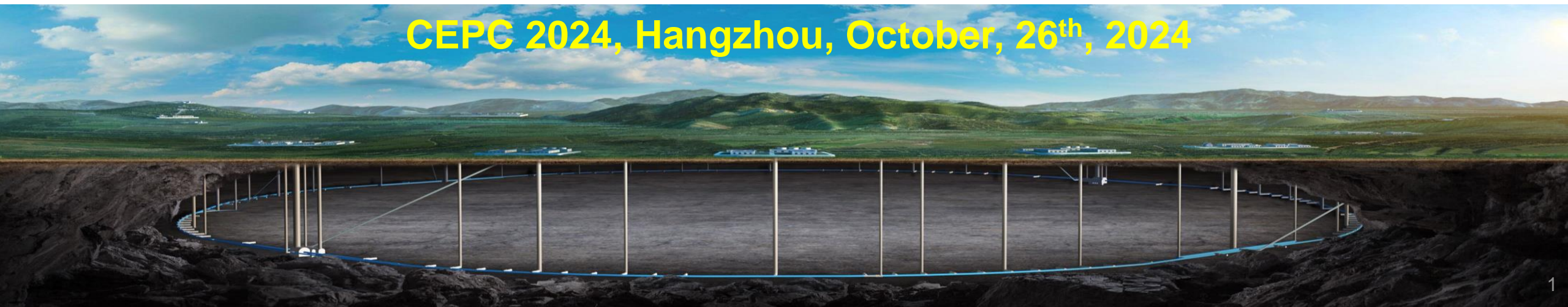




CEPC DeepC Status

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CEPC 2024, Hangzhou, October, 26th, 2024



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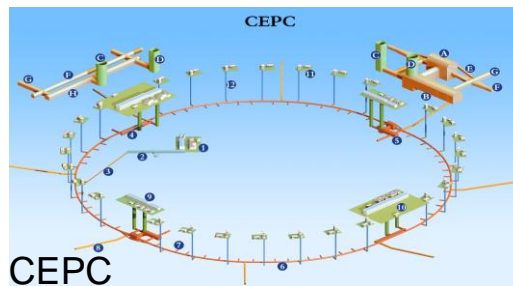
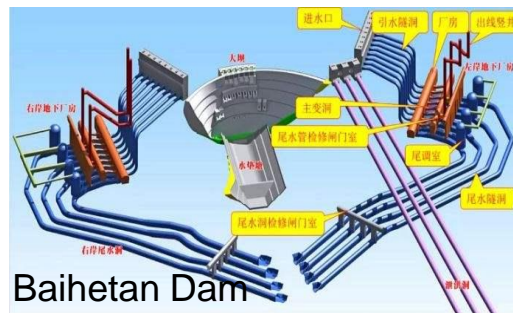
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Introduction

- DeepC is a software tool for developing data management systems. It is exploited by Huadong Engineering Company (HDEC), a member of CEPC Industrial Promotion Consortium (CIPC).
- One of the main works of HDEC are on traditional projects such as hydropower stations, and has a team to provide a all life-time customized digital software for the large projects.
- It is some similar as CEPC. So, the collaboration was conducted on the data management system of CEPC.



中国科学院高能物理研究所

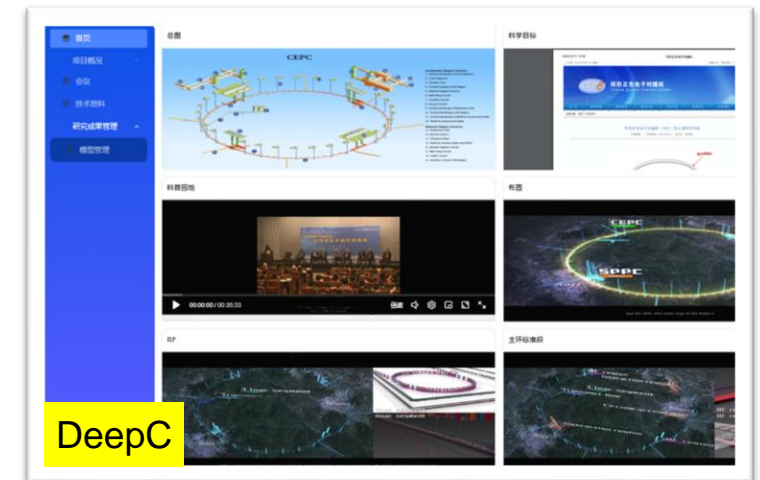
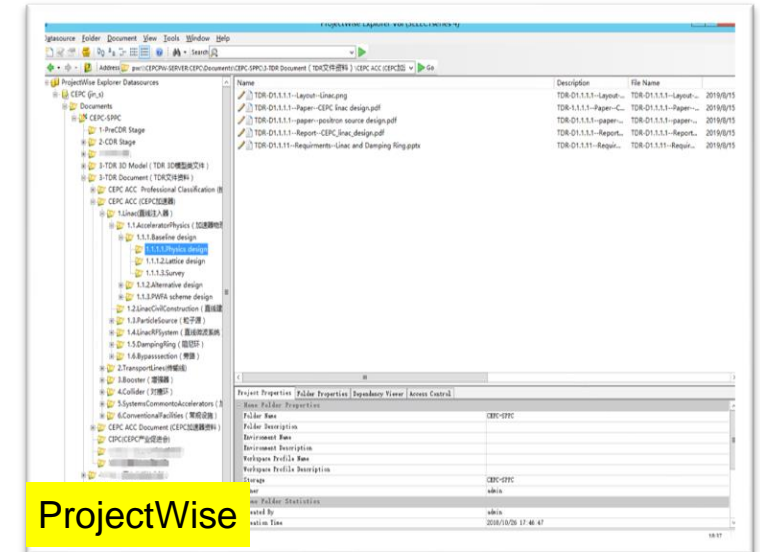
中国电建集团华东勘测设计研究院有限公司:

