

From *development to O&M*
structuring efficient
PV projects

Your speakers today



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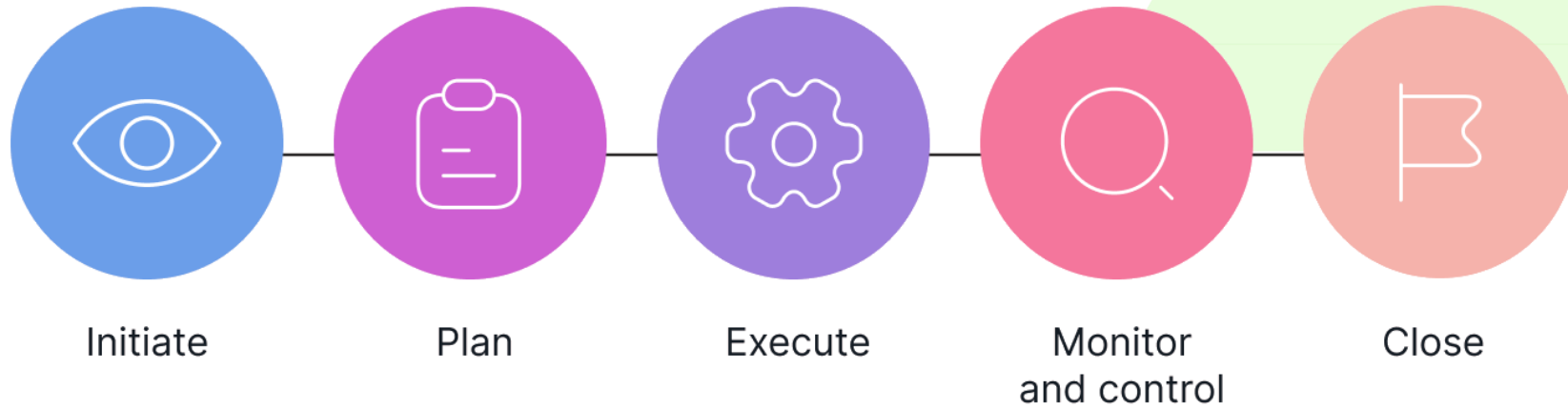
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01. PV development
02. Software showcase
03. O&M
04. Q&A session



