

TEMPORALITIES OF ASSEMBLING TRANSPORT SYSTEMS: PRESENCES AND ABSENCES IN AN INTERMITTENT PROCESS

Today is 25th January 2017. Right now, it is 10 a.m. in Tanzania and John P. Magufuli, Tanzania's president, is officially inaugurating *Dar es Salaam Rapid Transit* (DART).¹ The day before, stakeholders of DART were discussing the preparatory work for this inauguration in a group called BRT EDUCATION CAMPAIGN of the messenger service WhatsApp. One major concern was a sign with an inscription in Swahili and English (see as well figure 1 and 2 on the next page):

Phase 1 of the Dar es Salaam Bus Rapid Transit (BRT) infrastructure and bus operations have been officially inaugurated by his Excellency Dr. John Pombe Joseph Magufuli, President of the United Republic of Tanzania on 25th January 2017 in the presence of Mr. Makhtar Diop, World Bank Vice President, Africa Region.

After one person had posted a photo of this memorial plaque, several group members reacted on that: 'I think, it's not wise to spread this plaque before the day of inauguration.' – 'It's not a good idea. People should not be able to see what is written on it until they will have revealed the curtain. This is an open group, just imagine if the Honourable gets this picture. He will ask what he is supposed to inaugurate if DART has been inaugurated already.'²

¹ DART is Dar es Salaam's Bus Rapid Transit (BRT) system. BRT is a model of public bus service that operates on dedicated lanes of the existing road network. Usually, BRTs contain intelligent transport system (ITS) technology including a control centre that carries out bus scheduling, and an electronic ticketing system with off-board fare collection. Therefore, BRTs combine two relevant factors of transport systems: high passenger capacity at low costs. During the last two decades, BRT systems have been promoted and implemented mainly in the Global South.

² Own translation, original in Swahili.

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Figure 1 and 2: Sign for memorising the inauguration of Dar es Salaam's Bus Rapid Transit system and discussion in a messenger forum about the appearance of the sign before the inauguration, January 2017 (Image source: WhatsApp group *BRT EDUCATION CAMPAIGN*).

DART has been operating since 10th May 2016. Why does this ceremonial event take place more than eight months delayed? What is this inauguration about? In how far does this deferred inauguration defy the idea of 'inauguration'? I will not answer these questions here but today's event shows that the process of planning and implementing this transport system is not following any chronological order but is rather characterised by multiple temporalities. Incidents happen now which were supposed to happen in the future (the sign stating that the inauguration had already taken place) and incidents happen now which were supposed to happen in the past (the inauguration after a number of months of operations).

DOING RESEARCH ON A PROCESS

If you want to investigate a process, it is not far-fetched to seek to employ a perspective of temporality. But how exactly is this done? 'You never complete an infrastructure in the way you complete a novel; it is always and ever in the making. [...] It is difficult to study things that do not have a singular identity at any one moment, that do not have clear life cycles' (Bowker, 2015). Therefore, Bowker suggests developing new historiographical skills, which fit into the complex nature(s) of infrastructures. Especially when we do research on processes, or more generally on the temporal dimension of infrastructures, we need to be careful not to fall into the trap of wanting to understand its temporality in a linear or chronological way. The introductory sequence demonstrates that the planning, implementation and stabilisation process of DART is not following a unidimensional, linear principle. The process temporarily slows up and down, unexpected actors and practices occur, and changes seem to be the only continuum. Consequently, I will utilise the term 'temporalities' in plural in order to emphasize the multiple dimensions of temporality. The following essay will focus on a number of objects belonging to a bus, appearing in different shapes: beeping sounds, number plates, closing doors, and the numbers 76 and 140. Those, and many other objects, are part of DART. Since the early 2000s, diverse actors are planning, designing, implementing and operating, stabilising and adapting this bus system. I will

demonstrate what objects might tell about the socio-political dimensions of this multifaceted and intermittent process.

