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## INTRODUCTION

# Technology hypes: Practices, approaches and assessments

Jascha Bareis<sup>\*1,2</sup> , Maximilian Roßmann<sup>3</sup> , Frédérique Bordignon<sup>4,5</sup> 

**Abstract** • To date, the study of hype has become a productive but also eclectic field of research. This introduction provides an overview of the core characteristics of technology hype and distinguishes it from other future-oriented concepts. Further, the authors present promising approaches from various disciplines for studying, critiquing, and dealing with hype. The special issue assembles case studies, methodological and theoretical contributions that analyze tech hypes' temporality, agency, and institutional dynamics. It provides insights into how hypes are triggered and fostered, but also how they can be deconstructed and anticipated.

**Technologie-Hypes: Praktiken, Ansätze und Abschätzungen**

**Zusammenfassung** • Mit der Erforschung von Hypes ist ein produktives, aber auch vielschichtiges Forschungsfeld entstanden. Ziel dieser Einführung ist es, einen Überblick über die zentralen Merkmale von Technologie-Hypes zu geben und diese von anderen zukunftsorientierten Konzepten abzugrenzen. Darüber hinaus stellen die Autor\*innen vielversprechende Ansätze aus verschiedenen Disziplinen zur Untersuchung, Antizipation und zum Umgang mit Hype vor. Das Sonderheft versammelt Fallstudien, methodische und theoretische Beiträge, die die Zeitlichkeit, das Handeln und die institutionelle Dynamik von Tech-Hypes analysieren. Es bietet Einblicke, wie Hypes ausgelöst und gefördert werden, aber auch wie sie dekonstruiert und antizipiert werden können.

\* Corresponding author: [jascha.bareis@kit.edu](mailto:jascha.bareis@kit.edu)

<sup>1</sup> Institute for Technology Assessment and Systems Analysis,  
Karlsruhe Institute of Technology, Karlsruhe, DE

<sup>2</sup> Humboldt Institute for Internet and Society, Berlin, DE

<sup>3</sup> Faculty of Arts and Social Sciences (FASoS),  
Maastricht University, Maastricht, NL

<sup>4</sup> École des Ponts ParisTech, Marne-la-Vallée, FR

<sup>5</sup> LISIS, INRAE, Univ Gustave Eiffel, CNRS, Marne-la-Vallée, FR

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"Hyper! Hyper!  
We need the bass drum!  
Come on!"<sup>1</sup>

## Introduction

Technology assessment (TA) has been highly productive in discussing the power and problems of technology expectations, futuristic communication, and their overpromising. Situating TA in societal context, ranging from political debates to the attention economy in social media, sheds light not only on the analysis of hype but also on the 'modulation' of visions to reach wider audiences. This may include unheard or neglected voices and arguments in technology development and its critiques, e.g., to reach sustainable development goals (Dierkes et al. 1996; Grunwald 2015; Rip 2006; Schneider et al. 2023).

In contrast to 'vision' or 'expectation', calling technology 'hype' is both descriptive and action-guiding. It suggests a temporal dynamic of attention and confidence in projected technological change – an increase followed by a decrease – and points to the question of inappropriate attitude and reaction, given the context of a debate. At stake are taking poor public policy decisions, misdirecting financial resources, the lack of studying more pressing societal consequences, and, more generally, jeopardizing trust in science (Intemann 2020; Löfstedt 2003).

However, TA has never been alone in developing methods to study and find a response to technology hype. This Special topic in the *Journal for Technology Assessment in Theory and Practice* seeks to highlight the variety of approaches from dif-

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<sup>1</sup> "Hyper Hyper" is a song by German band Scooter, released in May 1994 from their debut album, "... and the Beat Goes On!" (1995).

ferent disciplines and the internationality of cases. Herewith the issue contributes to a better understanding of temporalities, agency, and institutional dynamics that provoke, fuel and maintain hypes, and provides knowledge to better anticipate, deconstruct and criticize them.