中国科学院高能物理所正在进行 CEPC-SPPC 项目工作。CEPC-SPPC 全称是“环形正负电子对撞机和超级质子对撞机”，是我国科学家提出的一个长达 100 公里的环形加速器，项目建成后是世界最大加速器。目前，本项目已经进入技术设计报告（TDR）阶段。

请贵单位根据本阶段项目需要，开展工程数字化研究有关工作：包括复杂物理设备虚拟安装技术、全生命周期工程数字化协同设计管理及展示技术等研究工作，为项目服务。

Why develop a new software

	Traditional projects (e.g. hydropower station)	Scientific/modern projects (e.g. CEPC)
1	Most were hosted by one company and have standard data management products	More collaboration and Non-standard products
2	Can be strictly decomposed into multiple engineering stages with fixed processes	High degree of process freedom and Relative long project time span
3	Relatively easy. The difficulties of management can be overcome by using more full-time personnel.	Structure is more complex and professional. The overuse of scientists for management is a waste of talent.



Interface of DeepC

The screenshot shows the 'Contributions' page in the DeepC system. It features a search bar at the top with filters for Event, Session, and Presenter. Below the search bar is a table of contributions with columns for ID, Title, Date, Start Time, End Time, Location, Session, and Presenter. A sidebar on the left contains a tree view of the system's structure, including Event, Session, and Contribution categories. A purple dashed line highlights a path from the 'Session' category in the sidebar to a specific contribution in the table.

序号	Contribution	Date	Start Time	End Time	Location	Session	Presenter
1	Physics at future electron positron colliders	2023-10-23	09:10:00	09:50:00	Lecture Hall 1 (NJU SciTech)	Plenary	Michael Ramsey-Musolf
2	Status of the CEPC	2023-10-23	09:50:00	10:30:00	Lecture Hall 1 (NJU SciTech)	Plenary	Yuhui Li
3	FCC Feasibility Study Status	2023-10-23	11:00:00	11:30:00	Lecture Hall 1 (NJU SciTech)	Plenary	Frank Zimmermann
4	Progress of the ILC and the CLIC	2023-10-23	11:30:00	12:00:00	Lecture Hall 1 (NJU SciTech)	Plenary	Junping Tian
5	Microelectronics at CERN	2023-10-23	12:00:00	12:30:00	Lecture Hall 1 (NJU SciTech)	Plenary	Paulo Moreira
6	SM Higgs precision physics at CEPC [exp]	2023-10-23	14:00:00	14:20:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Kaili Zhang
7	BSM Higgses at CEPC	2023-10-23	14:25:00	14:45:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Jia Liu
8	BSM Higgs sector and SFOEWPT at CEPC	2023-10-23	14:50:00	15:10:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Michael Ramsey-Musolf
9	Searches for Additional Scalars at future e^+e^- Colliders	2023-10-23	15:15:00	15:30:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Karabo Mosala
10	Bell inequalities and quantum entanglement in weak gauge bosons production at colliders	2023-10-23	16:00:00	16:20:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Emidio Gabrielli
11	SMEFT for H/EWitt	2023-10-23	16:25:00	16:45:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Jiayin Gu
12	Complete NNLO EW to $e^+e^- \rightarrow HZ$	2023-10-23	16:50:00	17:10:00	CEPC Room 1 (GrandHotelNanjing)	Higgs	Xiang Chen



Navigation bar for the Indico session page, showing dates from Monday 24/10 to Friday 28/10, and options for printing, PDF, full screen, detailed view, and transition.

The 'Session' overview panel displays a grid of session topics. A purple dashed line connects the 'Session' category in the sidebar to this panel. A 'Talk' label is positioned to the right of the panel.

The 'Session Info' panel provides details for the session, including the Zoom link, recording information, date and time, session topic, moderator, event name, event dates, and event moderator.

Start	Title	Author(s)	Topic(s)	File(s)	Length	Edit
14:30	Updates on PMT Parameter Management	Qian Zhen	Simulation	20210712_qianzhen...pdf	00:30	Edit
15:00	Update of CD detector simulation	Yuxiang Hu	Simulation	CD detector sim...pdf CD detector s...pptx	00:30	Edit
15:30	CD Electronics Simulation Updates	Guofu Cao <i>et al.</i>	Simulation	ElecSim20210712.pdf	00:30	Edit
16:00	SPMT simulation status	Cecile Jolliet	Software and simulation	SPMT_Simulation...pdf	00:20	Edit
16:20	Veto detector simulation	Joao Pedro Athayde Marcelo de Almeida <i>et al.</i>	Veto Detector	Update_Veto_MC.pdf Update_Veto_MC.pptx	00:20	Edit
16:40	Optical simulation of the CEPC truth	Yao Yu	Simulation	Optical simulation of the CEPC truth software	00:30	Edit
17:10	JUNO Optics/Giant4 Optical Photon Simulation Matching	Simon Blyth	Simulation	PDF slides	00:30	Edit

