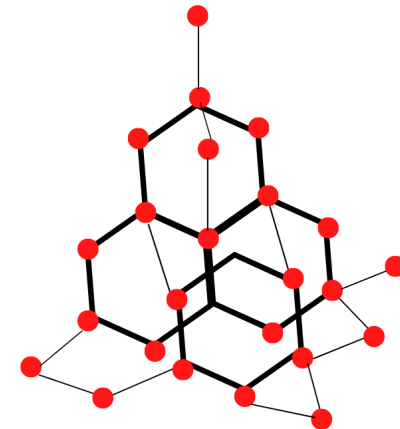
Structure for a “medium” Low-Code ISD Method Course

Type	Substantial Learning
Focus	5 units
Topics	<ol style="list-style-type: none"> 1) Definition of low-code method 2) Introduction to platform features 3) Team building and requirements activities 4) Creation of a multiple-page rich app 5) Simple microflows 6) Data management
Learning goals	<p>1 unit – Theory introductions</p> <p>0.5 unit – Introduction of Mendix platform</p> <p>2 units – Simple pages</p> <p>1 unit – Microflows</p> <p>0.5 unit – Presentation</p>
Focus	<ul style="list-style-type: none"> • Guided app development with some advanced features • Basic set of low-code skills with the option to grow further



Structure for a “extended” Low-Code ISD Method Course

Type	Semester-long Project	
Focus	10 units	Example for a course information sheet or syllabus/ course profile:
Topics	<ol style="list-style-type: none"> 1. Definition of low-code method 2. Introduction to platform features 3. Team building and requirements activities 4. Creation of a multiple-page rich app 5. Advanced microflow 6. Data management 7. Dynamic elements 	https://my.uq.edu.au/programs-courses/course.html?course_code=BI SM7255
Learning goals	<ul style="list-style-type: none"> 1 unit – Theory introductions 1 unit – Requirements and team building 1 unit – Introduction of Mendix platform 2 units – Simple pages 2 units – Microflows 2 units – Dynamic elements 1 unit – Presentation 	
Focus	<ul style="list-style-type: none"> • Good low-code capabilities • Independent working to create app • Mendix Certification possibility 	



Learning in Action -- Low-code with industry partners

Jam Sessions – Design Sprints with the client (NGO, Charities) about their software requirements.

Educational Learning Sessions – Presentation to students on how to best learn in practical settings from education experts

Technology Sessions – Mendix platform training on new features and software use by IT partners

Reflection Sessions – Facilitated retrospectives to identify 'stop, continue, new' practices.

Error Finding and Testing Sessions – Facilitators support and showed students how to identify and fix implementation errors

Reflection Writing – Formative assessments 'metacognitive essay' to reflect on project (design, overall learning)

Software Development Sessions – Students worked in small teams to implement the requirements

Delivery and Awards – Students present their apps to the client, Students get awards for best app

Client Feedback Sessions – Client gave students feedback and further requirements on their software app

Materials

Textbook low-code method and development:

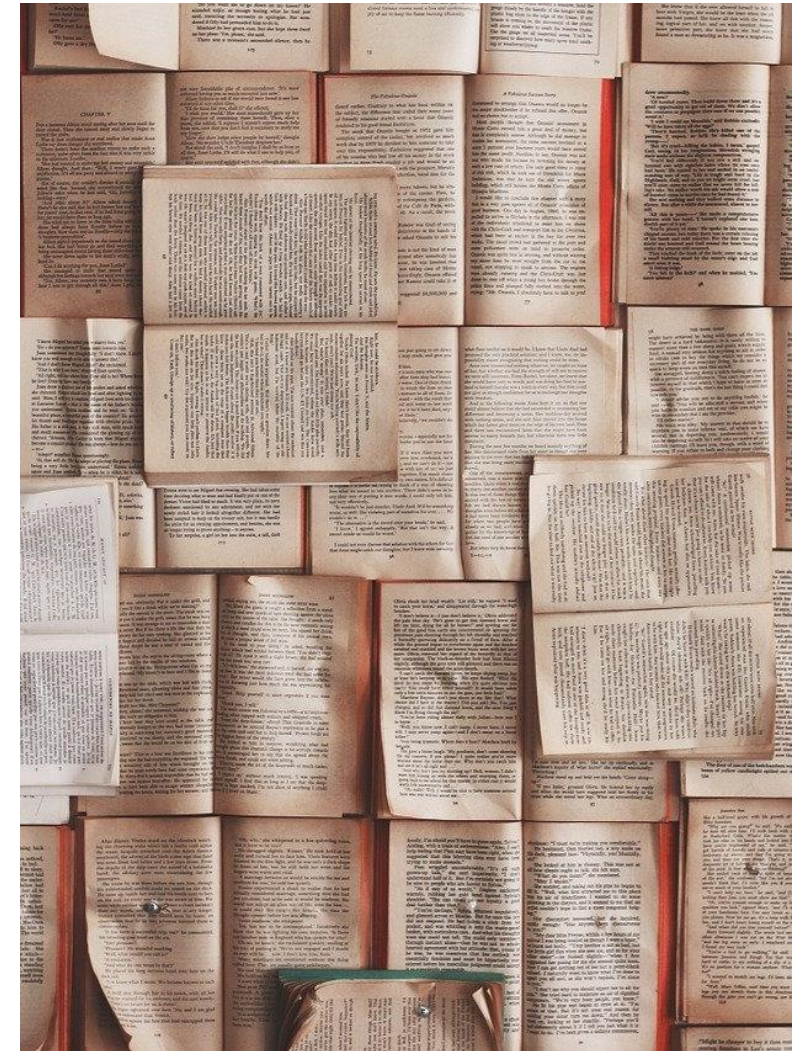
Bryan Kenneweg, Imran Kasam, Micah McMullen (2021):
Building Low-Code Applications with Mendix. Packt
Publishing.

Phil Simon (2022): Low-Code/No-Code Citizen Developers
and the Surprising Future of Business Applications. Racket
Publishing.

Online course for low-code development:

Mendix Academy - Learning Paths

<https://academy.mendix.com/link/home>



Selection of academic papers on low-code development

- Matook, S., Maggie Wang, Y., Koeppel, N., & Guerin, S. (2023). Metacognitive skills in low-code app development: Work-integrated learning in information systems development. *Journal of Information Technology*, 0(0). <https://doi.org/10.1177/02683962231170238>
- Carroll, N., & Maher, M. (2023). How shell fueled a digital transformation by establishing DIY software development. *MIS Quarterly Executive*, 22(2), 3.
- Biedova, O., Ives, B., & Junglas, I. (2023). Gnosis Freight: Harnessing Data and Low-Code to Shipping Container Visibility and Logistics. *Communications of the Association for Information Systems*, 52(1), 27.
- Wang, H., & Wang, S. (2022). Teaching Tip: Improving Student Performance by Introducing a No-Code Approach: A Course Unit of Decision Support Systems. *Journal of Information Systems Education*, 33(2), pp. 127-134.

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*Thank you very much for
your attention.*

Are there any questions?

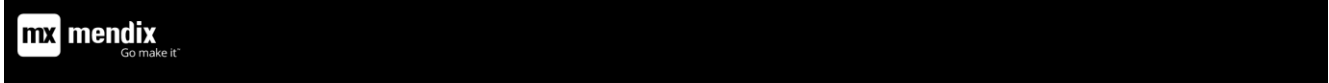
How to start?




1) Sign Up

LINK: <https://www.mendix.com/https://signup.mendix.com/link/signup/>

Start for free! (top right corner)



mx mendix
Go make it™



Create your own free app with Mendix


Share your app with unlimited users

Become a Maker.


First Name	Last Name
<input type="text" value="Your first name"/>	<input type="text" value="Your last name"/>

Company Email

Password



Country



☐ I agree to the [Mendix Privacy Policy](#) and [Terms](#).

Already have an account? [Sign in](#)

First step – Create the Environment for the App

Start here!



My Apps

Create App

All Pinned



Nothing here yet?

Pinning apps is really easy. Just select the apps you want to have quick access to and press the pin icon.