01. PV Development

Project Lifecycle – *When?*



Development Timeline of a Solar Project



¹Power Market Analysis, Site Prospection, Financial Feasibility

²Financial Analysis, Engineering Feasibility

Challenges in the Development of PV projects

Complex Regulatory Landscape

Navigating permits, grid access, and environmental assessments

Variability in regulations across regions

The need for extensive documentation and compliance

Impact on project timelines and budgets

Manual Processes

Time-consuming design cycles and documentation

Lengthy design cycles that can take weeks

Increased likelihood of human error

Engineering teams spending valuable time on repetitive tasks

Prospecting challenges

Difficulty in finding optimal sites for solar projects

The importance of accurate site assessments

Limited access to reliable data and analytics

Identifying optimal configurations can be cumbersome

Data Management

Inefficient handling of project data, leading to errors and delays

Lack of integrated data management systems

Challenges in tracking project progress and KPIs

Difficulty in making data-driven decisions

+ Project delays and increased costs

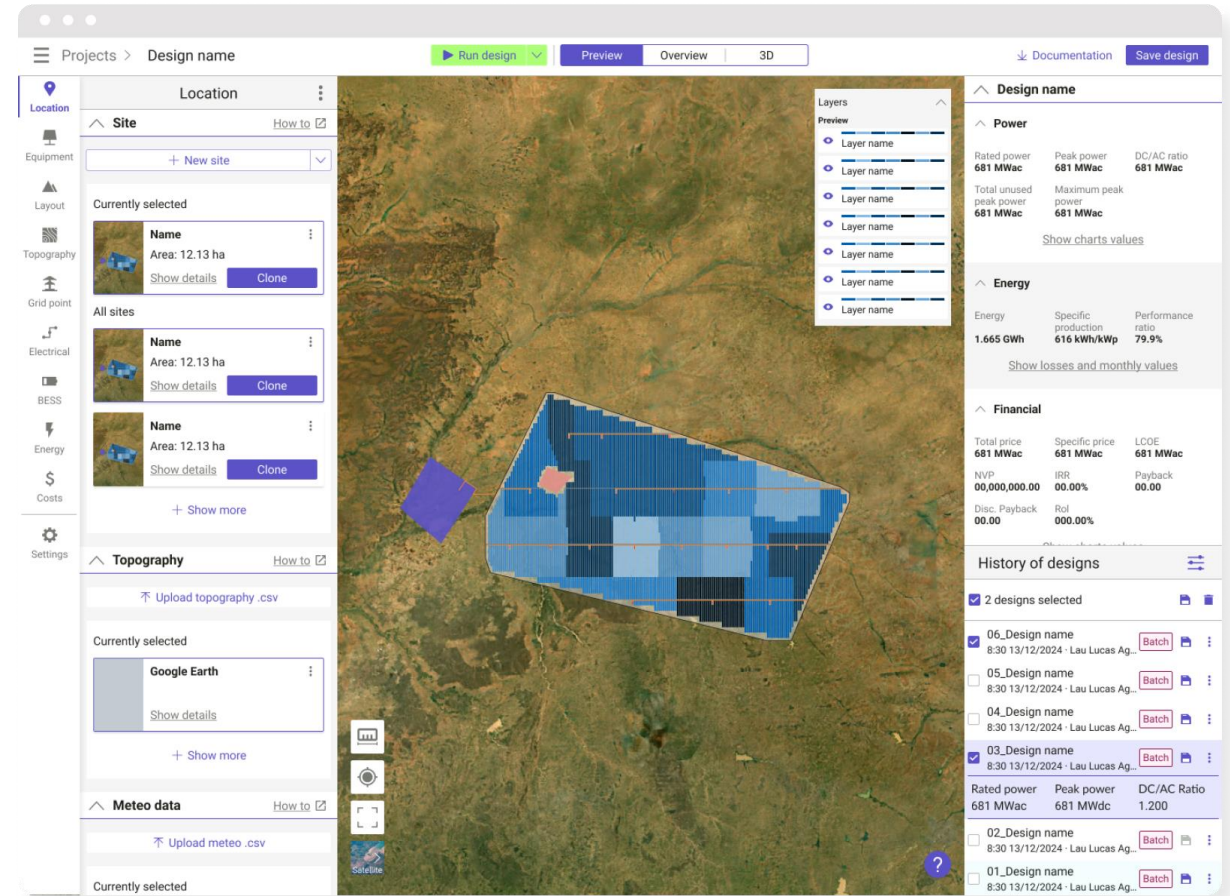
+ Inefficient use of resources

+ Missed opportunities for optimizing project performance ...

Feasibility Studies

A solar power **feasibility analysis** determines if the renewable energy project gets the green light by identifying roadblocks in the beginning of the planning phase spanning all project stages:

- Site Selection
- Solar Resource Assessment
- System Sizing
- Technology Selection
- Solar Plant Layout And Design
- Electrical Design
- Interconnection And Grid Integration
- Civil And Structural Design
- Environmental Impact Assessment
- Project Economics
- Construction And Commissioning
- Operation And Maintenance
- Monitoring And Performance Analysis