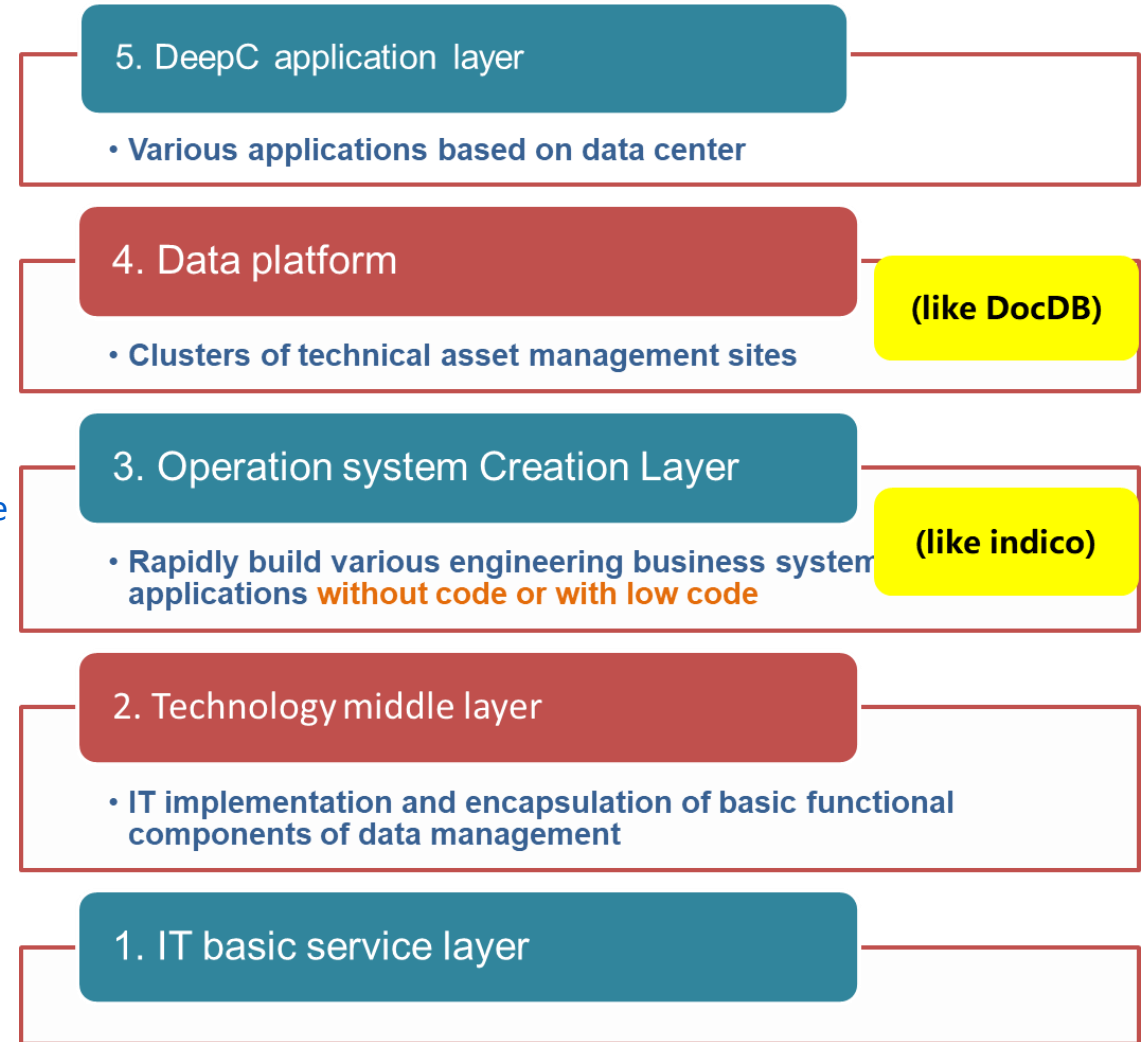
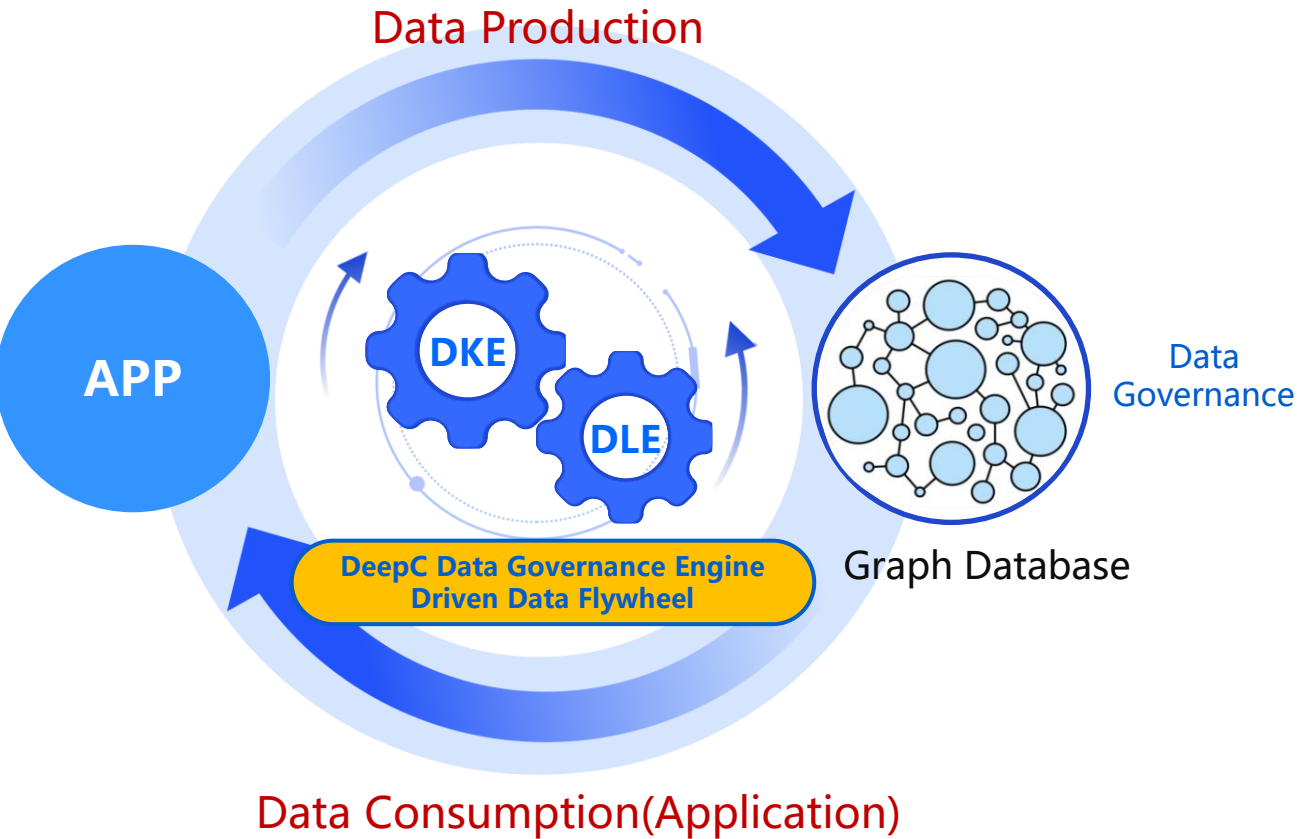
■ The system interface can be customized freely.