Open All Apps

Templates

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App Templates

Don't know where to start? Get inspired by our app templates, including feature demos, academy training apps, and ready-made apps. You can also add your own template [here](#).

All

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Search

Satisfaction Survey

Get the opinion of your employees
Clear overview of their opinions
Export to Excel

Employee Satisfaction Survey

v 9.11.1 Starter Apps

Forms Template

v 9.11.1 Starter Apps

Purchase Request

Vendor management
Purchase orders
Invoice processing

Purchase Request

v 9.11.1 Starter Apps

Marketing Content

Approve marketing requests
Review implementation
Track content

Marketing Content Approvals

v 9.11.1 Starter Apps

E-mail Requests

Approve marketing email content
Define mailing lists and audiences
Schedule sending dates

Marketing Email Request

v 9.11.1 Starter Apps

Leave Request

Submit and approve leave requests
Track your team's time off
Manage users

Leave Request

v 9.9.1 Starter Apps

Time Writing

Enable time writing in your company
Create clients and projects
Set billable hours

Time writing

v 9.9.1 Starter Apps

Approval Template

v 9.11.1 Starter Apps

Surveys, Quizzes & Polls

HR and onboarding
Set up wizards
Collect data

Tasks & Planning

Create teams
Assign tasks
Track progress

Asset Management

Track your stock
Handle requests
Update inventory

Finance & Budgeting

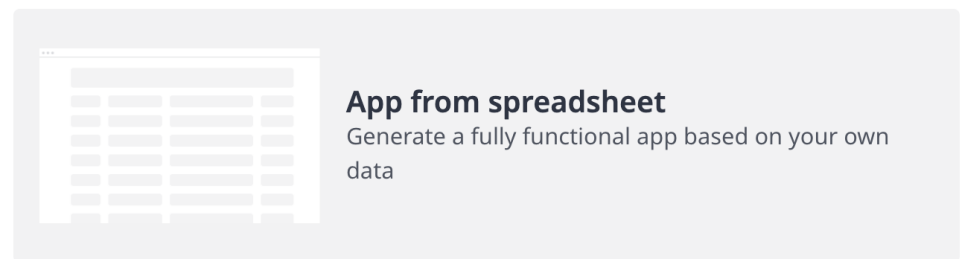
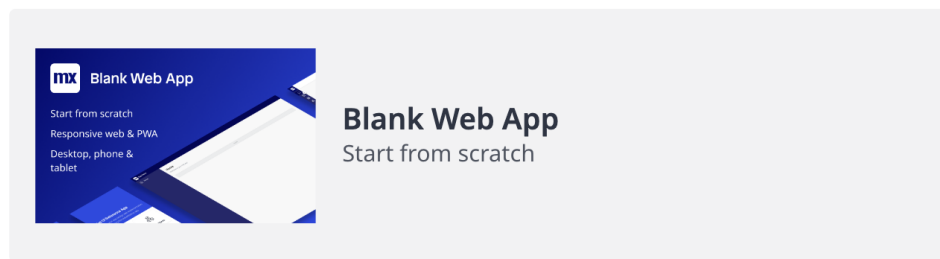
Opex/Capex spending visibility
Budget forecasting
Create budget plans

Blank App Templates

Use Mendix Pro Version 10



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Give the App a name



← Go Back

Customize Your App

Choose an App Name ⓘ

Choose an Icon

This will be shown in your list of apps. You can always customize this icon later in your App settings.

Select a background color and icon:



↻ Choose for me



Cancel

Create App



We are building your app

...it may take a few minutes for us to set up your team
server, project management tools and environments...

Training for Mendix in 2023

Dates:

- July 25 – 28, 2023 (9am-4pm EST, Boston) Americas
- August 1 – 4, 2023 (10am-5pm JST, Japan) APAC
- August 8 – 11, 2023 (9am-4pm CET, Rotterdam) EMEA

Onsite Locations:

- Mendix Boston: 22 Boston Wharf Rd 8th floor, Boston, MA 02210
- Mendix Rotterdam: Wilhelminakade 197, 3072 AP Rotterdam, Netherlands

Remote Option:

- Zoom Video Conference

<https://www.mendix.com/university-program/training/>



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