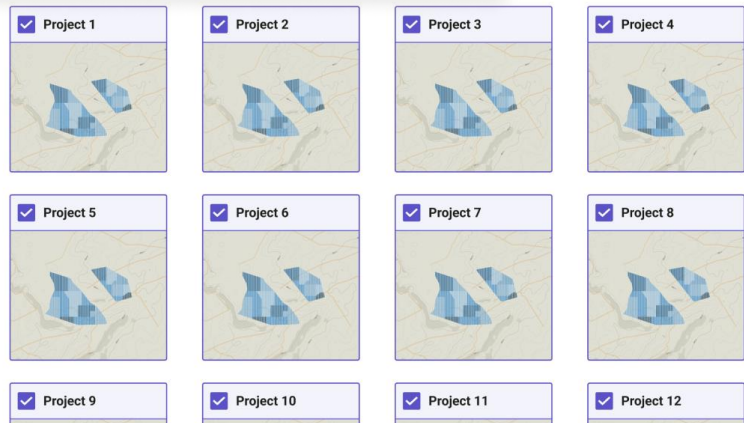
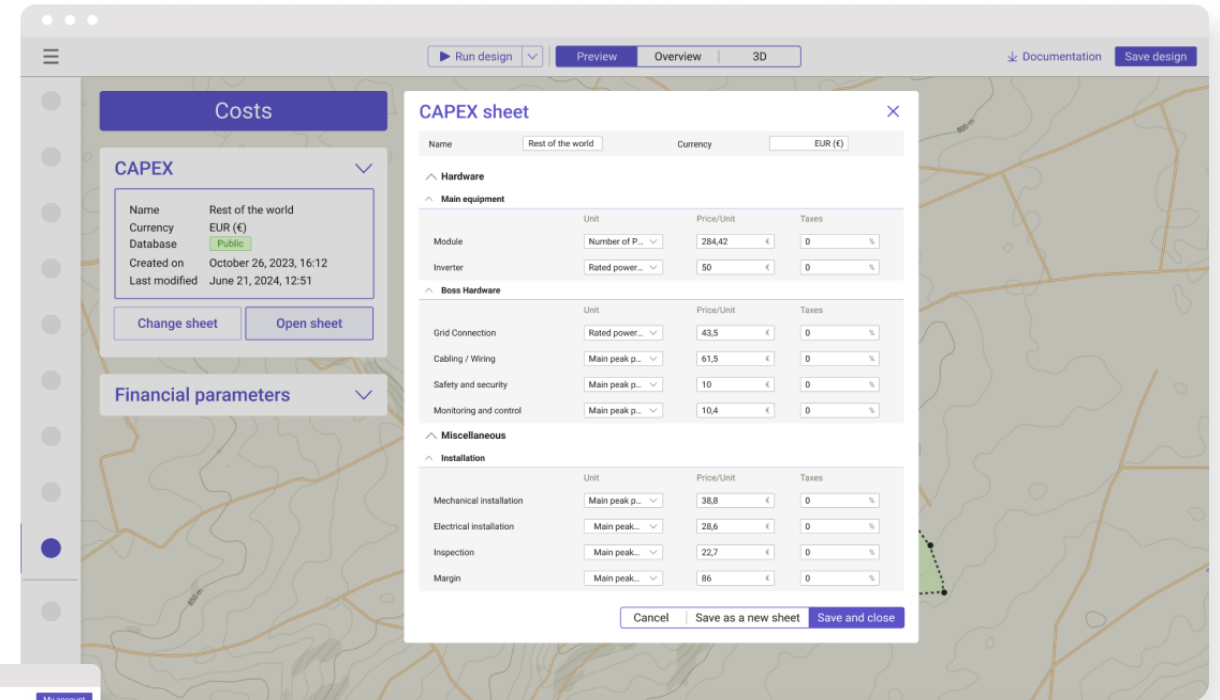
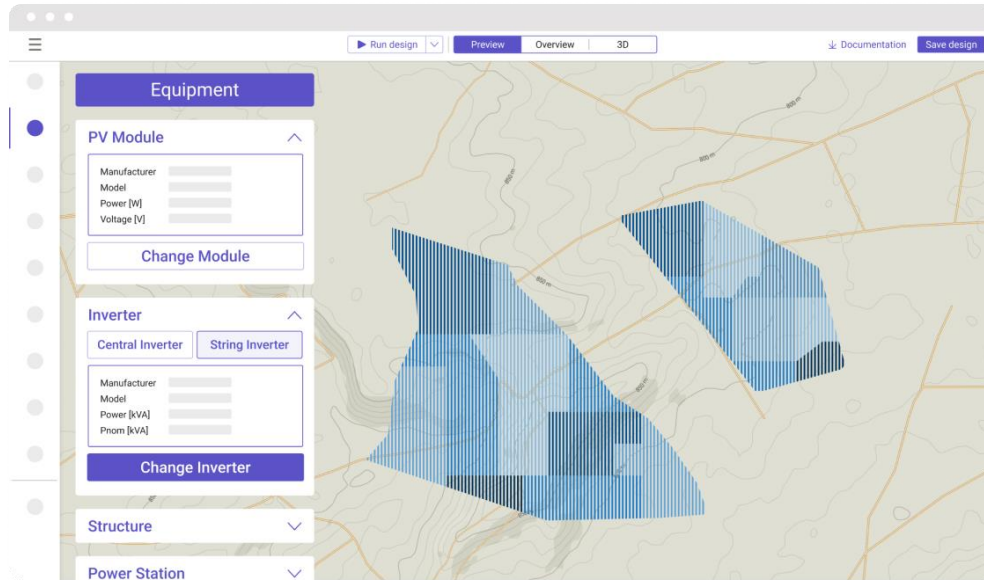


The goal is to limit project risk and address issues early on. When identified, many critical design constraints can be overcome effectively with planning, avoiding going over budget or getting stalled.