SCRIPTS

Building upon STS scholarship and Akrich's work on de-scribing technical objects (ibid., 1992), objects have roles that are inscribed in their material composition. Roles might change over time – from initial design to actual employment – and might be de-scribed in practice by encountering a user. In line with Akrich, objects participate in building heterogeneous networks that bring together actants. Though, I will employ the concept of assemblage rather than networks. Even if these two approaches have a lot in common by referring to the (provisional) co-constitution of (non-)humans in heterogeneous forms (Law, 2009; Müller, 2015), the aspect of temporality emerges stronger in assemblages than in networks: 'assemblage is a process of bundling, of assembling' (Law, 2004, p. 42) and 'assemblage is a mode of ordering heterogeneous entities so that they work together for a certain time' (Müller, 2015, p. 28). This emphasis on process and temporality, also materialised in the verb (*to assemble*), and the widespread critique that networks might comprise (pre-determined) hierarchies makes assemblages more appropriate for understanding intermittent processes.

'Times and spaces are in the making' (Callon & Law, 2004, p. 3) so that DART exists in a constant (re-)making by its (non-)human actors. Therefore, I will work with the objects of DART as scripts of an assemblage. For example, DART's buses are taking shape in various scripts, differing in time and space. They appear as models in policy papers of international consulting firms, technical instructions for the bus manufacturer, materialised prototypes arriving in Dar es Salaam, a bus fleet being expressed in the controversial number 140, a modern means of public transport carrying passengers, sky blue chassis with traces of usage and accidents, fast and huge vehicles impressing passengers and making minibuses look slow and small, the types *articulated bus* and *rigid bus*, flexible buses with doors at both sides for driving on different road types, etc. Their overall role inscribed by planners and manufacturers is to transport passengers and facilitate the operations of DART. Certain values are inscribed in these different roles, which are not just about transporting people but more specifically about how to transport people and how to shape the public transport system. Those values will be better understood by looking at certain objects of the bus assemblage. In them, this *how* is inscribed in detail. For example, DART shall 'provide a better, more modern and more efficient public transport service' (DART, 2014b). According to a dominant script regarding the materialisation of these policies called Bus Output Specifications, the bus design 'shall be energy efficient, environmentally friendly, and safe and secure for transportation of passengers'. Furthermore, since passenger comfort is a major concern, 'particular

attention must be taken to minimise noise, vibration and harshness transmitted to passengers' (DART, 2014a).

But actants do not necessarily comply with the initially defined scripts, and objects do not strictly execute their roles as inscribed. Akrich mainly refers to (human) users employing objects in a different manner than planned by the designers: 'To be sure, it may be that no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own' (ibid., 1992, p. 208). However, de-descriptions occur much broader within the assemblage between various actors. Not only the agency of passengers, drivers and political decision makers but also the agency of speed restrictions, climate conditions and the road surface do have a role and consequently an impact on the complex and prolonged process. Taking the case of DART's passenger comfort, the planners' script of the buses has not been realised in several regards. For example, the hot and humid weather in Dar es Salaam, characterised by temperatures almost all over the year above 30 degrees Celsius do not comply with the initial climate control script of the buses. Due to financial constraints, the interim service provider ordered buses without air conditioning. Now, only little air ventilation is provided while the bus is moving and small windows are open (DART, 2014a; Observations 09-10/2015, 05/2016, 09/2016). On so-called feeder routes³, buses cannot drive continuously rapid as inscribed in operational plans, which further decreases the air ventilation. Due to two main reasons, the speed of buses leaving the dedicated lane and entering the mixed-use traffic is reduced. First, transport planners have underestimated the high volume of traffic on this mixed-traffic road, which is slowing down any movement. Moreover, since the buses are quite low, they would be of better use on newly constructed plane corridors. The actual condition outside of dedicated lanes though is characterised by numerous bumps and potholes that make fast driving impossible since speeding would damage the buses' bottom chassis (DART, 2015b).

Hence, objects have inscribed roles, which are de-described in and translated to new contexts. Scripts are present and absent at different points of time within the planning process, or rather: various scripts can co-exist; they can be present in one shape and absent in another. Coming back to the Bus Output Specifications, this script had not disappeared by the time the materialised version of the buses appeared. Both scripts were present, either physically or in discourse.

³ On feeder routes, i.e. routes between BRT terminals and feeder stations, buses serve outside the dedicated lane on a mixed-traffic road.

