The Digital Footprint of Engineering Design Projects

Sensors for project health monitoring

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The global value of major engineering projects is estimated at **$3,000,000,000USD**

With the US DoD estimated to lose **$150,000,000USD** per day due to delays and overruns

Globally, from major engineering projects, this equates to **$1.2M LOST PER MINUTE**

**Project aim**

What understanding, insights and predictions can be generated about engineering projects through an understanding of the changing content and structure of the digital assets produced?

ePHM is ...

1. Based on Digital Assets and features of a project.
2. Includes a suite of information analytics (methods) to reveal the state of a project in between stage gates.
3. Uses dashboards to:
   - Transform PMs into evidence based hypothesis testers;
   - Provide user-in-the-loop monitoring and feedback (control); and
   - Enable root cause analysis to be undertaken and the impact of an intervention to be assessed.

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**Project structure / challenges**

- How to measure?
- How to present?
- How to interpret?
- How to measure?

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**COMMUNICATIONS**

- Visualising the purpose and sentiment of emails w.r.t. the product.
- Analysis of trends across project archives (content analysis of reports) & real time project monitoring dashboards (project and programme monitoring).

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**MODELS**

- Revealing model/product dependencies through co-occurrence analysis.
- Real time prediction of project complexity based on work request (content) and continuous monitoring based on transactions (sequence) and comparison historical workflows.
- Model and predict CAD & FEA model evolution including: time to completion and identifying potential issues (non conformance).

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**Model and Predictive Analytics**

- Understand, predict and optimise engineering projects and their outcomes using AI and big data.
- Analyse data at scale and across multiple sources to reveal hidden insights.
- Identify the most promising and impactful areas to focus on.

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**Understanding**

- Insights
- Predictions

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**REMEDIATION**

- Implement remediating solutions to address key issues.
- Improve processes and efficiency through AI-driven decision making.

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**METHODOLOGY**

- Use AI-driven approaches to improve project outcomes.
- Implement AI-driven solutions to address key issues.
- Improve processes and efficiency through AI-driven decision making.

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**Project Details**

- More than 67,000 employees in 70 countries
- 13,000 suppliers in more than 100 countries
- 75,000-100,000 parts designed in 3D
- R&D work in 43 countries

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**Communication**

- Model and predict CAD & FEA model evolution including: time to completion and identifying potential issues (non conformance).

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**Reports**

- Revealing model/product dependencies through co-occurrence analysis.
- Real time prediction of project complexity based on work request (content) and continuous monitoring based on transactions (sequence) and comparison historical workflows.

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**Table**

- | Country | Employees |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>USA</td>
<td>67,000</td>
</tr>
<tr>
<td>China</td>
<td>13,000</td>
</tr>
<tr>
<td>Japan</td>
<td>75,000</td>
</tr>
<tr>
<td>Germany</td>
<td>100,000</td>
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</tbody>
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**Graphs**

- Bar graphs showing project status over time.
- Line graphs showing project cost and schedule performance.
- Pie charts showing project budget allocation.

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**Visuals**

- Infographics showing data analysis and predictive analytics.
- Maps showing project location and workforce distribution.
- Charts showing project milestones and budget trends.