How??

PV Development

RatedPower, the smartest way to design utility-scale solar PV plants



02. Software showcase

RatedPower case study: Spain

Site location: Almería, Spain

PV module: Bifacial 610 W

Central inverter: 2310 kVA

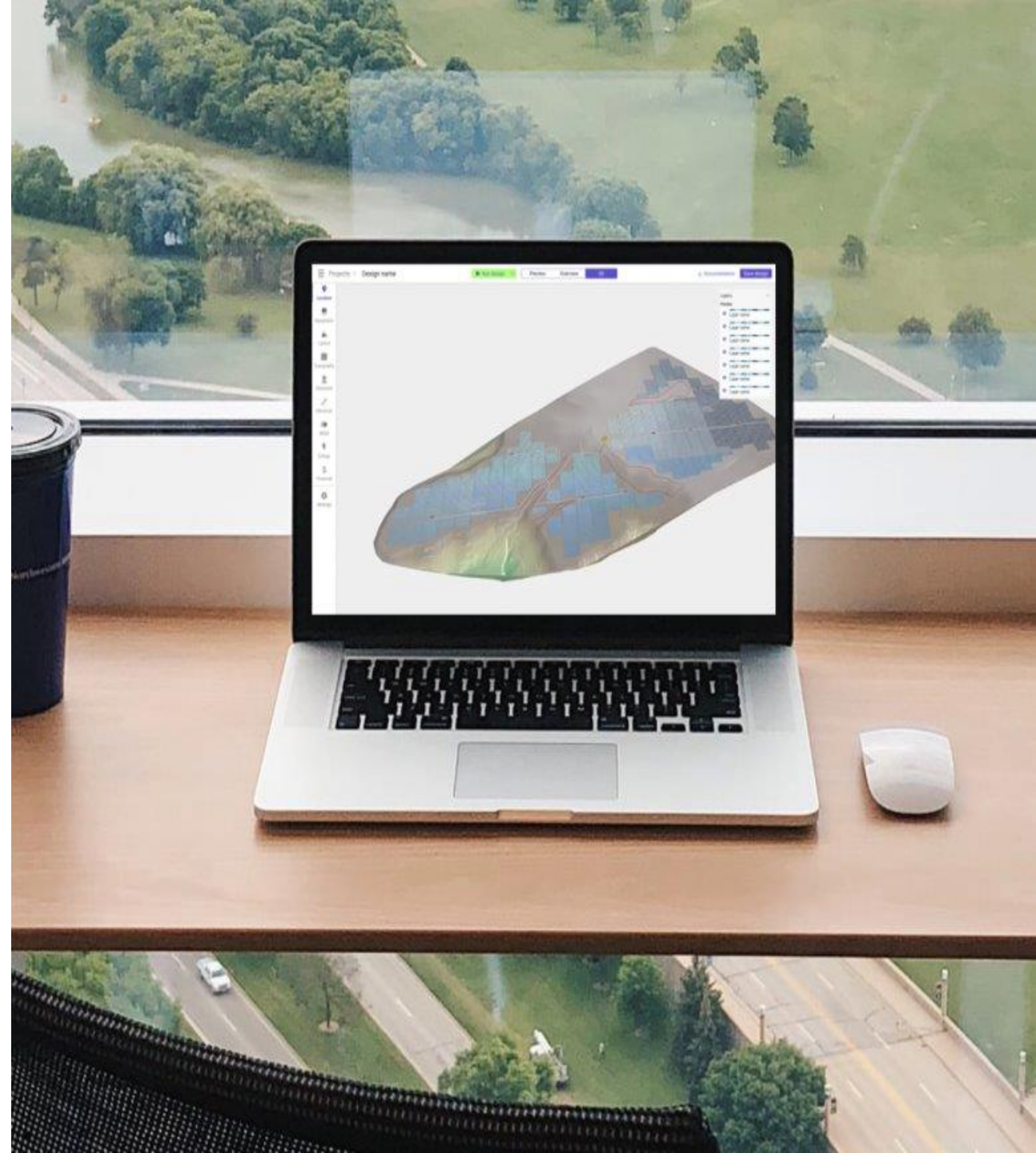
Structure: SAT

Objective:

- Find the best **DC/AC** ratio to minimize **LCOE**
- Compare the results and decide on final design

Tools:

- Batch design
- Comparison tool





Time to log in!