PRESENT ABSENCES AND ABSENT PRESENCES

In addition to considering co-existing scripts, I will go deeper into the notion of presence and absence. Not only can different scripts of an object or assemblage co-exist; one script can also be present and absent – at the same point in time or at different points in time. We could also talk of *pre-ab-sences* and *ab-pre-sences*, implicating the interdependency and mutual being of presence and absence: The presence of the absent and the absence of the present. In order to work with this perspective, we consequently need to acknowledge and internalise the fact that presence and absence are not opposed to one another. Therefore, scripts of an object can be present in (physical) absence of the object or in presence of another object, and scripts of an object can be absent in the presence of an object. The questions are: which forms do absent presences and present absences have and how do these forms develop within a process, characterised by multiple temporalities?

Hetherington, who examines disposal as an integral part of consumption, writes: ‘Social relations are performed not only around what is there but sometimes also around the presence of what is not’ (ibid., 2004, p. 159). We can go even further and argue that this co-existence of presence and absence is a necessary condition for the existence of every single thing. Without absence, there is no presence and vice versa. Though, many scholars⁴ only think about absence in terms of *there had been a presence before*. According to them, present absence is disposal and death. But isn’t it vital to consider absences of objects which had never been physically present? For example, a lack of knowledge or information can be very present in a conversation. Or, if crucial elements for the materialisations of the buses had not been addressed in the Bus Output Specifications, this might have fundamental consequences for bus operations.

The agency of the absent object further plays a role in research on (in)formality⁵ and infrastructure research. Star wrote in her famous paper on the ethnography of infrastructure that, for many users, infrastructures become visible upon breakdown. This can be interpreted as by the time the infrastructure does not follow its (temporal) script, the infrastructure becomes absent in terms of not being present (e.g. no water coming out of the tap, no buses running on the streets, no electricity coming out of the socket). At the same time, the infrastructure might become more present for its users, like in the case of Star’s research: ‘This breakdown became the basis for a much more detailed understanding of the relational nature of infrastructure’ (ibid., 1999, p. 382). I would add that infrastructures are also present in their *absence at all times*: if you never have running water from the tap, bus services or electricity (but

⁴ Scholars have been working on concepts of presence and absence not only in fields of STS, but also in fields of philosophy and cultural sciences (e.g. Homi Bhaba wrote on absence referring to Jacques Derrida’s concept of *Différance*).

⁵ A widespread, one-sided argument is that the void of formality leads to informality.

you are aware that those infrastructures generally exist), they can also be very present – in their role of not being physically, materially, or effectively present. The same argument can be applied to the planning and implementation of new infrastructures. As the following section will demonstrate, the DART system has been present (for different actors of the assemblage) in many different, temporally changing forms. By the time that the construction of the physical infrastructure (i.e. corridors, stations, terminals and depot) had been finalised and an interim service provider had been found, the buses were actively missing in order to put the DART script into being and to start operations. However, the buses had never been there before in a material shape (and were not yet even manufactured), but only in their expected role of transporting people.

THE IMPACT OF BIG NUMBERS

All roles addressed in this section have a numerical dimension in terms of influencing the change of the whole script. How have the roles been changing within the script of DART?

HIGHER AMOUNT OF BUSES

The local service provider, UDA-RT, and the governmental entity responsible for DART, the DART Agency, signed the Interim Service Provider (ISP) Agreement in April 2015. This document obliges the interim service provider to supply BRT services for two years until a ‘full’ service provider for the long term is selected. UDA-RT should purchase 76 buses in total in accordance with the Bus Output Specifications. Two of the buses should be provided before the launch of ISP services in order to train drivers (DART, 2015a). But UDA-RT flouted this contract and ordered a total of 140 buses. This step had strategic reasons: UDA-RT counted on a stronger and more permanent position within the DART project through the increased amount of buses. Ironically, the Tanzanian government officially became aware of this almost doubled amount only by the time the buses arrived from China at Dar es Salaam’s port in September 2015 (Interviews 10/2015, 05/2016). Consequently, the DART Agency had to amend the ISP Agreement, along with the operational plans to this physical appearance. These amendments had further consequences on the whole operational design and the power structure of Dar es Salaam’s BRT scheme. UDA-RT successfully enforced their long-term participation through this massive investment of 140 buses.

