Focus Groups Report: Industry Supervisors

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RSVP | Next Generation Research SuperVision Project

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1. Executive Summary

In 2025, the Next Generation Research SuperVision Project (RSVP) undertook a series of seven focus groups with doctoral supervisors based outside Higher Education Institutions (HEIs) (referred to as industry supervisors). This included representation from Science, Technology, Engineering, and Mathematics (34 participants), Arts and Heritage (7), and Clinical/Medical (2). The discussions explored these supervisors' perceptions of their role, reflections on good and poor practice, challenges encountered, skills and experience applied, and expectations for continuing professional development (CPD). The analysis highlights the **distinctive expertise that industry supervisors bring to doctoral supervision and their priorities for support and recognition, addressing a vital but underrepresented area in doctoral education**.

Role and Approach

Industry supervisors (a term focus group participants were all comfortable in using regardless of discipline) consistently aspired to be **recognised as equal partners within HEI supervisory teams**. Their main contribution was described as **bridging academia and industry and broadening postgraduate researchers' (PGRs) experience**. This included **connecting academic and industrial contexts, providing access to resources, and expanding professional exposure**. Industry supervisors saw their role as shaping PGRs' doctoral experience not only through research outputs but also by creating external opportunities and supporting long-term career development.

Approaches to supervision varied depending on relationships with academic supervisors and PGRs, as well as practical factors such as funding arrangements and PGR location. **Clear and consistent communication with the PGR emerged as a central principle**. Industry supervisors aimed to raise awareness of industry expectations, including timelines and goal setting, and expressed a strong commitment to connecting PGRs with professional networks and developing transferable skills such as communication and networking.

Reflections on Practice

Participants emphasised that effective supervision extends beyond technical guidance to encompass relational and developmental support. **Good practice was associated with structured communication, trust-building, and candidate-centred approaches that recognise PGRs as individuals with diverse needs. Flexibility, proactive care, and attention to wellbeing were highlighted as essential, alongside initiatives such as digital training and industry presentations to develop transferable skills**. Constructive responses to mistakes were also valued, helping PGRs view errors as part of learning rather than failure.

Poor supervisory practice was characterised by supervisors' absence, disengagement, and lack of openness — often described as the inverse of positive behaviours. Many participants drew on their own doctoral experiences to inform their supervisory approach, reinforcing the importance of attitudes and behaviours that foster trust and constructive engagement.

Challenges

Several challenges were identified. Role clarity was a recurring issue, with **misalignment between academic supervisors' expectations and industry supervisors' perspectives**. Recruitment processes sometimes revealed differing views on candidate suitability. Participants also noted a decline in PGR resilience and expressed uncertainty about how to support PGRs in crisis, citing limited awareness of institutional support mechanisms.

Administrative burdens, including intellectual property, contracts, and compliance, were significant and often compounded by limited institutional understanding of industry regulations. A lack of formal recognition for supervisors' contributions and insufficient time allocation further exacerbated these challenges, leaving many feeling undervalued despite their commitment.

Skills and Experience

Supervisors drew on a wide range of skills, including prior doctoral experience, industry-based leadership and management expertise, and sector-specific knowledge. Interdisciplinary perspectives were seen as particularly valuable for enriching PGRs' projects. However, **exposure to and the opportunity to engage in supervision-specific development were limited**. Existing development opportunities tended to focus on institutional processes rather than practical supervisory approaches, leaving many supervisors reliant on informal learning and observation.

Peer Support and CPD Needs

Peer-sharing initiatives, both formal and informal, were highly valued for fostering shared learning and exchange of ideas. **Participants expressed a strong need for CPD tailored to doctoral supervision, including guidance on the doctoral lifecycle, PGR wellbeing, and effective communication**. Professional development in pedagogy and learning processes was considered particularly beneficial, alongside opportunities for collaborative learning with academic supervisors. Supervisors also highlighted the importance of **Communities of Practice (CoP) as a mechanism for ongoing support and development**. Many valued the opportunity afforded by the focus groups to meet supervisors from other industry sectors and disciplines and to share practice.

2. Introduction

The RSVP research project is committed to understanding and exploring four main areas:

1. The role of team supervision
2. Supervision practice in different disciplines and contexts
3. Supervising different types of research degrees
4. Understanding and combatting poor supervision practice.

This report is concerned with the experiences of industry-based doctoral supervisors reported through a series of focus groups conducted as part of the Next Generation Research SuperVision Project (RSVP). 'Industry Supervisor' is used as an umbrella term to refer to supervisors based in non-HEI organisations who support PGRs in all disciplines, including those from Science, Technology, Engineering, and Mathematics, Arts and Heritage, Social Science, Clinical/Medical and Management organisations. This term has been adopted to reflect participants' own framing of their supervisory role and is consistent with European Commission's (2011) definition of doctoral programmes involved non-academic organisation partners:

> *The term 'industry' is used in the widest sense, including all fields of future workplaces and public engagement, from industry to business, government, NGO's, charities and cultural institutions (e.g. musea). This can include placements during research training; shared funding; involvement of non-academics from relevant industry in informing/delivering teaching and supervision...* (p. 6).

The aim of these focus groups was to explore this, to date, largely unexplored set of stakeholders who contribute, as co-supervisors, to the PGR experience in collaborative university -industry projects. This data set forms part of a broader RSVP approach to understanding different doctoral supervision stakeholders.

3. Methodology

Ethical approval for participant recruitment and data collection was granted by the School of Arts and Creative Technologies Ethics Committee at the University of York. Participant recruitment combined open and targeted approaches. An open call for participation was posted on the RSVP LinkedIn page, with a Google Form attached to register an expression of interest from industry-based supervisors involved in UK PGR supervision. RSVP consortium members and practitioner partners also distributed the recruitment email through their professional networks and institutional mailing lists.[1] In total, 67 interested supervisors responded to the initial recruitment promotions, and of these, 47 supervisors attended one of the seven 90-minute online focus groups.[2] In advance of the focus group, participants were provided with an information sheet outlining the processes of data collection, analysis, data storage, and dissemination of findings (Appendix 1). Informed consent was requested prior to the running of the focus groups.

Participants were also asked to complete a pre-questionnaire to establish background information, including industry sector, education levels, career stages and supervision experience. Access to the focus group questions, agreed by the RSVP consortium partners, was provided to each participant ahead of the focus group. The question set consists of two sections (Appendix 2). 'Supervision Approach' explores participants' perceived roles and contributions within the PGR supervisory team, including how they approached supervision and the challenges they encountered. 'Skills and Professional Development' explores the skills and experiences participants drew upon in their supervisory role, their engagement with continuing professional development (CPD) and expectations and development needs for their supervisory role.

[1] The RSVP consortium comprises the University of York, Sheffield Hallam University, King's College London, Coventry University, the University of Nottingham, and the UK Council for Graduate Education. Information about RSVP practitioner partners is available at https://www.rsvp.ac.uk/partners.

[2] Participants in the focus group were required to be based outside HEI and involved in doctoral level supervision. Following these criteria, alongside practical considerations of participants' availability for the scheduled sessions, 47 participants attended the focus group.

In total, 43 participants' contributions were included in the formal analysis.[3] These participants included industry supervisors based within and outside the UK who engaged in UK doctoral supervision through varied forms of involvement. These included participation in university-industry collaborative doctoral schemes funded by research councils, as well as more ad hoc forms of involvement such as acting as 'rescue' supervisors following changes in supervisory teams, or contributing at specific stages of the doctoral journey.[4]

Participants represented disciplinary sectors including Science, Technology, Engineering and Mathematics (STEM), Arts and Heritage (A&H), and Medical/Clinical (MED), with roles based across government or public agencies (19) and private companies (24).

It is important to note that 81% of participants were from STEM sectors (see Table 1), and thus this report has a dominant STEM industry supervisor voice. Table 2 summarises participant characteristics by their education and career level.

Sectors	Number of participants
STEM	34
Arts & Heritage	7
Clinical/Medical	2
Total	**43**

Table 1 | Summary of participants by discipline

Education level	PhD	35
	BSc	2
	MSc	2
	EngD	1
	MA	3
Career level	Early career	6
	Mid career	20
	Late career	15
	Unknown	2

Table 2 | Summary of participants by education and career level

[3] As four participants failed to confirm the written consent, their contributions were excluded in data analysis, resulting in the final focus group data set of 43 participants' contributions.

[4] As defined in UK Research Supervision Survey 2024 (Gower et al., 2024), rescue supervisors refers to those who "had taken on a doctoral candidate who had previously worked with a different supervisor" (p. 9).

The focus groups were held online via Zoom and recorded for transcription with participants' consent. Transcripts generated were checked, edited for clarity, and anonymised for thematic analysis (Braun and Clarke, 2006). Two researchers familiarised themselves with the anonymised transcripts and recorded initial notes for potential codes. Transcripts were then imported into the qualitative data analysis software MaxQDA to support data organisation, coding, and retrieval. Two researchers independently coded the transcripts, after which they met regularly to compare interpretations and iteratively refine the coding framework. The process was supervised by RSVP management members. Codes were then synthesised into themes and presented as thematic sections in the Findings section.

4. Findings

4.1 Industry supervisors' role and contribution

Participants discussed how they perceived their supervisory role within doctoral projects and the distinctive forms of contribution they believed that they provided as industry supervisors. The aspiration to be recognised as equal partners in doctoral supervision was consistently emphasised across the cohort. This was reflected in participants' descriptions of their engagement in enhancing the impact of doctoral research and broadening doctoral candidates' experiences beyond the university setting.

4.1.1 Industry supervisors' partnership in the supervisory team

Many participants articulated the shared responsibility in supporting candidates through the doctoral lifecycle, parity of respect with academic supervisors, and involvement in shaping the direction and impact of the doctoral project from an industrial perspective:

> "...it's very much a kind of working partnership relationship with the academic partner, the student and ourselves." (Participant 34, A&H)

> "We would see ourselves as full supervisors, but recognising that as the non-academic partner, as the arts industry partner. We bring particular skills and things to it, and our role is about helping to shape the project and helping support the student and provide the student with mentoring..." (Participant 17, A&H)

> "We're kind of very much an equal partner... in terms of the supervisory role... I would see my supervisory role to be respectful of the academic structure and needs of the programme that they're working in, but also to provide the guidance in industry of ... the application of that science and the potential of where it could go and helping to guide the student or postdoc on...how we would use their outputs going forward... It's just much more collaborative and helps to give people a different kind of work experience whilst doing the research." (Participant 29, STEM)

Some participants positioned themselves in a supportive capacity to complement the academic supervisor with industry-based perspectives:

> "If they want a second opinion on things, then that's kind of what I'm here for. The main show is with the main supervisor, but I'm here as an additional asset." (Participant 4, STEM)

Other participants noted that the context of particular projects, institutional arrangements, or supervisory structures shaped their role:

> "It very much depends on the main source of the funding. So, sometimes we fund PhD projects, and they're actually based here within the group [in the industry organisation], in which case the role is very different to if they're actually based in the university." (Participant 11, STEM)

> "It varies...most of the time it's...keeping things on track, with their academic supervisor being the primary supervisor. But there is a placement aspect of the programme. So, in that duration, I would then become kind of the principal supervisor as they would come to site at [the company]." (Participant 43, STEM)

While participants' supervisory involvement varied in practice, their aim and expectation to be meaningfully engaged with the doctoral project was consistently emphasised:

> "...we want to be the 'everyday parent', 'present parent', not the one that just shows up with the Christmas presents." (Participant 20, STEM)

In participants' further discussion of their role, bridging and broadening doctoral projects and PGRs' experience of industrial contexts emerged as the core themes. This unfolded through connecting academic and industrial contexts, providing industrial resources and materials, and broadening PGRs' experience beyond the university setting.