Document title/author/systems/...

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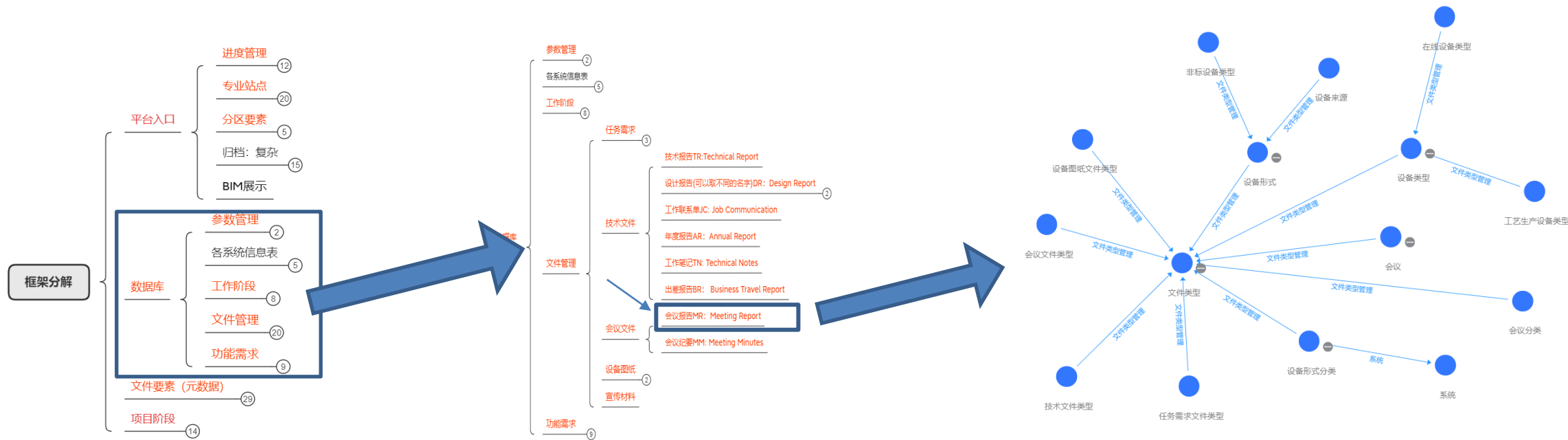
1. Basic functions of DeepC have been achieved