HIGH TAXES

After the arrival of the buses, national media expected DART to commence operations soon (Lugongo, 2015). But for a long period of time, only the two prototypes were driving along the BRT corridor (Interviews 05/2016; Observations 09-10/2015). In order to avoid paying high storage costs at the port,

the Tanzanian government allowed UDA-RT to move the newly arrived bunch of buses from the port to two bus terminals (see figure 3 below). Apart from that movement, vehicles were not allowed to use public roads and become operational before clearance and registration.⁶ It would have been much easier to park all buses at the depot, which has larger facilities. But by that time, the depot had not been part of the ISP Agreement.



Figure 3: Buses with and without number plates at a bus terminal, September 2015 (Image source: own photo).

The script of ISP operations was changed a couple of weeks later in order to adapt to the new situation. Part of this ISP Addendum was to acknowledge all 140 buses and hand the depot over to UDA-RT. It became obvious that the interim service will be much more extensive than previously agreed. This means that also the script for the long-term service provision changed according to the de-scription of the interim service. So far, the script for long-term service had existed in political and medial discourse but not in binding contracts. In the meantime, UDA-RT tried to register itself as a public limited company instead of having the status of a private company (Interviews 09/2015). The company asked Tanzania Revenue Authority (TRA, in charge of collecting import duties and other taxes) to obtain a tax exemption for the imported buses since the buses will serve the public. TRA refused this request after months of negotiations and standstill. Imported goods, especially motor vehicles, have been a highly political issue in Tanzania. On the one hand, Tanzania has a rather protectionist and rigid import policy. On the other hand, a lot of tax exemption had been granted due to corruption and in order to attract foreign companies and to ease international trade. Then, during the negotiation process between TRA and UDA-RT, Tanzania elected a new president. The president's topmost priority was to evict corruption and redistribute wealth from the big (foreign) companies to the Tanzanian people. It seemed this case became the precedent for the new Tanzanian government, in order to prove that there was no longer

⁶ The exact amount of import duties is not public and no involved actor responded to that. Estimated amounts range from USD 3.6 million to 1.4 billion (Interviews 10/2015, 11/2016; Lugongo, 2015).

extortion and corruption. Moreover, TRA only accepted full payment of the high amount,⁷ which led to further delays since UDA-RT had to take out another loan (Msikula, 2015). Only after the full clearance in April 2016 were buses allowed to leave the terminals, and operations started a month later, after all buses had been checked regarding safety concerns (see as well figure 4 and 5 below) (Observations 05/2016).⁸



Figure 4 and 5: Buses riding on the BRT corridor and parking at the depot after clearance, May 2016 (Image source: own photo).

Apart from some signs of usage like scratches and unpacked driver seats, the only material difference between the two mobile buses and those 138 immobile ones was the physical presence/absence of number plates. Each bus has two placeholders for the number plates: one in the rear and one in the front. The physical absence of number plates is also visually penetrating once this apparent gap at the chassis is not filled (Observations 09-10/2015). A bus that does not possess this item is immobile. It might be a global phenomenon that vehicles need to have number plates in order to use public spaces like roads. This is due to the fact that possessing a number plate means owning a registration. Indeed, a number plate is the materialisation of a formal registration and tax payment. Number plates restrict where vehicles can be physically present – and where not. They have the role in the DART assemblage as proving the legal status of the bus, as having been imported legally, meaning that import duties were paid. Only with that legal status can buses move and operate on public ground and fulfil their duty and take their role as transporting people within the DART service.

It is remarkable that the number plates appear neither in the Bus Output Specifications, nor in the ISP Agreement. Whereby, both documents describe the materiality and agency of the buses and inscribe

⁷ UDA-RT asked for payment in pieces. UDA, one major shareholder of the UDA-RT, once made the same request to TRA. TRA agreed and UDA did not pay due taxes in instalments. Therefore, TRA became even more careful with the company's request (Msikula, 2015).