4.1.2 Connecting academic and industrial contexts

Some participants highlighted their role in ensuring that the doctoral research was positioned within wider contexts. This involved aligning project objectives with industrial priorities and facilitating the translation of doctoral research into applied outcomes and values. In this sense, industry supervisors helped PGRs to situate their work appropriately within an industry context. Supervisors described this role as 'lifting' both the project and the PGRs' vision towards broader relevance and impact:

> "As sort of lead supervisor for the museum side, I think my main role is to ensure that the trajectory of the study is of benefit or some benefit at least to the museum at the end of it... We hope to have a PhD from which we can draw useful insights to apply on site. So that's something I want to keep an eye on to ensure that I continue to do that." (Participant 40, A&H)

> "In our case, it's usually [Clinical service] or charity or someone working with psychology in that way...that it's to bring this practical industry, if you call it that way. There's a sort of hands-on [understanding of] what's happening out there and make the practical knowledge, the practice-based knowledge academically translatable." (Participant 24, MED)

> "I think part of the role, as I see it, is to maybe lift the vision a bit of the student. It's easy to get really deep into your technical questions...but I think it can provide some value not only from this for us as a company...but also for the students to make sure that the impact of the research is increased by making sure they stay in something that we identified as a relevant topic." (Participant 6, STEM)

"...we want to be the 'everyday parent', 'present parent', not the one that just shows up with the Christmas presents." (Participant 20, STEM)

4.1.3 Providing industrial resources and materials

Some participants described their role as a facilitator to PGRs' access to specialist resources and materials which may not be available in the academic setting:

> "We're providing that link there to make sure that the student and their academic supervisor can access the information they need to access from the industry side." (Participant 2, STEM)

> "There may be some other equipment we have...Actually, students we've supervised at [university] often got access to it but some of the universities don't. So, they may come here and use some specific tools." (Participant 23, STEM)

With their input of expertise in this process, participants aimed to guide PGRs in making effective use of these resources, to ensure that such access not only extended the scope of the doctoral project but also translated meaningfully in the research process:

> "In the case of some things, we will point you towards grey literature, which you would not have had access to had you not talked to us, because that will give you a much greater understanding of why you're doing the work." (Participant 39, STEM)

> "I think a lot of what I see is opening doors for the students as well...often in a practical sense, like if they want to work with our museum group, they want access to archives and to museum collections that are mediated through other people. So, [as] a supervisor, you become the ambassador for that sort of process of getting them trained, getting them access in a practical sense." (Participant 21, A&H)

4.1.4 Broadening PGRs' experience

Some participants described their engagement with facilitating PGRs' exposure to industrial practices and networks, and offering perspectives on industrial employability and career development, which provides some capital for the PGRs they supervise:

> "Very often the whole point of collaboration is that the student is going to learn skills that they wouldn't get in a standard university PhD project that they're going to be working directly with collections that we have in the museum... it's my role to make sure they have those skills, to teach them and guide them while they're doing that." (Participant 38, A&H)

> "We're interested in the student as a person as well, and making sure that they can develop in a way that's going to be relevant for industry...so that when they finish their PhD, they become effectively a good potential recruit for us, and to get those skills and to get that understanding of how the industry works is a key part of that, and we as industrial supervisors are the main way of providing them with that understanding and getting them industry ready at the end of their project." (Participant 2, STEM)

These forms of engagement were perceived to enrich doctoral study by situating PGRs' research journey within real-world contexts and expanding their vision beyond the university. In this way, participants positioned themselves as active agents of industrial socialisation who aim to extend the developmental impact of the doctorate, as well as providing candidates with a broader view of potential postdoctoral career opportunities.

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4.2 Industry supervisors' approach

Participants stated that there was no formalised or standard method in approaching participation in the PGR supervisory team. Rather, their approach to their supervisory role was dependent on a range of factors, including the funding arrangement, the relationship with the academic supervisors and the PGR, and the geographical proximity with the PGR's location. Consistent communication among the supervisory team members was viewed as central to the development of a trusting supervisory relationship. Despite the range of relationships that they experienced in PGR supervision teams, participants' aims in doctoral supervision pointed to raising awareness of industry expectations and developing PGRs' professional skills. It is worth noting that the prominence of STEM perspectives in this section reflects the overall composition of the focus group cohort, with STEM participants representing 81% of the focus group cohort.

4.2.1 Context-dependent approach

Participants' discussions reflect the relationship-dependent nature of their approach to supervision. There are relationships centred around the PGR, underpinning participants' focus on a candidate-centred approach:

> "I let the student kind of dictate what relationship they want to have with me, and also what they would like from this industrial partnership. So I offer lots of different things, but I let them sort of dictate how formal or informal the discussions are going to be." (Participant 4, STEM)

Relationships between industry and academic supervisors appeared to be of equal significance. However, these relationships were identified as being influenced by the stage of development of working relationships with academics and the contracting universities:

> "It really depends on the individual, sometimes also actually depends a lot on the other academic supervisors." (Participant 7, STEM)

> "I would say it's mostly an organic approach from my side based on the fact that we have varying relationships with the different universities with which we work. Some main supervisors have been involved with us for 30 years and others are here for the first time, and they're with newer relationships." (Participant 6, STEM)

Some industries had previous working relationships and knowledge of different environments. As a result, the approach and 'roles' that participants fell into were organic:

> "We come from the same backgrounds — the whole supervisory team. That, of course, also makes it a bit easier coming in from industry, having worked in the same labs and everything. So yeah, but it flows very organically, and what role you take on in the supervisory team that everyone seems to have a sort of a specific

expertise, and we can utilise each other in that way." (Participant 19, MED)

Where the PGR is primarily located was perceived to impact participants' supervisory practice:

"[There are] different scenarios [of] internal students which are directly managed by employees here, and students are mostly based at their home university on which we have regular feedback, meetings and bimonthly..." (Participant 15, STEM)

"So very much how much [organisation] is contributing to the funding and where our role is. If we're a nominal kind of industry partner...is very much led from the academic side and may go and have face-to-face meetings a few times a year... if they're based here, then they have much more day-to-day contact with them as part of the [organisation's] funding." (Participant 11, STEM)

PGR project arrangements emerged as a factor affecting the candidate and industry supervisor relationship:

"So some are mainly based with us, some have to spend at least three months with us and some we basically never see ...often it depends on how it's been set up, the funding and so on..." (Participant 7, STEM)

The variation in supervising for different academic institutions was noted as a factor in participants' supervisory approach:

"...universities is the big variable in the mix because they're all slightly different, even before you get down to different supervisors, there's very slightly different approaches" (Participant 1, STEM)

"[It] tends to vary depending on the academics you're working with and the university you're working with [and] how they view you. I've got some very good relationships with different institutions, and I feel very much part of the team there, other times I felt held a little bit at arm's length" (Participant 42, STEM)

4.2.2 Maintenance of industry expectations

While relationships and contextual factors influenced participants' supervisory practice, contextualised industry expectations, organisational ways of working and research cultures also had an impact:

"...we like students to finish within the funded time or as soon as possible afterwards... So we set quite firm expectations quite early on." (Participant 10, STEM)

"It's a case of trying to ensure that the project doesn't deviate too greatly from the company's goals. We always understand that there is a need to produce something that's thesis-worthy at the end, but also to try and solve the problem we've set and get a return on investment..." (Participant 9, STEM)

"[It] tends to vary depending on the academics you're working with and the university you're working with [and] how they view you. I've got some very good relationships with different institutions, and I feel very much part of the team there, other times I felt held a little bit at arm's length" (Participant 42, STEM)

Participants also noted tensions and challenges associated with applied or practice-based versus academic research expectations. These were perceived to affect industry and academic supervisor guidance to candidates:

> "The biggest challenge we've had is when the academic supervisors decided that the direction of travel for the project is not necessarily in alignment with the requirements of our own. It's not the PGR themselves." (Participant 9, STEM)

> "[we] had issues where the work is not really useful and we understand also from the student point of view, it's not their fault. So we need to let them finish the paper, otherwise they will never graduate, but we don't really know how to navigate that." (Participant 3, STEM)

The quotations above suggest that participants' positioning in the supervisory team also shapes the extent to which they felt able to influence the project direction.

4.2.3 Developing PGR professional skills

Participants viewed broadening and expanding the PGR's industry experience as a key facet in their supervisory role. They translated this into their practice through supporting the development of professional skills, such as delivering industry presentations, as well as supporting PGRs' professional networking:

> "...the in-depth science says X, Y, and Z and the application of that to the industrial problem is A, B, and C...they need to do that translation in their head before they present [it] to an industrial audience, as opposed to a technical conference audience, for example." (Participant 2, STEM)

> "...trying to get the students to present to particular members within our team, within my company as well. So they actually meet more of the experts within the fields that they're working in..." (Participant 14, STEM)

Networking is a particular key skill that participants sought to include in their approach to PGR supervision:

> "Connectivity internally, but also connectivity to other researchers, to our clients and policymakers and others as well." (Participant 13, STEM)

> "One thing you provide is access to all of these other people that you could be speaking to, and it's your job to get them [PGRs] in front of as many people as you possibly can and that the student is comfortable with." (Participant 3, STEM)

Again, it is important to point out that findings in this section are informed predominantly by STEM perspectives.

"One thing you provide is access to all of these other people that you could be speaking to, and it's your job to get them [PGRs] in front of as many people as you possibly can and that the student is comfortable with." (Participant 3, STEM)

4.3 Reflection on supervisory practice

Drawing upon their experiences, participants reflected on what constitutes good and poor supervisory practices. These reflections moved beyond the provision of technical guidance and also emphasised the relational and developmental dimensions of supervisory practice that are essential to support PGRs' engagement and overall PGR experience. Again, the majority of participants being from STEM has led to a dominance of this disciplinary voice in this section.