## Joint efforts to narrow down the phenomenon: dimensions and characteristics of technology hypes

### Rhetorics and the emotional appeal of overpromising language

By means of bold statements, superlatives and exaggerated claims, hypes appeal to emotions to seek attention. Historical analogies to break-throughs or reference to fictional literature serve tech-evangelists to claim proficiency and reliable guidance in uncertain times. Cherishing narratives of approaching disruptions suggest societal roles and call for requirements to be met, so a specific goal can be achieved (Mische 2014; Van Lente and Rip 1998). People often share technology narratives for the sake of excitement, however, often ignoring how they assemble and change the meaning of arguments, facts, and data, e.g. at a scenario workshop (Roßmann 2021).

Ideally, “imagination under constraints” of beliefs and scientific knowledge allow for societal learning (Kind 2016, p. 3). The simulated experience of technological consequences (by means of illustrative imagery, or stories in place of an argumentation) reaches wider audiences and can help to bridge boundaries between disciplines, publics and institutions (Dierkes et al. 1996; Lösch 2006). However, by means of emotional appeal and dramatization, narrative communication can also bypass the rational assessment of statements (Green and Brock 2000). This

potentially conflicting communication aims. It urges us to carefully consider the context, speech positions and audience, when technological novelties are announced.

### Temporality and the play with attention spans

The three ‘musketeers’ of rhetoric – *ethos*, *pathos* and *logos* – are occasionally supplemented by *kairos*, which is the opportune moment for action. Hypes gain their real performative momentum by pointing to vast opportunities that lie ahead, which ask for the right timing if great potentials shall not be lost. Hence, temporality is a crucial dimension for understanding and negotiating technology expectations.

Popular technology narratives structure salient societal discourses on technology and usually refer to bigger time-spans. The studies of socio-technical imaginaries (Jasanoff and Kim 2009), for example, reveal differences in common understandings of technology projects in society, informing about hopes and concerns in project proposals or policy papers that consider large future trajectories (e.g. see Bareis and Katzenbach 2022 for staging Artificial Intelligence; or Mosco 2005 for the study of the cyberspace metaphor).

Technology hypes, however, radically focus on temporal prominence. Stressing the opportunity costs is a distinctive feature of hypes, who urge followers to act instantly, take risks and think boldly. Thereby hype narrows down remembrances of the past and, likewise, future trajectories to come. While narratives, visions and imaginaries rather mark the cultural background that persists over a longer period of time, technology hypes foreground peak and outlier achievements of tech development. Hereby, they give relevance to certain claims for only a limited period of time. Hypes are the opportunists among future tellers, who ride on the wave of attention and are less interested in the long-term societal consequences of what happens

## *Hypes appeal to emotions to seek attention.*

emotional celebration of statements is characteristic of hype – and risks turning an informative and appealing story into a sensationalist one.

Social media has further increased this phenomenon. Big tech platforms reinforce outreach and attention to a topic by a system of likes, shares, hails and reposts. Here, research has shown that communication and algorithmic content moderation on platforms supports sensationalism and click-baiting. It is emotional and controversial posts, and especially visual material over factual and descriptive content, that become featured in timelines by users (Gillespie 2018; Gorwa et al. 2020). Such attention-seeking logic on platforms certainly contributes to an environment that nourishes hyping as it elicits emotional appeal and impulsive action over critical reflection.

Given this large influence of language, deliberate and responsible communication about technology requires reflection about

when the wave collapses. Comparing hype cycles therefore studies the attention and popularity of technologies and their claims by means of time-row analysis of publication counts in newspapers or social media, citation counts, or patent applications (Dedehayir and Steinert 2016). One can also draw on discourse analysis or stakeholder interviews, for instance to assess confidence in stock market trends. The representation of a hype cycle according to Gartner Consulting, which follows the evolution of hype from an attention trigger, over a peak of inflated expectations, to a trough of disillusionment – until state of affairs stabilize in a plateau of productivity, is particularly popular (Linden and Fenn 2003). Though, due to its missing empirical validation, weak theoretical grounding, and instrumental use for claiming future developments with the authority of a seemingly scientific representation, Rip (2006) calls the model a “folk theory” (p. 362).