⁸ Also the clearance of the two prototype buses took much more time than expected and delayed the trainings for more than a month. UDA-RT tried to release the buses from the port without clearance.

roles to them. Generally, the documents ignore the necessity of licensing as a precondition for operations. Regarding the absence of number plates in the Bus Output Specifications, it is necessary to admit that a number plate is technically not necessary for moving the bus. In theory, an unregistered bus can comply with the script of a safe and comfortable bus service. This point strengthens the outstanding role of the number plates since it might be the only material component which is only legally, but not technically, necessary – e.g. in contrast to the steering wheel, doors, gearbox, axles, etc. By and large, this absence might be due to the fact that a valid license is so deeply inscribed into DART that it is indispensable. The actors who assembled these documents probably assumed that this precondition is so clear that it is not necessary to be mentioned. Since the role of the number plate is deeply inscribed into the script of (legally) moving a bus, it is not flexible. A Tanzanian number plate cannot be replaced by a Chinese one without legal steps. But all other material components could be replaced with spare parts from elsewhere, as long as they comply with the Bus Output Specifications. The salient point is: the material inscription of laws and state power is crucial for the functioning of the DART script. The state is materialised in the number plate and, therefore, the number plate directly connects the vehicle with the state.

The following two examples will illustrate the case of flexible, changing roles that embody another kind of de-description of the technology in which operations can happen even if the object is not installed or used as inscribed. By the time that new actors become active parts of the DART assemblage, it necessarily changes and adapts to the present practice. Those actors do not comply in all means with their roles that planners and politicians had inscribed previously.

OVERCROWDING AND SPEEDING

For safety concerns, the role of the doors was supposed to comply with two essential features. First, doors should not be able to close (even if the driver pushes a respective button) when passengers are standing in the door area, marked yellow with red letters stating *No Standing Area*. Second, '[t]he doors on each bus must [...] have a mechanism with safeguard to avoid opening of the doors while the vehicle is in motion or that the vehicles moves with open doors' (DART Agency, 2014a). In practice, both features are no longer present (Observations 05/2016). Doors close even though people stand in the *No Standing Area* and even when they stand right between the two wings of the doors, with one leg in the bus and the other one on the platform. Beyond that, buses set off with open doors, the doors just closing once the bus accelerates. Interestingly, different versions of the initial script circulated: A manufacturer employee told me that doors cannot close when passengers block them. By contrast, service provider staff claims that there has never been a technology to prevent doors from closing (Interviews 05/2016, 09/2016).

Both changes bring the new script of DART operations closer to common practices of minibus operations. Dar es Salaam's minibuses are highly overcrowded in peak hours so that people squeeze and doors are frequently opened during movements – in order to save time when passengers (dis)embark. Therefore, in trainings, future drivers of these rapid buses were instructed not to do so due to the BRT ideals regarding customer care, such as safety and comfort. Moreover, also the passengers should be prevented from standing in this yellow area so that no one gets injured and operations do not delay. In these trainings, bus drivers learned to announce a welcome and safety note on how to behave in the bus, and particularly in this yellow area (Observations 09-10/2015):

Habarini za mchana abiria wangu. Kwa jina, naitwa Jason. Mimi ni dereva wenu. Angalizo: Abiria wote waliosimama, naomba msisimame kwenye mlango na alama ya manjano kwani mlango wetu unafungua kwa sensor ya umeme. Pia, abiria usitupe takataka nje ovyo. Weka takataka kwenye chombo maalum ndani ya basi, yaani dustbin. Asanteni sana. Karibuni.⁹

In the initial beginning of operations, drivers still tried to follow this policy in order to not change that script. They did not close the doors when people still stood in the door area and they did not accelerate the vehicle with doors opened. Many drivers announced the note before disembarking at the terminals, some even adding their final destination and major stops since displays (indicating which buses are serving which line) were still missing at the buses, stations and terminals. But this behaviour has gradually ceased. Passengers followed the changing script and returned to stand in the *No Standing Area* during peak hours (Observations 05/2016, 09/2016). Not only drivers and passengers but also other actors like the unexpected high capacity of the buses when passengers squeeze, the openness and acceptance of Dar es Salaam's residents towards a new bus system and the experiences of minibus practices changed the script. Due to high passenger demand and overcrowding, (dis)embarking takes much longer than scheduled and drivers try to take as many passengers as possible on board. At the end of the day, higher passenger loads imply higher revenues for UDA-RT as the interim service provider.