Hierarchical Structure of DeepC

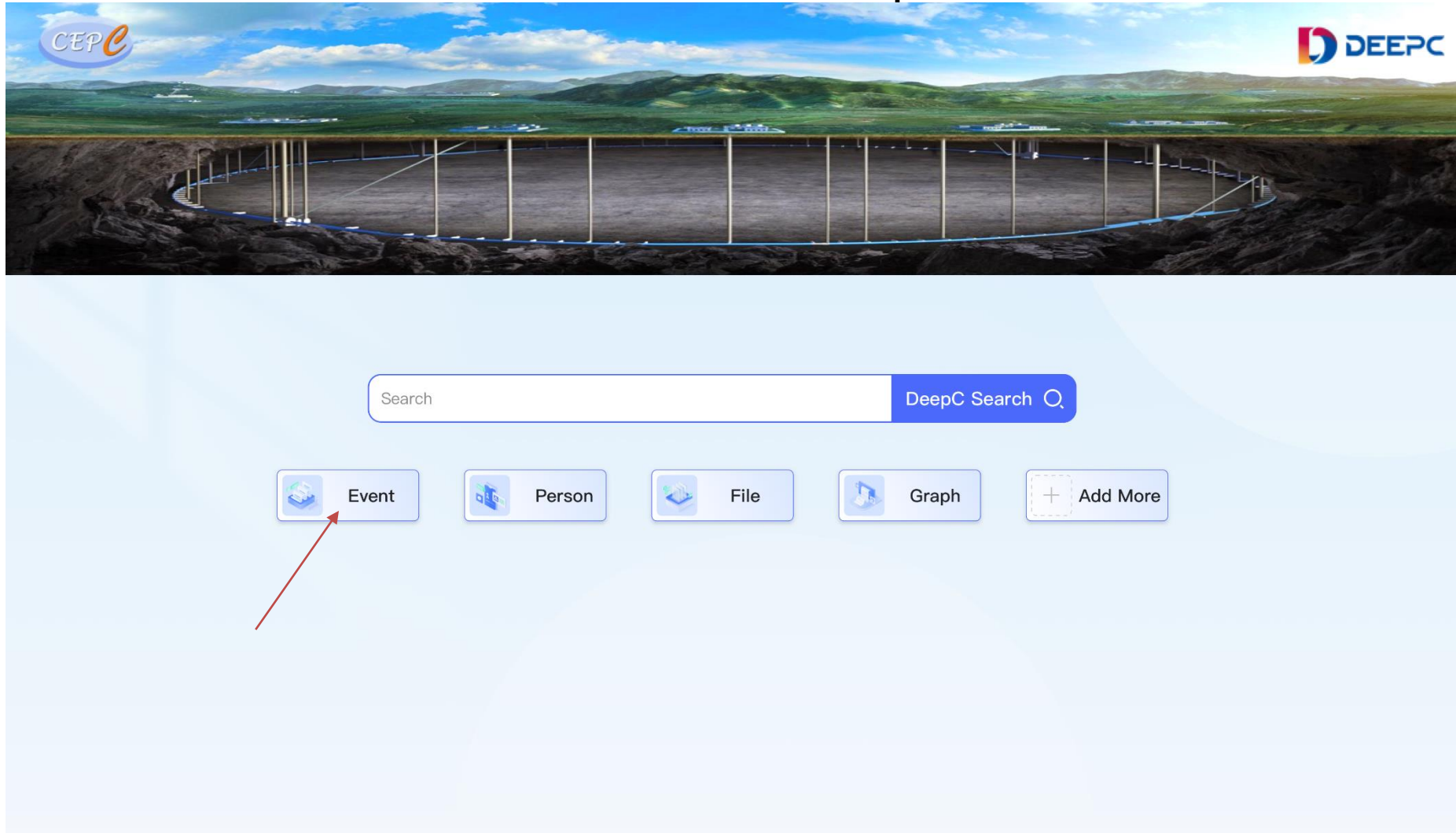
2. Draft framework and build initial database

- After initially drafting the data framework for the CEPC accelerator, discussions were held with HDEC regarding the implementation of the DeepC system.
- Utilizing publicly available events and news articles from previous years as source material, data was entered into the system to create a graphical data model.