Time is a crucial factor in the phenomenon of hype – both as a constitutive feature (hypes need the future trajectory in order to gain momentum), and also as an analytical dimension (e.g., when studying the attention span in the building up and waning of a hype).

### Impression management and the creation of followership and collaboration

The possibility to learn from imagining futures and to influence how others imagine them with pretense practices, invites various stakeholders for strategic actions and engage in the “politics of expectations” (Beckert 2016, p. 79). Recalling *kairos* above: Observing a trend as hype points to a short window of

spectives and indicating how one would act if a certain scenario unfolds, generates a common ground for individuals or organizations to understand each other and plan with mutual assurances. Two extreme poles can be distinguished that both allow for coordination: either a situation of mutual trust, where stakeholders understand and rely on each other, or the situation of mistrust, when all statements about the future are perceived as strategic performances resulting from profit or power striving. The study of hypes and overpromising provides insights into popular expectations and their reactions. Mische (2014) suggests developing digital methods to study ‘projective grammars’ that can further indicate e.g., the perceived openness and attitude of different actors to shape or collaborate in the future.

*Hypes gain their real performative momentum by pointing to vast opportunities that lie ahead, which ask for the right timing if great potentials shall not be lost.*

opportunity to instrumentally exploit the attention for one’s own purpose. Especially on social media, the strategic use of certain buzzwords, hashtags and prefixes, like *AI*, *nano-*, *smart-*, or *green-*, helps actors to reach a wider audience, even though actors know that there is little or no shared understanding of the term (Bensaude Vincent 2014). The relationship between leaders and their followers is shaped sustainably by ‘impression management’ that instills attention and authority in promises about products, applications, or tech-companies. It becomes visible when one follows actors and objects across different sites, revealing differences between ‘front region’ performances and statements and actions ‘backstage’ in team meetings or the laboratory (Goffman 1990, p. 69). Technology presentations, such as the release of a new iPhone (Sharma and Grant 2011) or the advertisement of air-taxis (Woznica 2022) strategically highlight and disguise expectations. As ‘narrative accelerators’ they fuel public discourse and can further bloat an emerging bubble (Goldfarb and Kirsch 2019). In interaction with their own communities of practice, scientists tend to easily reject certain visions but still strategically use these narratives to gain funding or legitimacy from politicians (Selin 2007). Birch (2017), therefore, understands not the expectations of successful technological applications but the expectation to increase the value of research assets, such as networks, laboratory equipment, or topical knowledge, as a major driving force in techno-scientific capitalism. The economic, social, and cultural capital required for (strategic) ‘future making’ also sheds light on unequal speaker positions to advocate for neglected concerns or more ‘profane’ and less technocentric visions, such as job opportunities (Sand 2019).

Finally, imagined futures serve as a projective space to coordinate actions (Van Lente and Rip 1998). Sharing problem per-

Although our call for papers drew attention to the fact that digitization of mass media also necessitates a revision of methods for studying imagined futures and that we are particularly interested in computational methods, we received hardly any submissions from this field. In our opinion, TA is a welcoming interdisciplinary niche for experimenting with new methodological approaches. We would therefore call our colleagues to follow up, e.g., with the study of hype language in scientific publications by word lists (Bordignon et al. 2021; Millar et al. 2019; Vinkers et al. 2015), or with the use of metrics of significance (like citation surge or betweenness centrality) to identify emerging trends and potential hypes (Chen 2006; Chen et al. 2012).