4.3.1 Good supervision practice

Structured communication

Good supervisory practice was associated with regular and effective communication with the candidate and co-supervisors, towards building trust in the supervisory relationship:

> "I think there's also something about us being accessible. So, when it's one of the students or the supervisors that has contacted [me], then I do try to get back fairly promptly... I do try to make sure that student or the supervisor feels that we are there" (Participant 25, STEM)

Participants also linked effective communication to an open-minded attitude, which allowed them to be seen as approachable to PGRs, as well as encouraging a safe space for open discussion:

> "I think for a good supervision, being approachable, being seen as part of a team being open and having that scientific discussion, seen as being trusted by the student and by the academic group, and being able to demonstrate what that value is that we bring has been part of it, so that they can see why it's worthwhile, that we're part of their world." (Participant 22, STEM)

> "It really comes about being closer to them, actually being open — those open discussions where it is really a collaboration. At the end of the day, we all have something to gain and we are able to really have those very open discussions where we constructively challenge each other... that's really where I draw the line for [a] good supervisor." (Participant 20, STEM)

Consistency in communication practices was articulated as another dimension of effective communication:

> "I think being consistent with the student is important ...we have been setting the monthly supervisions, that we're in a pattern now about doing that and that she's [the PGR's] following through when she's committing to doing a piece of work and that we're following through with making sure that we go back with comments and feedback in advance of the supervision session... I think she feels that she's supported and she can rely on me and the academic lead supervisor... So, trying to keep consistency with her in terms of how we're engaging with her and communicating with her just helps to create more of a smoother process for her." (Participant 40, A&H)

Candidate-centred practice

Participants articulated that providing candidate-centred support was a key aspect of positive supervisory practice. This was described as going beyond immediate demands of the project and recognising PGRs as individuals with diverse circumstances and needs. Good practice in this respect was perceived to involve flexibility, proactive care, empowerment, and the valuing of wellbeing and personal development alongside research project progress:

> "Everybody is different, meaning also the students and they each need very different support, but also at different times of the PhD they will need different support. So... good supervision is trying to take that into account... Some will constantly need pushing, others you have to back off, others you need to reiterate deadlines, [and] others will do that themselves. So, kind of adapting ... and being flexible about it." (Participant 7, STEM)

> "...supporting the person, not just the research or the academic, but actually just sort of seeing and being aware of the person maybe relates to other mental health... So I think holding that in mind is a helpful thing to provide." (Participant 12, STEM)

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The quote below exemplifies the emotional intelligence and compassion articulated by multiple participants:

> "It's sometimes having to catch yourself and stop just giving them the answer, but try and provide suggestions of how they might go out and find their own answer and encourage them to take ownership of the project ...So, it's about sort of how do you sometimes have to stop yourself from saying 'that's not how I would do it', as opposed to 'could you do it this way', or 'could you do it that way' or 'just ignore me'." (Participant 17, A&H)

> "I think perhaps a useful word here is 'care' in all senses of that word. The PhD system... does have a strong personal engagement, which would be all sorts of different levels with different students." (Participant 10, STEM)

These responses have implications for the extent to which industry supervisors contribute to the development and support of PGRs' self-efficacy.

Facilitation of PGRs' transferable skills

With an emphasis on PGRs' holistic development, some participants also mentioned positive practices including supervisory support for transferable skills, such as digital training and industry presentations:

> "...in terms of those transferable skills, like in our world, everything's about digital at the moment. So we make sure that all our students get as much exposure to the digital landscape as they can, whether that be stats training or software training or whatever they need." (Participant 35, A&H)

> "Because ultimately this is about us saying 'right, okay, fantastic piece of work, it probably means the following, justify your arguments, but understanding as well that there'll be a very broad audience you might have to take that to, and to give them [the PGR] the understanding of how you pitch that to that broad group of individuals who may have different needs for the product that they're producing'." (Participant 39, STEM)

Normalising mistake-making

Some of the industry supervisors also highlighted the value of being supportive in their responses to PGRs' mistakes, to help PGRs understand the formative nature of their development; they recognised mistakes as a constructive part of the PGRs' development rather than failures:

> "...acknowledging the fact that things don't go right...sometimes people can get a bit demoralised if spending several weeks perhaps slogging away and perhaps not getting the results or data they were either expecting to or wanting to. But that's just part of research and acknowledging that." (Participant 11, STEM)

> "...normalising the fact that it's okay to fail, try to find the edges of failure. That's all great, and that can be, you know, quite at odds with how we tend to work here. So that tends to be good to work with the students in that way." (Participant 29, STEM)

4.3.2 Poor supervisory practice

In contrast, poor supervision practices were often framed in terms of the supervisor's absence or disengagement, and were largely described as the reverse of the positive practices outlined above. Participants associated these poor practices with a supervisor's lack of consistent engagement, openness, and candidate-centredness, as summarised below (Figure 1).

Poor supervisory practices identified by participants

- Being absent or passive in supervisory communication
- Overly hierarchical approach to supervision
- Micromanagement
- Rigid and reluctant stance toward the use of advanced techniques (particular to STEM subjects)

Figure 1 | Poor supervisory practices identified by participants

Notably, the identification of good and poor practice was often referred to participants' own experiences as PGRs: many drew comparisons with the practices they had found supportive, or unhelpful, during their doctorate. These experiences and reflections shaped participants' approach to supervisory and were closely linked to the skills they considered useful in the supervisory role:

> "When I think back to my PhD experience, it wasn't until my third year I began putting publications together, began thinking about my thesis, and it broke me when I got my first chapters back and they were covered in red and it was heartbreaking. So one thing I try and make sure we're doing with our students is normalising that feedback mechanism, making sure that it's not a personal attack." (Participant 29, STEM)

> "I finished my PhD not that long ago...and I definitely remember what was really good about the supervision that I received, but also what was sort of lacking. And if I see it may be different for every student, but if I see that something is lacking, I try to ask if they need any more support in any particular part of the project. Is it working with the academic supervisor, or is it technical, or do they just need listening and venting a bit? Just seeing what they may need because, again, a PhD can be quite a lonely process." (Participant 26, STEM)

Overall, these reflections highlight that effective supervisory practices are grounded beyond inputs of disciplinary and industry sector expertise but also in the supervisor's approach and attitudes to foster trust, support, and constructive engagement with PGRs.

4.4 Challenges encountered as part of the supervision team

Participants were asked to share challenges that they have experienced in their role as part of PGR supervisory teams. Key challenges centred around a misalignment between the academic and industrial perspective. Tensions could surface earlier in the journey of a doctoral project at the recruitment stage. In some cases, participants' ideas of the ideal candidate were different to the academic supervisory team. Many participants highlighted a perceived decline in PGR resilience over recent years, alongside their articulation of their challenges in knowing how to support PGRs linked to lack of knowledge of institutional support that is available and how PGRs can access it. Institutional logistics also presented challenges throughout doctoral projects, including Intellectual Property (IP), contracts, policy and other administrative issues, which were often seen as significant burdens and time-consuming.

Encompassing many of these challenges was the issue of recognition. Participants described limited formal recognition for their work and role in doctoral projects. As a result, supervision was often undertaken alongside participants' professional duties, with limited dedicated time, structure, or organisational support allocated to the supervisory role.

4.4.1 PGR recruitment process

The challenges experienced by participants during the PGR recruitment process centred on mismatched criteria around the candidate suitability. These misaligned ideas usually focused on an industry desire for different skill sets beyond a 'traditional' academic trajectory. While this was often resolved, this misalignment could pose potential challenges further into the doctoral project:

> "It's been quite interesting that when we go to actually mark the applications and mark the interviews, our scores do not align. So on the museum side, we mark higher certain candidates, and then the university marks higher other candidates...It tends to be, though, that once we go through the shortlisting and then the interviews, it starts to get...a bit more clear once we've kind of gone through the process about who our joint...preferred candidate has been... I think we've tried to be quite conscious on both sides...that we're trying to get a candidate that's...going to tick the boxes on both sides."
> (Participant 40, A&H, Museum)

> "...this issue of the choice of [the] student sometimes, because perhaps the academic supervisors...are looking for...standard documentary theoretical philosophical skills, whereas we're looking for a different set of skills... Sometimes that can...lead to...a bit of difficulty perhaps down the road when...whatever skills you haven't agreed on, how do you make those up so that both parties are happy with the work that's being produced?"
> (Participant 38, A&H, Museum)

Similar challenges to those in A&H are also seen in the STEM industry where different skills are desired and required in the industry setting:

> "In most cases, the academic supervisor has the final say on the students that get selected, and I'm not sure that's always worked in our favour, because actually, if you are going to work in, most of your PhD, for example, in an industrial setting, as other people have mentioned, the requirements are different."
> (Participant 29, STEM)

Others also described exclusion from the recruitment process linked to the contractual nature of the doctoral project being with the university:

> "So sometimes I've been involved in interviews, students, prospective students, but mostly not... I think that comes down to the student having a contractual relationship with the university rather than the sponsoring organisation."
> (Participant 42, STEM)

4.4.2 Supervisory team relationships

There are multiple areas where participants expressed challenges with their relationship with academic supervisory team members. These challenges include negotiating participants' supervisory role, approach in terms of timeframes and priorities of the research. Other relationship-focused challenges were around building relationships with academic teams and stepping into a PGR supervisory team due to staff changes.

Participants experienced challenges when they felt they were not recognised as equal partners within the supervisory team. For example, when there is limited communication between industry and academia or having to set the expectation of what their participation in the PGR supervisory team will look like:

> "I've found some [universities] have been very...keen to have my views input into and [arrange] regular meetings, and some

of them you just never hear from them until there's a problem, or...you initiate the conversation. So, there is also an element of having to push, from our side sometimes, to initiate regular meetings and catch-ups and find out what's going on... but there could be some element of feeding back to the academic community about expectations of involvement for industrial supervisors." (Participant 37, STEM)

"We will encounter situations where perhaps the university supervisor perhaps wasn't fully aware of...how we might want to work. And there can sometimes be some tensions there, but that type of sort of level of involvement... I attend every single monthly meeting...if that means we have to travel to do it, we travel to do it to ensure that we have that, that buy in... because it's then it's our own project. It helps us, I think, be more engaged in the project...hopefully the university supervisor understands where we're coming from..." (Participant 17, A&H)

Maintaining Industry expectations in project focus and timeline is an element of how participants approach their role in the supervisory team. When academic supervisors and universities behave in a way which feels in opposition to their belief in what the role is there are further challenges:

"...usually when we have an application we outline some objectives for, for example, BSc funding with the academic supervisors, and sometimes the projects can be quite challenging and it might be difficult to fulfil those objectives as we had envisioned. But we still want to do something that's of value to [company] or have an industrial value. So, aligning when you have to pivot and have different objectives, having those aligned to what we initially wanted to fund or we think it's valuable, that might be challenging as well." (Participant 28, STEM)

"The first one relates to the content, and obviously there are different expectations. Academia wants to do discovery and beautiful research, and they're interested in publishing papers, and industry wants to get results and value. By the nature of it, there is some form of tension, and communication is certainly the only way to overcome that tension, and as you grow the partnership, you're going to get a better understanding. And in some cases, it simply doesn't work out because the individual needs and interests are so far apart." (Participant 31, STEM)

