

## Plausible scenarios for the radiography profession in Sweden in 2025



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### ABSTRACT

**Introduction:** Radiography is a healthcare speciality with many technical challenges. Advances in engineering and information technology applications may continue to drive and be driven by radiographers. The world of diagnostic imaging is changing rapidly and radiographers must be proactive in order to survive. To ensure sustainable development, organisations have to identify future opportunities and threats in a timely manner and incorporate them into their strategic planning. Hence, the aim of this study was to analyse and describe plausible scenarios for the radiography profession in 2025.

**Method:** The study has a qualitative design with an inductive approach based on focus group interviews. The interviews were inspired by the Scenario-Planning method.

**Results:** Of the seven trends identified in a previous study, the radiographers considered two as the most uncertain scenarios that would have the greatest impact on the profession should they occur. These trends, labelled “Access to career advancement” and “A sufficient number of radiographers”, were inserted into the scenario cross. The resulting four plausible future scenarios were: The happy radiographer, the specialist radiographer, the dying profession and the assembly line.

**Conclusion:** It is suggested that “The dying profession” scenario could probably be turned in the opposite direction by facilitating career development opportunities for radiographers within the profession. Changing the direction would probably lead to a profession composed of “happy radiographers” who are specialists, proud of their profession and competent to carry out advanced tasks, in contrast to being solely occupied by “the assembly line”.

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### Introduction

This study is an extensive review of trends that have the potential to predict the future of the radiography profession in Sweden in 2025. The two most uncertain trends among those outlined in a previous study<sup>1</sup> were identified and used to construct four possible scenarios that predict the future of the radiography profession in Sweden.

Radiography is a healthcare speciality with many technical challenges.<sup>2</sup> Radiography technologies and procedures are developing and the potential for new forms of treatment in the future seems unlimited.<sup>3</sup> The expansion of technology in advanced modalities and hybrid machines that combine the physiological processes of positron emission tomography (PET) with morphology from magnetic resonance imaging (MRI) and computed

tomography (CT) provides more varied opportunities for diagnosing illnesses, while technological improvement in radiological imaging has enabled images to be post-processed,<sup>4–6</sup> thus expanding radiographers' area of responsibility.

The above-mentioned advances include the introduction of digital imaging and increased use of the digital imaging Picture Archiving and Communication System (PACS).<sup>6</sup> The greater demand for advanced radiological examinations and ease of communication via the Internet has influenced radiographers' task assignments, skills and role.<sup>7,8</sup> The world of diagnostic imaging is changing rapidly and radiographers must be proactive in order to survive.<sup>9</sup>

#### *Predicting the future – a key aspect of planning*

Good planning requires a vision of the future. Planning implies studying what might happen in the future to ensure that companies and organisations take the right actions in order to be successful.<sup>10</sup> One of the most difficult tasks in any organisation is creating a strategy that will meet future challenges.

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To ensure sustainable development, organisations have to identify future opportunities and threats in a timely manner and incorporate them into their strategic planning.<sup>3,11</sup> Managers should endeavour to provide multiple perspectives describing a variety of possibilities.<sup>12,13</sup> It has been demonstrated that the Scenario-Planning method may serve as a management strategy and useful tool in any field and that it has the potential to consider multiple strategy options and take several perspectives into account.<sup>14,15</sup> The method is often employed to explore the actual situation in anticipation of specific threats, such as technological challenges within an industry or healthcare system as well as environmental or political changes.<sup>16,17</sup> It has also been shown that Scenario-Planning can provide a deeper understanding of the inherent variability of any company, organisation or profession.<sup>18–20</sup>

The organisational planning processes employed by healthcare executives have been fundamentally transformed over the last decade,<sup>14</sup> one major motive being that the healthcare industry itself has undergone rapid change. Scenario-Planning has been used in healthcare environments and organisations in recent years.<sup>21,22</sup> The complexity of healthcare requires planning. In this regard Scenario-Planning has an outstanding ability to create a clear sense of direction. At the same time the method provides an understanding of weaknesses and strengths and helps capture a whole range of prospects.

A variety of views of the future enable us to explore the potential consequences of different trends. This study builds on Scenario-Planning, which has the potential to predict four plausible scenarios for the radiography profession in the future. The aim of this study was to analyse and describe plausible scenarios for the radiography profession in 2025.