### Dealing with hype: How and when to intervene?

Actors can be stuck in ‘lock-ins’ when promises call for action and stakeholders are on the spot to deliver on their bold claims. Such lock-ins hinder organizations to acknowledge ‘uncomfortable knowledge’ or to share relevant information, which can spur worrisome trajectories based on misguided beliefs (Rayner 2012). Exchanging expectations about potential but unproven harms or benefits of technology is indispensable for reflecting about societal change, though. It is the realm of shared imagined futures that allows for debates, self-reflection and strategic planning about the use and misuse of technology and their societal consequences.

How, though, can we assess when a red line is crossed regarding economic market power and an overheated discursive situation? When do some players gain too much attention and lock society in unwanted path-dependencies? Assessing the dis-

course on Nanoethics, Nordmann (2007) prominently warned of the looming danger of futuristic ‘tunnel visions’ that draw all attention and ‘ethical resources’ away from other, more pressing issues. Also, Vinsel (2021) understands the criti-hype as an academic business model. Others argue that it may only be right that TA not only analyzes but speaks out for the instrumental use of visions, e.g., to foster democratic values and sustainable development goals (Dierkes et al. 1996; Schneider et al. 2023). Grunwald (2010) argued that enabling public debates about technology in society makes imaginaries available for technology development and can, thus, justify or outweigh the danger of tunnel visions. However, the question remains when and why such an instrumental use of imagined futures becomes inappropriate. Auch (2013) suggests that there is no checklist answer but we

presented in national strategies. Their analysis considers how this policy discourse is collaboratively shaped by scientists, politicians, and industry. They challenge current models of hype in science and innovation, mainly the Gartner hype cycle, and propose the ‘hype helix’, a model that captures the cyclical and iterative nature of hype in research.

Arora and Sarkar endeavor to go beyond hype as a discursive process by redescribing it also as a mnemonic device. They show how tech hype, when applied to emerging technologies like blockchain, can influence the way complex societal problems, such as land rights in India, are (mis-)remembered. Their study highlights the danger of oversimplification and selective presentation of benefits – mainly a solution to corruption and an improvement of land titles management – which overlooks the

## *Actors can be stuck in 'lock-ins' when promises call for action and stakeholders are on the spot to deliver on their bold claims.*

can only train our ‘virtue of proportionality’. As Dani Shanley illustrates in her TATuP interview (this issue), the history of TA and Responsible Research and Innovation (RRI) also provides some learnings on this.

An even more hands-on treatment of technology hypes would be the building of scenario pathways. Here, policy makers can discuss potential future trajectories and ground lofty discourses with plausibility. This helps them to assess the complexity and ambiguity of future developments and structure messy and contradictory future discussions. The benefits are manifold. Policy makers can escape dominant thought patterns and dive into different epistemic and power positions of actors in society, giving space to silenced and neglected discourses. The biggest benefit of scenarios in the context of hype, though, is to strengthen one’s own strategic orientation in the midst of societal crisis, or technology glorification by some attention-seeking actor. The knowledge about different scenarios allows policy makers a strategic-resilient treatment of exuberant promises, encouraging them not to jump on every bandwagon a tech-hype proclaims.

### Presentation of the volume

The contributors to this TATuP Special topic have used different methods to respond to our call to deconstruct technological hypes: Some have developed an original analytical framework, others have used interviews and field observations, some have proposed case studies, and finally a few others have also supplemented their study with a quantitative approach.

Roberson et al. examine the dynamics of hype in the field of quantum technology by deconstructing core arguments pre-

complexities and nuances of India’s land tenure system and the potential negative consequences for marginalized groups.

In his study of exaggerations in debates surrounding social experiments, Neuwinger also finds a tendency among both advocates and critics to overstate benefits and understate risks. This stems from a reductive, tool-based mindset that glosses over complexity by equating social experiments with drug trials, and solely defining impact in causal terms.