While the participants described challenges of working in a supervisory team, there were examples of successful relationships and teamwork with supervisors that participants celebrated. These are described as relationships that grow over time which have developed into a strong and mutual understanding of each other's roles and expectations:

"The PhDs that work really effectively and give us real value: you have a supervisor on the academic side attached to really understand our world...[and] understand some of the unique challenges... Every industry has unique challenges and situations... but having someone who understands some of those challenges on the academic supervisory side is really helpful." (Participant 12, STEM)

"I do quite a lot of research with [academic supervisors], and [have] a long-standing relationship with [them]...we started to work together on kind of unfunded master's projects and kind of built it up from there... The other end of the spectrum...and you've got a supervisor you're working with the first time and, and that takes some time to build up that relationship and for them to kind of get where you're coming from and you to get where they're coming from." (Participant 42, STEM)

"The PhDs that work really effectively and give us real value: you have a supervisor on the academic side attached to really understand our world...[and] understand some of the unique challenges... Every industry has unique challenges and situations... but having someone who understands some of those challenges on the academic supervisory side is really helpful." (Participant 12, STEM)

Building new relationships with the PGR supervisory team which experienced a supervisor change was also described as a challenge. In these examples there was concern for the PGR and the challenge that they experienced with the change. Participants also have a desire to fulfil their role effectively by being fully aware of the project and its progress. The quotes below also reflect participants' approach and perceived good practice — having continuity in their relationship with PGRs, being present rather than absent and being candidate-centred:

> "So the PhD students that I started supervising...I was given their supervision at some point during their PhD...as a supervisor, it might be tricky to fully understand the project if you jump in midterms." (Participant 16, STEM)

> "I've got one that ended up with...a supervisory team that included about 11 people... people constantly coming in [with] no continuity whatsoever...and I ended up as the sort of continuity supervisor... I mean, it was kind of the worst situation you can possibly have. So that ended up with me...moving into the role of checking that their work was happening on a regular basis...to make sure that this wasn't going to completely fall apart through a lack of continuity, [and] also be able to kind of update them (new people came on to the team) on what was, what had happened and what was going to happen next... It worked out in the end, but that was a difficult one." (Participant 4, STEM)

4.4.3 Institutional logistics

The experience of mismatched expectations was also experienced at an institutional level:

> "...when we have started working with groups that have previously been running industrial collaborations for a long time, but not necessarily with us, they have had very deep wheel tracks in the way they kind of run things. And we don't necessarily want to follow in those wheel tracks exactly, and then there's been a bit of friction, maybe in establishing a way that works for both partners in running it...the way we would like to..." (Participant 6, STEM)

Other participants described institutional challenges, highlighting specific elements of the relationships. These include agreements and compliance with these around IP and publication, research on animals, which policy do PGRs adhere to, as well as financial and timeline issues:

> "And we did have one case in the past where there was a PI who had just sent something off to a publication without telling us or without acknowledging anything on there. So, we did have our academic liaison department have a conversation with them and a reminder of what was in the contract and the fact that this could not be repeated, otherwise you're in breach... I completely understand when you've got something that's a really

hot topic, you want to be able to go ahead and get it out there...we want to try and support that. But unfortunately, we also have clauses that have to go in again from our legal point of view." (Participant 23, STEM)

"...the publication aspect...that's a real challenge with these kind of industrial PhDs...there's a bit of a conflict of interest... academics want to publish as much as possible, and we, on the side of caution, we want to get IP protection in certain areas before releasing that out." (Participant 42, STEM)

These challenges also pointed to issues around time and bureaucracy. Participants highlighted the length of time that processes take, as well as PGRs' and academics' approaches to participants and industry constraints, especially around publication:

"Certainly about IP just takes forever. It's really frustrating, even though we have a standard contract that they agree to before we fund the work." (Participant 2, STEM)

"We have a strict approval system for anything that is going to go out into the public domain, which has to be approved by several levels of hierarchy, which can take time, obviously, whereas an academic group will maybe just decide themselves that they can release a poster the next day, and they're much more flexible...we've had requests for abstracts for conferences like 'Can you approve this by tomorrow?'...which obviously is never going to happen. So, there's that kind of lack of understanding of the different needs of the industrial setting." (Participant 37, STEM)

Changes to certain Intellectual Property (IP) policy and procedure were also a challenge, which created friction and could take a long time to be resolved:

"...in the middle of projects, one specific university became a bit overzealous about the export control laws or rules and decided that they couldn't tell us about the results and we had the funding of the students already paid. We had sent material, we had created a lot of projects around [it] for close to a year. They refused to tell us the results because of export control rules, and they changed their interpretation of the text. So that was a big issue for us..." (Participant 3, STEM)

Participants also highlighted how university systems and policy knowledge was not known by others in the PGR supervisory team:

"I consider a large amount of my time is spent actually fighting with university administration because our university partners simply don't even understand how the funding works from the research councils, what the terms and conditions are... the number of times I've had to explain to universities that PhD students with this funding are allowed maternity leave or allowed sickness leave. So, that's a big part of what we do, which I don't think any of us expected we'd have to do." (Participant 17, A&H)

Similar to the above, institutional logistics around funding were a challenge.

"...the publication aspect... that's a real challenge with these kind of industrial PhDs... there's a bit of a conflict of interest...academics want to publish as much as possible, and we, on the side of caution, we want to get IP protection in certain areas before releasing that out." (Participant 42, STEM)

Some participants described how their industries have made adaptations to studentship processes for PGRs to be financially supported:

> "...from a financial standpoint...the student stipend stops just at the point of write up, and typically we would do secondments... and we've got a tricky situation where we're having to look at part-time contracts to enable that person to just have a quality of life while they're doing the write-up at net financial income ultimately. So it's more [than] just a real logistical challenge, I think from a wellbeing perspective for those students." (Participant 13, STEM)

> "We had a particular challenge during the cost of living crisis...the stipend rates were clearly well below inflation when inflation was 10%...unless we did something, our students would have suffered tremendous hardship, kind of quite abruptly, and that was kind of an existential thing we had to get to on top on and find some extra money and find...an approach to do that, a consistent and a fair approach." (Participant 1, STEM)

4.4.4 PGR wellbeing

Many participants articulated the COVID-19 pandemic as a turning point, where post-COVID-19 PGRs had lower resilience to persevere through the doctoral journey. The decrease in PGR resilience has impacts on their progression and completion of the project:

> "I have absolutely noticed that the number of students we've had dropping out or asking for significant extensions to their projects since COVID has dramatically increased, and I think that's probably been our biggest challenge in the last few years." (Participant 2, STEM)

> "I think resilience is something which we've noticed has got, like others sitting around, we think many of the younger students are less resilient than they were before... one of the things I think we find from our experience is it's us, as the non-academic supervisors, who seem to worry the most about resilience and care and support, we can often be the ones...who seem to spend much of our time doing a lot of this" (Participant 17, A&H)

The quote below details how participants are developing systems and extra support which is needed beyond the academic institution to support their PGRs as best they can:

> "We're seeing a little bit more of a challenge around mental health of the PGR. The lot of them are finding it quite hard, and we've put in a scheme of allowing them access to benefits our own staff have... they're not really actual staff members that gives them access to out-of-hours GP and mental health counselling, financial counselling and bits and pieces like that, which we seem to think is helping." (Participant 9, STEM)

4.4.5 Limited recognition

Multiple participants described limited formal recognition that they received for their role in PGR supervisory teams:

> "I don't get any formal recognition as such." (Participant 7, STEM)

> "So there's no real kind of formal recognition I would say for affiliation with academics..." (Participant 43, STEM)

Some participants articulated that their supervisory role was not formally recognised or rewarded by their organisations:

> "I've always been told it's career-enabling, but I haven't got any direct proof of that." (Participant 8, STEM)

> "I've been in the academic space and I know...writing your CV... [about] supervised X number of PhD students through to completion. But from an industrial perspective, no, that wouldn't be a metric that would be seen as counting towards promotion." (Participant 5, STEM)

Rather, being part of a PGR supervisory team is regarded as an expectation in industry and considered part of some participants' workload. Although on reflection, this participant felt that the wider value for supporting PGRs has changed:

> "But times have changed and are changing, so it's gone for me from something I kind of fitted in with my job and I had to spend a lot of time justifying... I'm encouraged to go and get them [research projects] — they're viewed as part of my workload..." (Participant 42, STEM)

> "...there's an expectation that it's part of their role that they'll sit on a supervisory group for at least one PhD. And then the same for me in my role. So no, we don't get explicitly recognised for it, but it is sort of part of the job." (Participant 12, STEM)

Some participants detailed that they discussed their PGR supervisory team role as part of formal performance reviews. Participants also described how participation in doctoral research projects support industry with its Independent Research Organisation (IRO) status and supporting industry culture, further highlighting PGR supervisory team participation as part of their regular workload:

> "it's on my...job plan... it contributes to...our IRO status." (Participant 34, A&H)

> "...part of our annual performance review is that we have to demonstrate certain values and how we are taking action to live those values and demonstrate those values...within our day to day jobs. And certainly there's a lot of things that you do as an industry supervisor that can help you demonstrate some of those values." (Participant 2, STEM)

Notably, participants did not equate limited formal recognition with a lack of value in the supervisory role. Multiple participants considered their supervisory role as highly rewarding and often experienced it as an opportunity for two-way learning:

> "I find that really rewarding, but I also find it's like a two-way learning as well, because I'm getting access to these very experienced academic supervisors that I haven't had since I did my own PhD. And it's quite nice to bring that very different perspective on the source material that somebody's using, but it does feel like it's sort of a facilitation role for them working in a very different area that they're not used to working in as well, which is very useful for me as well, because it just sort of helps you reflect on your practice." (Participant 35, A&H)

> "...a way to actually make an impact on some young talents' lives...on some innovative research. It's really the people that are rewarding you for what you're doing, working with colleagues, working with collaborators... Only the ones with dedicated people are going to work out, and that's what I think brings the joy and the reward in the university in this industry partnership." (Participant 31, STEM)

Some participants described informal forms of recognition that they experienced as a result of PGR supervisory team participation. This included becoming a leader for partnerships and opportunities, viability of the programme and networking opportunities along with academic publication. Those with supervisory experience may be able to access other future opportunities which require similar skill sets and being a point person between industry and academia:

> "I guess the recognition is that with the experience comes more opportunity in that same area. So... I'd say a little bit more work now is going external with external partners, whether that be kind of academic institutions or elsewhere in industry. And having that experience of supervision does kind of put you at the forefront of being suggested to get involved with these things." (Participant 43, STEM)

"...a way to actually make an impact on some young talents' lives...on some innovative research. It's really the people that are rewarding you for what you're doing, working with colleagues, working with collaborators... Only the ones with dedicated people are going to work out, and that's what I think brings the joy and the reward in the university in this industry partnership." (Participant 31, STEM)

Participants' commitment to supporting networking opportunities for PGRs was also felt to raise their own profiles, and the visibility of the studentship programme:

> "[I] organise for the postgrads to present at our internal seminars. So in that sense, by doing that, it raises their visibility, but also raises the visibility of the programme that we are running. So, I'm not looking to steal their glory, but it makes it valuable all around for the organisation and for me to have their work more widely spread [and] more widely acknowledged." (Participant 39, STEM)

> "Maybe the only recognition that I've got is... let's say we've got six students when they come to site and maybe do a little mini conference, and it's the first time that a lot of people [in the organisation] will be engaging, and it's the first time you put it at the forefront of their minds... There's nothing beyond kind of a pat on the back for getting people involved. But...it is nice for the students and for us that it does kind of increase that interest in what they're doing." (Participant 43, STEM)

Similarly, recognition and acknowledgement of industry partnerships at conferences with academia being celebrated leads to positive motivation:

> "I would say that probably some of the most valuable recognition is actually coming from the academics themselves: the academic institutions praising the initiatives that we put in place with the industry supervisors and with the annual conferences and that sort of thing. The fact that they're feeding back to us 'this is really valuable, and it definitely makes the students have a better experience than comparable PhD students who don't have industrial sponsorship and industrial supervision'. I think that reinforcement gives us motivation to continue doing it." (Participant 2, STEM)

Others stated that other sources of informal recognition came from participating in academic publications:

> "...does it go without saying this? Like when things get published, we're included in the publication and that's...valuable for us as applied practitioners that we don't get a lot of exposure to publication and things, but obviously we've contributed to it. So, in that sense, we're recognised in that way when things are published." (Participant 12, STEM)

> "...publishing does buy you a little bit of kudos" (Participant 8, STEM)

Despite this acceptance of limited recognition, there was a general frustration about the limited time for the supervisory commitment, leading to the role being seen as beyond regular work and an out-of-hours activity. Participants' struggles with time are often connected to lack of awareness as to the time needed for meaningful participation in supervision:

> "[Supervising] the PhD student not being part of our core role and therefore not always valued within our organisations in terms of the amount of time and commitment that it takes to supervise, and therefore sometimes feels like more work than it's worth. But that's just kind of an internal problem for us..." (Participant 37, STEM)

> "I think I feel like I would get recognised by the research manager and my line manager and the people I work with in my team, that I'm supervising students maybe less recognised, organisation-wide...about what that actually entails in terms of the time it would take me or what my role is within it." (Participant 40, A&H)

It was widely recognised that there was not enough time allocated or given to participants' participation on PGR supervisory teams:

> "...the organisation does not give me sufficient time within my day-to-day job to undertake supervision in the way that I would want to do it...I want to do the best that I can for the students and...for the project and the research that comes out of it." (Participant 34, A&H)

> "I'd say the amount of work that is involved in the supervision of internal or external PhD students is usually underestimated." (Participant 15, STEM)

Only two A&H participants across the cohort reported that there are estimated time models for their supervisory role in their workload:

> "I think it was sort of maybe 10%, 15% of your time...would be going towards a student if you were doing a first supervisor role." (Participant 40, A&H)

> "We reckon it takes 4 to 5% of a full-time member of staff's time for a full-time student...I would be worried if my colleagues were spending more than 20 or 25% of their time delivering projects amongst them, that's how we think about it in terms of commitments." (Participant 17, A&H)

Again, the candidate-centred practice and approach to their PGR supervisory team role highlights the positive impacts that may come as a result of greater recognition and time given to these roles, which as a whole benefit companies:

> "We'd all like more time...we're [a] very budget-driven organisation, so there will be a certain allocation of time... I sometimes feel as though they are probably going above and beyond what's required, so I talk about this as a challenge for probably every organisation. When we talk about on-site visits for students, their time is supposed to include getting to the student, and that can be a challenge if [it's a long way]... My view is that...we would probably get more out of the programmes and the postgrads if we had a bit more time for doing this." (Participant 39, STEM)

"...the organisation does not give me sufficient time within my day-to-day job to undertake supervision in the way that I would want to do it...I want to do the best that I can for the students and...for the project and the research that comes out of it." (Participant 34, A&H)

4.5 Experience and skills for the supervisory role

Participants highlighted a range of skills that they used in their role as part of PGR supervisory teams. Many had their own experience of completing a doctorate degree, which they considered as a key source of the skills and insights informing their supervisory practice. Participants also highlighted skills other than completing a doctorate degree, especially within the A&H sector. Skills developed through training and experience in industry roles, around management and leadership were also used by participants in their supervisory role. Interdisciplinary perspectives and museum specific skills were also highlighted.

4.5.1 Participants' own doctorate experience and skills

Participants shared that having completed a doctorate degree themselves, they were able to provide advice rooted in knowledge of the process, also using this as a tool to encourage the PGR in times of difficulty:

> "I think it's hugely beneficial to have done a PhD on your own... I felt like I could step into this with...a decent amount of confidence anyway...because I've been in the shoes of the student in this case...in terms of skills, I think that's really something that I feel helps me a lot" (Participant 6, STEM)

> "...knowing that [the doctoral journey] from my own experience helps say, 'look, you know, you just have to get through this basically'" (Participant 7, STEM)

Appreciation of the doctorate experience, especially in relation to participants' own experience of supervision, enabled participants to build relationships and develop their own supervisory role and approach with PGRs:

> "What did I need at the time and what would I have liked the academic supervisors to do?... Reflecting back on that has helped in kind of developing my role as an industrial supervisor." (Participant 43, STEM)

> "...I still remember my experience, and I definitely remember what was really good about the supervision that I received, but also what was lacking...If I see that something is lacking, I try to ask if they need any more support in any particular part of the project." (Participant 26, STEM)

"I think it's hugely beneficial to have done a PhD on your own... I felt like I could step into this with...a decent amount of confidence anyway...because I've been in the shoes of the student in this case...in terms of skills, I think that's really something that I feel helps me a lot" (Participant 6, STEM)

The quote below also highlights the complexity that participants experience in their PGR supervisory team role in their 'weird relationship':

> "I think probably the most important skill that I've had is actually doing a PhD myself... because I think it's very difficult to describe that from the outside, how involved you get and how also this weird relationship...it all depends on your supervisor or that's definitely my experience of doing PhD." (Participant 7, STEM)

Some participants from the A&H sector reflected that, while not all industry supervisors held a doctorate, they did not view this as a barrier to meaningful participation in doctoral supervision.

Instead, they emphasised the distinctive skills and perspectives that industry supervisors contribute to collaborative doctoral projects:

> "...some of us don't have a PhD ourselves. So we were thinking about where we fit within this... We do have skills and capabilities to bring to the fore... There are other skills that you'll be bringing to this that will be of benefit to the student as part of it. And that's...the beauty of collaborative PhDs... they're getting aspects of two different worlds..." (Participant 40, A&H)

Detailing a CPD experience, this participant clearly shares the value that a supervisor without a doctorate degree can also bring to the PGR supervisory team:

> "...we do some sessions in the applying for funding rounds as well, where it's much more open, it's much more 'are you interested in supervising a PhD?', and I think those sessions have been really useful, especially for getting across to some of our staff who aren't in curatorial fields, or who don't have a PhD, that they could also be a really valuable supervisor for a PhD project." (Participant 35, A&H)

"...some of us don't have a PhD ourselves. So we were thinking about where we fit within this... We do have skills and capabilities to bring to the fore... There are other skills that you'll be bringing to this that will be of benefit to the student as part of it. And that's...the beauty of collaborative PhDs... they're getting aspects of two different worlds..." (Participant 40, A&H)

4.5.2 Communication skills from experience

Communication was a significant skill that participants described as central to what they bring to the PGR supervisory team, especially linked to communication of science. The use of these skills allows participants to fulfil their belief as to what their role is:

> "I think the main thing that I've learned as a scientist is to talk about my work and being able to communicate it to other people. And I think that's really important when you're dealing with a student who's coming to a new project, perhaps not knowing an awful lot about it and being able to...work with them, mentor them, and explain the relevance of what they're hoping to achieve" (Participant 8, STEM)

> "I think having been in an industrial setting and understanding things like press releases, social media...when you can talk about your science and how much of it you might want to talk about... Those sorts of communication skills I think are certainly I've learned since I've been here, and I think being able to take those into that supervision and help...with communicating difficult concepts and detailed complicated science in a less complicated way." (Participant 22, STEM)

Participants described having developed these communication skills through their professional roles — skills that were often not previously part of their doctorate experiences:

> "...if I compare, what would I take to supervision now compared to when I did my PhD is a different means of communication. So different means of communication of science. So I think when I did mine, [I did] posters at conferences, [...] publications — that was it." (Participant 22, STEM)

4.5.3 Project management skills

Participants mentioned management courses which they have completed as part of their professional roles that offered transferable skills to their supervision:

> "We have line manager training, which you can take those learnings across." (Participant 27, STEM)

> "There is a focus on management courses, some of which can be kind of transferred across..." (Participant 32, STEM)

Similarly, experience of managing projects was seen as a skill, also used in participants' PGR supervisory team role:

> "If someone has had on-the-job experience of having accountability for a stream of technical work that they themselves are planning and doing practically. I think that's a good skill to have learned." (Participant 1, STEM)

Skills for collaboration with other partners were also used by participants in their PGR supervisory team roles. These skills allowed them to be able to navigate academic collaboration relationships which often have challenging structures and limitations:

> "I think working, understanding a university through...collaboration...I think that's a good skill that helps them in their supervision...And I think the...collaborative projects generally, whether they're with a university or not, and particularly if they kind of come with sort of weird, arcane, highly specific constraints, which might be to do with duration or to do with governance or some other thing like that, because that's fundamentally what being an industrial supervisor on a project with the University of la la is..." (Participant 1, STEM)

4.5.4 Leadership skills

Leadership skills training was also highlighted by participants as useful for their supervisory roles. These skills encompassed mentoring and support for PGR wellbeing. They also related strongly to participants' beliefs and actions of good practice focused on candidate-centred care:

> "We've been given some really good courses...since I've been here in terms of leadership skills training, but also mentor training. So all of those have been really helpful for when I'm engaging the student." (Participant 40, A&H)

> "We were having a lot of mental health and wellbeing [-related development] organised by the organisation...teaching people how to practise mindfulness and things like that... I learnt a lot from those, and I've passed a lot of that on to the PhD students, especially when they reported feeling stressed and overwhelmed by things" (Participant 2, STEM)

> "...some of the things I found useful in training I've done in-house is learning about the different personality types and looking for those visual and audio clues as to how they learn, how they communicate, so you can have those proper, informed discussions." (Participant 9, STEM)

4.5.5 Interdisciplinary perspective

Participants linked their understanding of the PGR supervisory team role, looking beyond scientific content, to broader application and understanding interdisciplinary teamwork and approaches as skills that they also bring to the role:

> "...in terms of supervising PhD students, it's about encouraging them to think in that industrial context, not always in the scientific context in which they're working in their academic environment" (Participant 2, STEM)

> "Because we work in an industry, in a multidisciplinary environment, we would have a look at a problem with very different angles coming from very different disciplines." (Participant 32, STEM)

Beyond offering alternative insights, participants also used their research skills and knowledge of the landscape to be able to support PGRs' access and comprehensively explore datasets, equipment and tools:

> "So there are big sets of material...how do you delve into those? How can you extract data, whether it's quantitative or qualitative? And that's the kind of bread and butter of my own research background. This is highly interdisciplinary, and that is quite a distinctive contribution that is relatively rare." (Participant 10, STEM)

4.5.6 Museum-specific skills

Participants in the A&H sector have specific skills that they use in the PGR supervisory team role. These skills were used to benefit PGRs beyond the doctoral project, but into their future professional careers:

> "...I find that just sharing those museum skills has been really useful...reflecting on my own experience, but making sure that we provide training that may not be directly useful to the PhD, but we are thinking about employability in the future..." (Participant 35, A&H)

> "...the academic supervisor may not have done that kind of research before. So, it's my responsibility to be teaching the student...how to read objects and how to incorporate the evidence they provide with the kind of evidence they're using in academia." (Participant 38, A&H)

> "It's sort of the study of museums...so it's more sort of the practical skills that I can open the student up to during the four years that maybe they wouldn't get in an academic sphere." (Participant 40, A&H)

The above skills and experiences mentioned by participants are directly linked to how they understood their supervisory role and how they approached it. Their candidate-centred practices and approach to PGR relationship is underpinned by leadership and mentoring skills as well as being highly influenced by participants' own doctorate experience and journey. Participants' use of interdisciplinary skills echoes their understanding that PGR supervisory team role is to broaden the scope and potential impact of doctoral projects.