## Methodology

In brief, Scenario-Planning is a process of visualising the future in terms of the following issues: What future conditions or events are plausible?, What would be likely scenarios when unlikely trends occur?, and How can one respond to or benefit from these trends? (Fig. 1). The process of visualising the future often begins with; considering a range of plausible futures that include significant uncertainties, exploring future consequences of a decision and integrating alternative perspectives into management planning when scenarios with uncertain trends occur. Moreover, avoiding a potential risk or threat and benefiting from possible opportunities by means of a forum for policy making and evaluation enhance the ability of a company or an organisation to manage and take advantage of future change.<sup>19,23–26</sup>

## Method

*“If you don't know where you're going, any road will take you there.”*

*(The lyrics of the song ‘Any Road’ by George Harrison)*

## Design

The study has a qualitative design with an inductive approach based on focus group interviews.<sup>27</sup> In order to explore, from the

trends to four plausible futures, focus group interviews were considered the best method for data collection as they promote discussion and consensus. The interviews were inspired by the Scenario-Planning method.<sup>19</sup>

Rather than just predetermining one possible future scenario, Scenario-Planning visualises several plausible ones. In the final analysis, the method will provide an understanding of which of them is the most likely.<sup>22,23</sup>

## Data collection

Eleven focus group interviews were conducted. The size of the groups ranged from four to five radiographers. In total, 48 registered radiographers working in 11 different diagnostic radiology departments throughout Sweden participated. The focus group sessions were chaired by one of the authors, who was supported by an observer on nine of the eleven occasions. The observer took notes and assisted in capturing and summarising points of particular relevance to the aims of the study.

The interviews followed the modified Scenario-Planning method. Steps 1–7 below illustrate the process from the identification of trends to the construction of a Scenario Cross describing the four plausible futures.

1. Description of trends that have influenced current radiography practice.
2. Description of trends that will continue to shape the future of the radiography profession.
3. Overview of emerging trends that may influence the future of the radiography profession.
4. Summary of the described trends.
5. Evaluation of trends based on their plausible impact on the radiography profession.
6. Selection of the two trends considered the most “uncertain”, but which, if they materialize, will have a major impact on the radiography profession in the future.
7. Creating the Scenario Cross describing four plausible scenarios.

Based on the created Scenario Cross, respondents were asked to choose the most desirable as well as the most likely future scenarios (Fig. 2).

The results of the Scenario Cross are presented in four different scenarios, where scenario A is formed by *Trend 1+* and *Trend 2+*, scenario B by *Trend 2+* and *Trend 1-*, scenario C by *Trend 1+* and *Trend 2-* and scenario D by *Trend 1-* and *Trend 2-*.

## Data analysis

The 11 focus group interviews resulted in 22 trends described by the radiographers as the most uncertain, hence, if they materialize, will have the greatest impact on the profession. The trends were compared and organized into the two most uncertain ones and the two with the greatest impact on the profession (Fig. 3).

The result produced by the Scenario-Planning method is a description of four plausible futures. These future scenarios are based on two trends and the content of each scenario is based on seven principles as mentioned above. The description should be a

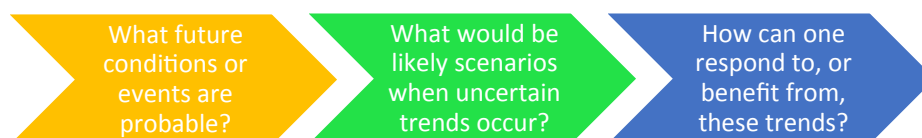
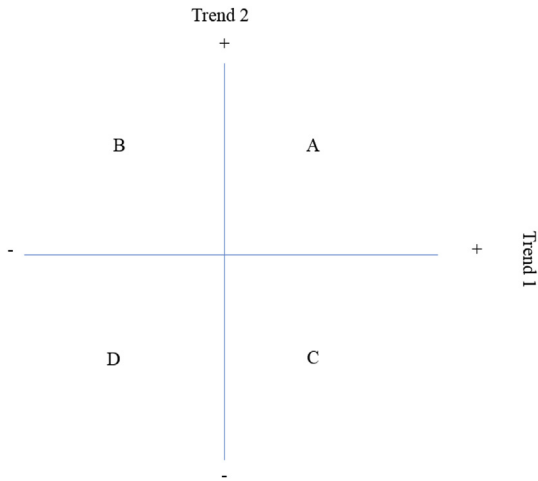


Figure 1. The process of visualizing the future using Scenario-Planning.