03. O&M

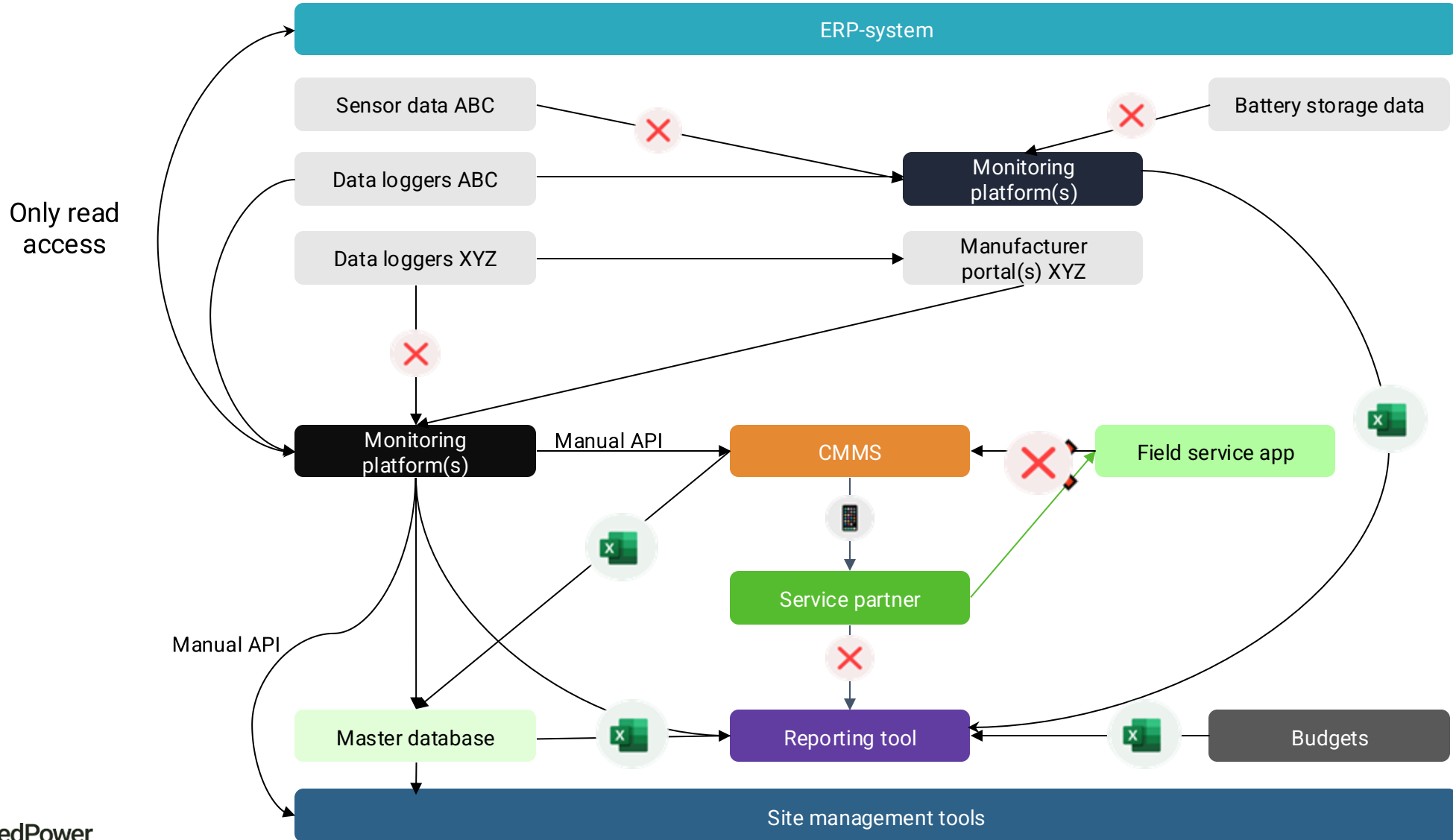
Development Timeline of a Solar Project



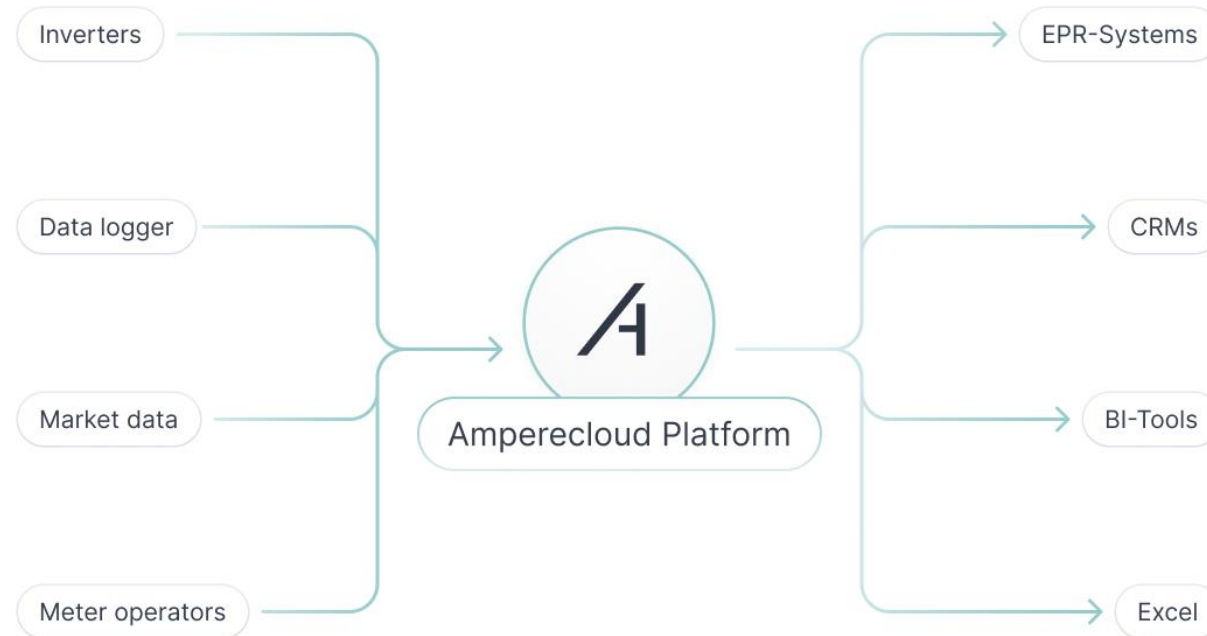
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Map your data flows



Map your data flows and streamline it with a central data warehouse



Map & automate your reporting structure

- Create a list of stakeholders (e.g. investors, grid operators, clients) and their needs
- Setup KPIs and events you want to report about in your monitoring system
- Best case: Build real-time dashboards for stakeholders they can view themselves
- Big plants = many stakeholders + lot of data → Automate your reporting

The screenshot displays the Amperecloud web interface. On the left is a navigation sidebar with categories: Monitoring (Master Display, Monitoring, Dashboards, Status, Alerts), Maintenance (Tickets, Services, Logbook), Management (Digital Twin, Master Data), Data (Data Studio, Data Export, Analysis), Configuration (Power Management, Amperecloud Log, FTP Dataloggers), and Remote Control (Remote Control). The 'Reports' category is highlighted. The main content area is titled 'REPORTS' and 'SCHEDULED'. It features a 'Report Templates' section with a table listing various report types and their descriptions.

Name ↓
Yield Report (Monthly)
Lists the yields of a facility in a month and displays a short service report
Yearly Load Profile
Excel-Report that exports the quarterhourly power of a facility for an entire year
Yearly Load Profile
Excel-Report that exports the quarterhourly power of a facility for an entire year
Proof of Remote Controllability
This proof is used to automatically proof the remote controllability of a facility when using ampere.clouds energy trading ...
Monthly Yield Report
Lists the performance of an installation in one month and shows a short service report
Maintenance Report (two columns)
Maintenance Report in a different layout.
Maintenance Report
This is a Maintenance Report after an on site service