4.6 Experiences of supervision CPD

Participants drew on a range of skills and professional experiences in their contribution to doctoral supervision. However, opportunities for supervision-specific CPD were reported to be limited. Participants offered insight into some supervision specific documents and online CPD that they accessed. This was usually focused on processes and procedure at institutions and organisations, rather than form and content of supervision meetings. Where there were development opportunities, they were usually linked to specific funding and partnerships, which was perceived not fully reaching participant needs. CPD that participants reflected positively on were often linked to forms of Communities of Practice (CoP). Participants also detailed that they were often learning on the job and from observing others.

4.6.1 Limited opportunities for supervision-specific CPD

Participants were asked if they had any specific CPD experiences for their role in the PGR supervisory team. The overwhelming response from participants was that they had not had any supervision-specific development for the role:

> "I have never taken part in any CPD or training related to supervision." (Participant 36, A&H)

"In terms of...requirement for industrial supervision, no formal CPD required." (Participant 5, STEM)

"Unfortunately, we do not have formal training at all." (Participant 20, STEM)

Basic handbooks and guides were referenced by some participants, and the content often seemed to be focused on elements related to policy and procedure around contracts and organisational logistics:

"We don't have any...formal training... specifically for supervising. I think that there's some sort of video or online course we have to do, but that's more to do with...recruiting the student sort of thing." (Participant 30, STEM)

"We have got a handbook as well...how do you raise the contract through our system... how to set up a studentship, how often you should be meeting ...we also request that all supervisors do Unbiased Conscious training if they're going to be interviewing students..." (Participant 27, STEM)

One participant suggested that the handbook from their organisation was most helpful to those who did not have experience of doing a doctorate themselves:

"I think the handbook is especially useful for those guys [supervisors with no doctorate experience], because they won't have had that experience that many of us have had of doing the PhD themselves and knowing what it's like to be a student and hopefully having had a good industrial supervisor themselves as well during that process." (Participant 2, STEM)

For participants working in smaller organisations, particularly those with limited internal capacity or infrastructure to support doctoral supervision, access to basic or generic development opportunities was considered insufficient:

"I think the lack of some kind of generic or fairly generic training on the non-academic side of supervision for collaborative doctoral projects specifically...is kind of off-putting for smaller organisations... we're a tiny service, three permanent staff, and you know, we don't have 33 doctoral students. We don't have that kind of support [offered by larger organisations]..." (Participant 36, A&H)

4.6.2 CPD through partnership and institutions

Some participants detailed CPD linked to funders and partnerships that the doctoral projects were linked to:

"It was a couple of hours, two-hours' course as part of a doctoral training centre that I'm involved with. So, that was mainly around supporting students, dealing with personal as well as...professional problems. It's a bit of a workshop." (Participant 8, STEM)

"...just in terms of the universities, sometimes there's a policy to read, but internally we did have to carry out...or attend a training course for the [institution]. So if we were to...be a supervisor if anything was going to be awarded through [institution], then there was a course that we had to do." (Participant 11, STEM)

"...before we started in our roles as supervisors last year, we got training... through the partnership. So, we went to London for a couple of days and did...a two-day training session for supervisors... [for] supervisors who would be on the museum side...to prepare us for scenarios that might come up or, you know, what skills do you think that you will need to become to be a supervisor, what challenges you might face and things like that." (Participant 40, A&H)

Other participants suggested that the content of CPD sessions they attended did not fully meet their desires to learn more about supervision. Rather, there was a focus on PGRs' benefit of the partnership and institutional logistics and policy, such as IP agreements:

> "Although we do have lots of collaborative PhD students...the Arts and Humanities Research Council, who provide the funding for most of the, I think all of the CPD that we do have done some very general sessions, which I've gone to in the past, but they seem to be actually more directed towards how this benefited the students." (Participant 38, A&H)

> "So several years ago, our first PhD student, we had a one day thing at the [institution], which was actually quite helpful. But to be quite honest, it was mainly about, well, protecting yourself from anything and IP and things like that. It wasn't hugely about how to support students, but that's all I've had." (Participant 7, STEM)

4.6.3 Other supervision-specific CPD

A participant from the A&H detailed how a number of colleagues worked together to advocate for relevant CPD, which reflects the significance of relevant CPD that reaches participants' desired capabilities:

> "...there's about 20 or 30 cultural organisations...all recognised that we needed to provide more training... What we've done is we've reached out to the UK Council for Graduate Education. They have created a bespoke two-day course to introduce supervision for non-academic supervisors, which I did as a trial on the last day of my last student completing. And had I done this 5 or 10 years ago, 15 years ago, it would have completely transformed my approach to supervision." (Participant 17, A&H)

Forms of Communities of Practice were also considered as CPD opportunities which were insightful and encouraging to participants:

> "We have brought in some of our academic partners to talk about...their perspective in terms of the academic rigour and what they expect from the academics...I think that was really useful to have a person stand up and talk about 'We, the university, do the following things, your role in terms of being complementary to us is as follows'... 'yes, we'll provide you with a very strong academic base from the university perspective, but what we'd like you to do is provide these things that we can't provide'. And it was great to hear from somebody who's a senior academic, but with lots of first-hand experience, that statement being made." (Participant 39, STEM)

> "... quarterly we run 12-hour CPD every year for the industry and academic supervisors to meet and exchange and talk about all sorts of areas." (Participant 24, MED)

"Although we do have lots of collaborative PhD students... the Arts and Humanities Research Council, who provide the funding for most of the, I think all of the CPD that we do have done some very general sessions, which I've gone to in the past, but they seem to be actually more directed towards how this benefited the students." (Participant 38, A&H)

These examples bring both academic and industry supervisors together, supporting shared understanding of their roles and how they work together. These experiences also relate to key challenges raised by participants in navigation of their supervisory role. The importance of a shared understanding of each supervisor's role, value, and input has vital significance in participants' supervision experience and when misalignment was highlighted as a major challenge that they encountered.

4.6.4 Skills from observing others and learning on the job

Experience and skill development from practical experience as well as observation of other supervisors were also highlighted by participants:

> "...watching my academic colleagues supervise is like a masterclass...these are brilliant teachers as well as brilliant academics...seeing them engage with students, and how they adjust to the student during the course of the supervision...We all know that we learn a huge amount from the process of supervising a PhD. The supervisors learn a lot and that includes teaching style. I would say I've learnt a lot." (Participant 10, STEM)

> "...being more thoughtful in watching how others are supervising and learning from them." (Participant 16, STEM)

Participants also detailed their experience of 'learning on the job':

> "So, learning on the job. I haven't got a PhD either, so I haven't done it myself, so I don't know what it's like." (Participant 12, STEM)

> "...don't think I've done an awful lot of... formal taught professional development, but I think a few of us said being a supervisor...gives you an awful lot of insight, both the technical side, but also kind of the personal side of how to manage people and stuff." (Participant 8, STEM)

Similarly, a participant highlights a lack of training, but the support that is available from others. The value of Communities of Practice will be further highlighted in the following section alongside participants' expectation of having more experience of these communities. This demonstrates that valuable CPD can be found in relationships with others:

> "I can only echo what's been said. I'm sure that there is internal training for skill sets that help you as a supervisor, but for the supervision itself, it's somehow being taught to swim by being thrown off the pier in that sense. But...the support is always there. But there is nothing...official existing for training in that area [of supervision]." (Participant 6, STEM)

"...watching my academic colleagues supervise is like a masterclass...these are brilliant teachers as well as brilliant academics...seeing them engage with students, and how they adjust to the student during the course of the supervision...We all know that we learn a huge amount from the process of supervising a PhD. The supervisors learn a lot and that includes teaching style. I would say I've learnt a lot." (Participant 10, STEM)

4.6.5 Communities of Practice (CoP)

Most participants reported experience of peer-support activities or relevant experience during their supervisory role. For some, these took the form of both structured initiatives and informal exchanges with colleagues, while for others, there were no formalised peer-sharing structures available. Although the form and focus varied, participants' feedback on these activities was consistently positive, with these experiences viewed as valuable for shared learning, peer support, and exchange of ideas on supervisory practice and development.

Figure 2 summarises the forms (indicated by blue rectangles) and perceived functions (indicated by yellow rectangles) reported by participants.