Züger et al. demonstrate how the performative nature of expectations has significant implications for actors within the public interest AI field. Their research, employing case studies and interviews, unveils the paradoxical position of actors in public interest initiatives. While they gain support and benefit from the community-building which fosters AI hype, they also maintain a critical stance, acknowledging the risks of unreliable funding and emphasizing the priority of addressing societal needs.

Kari et al. leverage the sociology of expectations perspective to offer valuable insights into the intricate interplay of hype and promises within the domain of nuclear technologies, particularly small modular reactors (SMRs). With the analysis of publication counts and ‘hype language’ in a Finnish newspaper, they highlight the crucial role of techno-scientific promising in shaping innovation trajectories. They show how the media serves as a key arena where proponents and critics battle over SMRs promises (e.g., cutting carbon emissions and enhancing energy security) leading to SMR topicality, hyping, and eventual deconstruction.

Meunier and Herzog clarify the relationship between a long-term socio-technical imaginary, such as precision medicine, and shorter-term technological hypes, including advancements in omics and AI technologies. They consider that an improvement in the assessment of precision medicine requires a cautious and



realistic approach that considers the long-term developments, including previous disappointments, as well as limitations that have hindered the realization of promises being made.

Both Frisch and Gaillard et al. unpack the concept of overpromising and provide new definitions. Frisch sees overpromising as a distinct feature of companies' imagined business futures in response to decarbonization pressure. He suggests that overpromises emerge from contradictions between a company's inevitable profit orientation, the exaggeration and misrepresentation of an organization's estimated potential to restructure itself, and the systemic pressure and bandwagon of performative commitments. Eventually, promoting optimistic narratives about achieving a decarbonized economy can paradoxically hinder climate action by creating a false sense of achievement and delaying necessary measures.

Gaillard et al. explore overpromising as a common feature of scientific discourse, particularly in fields such as nanoscience. In their multidisciplinary approach, combining signaling theory, philosophy of promising, and science studies research on scientific communication, they put forth a conceptualization that facilitates the identification and assessment of overpromises. They emphasize the importance of considering the context of knowledge available when assessing promises and delineating the crucial factors for assessing the plausibility of claims being made.

Some of the case studies that the authors have chosen to present raise issues that ethicists should help to address. But according to Pichl, ethicists can also contribute to hype as she shows in an investigation within the field of stem cells, where therapeutic promises are often used as moral arguments for funding and research-friendly regulation. Pichl's research article clearly demonstrates how this contributes to the hype surrounding stem cell research and its potential applications. To avoid contributing to hype, the article argues, ethicists must critically examine future visions and promises, be aware of their own performative role, and cooperate more closely with disciplines like STS and TA to contextualize analyses within socio-technical dimensions.

We conclude by expressing our gratitude to all the reviewers who contributed to improving the quality of the manuscripts with their constructive comments, and by wishing (with no overpromising) that the readers of this TATuP Special topic will find both inspiration and answers for future work.

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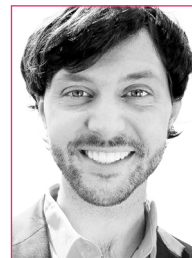
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### JASCHA BAREIS

is a researcher at the Institute for Technology Assessment and Systems Analysis (ITAS) at Karlsruhe Institute of Technology (KIT) and associate researcher at the Humboldt Institute for Internet and Society (HIIG) since 2020. He is a political scientist whose passion lies at the crossroads of studying AI policy, algorithmic culture and future visions.



### DR. MAXIMILIAN ROSSMANN

is a post-doc at Maastricht University and studies how hypes and narratives influence technology development and hinder error-correction in science. He graduated in chemical engineering and philosophy and worked on the Vision Assessment of 3D printing, microalgae nutrition, and nuclear waste management at ITAS.



### DR. FRÉDÉRIQUE BORDIGNON

is a researcher at Laboratoire Interdisciplinaire Sciences Innovations Sociétés (LISIS), bibliometrician at École des Ponts ParisTech, and ethics trainer. She is a linguist by training and studies academic writing, scholarly literature and correction of science.