Implement an intelligent alarm structure

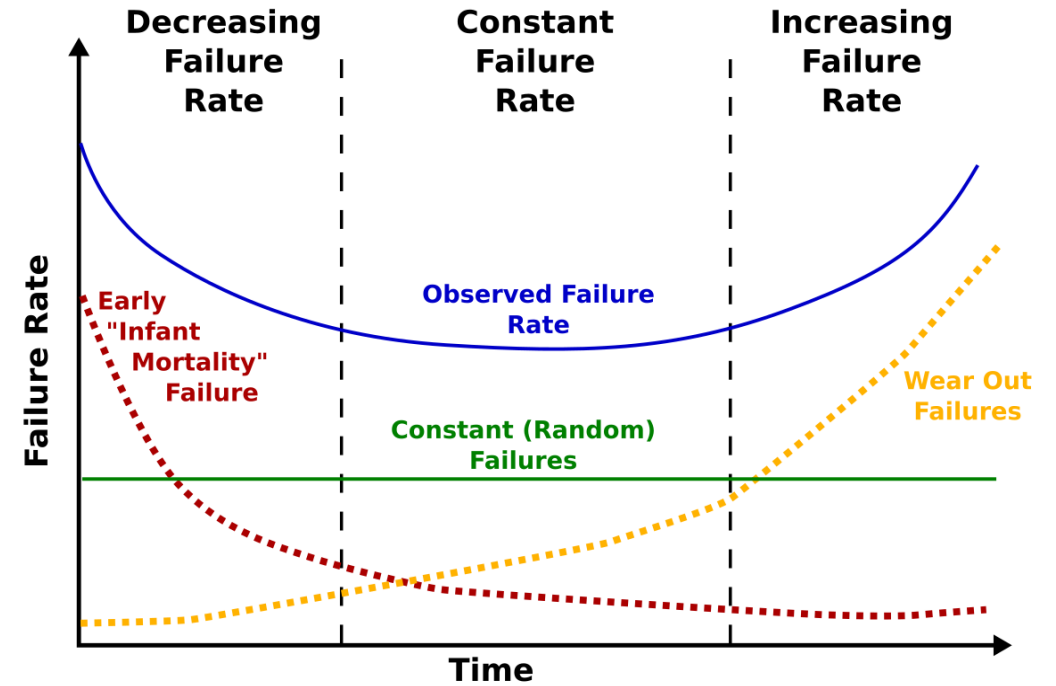
- Bigger plants = more components = exponentially more alarms
- Setup hierarchies in your alarm system to prevent alarm fatigue
- Challenge your alarm structure in the first 12 months on a constant basis

Type	Severity	Name	Facility	From	To	Yield Loss	Assignees	Actions
WARNING	WARNING	Facility Power < 0.8% (Pac, 10:00-14:59)	Köthen BF_4	7/21/2024, 1:20:00 PM	7/25/2024, 1:40:00 PM	0 kWh		+1 Alarms
ERROR	ERROR	4e Anlage: Leistung < 5% (Bei Einstrahlung...	Köthen BF_4	7/23/2024, 7:10:00 AM	-	0 kWh		+1 Alarms
WARNING	WARNING	Facility Power < 0.8% (Pac, 10:00-14:59)	Köthen BF_3	7/21/2024, 1:40:00 PM	7/25/2024, 2:00:00 PM	0 kWh		+1 Alarms
ERROR	ERROR	4e Anlage: Leistung < 5% (Bei Einstrahlung...	Köthen BF_3	7/21/2024, 12:50:00 PM	-	0 kWh		+3 Alarms
ERROR	ERROR	4e Anlage: Leistung < 5% (Bei Einstrahlung...	Köthen BF_2	7/18/2024, 8:30:00 PM	-	0 kWh		+3 Alarms
ERROR	ERROR	4e Anlage: Leistung < 5% (Bei Einstrahlung...	Köthen BF_2	7/24/2024, 8:50:00 AM	7/26/2024, 11:00:00 AM	0 kWh		+2 Alarms
ERROR	ERROR	4e Anlage: Leistung < 5% (Bei Einstrahlung...	Köthen BF_3D	7/21/2024, 12:50:00 PM	7/26/2024, 12:40:00 AM	0 kWh		+10 Alarms
CRITICAL	CRITICAL	Facility Power < 5% (Irradiation > 50W)	Barth	7/16/2024, 10:40:00 PM	7/22/2024, 10:55:00 AM	0 kWh		+3 Alarms
CRITICAL	CRITICAL	No data acquired (60 min, all devices)	Barth	7/7/2024, 10:00:02 AM	-	0 kWh		+6 Alarms
WARNING	WARNING	AA Einstrahlungsdaten unbrauchbar (Park)	Barth	7/16/2024, 2:35:00 PM	7/16/2024, 3:40:00 PM	0 kWh		+2 Alarms
ERROR	ERROR	AA Abweichung zw. den spez. Wirkleistung...	Neudorfgraben	7/16/2024, 11:30:00 AM	7/26/2024, 8:30:00 PM	0 kWh		+26 Alarms
CRITICAL	CRITICAL	Inverter: deviation greater than 99% for st...	Luckau	7/16/2024, 11:00:00 AM	7/22/2024, 12:15:00 PM	0 kWh		+10 Alarms
CRITICAL	CRITICAL	AA Zeit seit dem letzten Kontakt (Park)	Luckau	7/7/2024, 8:05:03 AM	7/7/2024, 4:30:03 PM	0 kWh		+1 Alarms
CRITICAL	CRITICAL	AA Fehlende Einstrahlungsdaten (Park)	Luckau	7/24/2024, 10:00:00 PM	7/25/2024, 12:15:00 AM	0 kWh		+1 Alarms
CRITICAL	CRITICAL	AA Zeit seit dem letzten Kontakt (Tratfo)	Luckau	7/7/2024, 6:15:03 PM	7/24/2024, 5:50:02 PM	0 kWh		+19 Alarms
ERROR	ERROR	AA Zeit seit dem letzten Kontakt (WR)	Luckau	7/7/2024, 5:55:02 AM	7/24/2024, 4:10:01 PM	0 kWh		+26 Alarms