Figure 2 | Communities of Practice forms and functions

Reported peer sharing and support activities took place in the form of formalised supervisory meetings or peer discussion sessions. Such sessions were often facilitated by an appointed industry colleague whose role was to provide support for doctoral projects and research:

> "We do quarterly research meetings in-house, so sometimes she [the research manager] will ask us to present those to sort of talk through how the projects are progressing so we can chat amongst ourselves." (Participant 40, A&H)

> "We tend to have two people from our team on our PhD, so I'll sit in on them to provide the team's broader application perspective. We have a team of experts that sit in our team and the expert panel, and each of them sit on a PhD supervisory group. So, the two of us will sit in on them together. The discussions I have with the expert panel members about their reflections on the supervision and how the project's going are really helpful." (Participant 12, STEM)

Participants also mentioned the existence of wider professional networks that supported peer sharing, such as cross-institutional groups based on online platforms for communication:

> "We're part of the [Museum] group...[there] tend to be lots of messages that will ping backwards and forwards in curatorial sort of chat threads, but often anonymised, but with people saying 'Has anyone come across this particular problem or this particular issue' ... We also have a research and public history team, who tend to be a sort of hub for bouncing ideas off across the group." (Participant 21, A&H)

Regular in-person or online drop-in sessions for supervisors were seen as the space for the exchange of experience and ideas between peers:

> "We have monthly drop-in sessions with all the supervisors. It's an open invite...a chance to just look at who's seeing what, whether there are any common themes, anything you need to pick up on if the students are embedded, obviously, in the organisation, it's a bit more informal than that because we see each other around the office, but because we're a multi-site organisation, the monthlies are a chance for that programme, just to compare notes." (Participant 39, STEM)

Participants also mentioned informal and ad hoc catch-ups with colleagues for peer communication and support:

> "...just sort of more on an ad hoc basis, you know, checking in with staff who are going through the same thing, maybe a bit more informally...and just sort of chatting through if we have any issues together about are we encountering similar things or maybe different things depending on the student or the university that's we're partnered with for each project. So, there's quite a few opportunities in-house to talk about it or to go to somebody if you're experiencing a particular issue." (Participant 40, A&H)

> "It's a little bit more informal, but we would both be sort of experts, or we would have a scientific interest in the project that's being discussed. Therefore, if anything's cropped up, there is the opportunity when the minutes go out and we're doing actions to think about who's the most appropriate person to do the actions, what the actions for the meetings are, and just a catch up outside...informally, but not structured." (Participant 25, STEM)

These peer sharing and supporting mechanisms were largely described to be situated in a problem-based context, where supervisors could raise questions or challenges for peer discussion or advice with careful attention to maintaining PGRs' privacy and confidentiality:

> "We do hold quarterly informal drop-ins as well, where they can come and report any problems they're having or ask questions about how to do something to each other as well as to me. We do often discuss specific cases in those instances. But again, being careful not to bypass any data privacy agreements and restrictions." (Participant 2, STEM)

> "I will run a monthly meeting where people can drop in and sort of raise anything that they're coming up with. That's an issue which can be any aspect of supervision. We also have a monthly meeting as part of the alliances and collaboration team that people can drop into if they've got any questions or want to raise anything." (Participant 23, STEM)

Some participants considered peer sharing spaces as important for building connections and emotional support. These forums helped mitigate the sense of isolation that could come with supervisory work and provided reassurance when navigating difficult situations:

> "It's very useful because otherwise it can be quite isolating sometimes being a supervisor within an organisation where not everyone is a supervisor. A lot of colleagues don't really quite understand

what's going on if they're not actively involved in supervision."
(Participant 21, A&H)

"...mainly for my own sanity, and it's basically only for those that are not going well. Those that go well, all I can say is 'she's amazing, she just does it all'...but when things become difficult, then it's basically for your own sanity, and also to see if anybody else had experience navigating these challenging things."
(Participant 7, STEM)

"A colleague of mine has encountered a few other different issues. So, being able to kind of chat to me about what she's encountering, then that's good for me to have an awareness of when I continue into this PhD and the next one that's coming up in September. So, it's been really beneficial to feel that you could chat amongst yourselves and just to get an idea of the things that can crop up."
(Participant 39, STEM)

**"I think all of the CPD that we do have done some very general sessions...but they seem to be actually more directed towards how this benefited the students. There'd be examples of students with prior students who would give examples of how it benefited them. I think as especially starting out as a supervisor, it would have been great to have a bit more support on what was expected of us."
(Participant 38, A&H)**

4.7 Expectations of CPD

Participants' expectations of CPD were often grounded in the value they had found in previous experience, skills, and training, including project management, communication skills, and peer-sharing experiences, but with interest in seeing existing forms of training tailored to the context of doctoral supervision. Such suggested initiatives were considered directly beneficial to their supervisory practice:

"The most relevant and interesting piece of CPD that I think fits the bill here is really sort of jumping into Gen AI...it's got its quirks, like it can hallucinate — you can ask it a very specific question and it would sort of know. But specifically, we've got a tool which does a formal literature review just by Gen AI and pulls loads and loads of papers. So, I think that will be a very accelerated way to help us in this role going forward." (Participant 5, STEM)

"I find that it was useful to go through [the leadership programme]...as part of that training. It was also people within the group sharing their own experiences of issues that they've encountered and how they went about and dealing with them... depending on the situation, but also on the individuals and who they manage and what they have to encounter... I think it would be more of a challenge for staff who are undertaking a supervisory role, and maybe they haven't managed staff before, it might be harder to embark on this without other training. So, it would be useful to have those types of courses available." (Participant 40, A&H)

There was also an expression of expectation that relevant development opportunities should have an explicit focus on supervisors:

"I think all of the CPD that we do have done some very general sessions...but they seem to be actually more directed towards how this benefited the students.

> There'd be examples of students with prior students who would give examples of how it benefited them. I think as especially starting out as a supervisor, it would have been great to have a bit more support on what was expected of us." (Participant 38, A&H)

An example of PGR-supervisor collective development raised by a participant suggested that, while such initiatives were valuable in principle, it is important to be clear with the intended audience and benefits that supervisors can gain from participation:

> "There's a postgraduate institute at my institution where they tried to run a [one-] day training course for students and supervisors together, where you'd both collectively learn something [about] progress for the relationship together. The idea is you do that at the start of your PhD, and it would teach the student how to communicate and how to do a PhD with a supervisor, and then how the supervisors respond. The problem is that no one responded from the staff side, with the exception of myself. So I turned up and they'd changed the schedule because it was just all students and no staff. It sounds like a really good idea in practice, but unfortunately it never materialised and they've not attempted it since." (Participant 18, STEM)

4.7.1 Peer support initiatives

Peer sharing and support initiatives were highly valued by participants, particularly in contexts where such opportunities were not always available:

> "I think for me personally, if it gave me the opportunity to share experiences with other people in the same or similar circumstances through that training, that would be really valuable." (Participant 42, STEM)

> "...talking to others, probably, and my boss and others who have more experience. That's the most [useful] for this specific supervisory thing, and getting advice from them so that I can develop how I — if I was challenged with this again — how I would deal with this kind of bit of 'learning by doing'." (Participant 7, STEM)

Establishing informal peer sharing initiatives for supervisors within the sector was also considered valuable:

> "I have actually suggested to our research department that it would be great to have some even informal get-togethers of all the staff in the museum who are supervisors just to get together and share experience, talk about the projects we're overseeing... perhaps get some shared advice. I think that would be very beneficial." (Participant 38, A&H)

4.7.2 Understanding of doctoral journey

Participants also stated a need for guidance on the overall doctoral journey, including the stages and expectations of doctoral study, examining responsibilities, PGRs' wider commitments in the academic setting, and practical aspects of supporting progress and wellbeing. Relevant initiatives were considered particularly valuable for those supervisors who had not undertaken a doctorate themselves — such input was seen as helpful to enhance their capacity to support PGRs:

> "The other area that could be useful for training...is on examining. I was asked to examine my first thesis, just after lockdown, and knowing what the expectation is as a non-academic would be very useful." (Participant 9, STEM)

> "I think it's important to have that wider knowledge to elicit that conversation, because there are points at which we find it necessary as the industry supervisor, to initiate a frank conversation about timetables. So in the last 18 months or so, you can't do that in a meaningful way if you don't know what the range of activities

is that students are going to do, because that conversation will almost certainly involve suggesting a greater focus at that point on completion." (Participant 10, STEM)

"...understanding what a PhD is all about — what are the different stages...we've all probably had to kind of learn the hard way, and it might make it easier for people who are considering doing this for the first time. If I had had that training on my first CPD, that would have been great." (Participant 38, A&H)

Higher education institutions were seen to play an instrumental role in shaping relevant provision, in light of the varied requirements and support mechanisms across institutional contexts:

"It would be great if that was a requirement from the business and from the uni that the supervisor needs to attend some training that would make it more streamlined and hopefully also be offered as a training from the university as well, because every university has different requirements from the supervisors. So it would be nice to know what these are." (Participant 16, STEM)

Some participants also emphasised the value of academic supervisors' participation in relevant schemes, noting that their academic counterparts' presence created further opportunities for mutual learning, stronger collaboration, a clearer understanding of complementary strengths, as well as offering unique insight into supervisory practices:

"It was through the AHRC...the collaborative doctoral partnerships scheme. We were all invited to go and it was really useful, but that was the only thing I thought was a wee bit lacking just about why aren't our academic partners here and why are we here on our own kind of thing?...it might have been useful to have the lead supervisor on the academic side with me on that. And then, we could be getting to know each other a bit better... just seeing where both our strengths lay. But maybe if there was...something that would bring us all together, because I think a lot of us from the museum side, who maybe hadn't embarked on one of these before, we were not really sure what it was going to work, and it would have been nice maybe to get more of a perspective from the academic side about how it would maybe all pan out." (Participant 40, A&H)

4.7.3 Pedagogy

Some participants, including those with or without relevant experience, expressed their interest in development schemes incorporating a pedagogical focus, particularly concerning their development of awareness of how people learn and communication skills with this understanding:

"I'm very aware I've never done any formal training in...pedagogy and that kind of area. It always interested me, but I should, at some point, probably try. So, working more by instinct is probably not sufficient." (Participant 10, STEM)

"...some of the modules [about leadership and operational management that I have taken were] very much focused on learning styles, how people listen differently, how to communicate differently depending on how people learnt, I've taken that forward in...I did find that useful and translatable across a number of different activities." (Participant 9, STEM)

Participants' expression of expectations reflected their shared value placed on targeted and context-specific supervisory CPD initiatives. These responses highlighted the need for schemes that move beyond generic provision to address the realities of doctoral supervision, strengthen collaboration with academic counterparts, and enhance pedagogical awareness. Participants anticipated that such opportunities would enhance their confidence and capacity to undertake supervisory commitments.

"It would be great if that was a requirement from the business and from the uni that the supervisor needs to attend some training that would make it more streamlined and hopefully also be offered as a training from the university as well, because every university has different requirements from the supervisors. So it would be nice to know what these are." (Participant 16, STEM)

5. Discussion

The present report explored how industry supervisors perceive and carry out their role in doctoral supervision, contributing to an area of doctoral education that remains underexplored (Lee, 2018). What stood out across the data was the passion and commitment that participants brought in their supervisory role and practices despite various challenges they encountered. Many participants spoke of their engagement in supporting PGR learning, wellbeing, and professional skill development — such commitment went beyond providing support for PGRs' immediate research needs but also extended to fostering PGRs' broader growth for future career pathways. These were also reflected in the examples of good supervision practices highlighted in the findings, particularly the candidate-centred approach that balances technical guidance with care and empowerment, which is articulated across participants from STEM, A&H, and MED sectors.