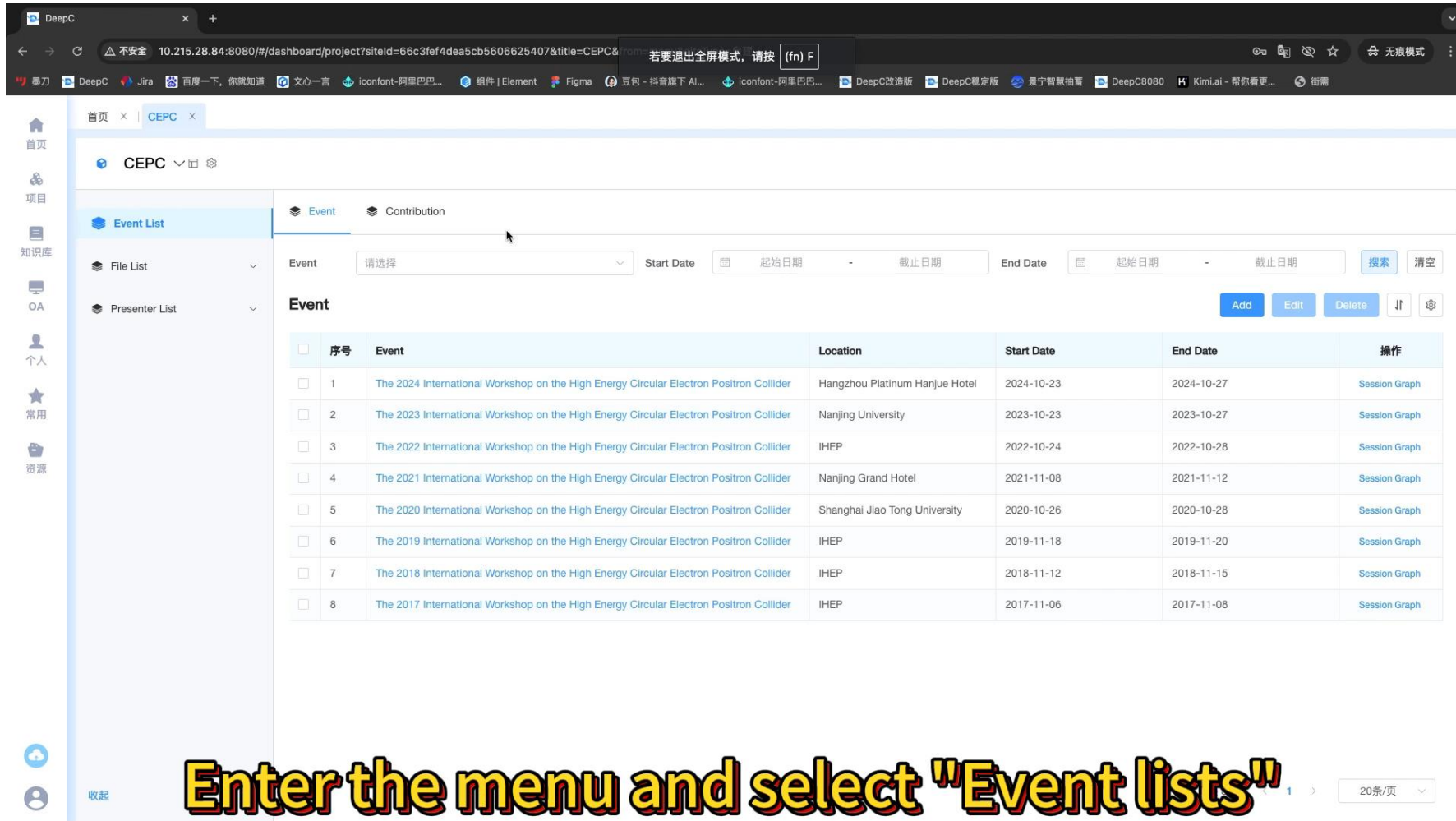
Document management

- View various data related to the event from multiple dimensions.



Meeting Document management (Video 1)

- View various data related to the event from multiple dimensions.



The screenshot displays a web application interface for CEPC. The main content area shows an 'Event List' with a table of events. The table has columns for '序号' (ID), 'Event', 'Location', 'Start Date', 'End Date', and '操作' (Actions). The events listed are:

序号	Event	Location	Start Date	End Date	操作
1	The 2024 International Workshop on the High Energy Circular Electron Positron Collider	Hangzhou Platinum Hanjue Hotel	2024-10-23	2024-10-27	Session Graph
2	The 2023 International Workshop on the High Energy Circular Electron Positron Collider	Nanjing University	2023-10-23	2023-10-27	Session Graph
3	The 2022 International Workshop on the High Energy Circular Electron Positron Collider	IHEP	2022-10-24	2022-10-28	Session Graph
4	The 2021 International Workshop on the High Energy Circular Electron Positron Collider	Nanjing Grand Hotel	2021-11-08	2021-11-12	Session Graph
5	The 2020 International Workshop on the High Energy Circular Electron Positron Collider	Shanghai Jiao Tong University	2020-10-26	2020-10-28	Session Graph
6	The 2019 International Workshop on the High Energy Circular Electron Positron Collider	IHEP	2019-11-18	2019-11-20	Session Graph
7	The 2018 International Workshop on the High Energy Circular Electron Positron Collider	IHEP	2018-11-12	2018-11-15	Session Graph
8	The 2017 International Workshop on the High Energy Circular Electron Positron Collider	IHEP	2017-11-06	2017-11-08	Session Graph

At the bottom of the screenshot, there is a large yellow text overlay that reads: "Enter the menu and select 'Event lists'".

News articles management (Video 2)

- As the pilot work progresses, more data is being added, such as news articles.

The screenshot shows a web application interface for CEPC (Compact Electron-Proton Collider) news management. The interface is divided into several sections:

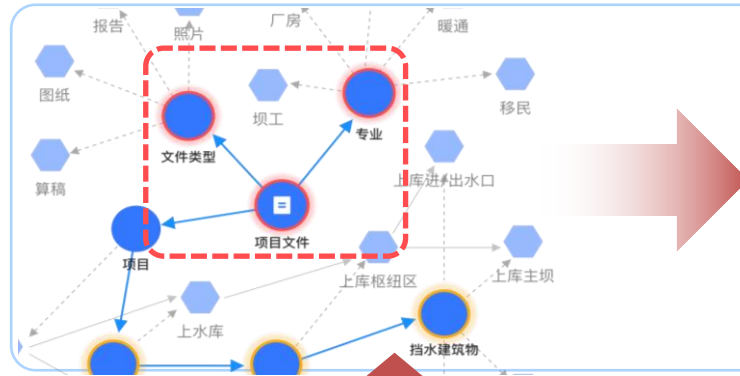
- Header:** Shows the project name 'CEPC' and navigation tabs for 'Presentation Materials', 'News', and 'AI Upload'.
- Left Sidebar:** Contains navigation options: 'Event List', 'Personnel List', 'File List', 'OA', '个人', '常用', and '资源'.
- Main Content Area:** Displays a table of 'Presentation Materials' with columns for 'Material', 'Contribution', and 'Presenter'. The table lists 11 items, including workshop posters and technical presentations.