**Figure 2.** The figure illustrates the two most uncertain trends (but likely to have the greatest impact) inserted into a Scenario Cross depicting four plausible future scenarios A, B, C, D.<sup>24</sup>

vivid account of the actors and details involved, and the scenario should be summarised by an evocative label.<sup>13</sup>

*Ethical considerations*

According to Swedish legislation, no formal ethics committee approval was required as the study only included staff members. Ethical aspects were taken into account in line with the Helsinki declaration.<sup>26</sup> Consequently, the ethical principles applicable to Swedish research are the information requirement, the consent requirement, the confidentiality requirement and the utilization requirement.<sup>28</sup> This means that at the beginning of each focus group interview, the participants received detailed information about the study and informed consent was obtained. The voluntary nature of participation as well as the right to withdraw at any time and the anonymous nature of the reported results were highlighted. Confidentiality was ensured by restricted, secure access to the data.

**Results**

Of the seven trends identified in a previous study, the radiographers considered two as the most uncertain scenarios that would have the greatest impact on the profession should they occur. These trends, labelled “Access to career advancement” and “A sufficient number of radiographers”, were inserted into the scenario cross. The resulting four plausible future scenarios were: The happy radiographer, The specialist radiographer, The dying profession and The assembly line (Fig. 4).

Subtrend	Trend
Access to radiographers	A sufficient number of radiographers
Recruitment	
Increased work opportunities	
Career pathways	Access to career advancement
Increased responsibility	
High specialization	

**Figure 3.** Examples from the analysis process.

*The happy radiographer (A)*

This is a scenario with a sufficient number of radiographers and good access to career advancement. It is the most desirable scenario – a veritable fairy tale in which daily work is varied, an aspect considered a great source of job and career satisfaction. Job satisfaction is also important for encouraging young people to become a radiographer.

In this scenario, the professional approach is more holistic than is currently the case. In addition, the radiographer has to be skilled, not only in performing a radiographic examination based on technical knowledge but also in terms of the quality of the examination and the advanced level of patient care associated with it.

*“The process of change and development within our profession is immensely quick...” (A).*

*“We have far more responsibility than previously.” (E).*

Patients often have a complex medical history and in this scenario radiographers are expected to assume greater responsibility for patient care and the performance of examinations than was previously the case. Consequently, when discussing this scenario the radiographers expressed a need for continuous education within the profession, which they considered essential for its survival.

*“We see older and very ill patients...” (I).*

*“Techniques are constantly developing and we must keep abreast of the changes in order to use them in an optimal way...” (E).*

The radiographers wished for a variety of career advancement opportunities in the form of development and specialisation.

*“I’m thinking of advanced level education... so that radiographers can carry out more complex tasks. If we can do so, I believe it will have a great impact on our profession.” (G).*

Advanced and specialised competence on the part of radiographers will be even more necessary in the future, leading to greater responsibility.

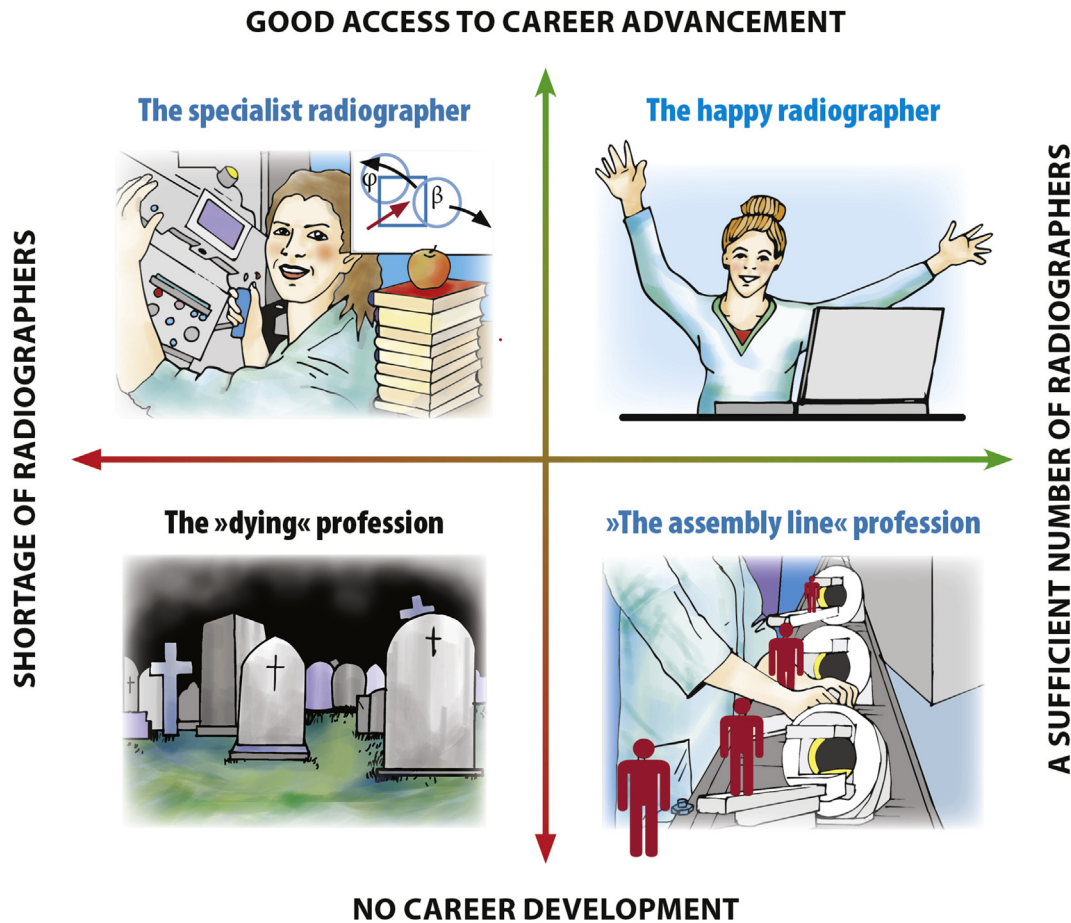
*“... today we don’t have the knowledge or the time and maybe we need specialist knowledge in various areas, because the X-ray machines actually have much greater capacity than that used today.” (E).*