RM CH	🔔 ! ✓ ...	+10 Alarms
RM CH	🔔 ! ✓ ...	+1 Alarms
RM CH	🔔 ! ✓ ...	+1 Alarms
RM CH	🔔 ! ✓ ...	+19 Alarms
RM CH	🔔 ! ✓ ...	+284 Alarms

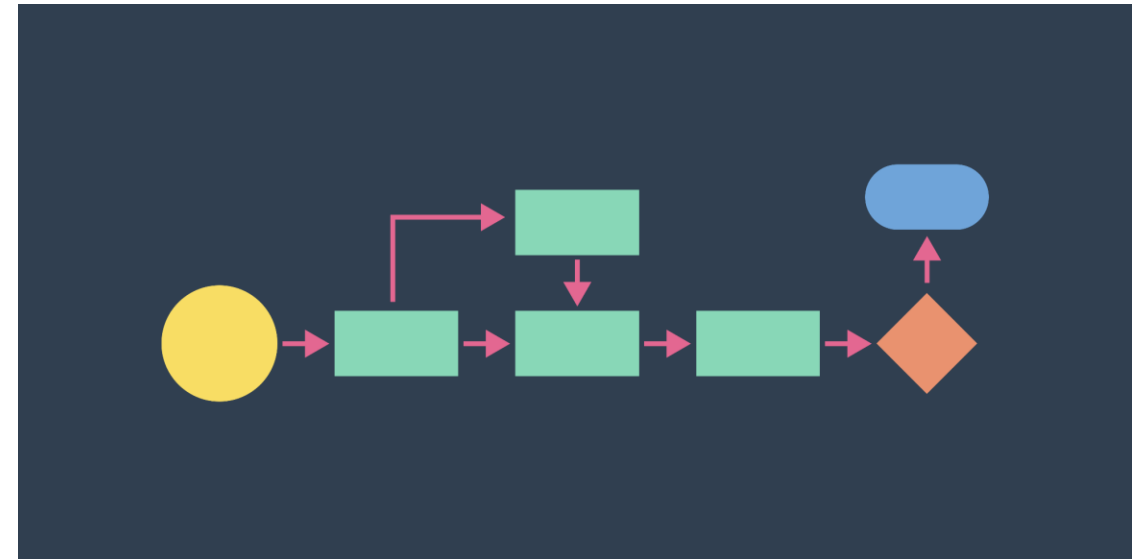
Anticipate initial failures

- Most hardware failures happen in the first months of operation
- Brief your control rooms about it
- Setup more sensitive alarms
- Plan regular maintenance at smaller intervals
- Best case: Have a stock of hardware components right next to your plant



Constantly challenge your (monitoring) workflows

- You can already automate > 90 % of monitoring processes
- Our best practice: review processes once a quarter
- Implement new, automated workflows for most time consuming tasks in the next quarter
- “We are doing this in excel” is the best hint that you need to automate a process :)



04. Q&A session

Questions?

We're all ears!

Drop yours in the question box!



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