序号	Material	Contribution	Presenter
1	23_CEPC_Workshop_poster2	B08: Preliminary design consideration for CEPC fast luminosity feedback system	Meng Li
2	23_CEPC_workshop_poster_heye	B10: CEPC Fast Luminosity Monitor with Silicon Carbide	Ye He
3	23.10_weizheng song_poster_CEPC International Workshop_V2	C06: Detector geometry and PFA reconstruction for the crystal bar ECAL in CEPC	Weizheng Song
4	2023_10_23_CEPC_workshop	Collective effects	M. Migliorati
5	2023-10-23-CEPC-Nanjing-JiaLiu-BSM-Higgs-1	BSM Higgses at CEPC	Jia Liu
6	2023HVC MOS 55nm_CEPC_POSTER_final	C11: Exploration of a 55nm HV-CMOS process for the CEPC silicon tracker	Yang ZHOU
7	20231023_NJU_CEPC_Kalli	SM Higgs precision physics at CEPC [exp]	Kalli Zhang
8	20231023_CEPC_workshop_BinWang_v2	Orbit correction and error analysis	Bin Wang
9	20231023_SiDetectorsForIDEA (1)	IDEA tracker design	Riccardo Zanzottera
10	高能同步辐射光源 (HEPS) 磁铁研制-王辉-CEPC2023(2)	高能同步辐射光源 (HEPS) 磁铁研制	Hui Wang
11	2023-10-cepc-nanjing-zhangyuan (1)	Beam-beam simulations for CEPC all energy modes and impedance effects	Yuan Zhang

3. Developing the Intelligent recognition

Intelligent Recognition (for automatically identifying metadata of uploaded files)

File Upload



- 专业
 - 坝工
 - 厂房
 - 引水
 -
- 文件类型
 - 图纸
 - 报告
 - 算稿
 - 照片

Custom Combination Directory to Display Corresponding File Sets

项目文件	专业	文件类型
白鹤滩电站正常蓄水位专题报告	坝工	报告
白鹤滩电站水库平面布置图	坝工	图纸
白鹤滩电站水库面板堆石坝结构布置图	坝工	图纸
白鹤滩电站水库结构布置图	坝工	图纸

Fully Automated File Processing

File Content Recognition

金沙江白鹤滩水电站
2016 年度防汛及地质灾害
隐患复查报告
(审定本)

Original File

浮石、边坡塌滑
营地后边坡
浮石滚动、局部坡体塌滑
房屋损坏、人员伤亡
III(危险的)
C(有时发生)
二级风险(不希望有的风险)

2. 雨季加强巡查, 暴雨设置值班制度, 发现危险紧急撤离。
通过评价, 六城坝水电站临时移民安置点风险指数为三级风险, 不希望有的风险。
雨季加强巡查, 暴雨设置值班制度, 发现危险紧急撤离。

General Text (Specifications, Reports, etc.)
Open Source + Self-Developed Optimization Tool
Fully Automatic Processing

Recognizing

示例知识库 =

- 文件
- 收藏
- 分享
- 看过
- 权限
- 回收站

Directory

2016年金沙江白鹤滩... 复查报告 (审定本)

- 封面
- 目录页
- 1 前言
- 2 防汛及地质灾害隐患排查
- 2.1 临时移民安置点
- 2.2 左岸营地及施工场地
- 2.3 右岸营地及施工场地
- 2.4 左岸泥石流沟与进场工程