A similar change in the script occurred regarding a technology that should prevent drivers from speeding. BRT buses are supposed to not exceed 50 km/h. If they do so, a high beeping sound rings out in order to remind the driver of that limit. In practice, it has turned out that many drivers speed in some sections of the corridor, simply ignore the noisy sound and do not adapt their driving to the initial

⁹ Translation: 'Good afternoon, dear passengers. My name is Jason. I am your driver. Announcement: Those passengers who are standing, I beg you not to stand in the yellow marked door area since our doors open with electric sensors. I also ask you not to throw your waste on the floor. Put the waste into the dustbin. Thank you very much. Have a nice trip.'

script (Interviews 05/2016, 11/2016; Observations 05/2016, 09/2016). An employee of the DART Agency put it in a funny way and meant that speeding drivers perceive this sound rather as music than as a warning signal. Consequently, the beeping is no longer a guarantee for maximum speed – as it used to be in the previous script of the bus in motion. It is intriguing that the sound was only passively inscribed: in an absent-present way. It should never ring out in practice, since the driver's role was to never exceed the speed limit of 50 km/h.

METHODOLOGICAL COMMENT

How did I become aware of these socio-political dimensions of assembling? In how far did the focus on objects and their scripts help me to understand multiple temporalities and the co-existence of presence and absence in the process of DART? I made various forms of participatory observations and conducted numerous in-depth interviews at four different points of time of DART's planning, implementation and stabilisation process.¹⁰ This methodological interplay helped me to come so close to the different scripts and made me understand DART in its different temporal shapes. For example, I saw the 138 buses without number plates parking at the terminals before anyone told me about clearance issues. I was wondering why the buses were not based in the depot, which has much better facilities. Over the next days, local actors told me, and newspapers reported, about on-going negotiations between the interim service provider (UDA-RT) and Tanzania Revenue Authority (TRA) regarding due import duties. Through my previous observations of the missing number plates and the dislocation of the buses, I was sensitised to this topic. Through the focus on the physical constitution and materiality of the buses, I was able to develop questions directed at this conflict between service provider and state.

Moreover, finding the balance between following the process chronologically, which is of big use for understanding the bigger picture, and the assumption of multiple, twisted temporalities of planning and implementation processes, is necessary. Wood criticised the allegedly linear and straightforward process of BRT projects when explaining that 'BRT circulation is a more convoluted and long-lasting process than ordinarily considered' (ibid., 2015, p. 11). Just coming back to the example of the amount of buses shows that scripts exist in parallel and that DART is not a stringent, linear process, but rather a process that is continuously slowing up and down, moving into new directions. I noticed several times that various actors have very different levels of knowledge and already decided issues were repeatedly

¹⁰ It is necessary to consider that my impressions though are very limited, basically due to the fact that I am not aware of where the gaps in my research are, and what I left out. It would never be possible to seamlessly describe a process. In my own research, the absent might be even more absent than the absent presence in the DART script itself. On the other hand, my own research process reflects the shape of the DART process: rather intermittent and multiple than (chrono)logical.

put back on the table. Also, different speeds need to be considered as the ISP Agreement first accelerated the process and then, negotiations between UDA-RT and TRA on the ISP Addendum slowed the process down yet again.

CONCLUDING THOUGHTS

Present absences and absent presences, both in material and discursive shapes, provide insights into the social and political dimensions of infrastructures and their processes of planning, implementing and stabilising. Regarding DART's intermittent process, a lot of controversies evolved around the actual implementation and the impact of local operators within bus operations. This implementation materialised in various ways and roles thus changed. The missing number plates can be interpreted not only as a symbol of missing tax payments and legal registration, but further as absent support by the Tanzanian government in regards to the local operator's attempt to strengthen their position. Even the changing amount of buses and their physical absence on the BRT corridor for more than half a year indicates this conflict. The cases of speeding and overcrowding show in detail how scripts change when new actors – like the hot climate, former minibus passengers or the passenger demand challenging the bus scheduling – enter the assemblage. Since DART's scripts are flexible (to a certain extent), bus operations do work under the modified scripts, e.g. when buses exceed their maximum passenger capacity so that passengers stand in areas that were originally not thought as standing areas.

Therefore, this closer look at several material components with a perspective on temporalities has proved that presence and absence can exist at the same time and that the scripts of an assemblage change over time. DART's objects temporarily have different shapes that are expressed through the presences and absences of material components and appearances, behaviours and discourses. Different forms of present absence and absent presence were determined, such as a divergence between the DART assemblage in discourse and its actual material shape, or perceivable consequences through these absences, which led to changes in the scripts and consequently of the respective object's agency itself.

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