The radiographers highlighted the importance of sensitive managers who possess the necessary knowledge and skills to lead in a progressive manner and develop the organisation, thus preparing the profession for future challenges. In this scenario, the managers have research skills, academic competence as well as an interest in research and development. Their appreciation of the value of academic competence ensures that the full potential of both human and technical resources will be utilized.

*“The knowledge you have attained through a post-graduate education must be of use in clinical practice; but the employer needs to understand and value that.” (I).*

In addition, specialised skills will make the profession more visible and consequently, radiographers will be proud of their profession.

*“...more pride... and we will become more visible...” (I).*



**Figure 4.** Four plausible future scenarios were unfolded in the result.

*"...we need to show that this is our area of expertise." (G).*

#### *The specialist radiographer (B)*

In this scenario there is good access to career advancement, but a shortage of radiographers. Radiographers currently work in a highly technological environment where they operate advanced equipment and encounter increasingly complex challenges related to patient needs. This combination leads to radiographers working in inter-professional teams in order to meet the patient's needs in a person-centered way.

*"In the future we will see more team work, as robust knowledge and more specialisation will be necessary..." (E).*

In this scenario radiographers will need confidence in their expertise as well as in-depth knowledge and specialised skills to safeguard their unique position and prevent other professions from becoming competitors.

*"...if we don't retain control (regarding specific knowledge), then others will take over." (G).*

Access to career advancement means that radiographers will carry out more advanced and specialised tasks, such as clinical reporting. The trend may also lead to the need for a skills mix,

where radiographers perform examinations that were previously the responsibility of radiologists, e.g., ultrasound.

*"...we [must] become skilled in what we do, so that no one can push us away." (B).*

*"...we need to be open to what can be accomplished with new techniques." (G).*

The scenario embraces professional development and requires a genuine interest on the part of the radiographer, as it probably implies that the individual will need to spend her/his leisure time studying.

*"...we will have to study on our own in the evening and maybe choose an academic career." (B).*

The radiographers also thought that this scenario could lead to more privatisation where radiographers become entrepreneurs.

*..."The radiographer becomes an entrepreneur... we have the competence required for this." (D).*

#### *The assembly line (C)*

In this scenario there are a sufficient number of radiographers, but no career development. However, the radiographers stated that



many diagnostic radiology departments nationwide are faced with a shortage of radiographers, making this a rather unlikely scenario. Nevertheless, it would have a great impact should it occur. A sufficient number of radiographers mean no competition from other professions, as there are enough radiographers to cover all aspects and modalities within clinical practice. This scenario also implies maximum use of modalities but not the full potential of the technology.

*“The machines should be utilized... and the staff...” (A).*

In this scenario the radiographers' work is like an assembly line. There is little or no opportunity for career advancement, as the top priority in clinics is to “produce” examinations, similar to manufacturing goods in a factory. This obsession with output was perceived as a negative aspect of the profession.