Table

六城坝水电站临时移民安置点危险性分析表

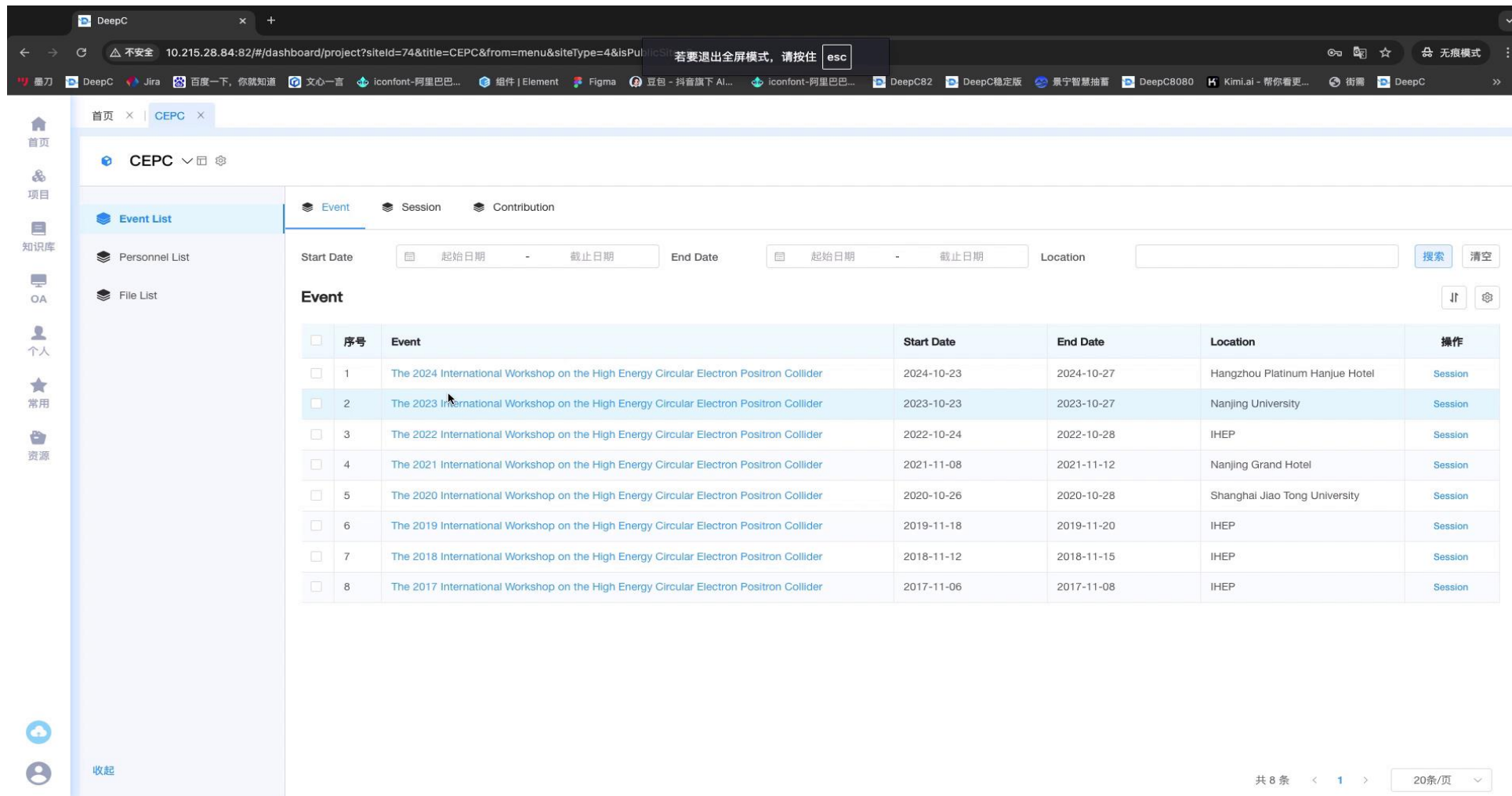
危险因素	浮石、边坡塌滑
所在位置	营地后边坡
事故原因	暴雨浮石滚动、局部坡体塌滑
事故后果	房屋损坏、人员伤亡
危险等级	III(危险的)
事故后果	房屋损坏、人员伤亡
事故原因	暴雨浮石滚动、局部坡体塌滑
事故后果	房屋损坏、人员伤亡

Table

六城坝水电站临时移民安置点危险性分析表	
危险因素	浮石、边坡塌滑
所在位置	营地后边坡
事故原因	暴雨浮石滚动、局部坡体塌滑
事故后果	房屋损坏、人员伤亡
危险等级	III(危险的)
事故后果	房屋损坏、人员伤亡
事故原因	暴雨浮石滚动、局部坡体塌滑
事故后果	房屋损坏、人员伤亡

Preliminary Intelligent recognition (Video 3)

- To reduce the workload of manual data entry, DeepC has implemented a function that automatically recognizes some file metadata upon upload.



The screenshot displays the DeepC web application interface. The browser address bar shows the URL: 10.215.28.84:82/#/dashboard/project?siteId=74&title=CEPC&from=menu&siteType=4&isPublic=1. The application title is "CEPC". The main content area is titled "Event List" and contains a table of events. The table has columns for "序号" (Serial Number), "Event", "Start Date", "End Date", "Location", and "操作" (Action). The events listed are international workshops on the High Energy Circular Electron Positron Collider, ranging from 2017 to 2024. The "操作" column contains a "Session" link for each event.

序号	Event	Start Date	End Date	Location	操作
1	The 2024 International Workshop on the High Energy Circular Electron Positron Collider	2024-10-23	2024-10-27	Hangzhou Platinum Hanjue Hotel	Session
2	The 2023 International Workshop on the High Energy Circular Electron Positron Collider	2023-10-23	2023-10-27	Nanjing University	Session
3	The 2022 International Workshop on the High Energy Circular Electron Positron Collider	2022-10-24	2022-10-28	IHEP	Session
4	The 2021 International Workshop on the High Energy Circular Electron Positron Collider	2021-11-08	2021-11-12	Nanjing Grand Hotel	Session
5	The 2020 International Workshop on the High Energy Circular Electron Positron Collider	2020-10-26	2020-10-28	Shanghai Jiao Tong University	Session
6	The 2019 International Workshop on the High Energy Circular Electron Positron Collider	2019-11-18	2019-11-20	IHEP	Session
7	The 2018 International Workshop on the High Energy Circular Electron Positron Collider	2018-11-12	2018-11-15	IHEP	Session
8	The 2017 International Workshop on the High Energy Circular Electron Positron Collider	2017-11-06	2017-11-08	IHEP	Session

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Summary

- **The documentation system for CEPC accelerator was initially developed based on DeepC.**
- **In the application processes, DeepC is in continuous iterations and enhancements of functionalities.**
- **The structure of accelerator documentation system will also be continuously optimized together with improvement of DeepC, with the aim to become a project data management tool for CEPC.**

Thanks!