Findings about role positioning in team supervision with academic supervisors complement those reported in UK Research Supervision Survey (UKRSS) 2024 (Gower et al., 2024) from an industry viewpoint. Both studies highlighted the case-by-case nature of role definition in the supervisory team, with responsibility often negotiated formally or informally depending on specific contexts. Similarly, the value placed on Communities of Practice (CoP) was found in both studies. UKRSS 2024 (Gower et al., 2024) found that many supervisors improve their practice through discussions with colleagues, and this is echoed in the focus groups where industry supervisors highlighted CoP as important spaces for problem-solving, sharing advice, and reflecting on practice. Additionally, focus group participants noted that CoP provided them opportunities to build connections and emotional support with other supervisors, which extends the UKRSS 2024 (Gower et al., 2024) findings by highlighting the value of CoP in supporting university-industry supervisory collaboration and wellbeing.

Findings reflect the need for the structural recognition of industry supervisors within university-industry collaborative doctoral programmes. Reported challenges around participants' role positioning and involvement were often related to a lack of clarity about the responsibilities, workload, and time allocation

in the studentship, compounded by the feeling of absence of corporate value. To address these tensions, one way that the sector might consider is the establishment of more explicit recognition of industry supervisors' contribution — for example, through clearer expectations, formalised workload allocation, and agreed communication structures. Such initiatives could help ensure that PGRs benefit from consistent guidance and shared responsibility for both project progress and supervisory support.

Findings also suggest the potential value of focused CPD opportunities for industry supervisors. While participants' supervision practices benefited from the experiences, skills, and training they acquired from professional careers, they also highlighted uncertainties around academic expectations and processes, as well as the pedagogical aspects in doctoral supervision, particularly among participants without doctorate experience. Targeted CPD initiatives could therefore be helpful in supporting industry supervisors to navigate these specific areas of the studentship. In addition, such initiatives could address practical approaches, such as supervisory communication skills, to balancing roles within triadic supervision in collaboration with academic counterparts. The provision of focused CPD opportunities could help industry supervisors engage more confidently and consistently with both PGRs and academic colleagues.

Strengthening CoP is suggested as a valuable way to enhance industry supervisors' confidence in their role. A sense of isolation and uncertainty was reported by some participants, and peer sharing and support platforms (e.g. museum collective) were considered useful; particularly, there was a desire for sharing from their academic counterparts. Creating more and structured CoP opportunities, such as cross-institutional forums, peer networks, and joint professional development sessions with academic supervisors, could provide spaces for supervisors to discuss challenges, explore effective approaches, and learn from each other's experiences. Such provision could not only support individual supervisors' confidence and development but also contribute to a coherent supervisory culture across academic-industry partnership in doctorate schemes.

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Appendix 1

RSVP Focus Group Discussion Information Sheet

Next Generation Research SuperVision Project



School of Arts and Creative Technologies

Participant Information Sheet – Anonymous Research

Project background

The University of York would like to invite you to take part in the following project: RSVP Focus Groups

Before agreeing to take part, please read this information sheet carefully and let us know if anything is unclear or you would like further information.

What is the purpose of the project?

This project is being undertaken by Dr. Liz Quinlan (liz.quinlan@york.ac.uk) and Dr. Karen Clegg (karen.clegg@york.ac.uk), both members of the School of ACT. The work is being conducted according to restrictions that have been subject to approval by the ACT Ethics committee. The Chair of the ACT Ethics committee can be contacted on ACT-ethics@york.ac.uk.

For this research project, we are interested in establishing baselines surrounding research supervision practice and culture across the UK, to inform the development of continuing professional development resources and influence broad research culture change. In order to achieve this, we are interested in a variety of topics and groups found within the UK higher education sector. These include the supervision experiences and development needs of tertiary (often industry) co-supervisors. Your participation in this project will involve attending a single 90-minute focus group with other participants from Science, technology, engineering and mathematics (STEM) industries, Arts, heritage and creative industries, Business and management industries, and Clinical and allied health professionals. You will be asked a series of questions, which you will be given access to ahead of the focus group, and asked to provide your reflections and observations about topics including supervision practice, challenges of supervision, and continuing professional development. Prior to taking place in this focus group we will also ask that you fill in a pre-questionnaire to establish some background information about you, your research discipline, and experience.

Please note that to comply with the approved Ethics requirements of this work, we do not intend to discuss sensitive topics with you that could be potentially upsetting or distressing. If you have any concerns about the topics that may be covered in the research study, please raise these concerns with the researcher.

Your participation in this project is voluntary. If you wish, we will provide you with access to any summary reports, publications, or other forms of research dissemination. If you would like to receive access to these, you can indicate as such on the consent form.

Why have I been invited to take part?

You have been invited to take part because you are a "tertiary" co-supervisor with expertise in a particular industry or field, who participates in research supervision in a team environment in the UK.

Do I have to take part?

No, participation is optional. If you do decide to take part, you will be given a copy of this information sheet for your records and will be asked to complete a participant consent form. If you change your mind at any point during the research activity, you will be able to withdraw your participation without having to provide a reason. To withdraw your participation, you need to inform project lead Liz Quinlan within 7 days of participating in a focus group, and your data and information will be disregarded during analysis and deleted.

Will I be identified in any outputs?

No. Your participation in this research activity will be treated anonymously and you will not be identified in any outputs.

Privacy Notice

This section explains how personal data will be used by RSVP at the University of York.

For this project, the University of York is the Data Controller. We are registered with the Information Commissioner's Office. Our registration number is Z4855807.

What is our legal basis for processing your data?

Privacy law (the UK General Data Protection Regulation (GDPR) and Data Protection Act 2018) requires us to have a legal reason to process your personal data. Our reason is we need it to perform a public task.[5]

This is because the University has a public function, defined in our charter and statutes, which includes carrying out research projects.[6] We need to use personal data in order to carry out this research project.

Information about your health, ethnicity, sexual identity and other sensitive information is called "special category" data. We have to have an additional legal reason to use this data, because it is sensitive. Our reason is that it is needed for research purposes.[7] All research projects at the University follow our research ethics policies.

How do we use your data?

The data collected in this research will be used to help us understand the experiences and professional development needs of research supervisors in the UK, and project outputs will be used to inform the development of new resources and UK higher education policy recommendations from organisations like the UKCGE.

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[5] This refers to UK GDPR Article 6 (1) (e): processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller.

[6] Our charter and statutes states: 4.f. To provide instruction in such branches of learning as the University may think fit and to make provision for research and for the advancement and dissemination of knowledge in such manner as the University may determine.

[7] This refers to UK GDPR Article 9 (2) (j): processing is necessary for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) based on Union or Member State law which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and the interests of the data subject.

Who do we share your data with?

The raw data from this project (audio and video recordings, transcriptions of your focus group discussion, and pre-questionnaire responses) will not be shared with anyone beyond the RSVP core analysis team (Liz Quinlan and Karen Clegg). Anonymised and pseudonymised data will be shared in various project output forms (including reports, summaries, and publications) with not only our wider RSVP research network, but interested parties across the global higher education sector.

As well as this, we use computer software or systems to hold and manage data. Other companies only provide the software, system or storage. They are not allowed to use your data for their own reasons.

We have agreements in place when we share data. These agreements meet legal requirements to ensure your data is protected.

How do we keep your data secure?

The University is serious about keeping your data secure and protecting your rights to privacy. We don't ask you for data we don't need, and only give access to people who need to know. We think about security when planning projects, to make sure they work well. Our IT security team checks regularly to make sure we're taking the right steps. For more details see our security webpages.

How do we transfer your data safely internationally?

If your data is stored or processed outside the UK, we follow legal requirements to make sure that the same level of privacy rules still apply.

How long will we keep your data?

The University has rules in place for how long research data can be kept when the research project is finished. Your information will be kept for a maximum of one year, and after this time an anonymised version will be kept. As this will be fully anonymous, it will not be possible to identify you in any way from this data.

What rights do you have in relation to your data?

You have rights over your data. This sheet explains how you can stop participating in the study, and what will happen to your data if you do. This information is in the section 'Do I have to take part?'.

If you want to get a copy of your data, or talk to us about any other rights, please contact us using the details below.

Questions or concerns

If you have any questions or concerns about how your data is being processed, please contact Liz Quinlan (liz.quinlan@york.ac.uk) or Karen Clegg (karen.clegg@york.ac.uk).

If you have further questions, the University's Data Protection Officer can be contacted at dataprotection@york.ac.uk or by writing to: **Data Protection Officer, University of York, Heslington, York, YO10 5DD**.

Right to complain

If you are unhappy with how the University has handled your personal data, please contact our Data Protection Officer using the details above, so that we can try to put things right.

If you are unhappy with our response, you have a right to complain to the Information Commissioner's Office. You can also contact the Information Commissioner's Office by post to I**nformation Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF** or by phone on **0303 123 1113**.

Appendix 2

Question set

Section 1 - Supervision Approach

1. What do you see as your main supervisory role or contribution to an academic project?
   - Follow up question prompts:
     - Do you consider yourself as a supervisor (do you supervise or input specialist knowledge)?
     - A consultant on a particular topic?
     - A co-supervisor guiding the project?
     - Something else?
2. What is your approach to participating as part of a PGR supervision team?
   - Follow up question prompts:
     - Do you take on a particular role when interacting with the PGR?
     - How do you define the relationship between yourself and the PGR? Yourself and other supervisors?
     - Is it something standardized, or more ad-hoc or organic?
3. What are some challenges you've encountered as part of academic supervision?
   - Follow up question prompts:
     - Have they arisen from the supervisory team or interaction with the PGR?
     - How have you addressed them?
4. What does it mean to you to be a "good" supervisor? What would you consider to be "bad" supervision practices?
5. **Optional:** If you have other supervision or management responsibilities, does your approach to academic project supervision differ from your supervision approach in other aspects of your job?
6. **Optional:** What do you see as the main value or motivation for participating in academic supervision? What are the highlights?
7. **Optional:** What, if any, aspects of your academic project-involved supervision do you think are field dependent?

Section 2 - Skills and Professional Development Needs

1. What skills from your career have you found most useful in participating in supervision?
   - Follow up question prompts:
     - What skills have you needed to develop in relation to supervision or management over the course of your career?
     - Are there any skills you currently find yourself wishing you had more training or development opportunities to work on?
2. Have you ever taken part in any CPD or training specifically related to supervising as part of doctoral research projects?
   - Follow up question prompts:
     - Who was responsible for offering this? Your company? A HEI you work with? A third party service?

- What format did this take? Workshops, courses, modules? Online or in-person?

3. Do you discuss supervisory experience and practice with your peers, and in what contexts?
   - Follow up question prompts
     - For example, informal discussions or formal mentorship schemes?
4. Do you get recognised in any way for your participation in academic research at your workplace?
   - Follow up question prompts
     - Would this be something of value to you?
5. **Optional:** What has been the most useful piece of CPD or training, on any topic, that you've taken part in over your career? What format was it in?

RSVP

The Next Generation Research SuperVision Project (RSVP) is a £4.6million, Research England funded project designed to transform the culture and practice of research supervision. Working with over 50 universities, industry, funders and researchers, RSVP is exploring what constitutes consistent, high quality supervision practice, the role of team supervision, and the impact of engagement in professional development on practice, as well as making recommendations about recognition and support.

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