*“...you count the minutes and how long an examination will take – chop-chop.” (I).*

It may imply a focus on the technology and performing examinations to such an extent that patient care is not considered an important part of the profession.

*“...the patient is no longer seen as a person...” (A).*

*“...everything is so focused on output...it hampers development...” (G).*

#### *The dying profession (D)*

In this scenario there will be a shortage of radiographers and no career development for those still available. If there is little or no opportunity for career advancement, i.e., specialisation and professional development, human and technical resources will not be used in an optimum way, resulting in the profession stagnating and gradually disappearing.

*“...who would want to become a radiographer then?” (E).*

In the Swedish context, one consequence might be radiographers becoming specialist technicians, performing the technical part of examinations and working closely with nurses who provide the necessary patient care.

*“In order to have a sufficient number of radiographers in the hospitals, nurses could be hired to take care of the patients.” (I) “... there will be no time for caring...” (H).*

Moreover, if no advanced level education is available for radiographers, the basic level will also be negatively affected, damaging the profession and reducing professional pride.

*“I think that... the education to become a radiographer will no longer exist in – let's say – 10 years' time...” (I).*

However, this in turn will weaken the profession, which will eventually disappear.

*“... everyone will study to become nurses and those who want to work with X-ray will just attend some courses.” (I).*

The radiographers considered this an alarming but possible scenario for the profession. Their concern was partly due to the fact that other professions with no radiation protection training would

carry out examinations and care for patients in this highly technological environment without possessing adequate knowledge to ensure patient safety.

*“Knowledge and competence regarding radiation protection is mostly possessed by radiographers” (F).*

Radiation protection is a vital part of the radiography profession and an area of great responsibility. Radiographers were concerned that adequate patient safety could not be maintained if professionals without such training were allowed to carry out radiography related tasks.

*“...when I think of this possibility my concern is patient care and safety...” (I).*

The scenario of a dying profession was perceived as undesirable yet plausible if no action is taken to prevent it happening.

#### **Discussion**

The two trends identified in the study; “Access to career advancement” and “A sufficient number of radiographers” revealed four plausible scenarios – two indicating a positive and two indicating a negative direction. The two positive scenarios “The happy radiographer” and “The specialist radiographer” represented a desirable future but are the most uncertain ones. Although the negative scenarios “The dying profession” and “The assembly line” may be the more realistic ones, according to the Scenario-Planning method they are also subject to change.<sup>29</sup> Hence, to develop and strengthen the profession, it is recommended that managers take account of the two positive scenarios in order to provide both academic and clinical opportunities for their staff.

It has been suggested that adopting new ways of thinking is important when predicting the future and working towards achieving a vision for the future.<sup>30</sup> Consequently, strategies should be developed in order to promote creative thinking.

In a Swedish perspective, the future availability of radiographers is not positive, due to increased retirement among radiographers and a smaller number of young people entering higher education. This implies a reduced number of radiographers in the future.<sup>31</sup>

The focus group interviews revealed that a profession with “happy radiographers” is based on access to career advancement with continuous education and variations in daily work. This is supported by previous research undertaken in the U.K. among final year radiography students, which demonstrated a significant correlation between job satisfaction and career development expectations – expressed as ‘role development’, ‘role extension’ and ‘specialist roles’.<sup>32</sup> A study undertaken in the U.S. also showed that health professionals found training and education to be important factors for job satisfaction.<sup>33</sup>

It is well known that access to career development that includes assuming more responsibility has a very positive influence on people's health.<sup>34</sup> In the area of radiography, this development has led to a positive change in conjunction with the introduction of PACS in 2002,<sup>35</sup> when new opportunities were given to radiographers. However, as this development has not been progressive, only small changes have been observed. A discussion is still ongoing about the implementation of career ladders, hence nothing concrete has occurred,<sup>36</sup> which may be due to the hierarchical organisational form within Swedish radiology.

It has also been argued that misalignment, such as failed or unrealised expectations, has a potentially negative impact on motivation, leading to a reduction of the future radiography

workforce and difficulties recruiting new radiographers.<sup>32</sup> This is in accordance with “The assembly line” scenario, a factor that managers should take into account when moving the profession forward in a positive direction. In conclusion, in order to stay on the “positive” side of the scenarios, managers need to focus on and implement satisfactory opportunities for career development.

The results revealed that radiographers need more advanced knowledge and skills in order to encounter and take greater responsibility for patients with increasingly complex medical histories. Furthermore, in light of the development of healthcare, the future of the traditional radiographer is tenuous, while that of the advanced radiographer is bright. The merger of these two roles into that of a specialist radiographer is significant for the radiography profession, for patients and for the entire healthcare system. In a previous study, this was described as the radiographer assuming an advanced role,<sup>37</sup> which in some cases implies taking on tasks that were previously the sole responsibility of radiologists, defined as role extension.<sup>38</sup> In the early twenty-first century, the College of Radiographers performed a number of studies focussing on changes that had occurred both in the academic community and the radiography profession.<sup>39,40</sup> New work practices were suggested, such as the creation of the role of assistant practitioners working under the supervision of a radiographer. The reason for introducing new work practices was to make radiographers available for tasks traditionally undertaken by radiologists.<sup>41</sup>

Moreover, the radiographers perceived being a specialist in their own profession as a source of pride, which would also make the profession more visible, thus facilitating recruitment of students. In this regard, the passing on of deeper knowledge to colleagues was perceived as an important factor when operating new and more advanced technology. This result is supported by a report published by the American Society of Radiologic Technologists (ASRT) in the early 21st century, which proposes education, professional standards and the implementation of new technology as future trends.<sup>42</sup>

Hogg<sup>30</sup> discussed radiographers' knowledge and skills related to new equipment as well as the need to take account of new evidence. It is argued that evidence varies over time and that technology is not fully utilised as a result of radiographers' lack of skills and inability to utilise its full potential.<sup>30</sup> This finding is in line with the results from the present study, indicating that a lack of career opportunities may lead to “a dying profession”. The reason for the stagnation in professional knowledge may be multi-faceted. However, as seen in previous studies, barriers can involve a failure to provide a training budget and conflicting priorities as well as the absence of support from other professions.<sup>37</sup> Furthermore, a study undertaken among educational institutions in Europe found that almost one third did not offer any post-graduate programmes whatsoever,<sup>44</sup> thus insufficient access to education may also be a factor leading to stagnation in the profession.

Nobody can accurately map the future, but there are tools that can help managers to explore various ways of supporting decision making.<sup>12</sup> Schoemaker<sup>45</sup> claims that one of the most popular tools for facilitating decision making in the midst of uncertainty is Scenario-Planning. The reason for this claim is that, during the process, informants discuss previous, current and future trends in order to identify the two most uncertain ones that may arise in an organisation's internal and external environment.<sup>21</sup> The strength of the method is its potential for linking a set of scenarios in order to provide a framework with four possible visions of the future. Scenario-Planning is also a tool for dealing with uncertainty without employing subjective probabilities.<sup>32</sup> “Under uncertainty, real options are valuable because they give management the flexibility to acquire, divest, and switch resources when such moves prove advantageous”.<sup>11,p. 97</sup>

The Scenario-Planning process has been adapted and reshaped by many organisations.<sup>45</sup> Consequently, Scenario-Planning has a different significance for each user with rules and procedures differing between various reports and articles.<sup>47</sup> Varum and Melo (2010) claimed that the methodological contributions from Scenario-Planning differ vastly and are sometimes at odds with each other. Nevertheless, Scenario-Planning has received increased attention in international academic publications in recent years.<sup>48</sup> In addition to the possible methodological weaknesses inherent in Scenario-Planning, the present study has some limitations that need to be considered.

First, the study describes plausible scenarios for the radiography profession in 2025, but it is possible that the personal experiences and subjective views of the participants influenced the results. Second, moderators can influence the outcome of focus group interviews.<sup>49</sup> The main task of the moderator is to ensure that all relevant issues are covered in depth,<sup>50</sup> which may be difficult if the moderator lacks experience. However, all moderators in this study were very familiar with qualitative interviews and qualitative analyses. Moreover, an experienced member of the research team was present at each focus group interview in order to guide the discussions and provide the expertise and experience required for the task.

## Conclusion

In conclusion, it was found that appropriate actions and timely decision-making can probably change the direction of the radiography profession within the Swedish context in a positive way. In order to ensure the most advantageous outcome, managers should reflect on several possible alternatives when scenario outcomes contain contradictory information. It is suggested that “The dying profession” scenario could probably be turned in the opposite direction by facilitating career development opportunities for radiographers within the profession. Changing the direction would probably lead to a profession composed of “happy radiographers” who are specialists, proud of their profession and competent to carry out advanced tasks, in contrast to being solely occupied by “the assembly line”.

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## Conflicts of interest

None.

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